

**EVALUATION STUDY OF MINOR IRRIGATION
SCHEMES (NABARD PROJECT) IN
MAHARASHTRA STATE**

**WITH SPECIAL REFERENCE TO DROUGHT PRONE
AREAS IN BEED & OSMANABAD DISTRICTS OF
MARATHWADA REGION**

C. S. GAJARAJAN

**GOKHALE INSTITUTE OF POLITICS AND ECONOMICS
PUNE - 411 004**

RESERVE SECTION

**EVALUATION STUDY
OF
MINOR IRRIGATION SCHEMES (NABARD PROJECT)
IN
MAHARASHTRA STATE**

**With Special Reference to Drought Prone
Areas of Beed and Osmanabad Districts of
Marathwada Region**

C. S. GAJARAJAN

**A Study Sponsored and Financed by
National Bank for Agriculture and
Rural Development**

GOKHALE INSTITUTE OF POLITICS AND ECONOMICS

PUNE 411 004

C O N T E N T S

		<u>Page</u>
LIST OF TABLES		(iii)
SUMMARY AND CONCLUSIONS		One
<u>CHAPTER</u>		
I	INTRODUCTION	1
1.1	Importance of Minor Irrigation.....	1
1.2	Irrigation Profile of the Region...	2
1.3	Ground Water Potential	3
1.4	General Features of the Selected Districts	4
II	SALIENT FEATURES OF THE SCHEME.....	17
2.1	General Proposal	17
2.2	Institutional Arrangement	21
III	OBJECTIVES, METHODOLOGY AND SAMPLE FRAME	27
3.1	Main Objectives	27
3.2	Methodology and Coverage	28
3.3	Sample Framework	32
3.4	Limitations of the Study	36
IV	SOCIO ECONOMIC PROFILE OF THE SELECTED HOUSEHOLDS	41
4.1	Social Background	41
4.2	Size of Operational Holdings	43
4.3	Occupational Pattern	49
4.4	Pattern of Income Levels	53

<u>CHAPTER</u>	<u>Page</u>
V SOME ASPECTS OF INFRUCTUOUS INVESTMENT	59
VI ASPECTS OF INVESTMENT AND FINANCE	74
6.1 Opinions and Experience	74
6.2 Dug Well and Lifting Device	80
6.3 Cost of Investment and Adequacy of Loan	85
VII ASSESSMENT OF POST INVESTMENT BENEFITS...	94
7.1 Area Under Irrigation	94
7.2 Intensity of Irrigation	98
7.3 Intensity of Cropping	101
7.4 Changes in the Cropping Pattern....	105
7.5 Deviation from the Recommended Cropping Pattern	111
7.6 Post-investment Benefits	114
APPENDIX-I TIME LAG IN LOANING OPERATION	122

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
1.1	Sourcewise net area irrigated in Maharashtra State	2
1.2	Percentage distribution of gross cropped area under main crops in Beed and Osmanabad districts during the year 1978-79	11
1.3	Percentage distribution of gross irrigated area under principal crops	12
1-A	Talukawise details of area irrigated in Osmanabad district during the year 1978-79..	14
1-B	Talukawise details of area irrigated in Beed district during the year 1978-79	14
1-C	Area under different crops in each district in 1978-79	15
1-D	Irrigated area under different crops in Beed and Osmanabad districts	16
2.1	Districtwise physical and financial programme recommended for sanction of NABARD	26
3.1	Typewise loans sanctioned and works completed in the districts of Beed and Osmanabad	31
3.2	Typewise distribution of projects completed and aases selected for the survey	35
3.3	Sub-branchwise distribution of number of selected households according to type of loan and control farmers in Beed district	37
3.4	Sub-branchwise distribution of number of selected households according to type of loan and control farmers in Osmanabad district	38

<u>Table No.</u>		<u>Page</u>
4.1	Distribution of sample loanee households according to main caste and caste groups	42
4.2	Average size of household, literacy proportion and average size of earners per household according to the categories of selected households	44
4.3	Distribution of selected households according to broad size groups of operational holdings	46
4.4	Holdingwise distribution of sample borrowing households according to type of loan	48
4.5	The average size of operational holding (in acres) of the selected households according to the sample category	50
4.6	Distribution of entire sample according to number of occupations pursued by the household	51
4.7	Distribution of reporting earners engaged in subsidiary occupations according to districts and categories of sample	52
4.8	Distribution of sample farmers according to size of household incomes	54
4.9	Incomewise distribution of entire sample households according to categories	55
4.10	Incomewise distribution of beneficiary and incomplete project borrowers according to items of loans	58
5.1	Distribution of cases of infructuous investment (incomplete) in the selected villages according to main reasons	64

<u>Table No.</u>		<u>Page</u>
6.1	Standard size of wells prescribed and deviation from the standard by sample dug wells	82
6.2	Distribution of wells according to type of water lifting device	84
6.3	Details of average cost of investment and the extent of average loan financing (New dugwell only)	86
6.4	Details of average cost of investment and the extent of average loan financing (Renovation of old well)	87
6.5	Details of average cost of investment and the extent of average loan financing (New well plus pumpset)	88
6.6	Details of average cost of investment and the extent of average loan financing (Renovation of old well plus pumpset)	89
6.7	Details of average cost of investment and the extent of average loan financing (only pumpset)	90
7.1	Changes in the area under irrigated between pre-investment and post-investment periods	96
7.2	Net increase in the average irrigated area per beneficiary farmer in the post-investment period	97
7.3	Seasonwise particulars of average level of water before and after operation of wells and average recuperation time (1983-84)	99
7.4	Cropping intensity of the irrigated areas of the beneficiary farmers	103

<u>Table No.</u>		<u>Page</u>
7.5	Seasonwise cropped area during pre- investment and post-investment years	106
7.6	Percentage distribution of cropwise area in pre-investment and pro-investment years	109
7.7	Holdingwise pattern of incremental farm employment in the post-investment period	116
7.8	Per acre average net income and incremental income from benefited area over unirrigated areas of loanee-farmers and control farmers	118

APPENDIX TABLES

A-1	Percentage distribution of beneficiary farmers opting for wells and composite loans according to time lag in loaning operation	123
A-2	Percentage distribution of beneficiary farmers according to total time lag from date of sanction of to final instalment	125
A-3	Distribution of 'only pumpset' cases according to time lag from date of application to disposal of the instalment	126

SUMMARY AND CONCLUSIONS

The present study, undertaken at the instance of National Bank for Agriculture and Rural Development (NABARD), is the result of a survey recently conducted in Beed and Osmanabad districts of Marathwada region in the State of Maharashtra. At the outset, it may be stated that the orientation of study has turned itself into one that required greater attention to persistent drought situation affecting the project implementation rather than the assessment of normal economic benefits. For, there has not been any appreciable degree of success achieved in the surveyed areas. Right from 1982-83, the year in which the works of the individual schemes were expected to be completed, the districts under reference have been afflicted by successive drought conditions. This factor has also affected the response and quality of field data because of the diffidence on the part of the informants. In the following are given the salient features of the study and the conclusions.

1. The successful implementation of minor irrigation schemes in Maharashtra assumes special significance for the state does not have abundance of surface water sources. Presently, the area under irrigation forms around eleven per cent of the total net area sown and about 60 per cent of it being accounted by ground water source. The situation

in Marathwada region is much worse than some other regions of the state. In general, the estimated potentiality of ground water is quite vast and the state can exploit the same for years to come. However, the relative feasibility and success or failure of minor irrigation works is primarily determined by the local hydrogeological conditions which in the hard rock areas are widely variable within short distances. The selected districts belong to semi-arid parts of the region. Several talukas of the district^{are} clearly regarded as drought-prone areas in the state. Area under forests is too insignificant and quite disturbing. In Beed district, area under forest accounts for just 1.9 per cent and in Osmanabad it is only 0.09 per cent of the total geographical area. Incredible but true that Greater Bombay district has more area under forest than Osmanabad district. The intensity of cropping is rather low at 120 per cent in these districts. Foodcrops, mainly comprising jowar, bajra and wheat overwhelmingly dominate the cropping pattern.

2. The schemes under the purview of the present study formed a part of the ARDC Credit Project-III Minor Irrigation Programme in 27 districts of Maharashtra State 1981-82. By and large, the various stipulations imposed by NABARD on MSCLDB, the financing and implementing

performance of implementing agency and the problems faced by beneficiaries, as well as, loanee-farmers with incomplete projects.

Both primary and secondary data were considered for the study. The coverage was restricted to only those coming under the purview of the NABARD project of 1981-82. In the case of beneficiaries, only those who had completed the works of the project by June 1983 and, availed of the irrigation facility during the agricultural year of 1983-84, were considered as this would give us atleast a year's data to assess the benefits. As the beneficiary farmers were disproportionately small among the loanee-farmers, the net had to be cast very wide to select a respectable number of sample considered appropriate for our purpose. The selection of villages became very crucial as the beneficiaries were very widely scattered. However, 50 villages were finally selected to get the various types of beneficiaries of the completed projects and, from the same villages, the loanee-farmers with incomplete or infructuous investment and the 'control' for without project conditions were also selected. The final sample, in all, covered 215 farmers, comprising 111 beneficiaries, 56 incomplete cases and 48 'control' having only dry farming. Over 80 per cent of the sample households belonged to those talukas that were clearly regarded as

agency, were fairly well conceived. The implementing agency in turn had standardised various assumptions and terms and conditions of loaning for generally normal situations and for broad agro-climatic regions. The approach is neither too rigid to discourage demand for credit nor too flexible to accommodate or adjust to the special circumstances of crisis and abnormal local situations.

3. It was observed that the overall response to the M.I. scheme under reference in the selected districts was very lukewarm, judged from loans actually sanctioned by Land Development Banks against physical target approved by NABARD (about 45 per cent for schemes involving wells and wells with pumpsets). Further, the proportion of officially or technically completed wells to that of total sanctioned ended up with 26.5 per cent in both districts put together. In other words, the scheme has had only a limited success all along and characterised by overwhelmingly more incomplete individual projects than technically complete ones. In view of the above situation, the broad objective of the study was geared to understand the various facets and problems of financing the dugwell schemes in hard rock areas that are prone to periodical droughts or successive scarcity conditions. However, some specific objectives were to consider the evaluation of whatever benefits accruing to the beneficiaries, some aspects of

drought-prone by the Sukhatankar Committee Report.

The two serious limitations of the data were (a) the reference period (1983-84) being the very first year in which the wells became operational and hence low key level of post-development and, (b) the persistent drought conditions causing abnormal situation upsetting the farmers in several ways. The upshot of it all was to affect the response and quality of primary data. The considerable short fall in the expected benefits caused reticence on the part of the beneficiary farmers. The amenability of such data for sophisticated analyses like benefit-cost ratio, financial rate of return and internal rate of return was a moot one.

4. The broad socio-economic profile of the selected farmers confirmed to the general rural scene. There was a fair mixture of minority communities among the borrowers. Nearly 85 per cent of the entire sample farmers were operators of small holdings, the average size of operational holding being less than eight acres. Pursuit of agricultural labour was the most common subsidiary occupation. About 40 per cent of the sample entirely depended on cultivation as the only occupation. Around 40 per cent of the sample belonged to low income group (upto Rs.5000). Majority of the low income group farmers had opted for composite loans. By and large, the beneficiary farmers

were slightly better placed than those borrowers who ended up with incomplete schemes.

5. The overall success rate of the apparently completed projects (excluding loans for only pumpset purpose), upto June 1983, was only about 27 per cent of the total loans sanctioned for wells and composite schemes in both districts together. The information pertaining to infructuous investment was inclusive of failed wells, technically incomplete works and cases of misutilisation of loans. Most of these were for composite schemes and had remained incomplete on account of physical constraints and human factors. The reasons were illustrative of types of difficulties and shades of motives for the incompleteness or improper use of loans. They were also indicative of genuine problems of physical or natural constraints in the process of construction work. Around 30 per cent of cases might not strictly be faulted for misutilisation as these were under physical constraints like absence of aquifers, caving in of side walls, hard base rock condition, inadequate water column even after reaching 40' depth etc. At the other extreme, we found varying extent of human factors being manifested in voluntary withdrawal from the scheme as a risky investment (9 per cent), technical and partial misutilisation arising from excess diameter, violation of time schedule, etc.

were slightly better placed than those borrowers who ended up with incomplete schemes.

5. The overall success rate of the apparently completed projects (excluding loans for only pumpset purpose), upto June 1983, was only about 27 per cent of the total loans sanctioned for wells and composite schemes in both districts together. The information pertaining to infructuous investment was inclusive of failed wells, technically incomplete works and cases of misutilisation of loans. Most of these were for composite schemes and had remained incomplete on account of physical constraints and human factors. The reasons were illustrative of types of difficulties and shades of motives for the incompleteness or improper use of loans. They were also indicative of genuine problems of physical or natural constraints in the process of construction work. Around 30 per cent of cases might not strictly be faulted for misutilisation as these were under physical constraints like absence of aquifers, caving in of side walls, hard base rock condition, inadequate water column even after reaching 40' depth etc. At the other extreme, we found varying extent of human factors being manifested in voluntary withdrawal from the scheme as a risky investment (9 per cent), technical and partial misutilisation arising from excess diameter, violation of time schedule, etc.

(21%) and lastly rank misuse of loan funds and false claims (34%).

Apparently, the misutilisation in one form or other and technical or otherwise had taken a very large toll of individual projects. The funds might eventually be recovered by Land Development Bank or, some of the projects would be completed on the own initiative of the defaulters. Nevertheless, the cause for immediate concern should be the fact of sinking of considerable amount of precious funds without securing commensurate benefits in terms of enhanced resource base, in the areas particularly vulnerable to prolonged droughts.

6. The opinions and experiences of the loanee-farmers have revealed many interesting and also disturbing aspects. The decision of siting of wells was entirely left to the borrowers themselves. The technical help arranged by Land Development Bank through GSDA could have avoided the heartburn at a later stage. The officials from extension and Land Development Bank confined themselves to render advice mainly on cropping pattern and loan utilisation. Apparently, one could find some contradiction between the claims of technical guidance being followed up and what actually turned out. This was particularly the case with the dimensions of the wells and more pronounced in respect of borrowers of infructuous investment. Two-thirds of the

completed wells were only seasonal and the rest reported low water columns. Anyway, this situation was not due to overclustering of wells as the stipulated 500' distance was strictly observed. The infrastructure facility for servicing pumpsets was rather inadequate especially distancewise in the case of Osmanabad district. Over a third of the borrowers were not members of any cooperative society for short term credit. Those receiving credit found it to be rather inadequate. In regard to type of assistance required, the preference was in favour of technical advice and timely supply of inputs.

In the matter of adherence to the specified dimensions of wells, only in 16 per cent cases the diameter approximated to the norm and, in about 10 per cent, the stipulated depth (35'-40') was achieved. The violation of diameter stipulation was quite rampant and it was very difficult on the part of the Land Development Bank officials to regulate the same against the local conviction for larger diameter. In the event, the loanees would try to compromise with the level of the required depth to end up with low water columns.

The average cost of the construction of well varied from Rs.8,750 to Rs.13,150 for different size groups and, in the case of composite loans, the maximum total cost was Rs.18,525. In almost all cases the loan amount fell

short of the reported expenditure by the loanee beneficiaries. This imbalance was due mainly to increase in the diameter and hence greater excavation cost and cost escalation by the contractors over a time. One could surmise that in genuine cases, the rigid loan eligibility limit might have contributed to compromise with the quality of construction work.

7. The changes in post-investment period might not have reflected the expected normal or ideal situation as the reference year, 1983-84, was the very first year of development after the investment and moreover, agro-climatically it was not a normal year since the drought condition persisted in the selected villages. Nevertheless, whatever the changes that the survey data could bring out might be worth even for a limited assessment.

The net increase in the irrigated area on account of the investment worked out to, on an average per beneficiary, 3.3 acres in Beed and 4.5 acres in Osmanabad. The use of well in kharif was less than that of rabi season and least in summer. The rabi being the main season, 89 per cent of wells in Beed and 95 per cent of wells in Osmanabad sample were put to use. No reliable data could be obtained from the informants in regard to the intensity of irrigation. The intensity of cropping was well below the level assumed in the economics of the

scheme worked out by the Land Development Bank. It was assumed at 160-180 per cent but the beneficiary farmers could achieve only 109 per cent in Osmanabad and 147 in Beed district. The low rate of crop intensity was blamed on low level of water columns in the wells. Thus, the net increase in irrigated area had not been accompanied by substantial increase in gross cropped area.

The cropping pattern adopted in the post-investment period continued to be almost similar to the one practised in the pre-development year. The cereals (mainly jowar and wheat) continued to dominate the pattern (60-70 per cent) followed by pulses, oilseeds and sugarcane as minor crops. Kharif jowar and oilseeds in both districts and, other cereals and pulses only in Osmanabad have somewhat relatively gained as irrigated crops. However, all the crops under irrigation have shown increase in the absolute acreage in the post-investment year. All the familiar crops grown under rainfed conditions, except wheat and sugarcane, have been continued under irrigated lands.

The most disturbing and crucial thing about the changes in the cropping pattern was that the eventually adopted one significantly differed from the one recommended mainly in regard to the variety of the crops. It was assumed by the economics of the scheme that the major switch should come in the form of high yielding varieties

in place of local varieties in the case of cereal crops. However, there was no strict adherence to this stipulation. In place of 60-70 per cent HYV cereals only six to seven per cent of area was clearly reported under hybrid jowar. The serious deviation included the neglect of bajra and maize; no cotton crop was raised instead sugarcane was the preference; the vegetable crop was practically ignored - just under one per cent in Osmanabad as against four per cent recommended in each district and sunflower was preferred to groundnut in most cases.

Although the farmers were aware of the implications, they pleaded helplessness on the grounds of low water columns in the wells, insufficient rainfall and inadequate financial resources to obtain costly inputs for HYV crops.

The position of incremental benefits as reflected in the generation of employment and net income on account of considerable investment in irrigation works was quite disappointing. The survey data in respect of irrigated areas of the beneficiary farmers did not reveal any significant level of incremental employment during the reference year. If anything, the per acre average incremental employment worked out to a meagre four days as excess over the level of unirrigated areas of the beneficiary farmers. When compared to control farms it was ten days in Osmanabad and

negative (0.7 day) in Beed district. The situation in regard to accrual of incremental income was no better. It was around Rs.300 per acre, far below the assumptions worked out by the economics of the scheme. The drought conditions to a great extent and human factors like making departure from the prescribed type dimension of the dug wells, deviation from the stipulated cropping pattern, non-adoption of improved technology, and all these things on the grounds of inadequacy of water columns and financial resources, have contributed to a low key operation during the reference year. The expected benefits were so low that it would be impossible for the beneficiaries to repay the loans as scheduled.

Following the low rainfall, the lowering ground water table is causing some concern and it calls for a closer look at the estimates of the ground water surveys, particularly in drought prone areas. Besides, the loanee farmers ought not to have been allowed free hand in siting the wells, exceeding the diameter and such other technical matters. A better loan management during the investment period rather than target minded loan disbursement operation should ensure better recovery performance.

Apart from superficial extension work, nothing is done to follow up the technical advice to ensure strict

thirteen

adherence to stipulated cropping pattern and arrangement for the supply of inputs and credit infrastructure. The Land Development Bank could consider selectively lending to member farmers against the crop hypothecation. Apart from the wilful defaulters many a genuine small farmer can be helped by the Land Development Bank if a part of the loan amount is advanced as crop loans during the gestation period to inculcate confidence and positively prevail over the farmers to adopt the prescribed cropping pattern. Also it should be possible for the Land Development Bank to deploy their most efficient staff to problem areas, especially the drought prone peckets. The continuous monitoring and maintenance of information system also need to be strengthened.

CHAPTER I

INTRODUCTION

1.1 Importance of Minor Irrigation

It is needless to stress the importance of the role of minor irrigation in the context of agricultural development. It assumes much greater significance, especially in hard rock regions lacking perennial surface water and characterised by relatively low precipitations, as well as, the areas prone to recurring droughts. Besides, the irrigation system that taps the ground water by means of dug wells has certain comparative advantages over major and medium projects that largely depend upon surface water. In particular, the well irrigation affords the farmer a more judicious and efficient use of precious water. It facilitates the timely availability of water more dependably than the surface irrigation. Moreover, the development of ground water irrigation is the only solution to the problems of the water-starved tracts in several parts of the country. Otherwise, these rainfed areas would remain outside the purview of certain technological benefits which demand assured irrigation as a major prerequisite. The resultant benefits to the concerned individuals and economic gains to the society at large need no special emphasis.

1.2 Irrigation Profile of the Region

Broadly speaking, Maharashtra State has a long way to go in attaining the level of irrigation already achieved by several other states, notably Punjab and Haryana. Even-though the total net area irrigated has nearly doubled, that is, from 10,72,200 in 1960-61 to 19,79,000 hectares in 1980-81, it forms only 10.6 per cent of the net area sown in the state. The major extent of the total net increase of 9,06,800 hectares is claimed by ground water source which accounts for 60 per cent of this increase. Between the two broad sources of irrigation, the ground water source has been commanding larger proportion of the irrigable area in the State. During the year 1980-81, it accounted for 57.5 per cent of the total net sown area as against 42.5 per cent commanded by surface irrigation. The relevant data are shown in Table 1.1.

Table 1.1 : Sourcewise net area irrigated in Maharashtra State

Year	Net area irrigated (in hectares) by source		
	Surface irrigation	Well irrigation	Total
1960-61	4,76,900	5,95,300	10,72,200
1970-71	5,79,000	7,67,900	13,46,900
1980-81	8,41,000	11,38,000	19,79,000

Source : Epitome of Agriculture in Maharashtra 1983-84.

The situation in Aurangabad Division (Marathwada) comprising five districts including the study area of Beed and Osmanabad, is no better than that of the entire state. During the year 1978-79, the percentage of net area irrigated to net area sown was only 9.7 per cent in this division as compared to 10.6 per cent for the entire state. The position in the same year revealed that the wells overwhelmingly constituted the chief source of irrigation in the division, accounting for 73 per cent of net area irrigated as compared to 57.5 per cent for the whole state. The area under well irrigation in the division was commanded by nearly 1.91 lakh wells, the average irrigable area per well being 1.8 hectares. The wells were mostly private ones and predominantly of masonry type.

1.3 Ground Water Potential

The State in general and Marathwada region in particular need to increase the area under irrigation. It can be achieved either by tapping surface water or by tapping ground water. However, the potentiality for any appreciable growth in surface irrigation is somewhat limited in the State owing to some natural constraints. Nevertheless, it is possible to increase the irrigable area considerably by tapping the ground water resources to the maximum extent.

The ground water potential has been assessed by the Ground-water Surveys and Development Agency (GSDA) in

respect of 1481 watersheds covering the entire state. According to this assessment, the total annual recharge which forms the ground water potential is of the order of 34,996 million cubic metres. As against this potential, the present annual withdrawal of ground water from the existing wells (about 9.4 lakh irrigation wells) is of the order of 7,451 million cubic metres only. Thus a substantial portion of the ground water potential would still be available for exploitation in the state.

However, the ground water resource potential is not unlimited as in the Indo-Gangetic alluvial areas. The State of Maharashtra has to contend with some geo-hydrological limitations. Almost the entire state consists of hard rock formation comprising either trap basalts or other crystalline rocks. Besides, there are large variations in rainfall. Also it is claimed that the relative feasibility and success or failure of the minor irrigation works is primarily determined by the local hydro-geological conditions which in the hard rock areas are widely variable within short distances.

1.4 General Features of the Selected Districts

A brief account of the broad agro-economic features of the selected districts is presented here so as to provide some background information. The aspects mentioned in this

section broadly pertain to agro-climatic characteristics, land use, irrigation, cropping pattern, etc. The published sources like Season and Crop Report, Socio-economic Review and Epitome of Agriculture in Maharashtra have provided the basis for information. However, 1978-79 being the latest year for which published data are available, the situation in Osmanabad refers to the composite district, prior to the bifurcation of some of its talukas to form the new district of Latur.

The districts of Osmanabad and Beed are situated in the Southern part of Marathwada region of the State. Both districts fall in the 'rain shadow area' characterised by low and uneven rainfall and hence scarcity conditions in some areas. The normal rainfall of the district is 786 MM for Beed and 809 MM for Osmanabad. Incidentally, how prone these areas to the drought can be realised when we notice the fact that Beed and Osmanabad districts have recorded 508 and 477 MM respectively during the year 1982-83.

Neither Beed nor Osmanabad wholly belongs to any single agro-climatic zone of the State. In point of fact, three talukas, namely, Ashti, Patoda and Majalgaon out of the seven from Beed and Paranda, Ehum and Kollam from 11 talukas of the composite Osmanabad district are grouped under what is officially classified as 'Scarcity Zone' (Zone No. 6). This agro-climatic zone includes the areas

receiving annual rainfall in the range of 500-700 MM; the altitude being less than 2,000 feet above MSL; having medium black calcareous soils formed trap with varying depth and texture and the predominant cropping pattern showing kharif-(excluding paddy)-cum-rabi crops mainly depending upon soil depth and textural class.

On the other hand, the remaining talukas belong to Zone-VII, that is, 'assured rainfall zone with mainly kharif cropping'. The rainfall in this zone varies from 700 to 900 MM and the areas are situated at less than 2000 feet altitude above MSL. The soil classification remains the same as the Zone-VI mentioned above. The predominant cropping pattern is of mainly kharif crops, but mostly excluding paddy

Land Use Pattern (1978-79)

The broad land use pattern reveals that the net area sown forms 73 per cent of the total geographical area of the district in Beed and similarly 80 per cent in Osmanabad. Land put to non-agricultural use accounts for 3.5 per cent and 1.9 per cent in Beed and Osmanabad districts respectively. A little more than one per cent of the area is totally barren and unculturable in each of the districts. These proportions, by and large, compare favourably with the broad pattern obtainable for the Marathwada (Aurangabad) division. The proportion of net area sown, however, is

far higher than is the case for the entire state (59.3 per cent).

The only remarkably disturbing feature is that the area under forests is too insignificant with 21,500 hectares (1.9 per cent of the total geographical area) in Beed and a meagre 1,200 hectares (0.09 per cent) in respect of Osmanabad district. For the entire Marathwada region the area under forests accounts for 3.5 per cent while it is 17.3 per cent in the case of entire State. Paradoxically enough, Osmanabad, one of the most rural districts, actually shows lesser extent of forest land than even the most urban district of Greater Bombay, where it is 1,500 hectares, accounting for nearly four per cent of its geographical area. Perhaps, this factor is one of the pointers to low precipitations and recurring droughts in major parts of the two districts under consideration.

Irrigation

Just like the situation in entire Aurangabad Division, wells constitute the predominant source of irrigation in selected districts as well. Net area irrigated by wells accounts for 77.7 per cent of total net irrigated area of the district in respect of Beed and, similarly 81.6 per cent in the case of Osmanabad. Tanks and medium irrigation projects appear to be the chief sources of surface irrigation,

which accounts for the remaining portion of the irrigable lands.

Among the individual talukas Ahmedpur, Omerga and Udgir in Osmanabad district and Georai and Kaij in Beed report almost entire irrigated area commanded only by wells. On the other hand, substantial part of the irrigated areas, relatively to the extent of around 40 per cent, is being commanded by surface sources in Paranda and Osmanabad talukas of Osmanabad district and Ashti and Patoda in Beed district.

The net irrigated area as proportion to total net sown area works out to 11.4 per cent at the aggregate level of the district in Beed. However, Georai and Beed are the two talukas, where it is around 19 per cent. On the other extreme, Majalgaon has recorded as low as only four per cent. In Osmanabad district, Tuljapur (27.4%) and Bhoom (21.6%) are the two prominent talukas with relatively higher proportions. Among the talukas recording rather low proportions, mention may be made of Ahmedpur (3%), Udgir (4.5%) and Ausa (7.5%).

The extent of irrigated area sown more than once, that is, intensity of cropping can be determined by working out the proportion of gross irrigated area as percentage of the net area irrigated. This intensity for the entire district works out to 118 per cent for Beed and 122 per cent

for Osmanabad. In other words, only about a fifth of the net irrigated area is utilised for raising more than one crop during the same year. This intensity is rather greater in Majalgaon (150%) and Ashti (132%) talukas of Beed district and Ahmedpur (176%) and Udgir (136%) of Osmanabad district. Incidentally, the crop intensity for the Aurangabad Division works out to 121.5 per cent and for Maharashtra State it is somewhat higher at 124.8 per cent. The relevant details of talukawise net irrigated areas by source, gross area irrigated, cropping intensity, etc., are presented in Tables 1-A and 1-B for Osmanabad and Beed districts respectively at the end of this chapter.

Regarding the number of irrigation wells in use, Beed reports 33,152 and Osmanabad 44,642. Almost all these wells are privately owned and approximately 87 per cent in Beed and 60 per cent of wells in Osmanabad district are classified as masonry type. The average net area commanded by wells works out to 2.17 hectares per well in Beed and 2.58 hectares in Osmanabad district.

Cropping Pattern (1978-79)

General

The area cropped more than once accounts for 5.2 per cent of the net area sown in Beed and 11.3 per cent in that of Osmanabad district. Kharif is the principal cropping season in both districts, accounting for 60 per cent in Beed and 62.5 per cent of the gross cropped area

in Osmanabad. The rabi or winter cropping accounts for the remaining area, the summer season being very negligible with less than 0.2 per cent in either district. In both Beed and Osmanabad, food crops dominate the scene by accounting a little over 80 per cent of the area in kharif as well as rabi seasons. The details of the general cropping pattern are presented in Table 1-C at the end of this chapter.

The overall cropping pattern of both irrigated and dry lands through all the seasons reveals that the cereals dominate the scene by accounting as much as 66.8 per cent of the gross cropped area of Beed and similarly 55 per cent in Osmanabad. Within the cereal group, jowar, bajra and wheat emerge as the major crops, together accounting for 97.2 per cent in Beed district, it being two-thirds of the gross cropped area devoted to just three crops. Similarly, in Osmanabad only jowar and wheat account for 86.4 per cent of the total area under cereals. The cereals are followed by pulses and oilseeds as the other major crops in both districts. In point of fact, the top five individual crops account for almost three-fourths of the gross cropped area of Beed and nearly two-thirds of that of Osmanabad district. In Table 1.2 are given the summary versions of relative proportions of the main crops.

Table 1.2 : Percentage distribution of gross cropped area under main crops in Beed and Osmanabad districts during the year 1978-79

District Beed		District Osmanabad	
Crop	As % of total G.C.A.	Crop	As % of total G.C.A.
Jowar	41.5	Jowar	42.0
Bajra	17.0	Red gram	7.6
Wheat	6.5	Wheat	5.5
Sufflower	5.5	Gram	4.9
Red gram	3.8	Groundnut	4.4
Other crops	25.7	Other crops	35.6
Total	100.0	Total	100.0
Actual Gross Cropped Area (hectares)	8,51,800	Actual Gross Cropped Area (hectares)	12,40,776

Cropping Pattern in Irrigated Lands

In Table 1-D are given cropping pattern of the irrigated areas in both districts. By and large, the pattern of area of crops irrigated is similar to the general one in both districts. Here too, very few crops dominate the irrigated lands. This is evident when we see that food crops account for 95 per cent of gross irrigated area of Beed and 88 per cent in Osmanabad. Among food crops, it is the cereals group that is

overwhelmingly dominant. Actually, jowar and wheat emerge as the most important crops, respectively accounting for 52% and 17% of the gross irrigated area in Beed and 37% and 23% in that of Osmanabad. Among the non-cereal food crops, sugarcane and gram in Beed and sugarcane and rice in Osmanabad figure next in importance. Among the non-food crops, cotton (about 5%) in Beed and fodder crops (about 11%) in Osmanabad are worth mentioning. The summarised version of the proportion of principal crops to the gross irrigated lands is given in Table 1.3.

Table 1.3 : Percentage distribution of gross irrigated area under principal crops

District Beed		District Osmanabad	
Crop	As % of total G.I.A.	Crop	As % of total G.I.A.
1) Jowar	51.9	1) Jowar	36.9
2) Wheat	17.2	2) Wheat	22.6
3) Sugarcane	7.9	3) Sugarcane	11.5
4) Gram	5.6	4) Fodder	10.7
5) Cotton	4.6	5) Rice	5.4
6) Others	12.8	6) Others	12.9
Total	100.0	Total	100.0
Gross irrigated area in hectares (109400)		Gross irrigated area (hectares) (172700)	

Drought Prone Conditions

Major parts of the two selected districts have been widely known to be prone to drought conditions. It is also well supported by the "Fact Finding Committee for Survey of Scarcity Areas - Maharashtra State, 1973

(Sukhatankar Committee)." Talukas identified as drought-prone by this Committee in the selected districts are :

(1) Beed District : (a) Ashti, (b) Beed, (c) Georai, (d) Kaij, (e) Majalgaon and (f) Patoda.

(2) Osmanabad District : (a) Bhoom, (b) Kallan, (c) Osmanabad, (d) Paranda and (e) Tuljapur.

Furthermore, the official records dealing in normalcy or otherwise of the agricultural yields also support the fact that most parts of the two districts under ^{consideration} condition have been under prolonged dry spells in recent years. During the years 1982-83 and 1983-84 over 500 villages in Beed district were declared scarcity affected (less than 50 per cent of normal yields). The situation was no less severe in Osmanabad district, as the total rainfall during the year 1982-83 was less than 60 per cent of thenormal. Tuljapur branch, which accounted for 81 per cent of the sample borrowers, had faced a severe dry spell in 1983-84 and in 56 of the affected villages the members of Land Development Bank got the postponement of the instalment due from them.

Table 1-A : Talukwise details of area irrigated in Osmanabad district during the year 1978-79 (Area in hectares)

District/ Tehsil	Sources of Irrigation		Net area irrigated	Total Gross area Irrigated	Gross area irrigated as % of the net sown area	Total net sown area	Net Irrigated area as % of gated area
	Surface Irrigation (net area)	Well Irrigation (net area)					
1) Osmanabad	6,509	9,899	16,408	20,818	126.9	99,500	16.5
2) Kalamn	2,074	10,694	12,768	15,498	121.4	1,08,500	11.8
3) Latur	149	12,136	12,285	13,939	113.5	82,400	14.9
4) Ahmedpur	-	3,455	3,455	6,095	176.4	1,16,100	3.0
5) Udpir	19	6,068	6,067	8,247	135.9	1,33,600	4.5
6) Nilanga	2,085	13,653	15,738	18,003	114.4	1,06,200	14.8
7) Ausa	690	7,092	7,782	9,982	128.3	1,03,400	7.5
8) Omarga	-	11,473	11,473	14,243	124.1	1,17,100	9.8
9) Tuljapur	6,179	20,083	26,262	31,852	121.3	95,800	27.4
10) Paranda	6,620	10,005	16,625	19,540	117.5	94,500	17.6
11) Bhoom	1,716	10,782	12,498	14,588	116.7	57,900	21.6
Total	26,041	1,15,320	1,41,361	1,72,805	122.2	11,15,000	12.7

Table 1-B : Talukwise details of area irrigated in Beed district during the year 1978-79

1) Beed	3,989	16,004	19,993	23,500	117.5	1,08,100	18.5
2) Georoi	53	22,852	22,905	24,195	105.6	1,20,100	19.1
3) Majalgaon	1,115	3,776	4,891	7,331	149.9	1,26,100	3.9
4) Ambajogai	3,200	7,720	10,920	12,025	110.1	1,35,800	8.0
5) Kalf	589	8,303	8,892	10,917	122.8	1,34,900	6.6
6) Patoda	5,440	7,645	13,085	15,725	120.2	93,800	13.9
7) Ashri	6,269	5,741	12,010	15,835	131.9	90,800	13.2
Total	20,655	72,041	92,696	1,09,536	118.2	8,09,600	11.4

N.B. : Figures in parentheses refer to percentages.

Table 1-C : Area under different crops in each district in 1978-79

(Area in hectares)

	Beed	Osmanabad
1. Rice	10,054 (1.2)	34,615 (2.8)
2. Wheat	55,009 (6.5)	68,075 (5.5)
3. Jowar (Kharif)	1,48,919 (17.5)	2,93,822 (23.7)
4. Jowar (Rabi)	2,04,521 (24.0)	2,27,285 (18.3)
5. Bajra	1,44,742 (16.9)	26,272 (2.1)
6. Other cereals	5,924 (1.0)	31,831 (2.6)
7. Total cereals	5,69,169 (66.8)	6,81,900 (54.9)
8. Gram	32,628 (3.8)	94,410 (7.6)
9. Tur	32,992 (3.9)	60,618 (4.9)
10. Other pulses	54,894 (6.4)	1,15,339 (9.3)
11. Total pulses	1,20,514 (14.1)	2,70,367 (21.8)
12. Sugarcane	8,592 (1.0)	19,919 (1.6)
13. Other foodcrops	8,246 (1.0)	26,242 (2.1)
14. Total foodcrops	7,06,521 (82.9)	9,98,428 (80.5)
15. Cotton	24,412 (2.9)	32,730 (2.6)
16. Total fibres	28,001 (3.3)	56,354 (4.5)
17. Groundnut	22,388 (2.6)	57,345 (4.4)
18. Other oilseeds	94,557 (11.1)	1,28,072 (10.3)
19. Total oilseeds	1,16,945 (13.7)	1,82,417 (14.7)
20. Other non-foodcrops	341 (0.5)	3,577 (1)
21. Total non-foodcrops	1,45,287 (17.1)	2,42,348 (19.5)
22. Total Gross cropped area	8,51,808 (100)	12,40,776 (100)

N.B. : Figures in parentheses refer to percentages to total Gross cropped area of the district.

Table 1-D : Irrigated area under different crops in Beed and Osmanabad districts during the year 1978-79

Name of the crop	(Area in hectares)	
	Beed	Osmanabad
1. Rice	2,600 (2.3)	9,300 (5.4)
2. Wheat	18,800 (17.2)	39,100 (22.6)
3. Jowar	56,800 (51.9)	63,800 (36.9)
4. Bajra	6,200 (5.7)	-
5. Other cereals	1,200 (1.1)	3,900 (2.3)
6. Total cereals	85,600 (78.2)	1,16,100 (67.2)
7. Gram	6,100 (5.6)	7,100 (4.1)
8. Other pulses	-	-
9. Total pulses	6,100 (5.6)	7,100 (4.1)
10. Sugarcane	8,600 (7.9)	19,900 (11.5)
11. Other foodcrops	3,100 (2.8)	8,200 (4.7)
12. Total foodcrops	1,03,400 (94.5)	1,51,300 (87.6)
13. Cotton	5,000 (4.6)	300 (.5)
14. Total fibres	5,000 (4.6)	300 (.5)
15. Groundnut	900 (1)	2,700 (1.6)
16. Other oilseeds	-	-
17. Total oilseeds	900 (1)	2,700 (1.6)
18. Other non-foodcrops	100 (.5)	18,400 (10.7)
19. Total non-food crops	6,000 (5.5)	21,600 (12.4)
20. Total Gross Irrigated area	1,09,400 (100)	1,72,700 (100)

N.B. : Figures in parentheses give percentages to total Gross Irrigated area.

Table 1-C : Area under different crops in each district in 1978-79

	(Area in hectares)	
	Beed	Osmanabad
1. Rice	10,054 (1.2)	34,615 (2.8)
2. Wheat	55,009 (6.5)	68,075 (5.5)
3. Jowar (Kharif)	1,48,919 (17.5)	2,93,822 (23.7)
4. Jowar (Rabi)	2,04,521 (24.0)	2,27,285 (18.3)
5. Bajra	1,44,742 (16.9)	26,272 (2.1)
6. Other cereals	5,924 (1.0)	31,831 (2.6)
7. Total cereals	5,69,169 (66.8)	6,81,900 (54.9)
8. Gram	32,628 (3.8)	94,410 (7.6)
9. Tur	32,992 (3.9)	60,618 (4.9)
10. Other pulses	54,894 (6.4)	1,15,339 (9.3)
11. Total pulses	1,20,514 (14.1)	2,70,367 (21.8)
12. Sugarcane	8,592 (1.0)	19,919 (1.6)
13. Other foodcrops	8,246 (1.0)	26,242 (2.1)
14. Total foodcrops	7,06,521 (82.9)	9,98,428 (80.5)

Table 1-D : Irrigated area under different crops in Beed and Osmanabad districts during the year 1978-79

Name of the crop	(Area in hectares)	
	Beed	Osmanabad
1. Rice	2,600 (2.3)	9,300 (5.4)
2. Wheat	18,500 (17.2)	39,100 (22.6)
3. Jowar	56,800 (51.9)	63,800 (36.9)
4. Bajra	6,200 (5.7)	-
5. Other cereals	1,200 (1.1)	3,900 (2.3)
6. Total cereals	85,600 (78.2)	1,16,100 (67.2)
7. Gram	6,100 (5.6)	7,100 (4.1)
8. Other pulses	-	-
9. Total pulses	6,100 (5.6)	7,100 (4.1)
10. Sugarcane	8,600 (7.9)	19,900 (11.5)
11. Other foodcrops	3,100 (2.8)	8,200 (4.7)
12. Total foodcrops	1,03,400 (94.5)	1,51,300 (87.6)
13. Cotton	5,000 (4.6)	300 (.5)
14. Total fibres	5,000 (4.6)	300 (.5)

CHAPTER II

SALIENT FEATURES OF THE SCHEME

The highlights of the Minor Irrigation Scheme in general are briefly presented here. In the first section, the proposal from the Land Development Bank as approved by National Bank for Agriculture and Rural Development (NABARD) with stipulations, is broadly reproduced from the available files. The institutional arrangement for the implementation of the approved scheme is followed up in the concluding section of this chapter.

2.1 General Proposal

The financial viability of the Minor Irrigation Scheme has not been separately appraised for the selected districts in Marathwada region. Actually it forms a part of a larger scheme covering different watersheds cutting across several districts of the entire State. By and large, the parameters of economic viability worked out for similar schemes earlier approved for the same area, have been assumed to hold good for the present scheme as well.

The scheme under reference, known as "ARDC Credit Project III - Minor Irrigation Programmes in 27 districts of Maharashtra State," was prepared by Maharashtra State.

Cooperative Land Development Bank Ltd. This project for providing long term credit involving a financial assistance of Rs.2635.99 lakhs and ARDC refinance (95%) at Rs.2504.18 lakhs was generally approved by ARDC for the year 1981-82. This ARDC Credit Project III was, in turn, sanctioned by the International Development Association. The refinance sanctioned was to be effected by way of subscription to the special development debentures to be floated by Land Development Bank from time to time for financing the scheme in question. However, the subscription from NABARD was limited to the extent of 95 per cent of each issue of the said debentures covering minor irrigation investment. Moreover, the aggregate contribution from NABARD was not to exceed Rs.2504.18 lakhs. The State and Central Government were to contribute the remaining five per cent of each issue of debentures.

The total financial outlay of the Scheme at Rs.2635.99 lakhs was calculated on the basis of :

- (1) (a) New well with pumpset units numbering 10,734 in hard rock areas at an average unit cost of Rs.17,000;
- (b) 566 units in alluvial areas at average unit cost of Rs.19,500 each;
- (2) renovation of 4500 existing wells, the unit cost being Rs.3,000 and (3) 9200 pumpsets, the unit cost being Rs.6,000 for 3 HP and Rs.7,000 for 5 HP motors. The basis of calculation of unit costs has also

taken into consideration the down payment to be made by the beneficiary farmers out of their own resources, such as, family labour and other contributions in cash and kind. The general terms and conditions have also provided for some variations in the quantum of loan in individual cases depending upon the depth of well, the nature of strata, the horse power of pumpsets required, etc. The Land Development Bank could adjust the amount of loan according to the actual requirements subject to the following conditions :

(a) The issue of loans for amounts in excess of the average would have to be done, if necessary, from savings effected on account of loans issued for an amount which is below the average, the total financial assistance under the scheme remaining unchanged.

(b) The bank should ensure that the cultivators availing themselves of loans larger than the average have adequate security to offer as well as adequate repaying capacity.

(c) Where the loan advance is lower than the estimated cost, the bank should ensure that the cultivator has sufficient resource to meet the balance and the work executed is according to specifications approved and that the materials to be used for construction are of standard quality.

Among the special terms and conditions stipulated by HABARD, brief mention may be made of some of the important ones. One such stipulation insisted that the Land Development Bank should implement the programme on watershedwise basis and not on districtwise basis. However, the Land Development Bank was forbidden to finance minor irrigation development in 12 watersheds of five districts where there was no potential for further exploitation of ground water. However, the bank was allowed to diversify the proposed programme in these 12 watersheds to other watersheds of the respective districts. It may also be noted here that none of these prohibited watersheds was in the two districts selected for the present study.

The bank was expected to ensure that a minimum spacing of 160 meters (500 feet) would be maintained between the proposed well and any of the existing wells. It was expected that 60 per cent of loaning be made to small and marginal farmers in each district. The loan maturity was to be based on the ultimate borrower's repaying capacity and should not exceed nine years for normal lending and 15 years for lending to small farmers except the pumpset component which would retain nine year period. Regarding the security the mortgage of land and hypothecation of machinery were required. The land would be valued according to its post-development market

value and the loan eligibility was to be restricted to 60 per cent of the value of land.

2.2 Institutional Arrangement

While NABARD remains a refinancing body, funding different implementing agencies to carry out various schemes under its specified conditionalities, the implementing agency for the minor irrigation schemes under consideration of the present study, is Maharashtra State Cooperative Land Development Bank Ltd. (MSCLDB). In the preceding section, we already have seen some highlights concerning the scheme as approved by NABARD. In the following are mentioned some salient features of the scheme from the point of view of Land Development Bank. The 'Manual of Loaning' issued by MSCLDB in 1976 (since revised in 1984) generally covers all the aspects of the procedures, operation and management functions of development financing. The relevant information culled from this manual, as also discussions with the Land Development Bank officials, form the basis for the following.

The Land Development Bank has been for a long time engaged in the financing of ground water utilisation mainly through dug-wells. The procedure of financing, however, has undergone a substantial change since the commencement of the IDA Project early in 1973. Loaning earlier done mainly on consideration of security offered, has given

place to production oriented system of lending based on project appraisal. The siting and spacing of wells have also been made more scientific by the technical criteria laid down by the Ground-water Surveys and Development Agency (GSDA). The Bank's officials have to follow the guidelines regarding the technical and economic appraisal of investment in the case of dug wells.

The standard estimates of cost of the dug wells for different areas coming under irrigation have been prepared separately for deccan trap and alluvial areas. The rates assumed while preparing the estimates have been the latest local rates and they should be adhered to until modifications are communicated by the Head Office. These estimates are, however, subject to upward modifications upto 10 per cent to allow for special local conditions.

To facilitate the concerned officials to make more rational economic appraisal of investment in dug wells, the Land Development Bank has prepared, for each homogeneous agro-climatic zone in the State, estimates of pre- and post-development incomes for various acreages coming under the irrigable command of a well. Similarly, the Bank has prepared for every such zone, statements of net income before and after development, incremental income based on standard cropping pattern, loan eligibility, etc. in respect of different sizes of irrigable command areas.

These estimates have been provided with built in allowance for variations such as cropping pattern like orchards to modify the criteria of loan eligibility at the discretion of the District Branch. In regard to loans for renovation of old wells, the Manual provides for guidelines and discretionary powers to the enquiry officers to visit the spot and make an appraisal to prepare estimates and technical officers to examine the same.

The Bank has recognised the fact that for the purpose of security, the mortgaged land should be valued on its intrinsic value after irrigation. However, under production-oriented system of lending, the amount of loan to be advanced is also linked with the repaying capacity of the farmer and not merely with the value of security. Since the repaying capacity depends upon the incremental income, the loan eligibility determines upper limit of the loan which can be sanctioned. The loan eligibility, in turn, depends upon repayment period. The longer the period of repayment, the same incremental income will result in a higher loan eligibility. In order to accommodate small farmers (as per NABARD definition) discriminatory considerations are built into period of repayment and the requirement of down payment.

The period of repayment of loans for dug wells and dug well improvements is nine years, including a gestation

period of two years for all farmers except the small farmers for whom this period is extended upto 15 years. The repayment period is same for the composite loans as well. However, in the case of only oil engine or pumpset the repayment period is seven years for all categories of farmers. It is expected that big farmers would bear 15 per cent of the estimated cost of investment out of their own resources and medium and small farmers 10 per cent. This down payment is inclusive of the 10 per cent share capital contribution to be made by the farmer.

The disbursement of loan in the case of new wells is to be in three instalments in proportion of 40:30:30 and for dug well improvement only two instalments at 40 per cent and 60 per cent. The second and third instalments are to be disbursed only after ascertaining the proper utilisation of loan amounts already disbursed. The loans carry the interest rate at 10.5 per cent. In case the loan instalment is defaulted, penal interest at the rate of over and above the rate on the defaulted instalment is to be recovered. The Bank insists that a well should normally be completed within a period of 12 months from the date on which the first instalment has been granted.

The manual provides sufficiently detailed procedures and instructions to Bank officials in anticipation of

various contingencies, especially in regard to disbursement of loan, supervision over the execution of work and mis-utilisation of loans. There are several built in provisions which allow for modifications, from time to time, in regard to loan eligibility, quantum of loan and additional funds in genuine cases to complete the projects.

The scheme has been drawn on the basis of several assumptions such as certain return on investment based on expected incremental income, which in turn assumes availability of certain quantity of water over a period of time. Furthermore, varying cropping pattern and productivity are key factors in realising the assumed incremental income to make the scheme financially a viable one. How realistic are the assumptions will ultimately depend upon the degree of the successful implementation of the scheme.

The details of the physical and financial programme recommended for sanction by NABARD in respect of Aurangabad, Beed and Osmanabad districts are presented in Table 2.1.

Table 2.1 : Districtwise physical and financial programme recommended for sanction of NABARD

District	Total physical programme				Financial outlay (Rs./lakhs)		
	New well with pumpset	Renovation of old well	Electric motor pumpset	Oil engine pumpset	New well with pumpset	Renovation of old well	Pumpset
Aurangabad	425	200	400	25	72.25	6.00	25.75
Beed	450	175	220	25	76.50	5.25	14.95
Osmanabad	600	240	460	50	102.00	7.20	31.10

CHAPTER III

OBJECTIVES, METHODOLOGY AND SAMPLE FRAME

3.1 Main Objectives

At the outset, it may be stated that the broad objective of the present study is to understand the various facets and the problems of financing the dug well schemes in hard rock areas that are prone to periodic droughts or scarcity conditions. Recognising the special ethos of the specific areas, it attempts to make the qualitative assessment of the extent of divergence between expectations of the scheme and problems or constraints in their actual realisation. Moreover, the study may assume some special importance as the data pertain to the very first year after the completion of the project. Since the basic aim of the ex-post evaluation studies is to enable NABARD in improving project planning and implementation, the present exercise modestly tries to focus attention on certain dimensions mentioned above.

In order to realise the broad aim of the study, some specific objectives, among others, to be covered are as mentioned in the following :

- (1) to evaluate the benefits accruing to the

borrowers of the scheme in terms of incremental income and employment;

(ii) to assess the performance of the agency involved in the implementation of the scheme under consideration and;

(iii) to identify the problems faced by the beneficiaries at all levels in general and those ending up with incomplete or failed wells in particular.

3.2 Methodology and Coverage

The methodology of the study has taken into consideration obtaining relevant primary data from the households selected to represent borrowers of different types under the scheme. These types refer to single or composite loans made available for (a) sinking of new well (b) renovation of old well and (c) electric motor or oil engine driven pumpset.

In order to arrive at the net incremental benefits arising from the investment, selection of 'control' from among non-beneficiary rainfed farmers has also been undertaken. This control sample is taken to represent "without project" condition. Besides, the rainfed cropped areas of selected beneficiary farmers themselves would provide as 'control' for the purpose of comparison.

Also considered within the purview of primary data is the inclusion of some borrowing farmers whose dug wells are treated as 'incomplete' or 'failed' ones.

Apart from the primary level data collected through the exhaustive questionnaire-schedules canvassed in the field survey among the selected households and case studies of some selected cases, the study has attempted to collect whatever information made available from the official sources of the Maharashtra State Cooperative Land Development Bank (MSCLDB), the implementing agency.

While the primary data from the selected households would facilitate, among other things, analyses of costs and benefits vis-a-vis the investment, the secondary data, it is hoped, would throw some light on institutional and other aspects of the project.

The coverage of the study is required to take into consideration the restrictive nature of qualifying universe to draw the sample and suitable areas that can give adequate size of sample. Firstly, since the scheme under consideration being the NABARD funded project for the year 1981-82, the coverage of the study is restricted to those of the farmers who have been sanctioned loans by the Land Development Banks during this particular year (1981-82). Among these again, we are to consider only those who have

completed their individual schemes as this would enable us to evaluate the benefits in the post-investment period. However, not many of them found to have completed the required works within the stipulated period of one year from the date of release of the first instalment of the loan. Nevertheless, in order to get an adequate size of sample, the cut off date for the completed project has been taken as of 30.6.1983. And only this could ensure one full year's data, that is, reference year (1.7.1983 to 30.6.1984) for the purpose of the study.

Initially, the study had planned to cover three districts in Marathwada, namely, Aurangabad, Beed and Osmanabad. However, Aurangabad got itself eliminated in view of very low number of completed projects of individual beneficiaries in any of the sub-branch areas of the district. In the entire district, the total number of loans sanctioned (1981-82) was 55 for wells and wells with pumpsets and 75 for only pumpset purposes. Out of this, however, only five concerning wells and wells with pumpsets and all the 75 purely pumpset cases could complete the project works by June 1983. Hence the exclusion of Aurangabad district from the purview of the present study.

On the other hand, the situation in the other two districts was somewhat promising, from the point of view of availability of fairly respectable size of sample cases

of beneficiaries. The relevant figures pertaining to types of loans sanctioned and works completed upto 30.6.1983 (qualifying beneficiaries) in Beed and Osmanabad districts are presented in Table 3.1.

Table 3.1 : Typewise loans sanctioned and works completed in the districts of Beed and Osmanabad

Type of loan	Beed		Osmanabad	
	No. of loans sanctioned (1981-82)	No. of completed works	No. of loans sanctioned	No. of works completed
1) New well	4	-	51	20
2) Old well	8	6	14	2
3) New well + Pumpset	163	38	254	47
4) Old well + pumpset	102	32	71	32
5) Only pumpset	65	59	232	232
All types	342	135	622	333

Apart from the simple cases of only pumpset loans, where the success rate is expectedly very high, the other four types, comprising only wells and wells combined with pumpsets (composite loans) have not performed well to provide a fairly large population base for drawing sample cases.

Another dimension adding to the problem of selection of beneficiary farmers has been the very wide dispersal of the completed works. Over 200 villages in Osmanabad and 100 in Beed, coming under the jurisdiction of nine sub-branches of Land Development Banks in each district, have been required to be considered for the purpose. However, five sub-branch areas of Osmanabad and four of Beed district have reported almost entirely consisting of simple cases of only pumpset works.

Since the main focus of the study being new and old dug wells and composite schemes, with somewhat lesser weightage being given to the uniformly simple cases of mere pumpsets, the operational areas of sample to be drawn have been narrowed down to about 60 villages in five sub-branches of Beed and about 70 villages in four sub-branches of Osmanabad district.

3.3 Sample Framework

The selection of final sample size has had to take into consideration the usual factors like costs, logistics and time required for collection of both primary and secondary data. The type of the target case to be studied was also a consideration in determining the overall sample size.

Bearing the above considerations in mind, we had approached the task of selecting a sample size, judged adequate for our purposes. Actually, we were required to select not only the beneficiary farmers of the different types of loans, but also a suitable number of loaner^es reporting incomplete and or failed wells. Besides, a sample of not more than 50 cases of 'control' farmers was the third requirement.

In regard to the selection of beneficiary farmers, the task became much easier in the case of those reporting loans for only pumpsets. It was decided to select only 10 per cent of this type as it involved^lrelatively a smaller investment, mostly made out in kind form and in one instalment. The problem of selecting other types of beneficiaries proved somewhat complicated as the qualifying population was widely scattered. In point of fact, the farmers of completed project works could be found in 58 villages of five sub-branch areas in Beed and, similarly in 71 villages of four sub-branches in Osmanabad. Among these, as many as 48 villages in Beed and 53 in Osmanabad did report just one beneficiary each.

Given the above situation and with due regard to logistics and time factors, it was decided, in the first instance, to select the qualifying villages. In the event, villages having two or more beneficiaries of wells

and composite loans were given greater weightage in selection and villages with single beneficiaries were selected mainly on the basis of spatial dispersion in order to have wider representation of areas in the selected districts.

Having selected the villages with due regard to availability of beneficiary farmers, the procedure of selecting 'control' and 'incomplete' cases became less complicated. It was felt desirable to select the 'control' cases from the same selected villages as the soil-climatic conditions and locally prevailing agronomic practices were likely to be common to facilitate better comparison. For the similar reasons, all the cases of 'incomplete' wells found in the selected villages were included.

Eventually, the final sample cases were obtained from 50 selected villages belonging to nine sub-branch areas of the two districts. While 'only pumpset' category of selected cases represented about 10 per cent of the total pumpsets, the single purpose new dug wells and renovation of old wells have accounted for 45 per cent and 38 per cent of their respective categories of beneficiaries. In the case of composite loans for new wells with pumpsets and old wells with pumpsets, the selected farmers similarly represented 45 per cent each. The distribution of districtwise selected beneficiaries is shown in Table 3.2.

Table 3.2 : Typewise distribution of projects completed and cases selected for the survey

Type of Benefit	District : Beed			District : Osmanabad			Both Districts		
	No. of works completed by 30.6.83	No. of cases selected	% of (B) to (A)	No. of works completed by 30.6.83	No. of cases selected	% of (B) to (A)	No. of works completed by 30.6.83	No. of cases selected	% of (B) to (A)
	(A)	(B)		(A)	(B)		(A)	(B)	
1) Only New Well	-	-	-	20	9	45.0	20	9	45.0
2) Only Old Well	6	2	33.3	2	1	50.0	8	3	37.5
3) New Well + Pumpset	38	15	39.5	47	25	53.2	85	40	44.9
4) Old Well + Pumpset	32	13	40.6	32	16	50.0	64	29	44.6
5) Only pumpset	59	6	10.2	232	24	10.3	291	30	10.3
All types	135	36	26.7	333	75	22.5	468	111	23.7

The details of finally selected cases of all the types of beneficiaries, farmers of incomplete wells and also control farmers according to sub-branches of Land Development Bank in Beed and Osmanabad districts are shown in Tables 3.3 and 3.4 respectively. In all, the cases finally included in the study cover 111 beneficiary farmers, 56 borrowers of incomplete wells and 48 farmers of wholly rainfed lands as 'control'.

3.4 Limitations of the Study

Apart from the usual limitations inherent in the surveys of the kind we have undertaken, the present study has to encounter some unforeseen circumstances which might pose some problems of inadequacy of data for more meaningful analyses. The main circumstances and the attendant difficulties may briefly be mentioned here.

Firstly, the reference period of the study, that is, July 1983 to June 1984 being the very first year in which the irrigational facility became operational, the benefits of the investment were not adequate. If we go by the local opinion, the level of benefits was far below even by the standards of expected benefits in the initial couple of years. Many an informant was quite frustrated and pessimistic about the usefulness of the scheme or profitability of the investment. Generally it is regarded

Table 3.3 : Sub-branchwise distribution of number of selected households according to type of loan and control farmers in Beed district

District/ Sub- branch	No. of vill- ages selec- ted	Beneficiaries						Incomplete cases					Control farmers	Grand total
		New well	Old well	New well+ pump set	Old well+ pump set	Pump set only	Total	New well	Old well	New well+ pump set	Old well+ pump set	Total		
<u>Beed</u>	5	-	1	5	3	5	14	-	-	-	-	-	5	19
Chawsala	3	-	-	3	1	-	4	-	-	1	2	3	3	10
Ashti	6	-	-	2	6	1	9	-	-	4	3	7	6	22
Ambejogai	2	-	-	-	3	-	3	-	1	-	1	2	2	7
Parali	7	-	1	5	-	-	6	-	-	6	1	7	5	18
Total	23	-	2	15	13	6	36	-	1	11	7	19	21	76

37

Table 3.4 : Sub-branchwise distribution of number of selected households according to type of loan and control farmers in Osmanabad district

District/ Sub- branch	No. of vill- ages	Beneficiaries						Incomplete cases					Control farmers	Grand total
		New well	Old well	New well+ pump set	Old well+ pump set	Pump- set only	Total	New well	Old well	New well+ pump- set	Old well+ pump- set	Total		
Osmanabad														
Tuljapur	18	8	1	20	12	14	55	2	2	27	5	36	18	109
Omarga	3	1	-	1	1	5	8	-	-	1	-	1	3	12
Kalamb	3	-	-	4	1	3	8	-	-	-	-	-	3	11
Murum	3	-	-	-	2	2	4	-	-	-	-	-	3	7
Total	27	9	1	25	16	24	75	2	2	28	5	37	27	139

that the expected benefits attain 100 per cent of its potential only in the third year of the operation of the dug wells scheme. This is borne by the fact that the bank's repayment schedule provides for only interest charges in the first two instalments without any component of the principal.

Secondly, the successive drought or scarcity conditions afflicting the survey areas in recent years would not reflect the normal agricultural conditions. Especially, the year (1982-83) preceding the reference period of the survey was very bad with only 477 MM and 508 MM rainfall recorded as against the normal rainfall of 809 MM and 786 MM respectively in Osmanabad and Beed districts. The survey year was no better as the scarcity conditions persisted in the selected districts. This was borne by the fact that the concerned collectorates declared a large number of villages as drought affected, where the 'annevari' crop yields were expected to be less than 50% of the normal yields. The Land Development Banks have allowed postponement of the recovery of instalments due from their borrowers. Besides, 81.4 per cent of the sample borrowers of this survey, anyway belong to traditionally recognised drought-prone talukas (vide Sukhtankar's Committee Report).

The above circumstances, especially the drought conditions, have adversely affected the general morale of the farmers, which in turn, has contributed to the difference on the part of the selected farmers. Consequently, the response to the field survey was rather lukewarm to the extent of considerably affecting the nature and quality of data.

In a way, for the reasons beyond one's control, the present study has been transformed into a survey of the problems of minor irrigation schemes in drought afflicted areas.

CHAPTER IV

SOCIO-ECONOMIC PROFILE OF THE SELECTED HOUSEHOLDS

The present chapter attempts to provide some broad account of socio-economic background of the farmers included in the study. However, the aspects briefly covered in the following are limited to main caste or caste groups, size of household, literacy, earners in the household, size of operational holdings, occupations pursued and household incomes.

4.1 Social Background

Although caste is not a basis for inclusion in the scheme by Land Development Bank, nor a factor for selection of sample for the study, the pattern among the sample borrowers (beneficiary and 'incomplete' cases) reveals somewhat a fair mixture, if not representative in character. For instance, the Maratha caste, generally regarded as a dominant one among the land owning cultivators, accounts for 59.3 per cent of the total loanees. It is followed by other advanced caste group, comprising Lingayat, Mali, Teli, Jain, etc., which accounts for 17 per cent of beneficiaries and 14 per cent of 'incomplete' category. A significant point, however, is the presence

of a fair number of minority or under privileged communities like 'other backward castes' group (8.4 per cent), scheduled castes (6.0 per cent) and Muslim (8.0 per cent).

Incidentally, a large majority of these minorities cultivates holdings below four hectares in size. A broad idea about the castewise distribution of borrowing households may be obtained from the data presented in Table 4.1.

Table 4.1 : Distribution of sample loanee households according to main caste and caste groups

Caste/ caste group	B e e d		Osmanabad		Both Districts		
	B	I	B	I	Total	Grand	total
					B	I	
Brahmin	1	-	1	2	2	2	4
Maratha	22	11	45	21	67	32	99
Other Hindu and Jain	3	4	16	4	19	8	27
Other Backward Castes	4	3	5	2	9	5	14
Scheduled Castes	2	1	5	2	7	3	10
Muslim	4	-	3	6	7	6	13
Total	36	19	75	37	111	56	167

NB : (B) = Beneficiary farmers.

(I) = Farmers with 'Incomplete' wells.

In regard to some demographic characteristics, it is seen that the average size of the selected household works out to 5.3 for all the categories in Beed and 5.5 in Osmanabad. Among the three categories of selected households the 'control' shows slightly less than five persons in Beed and nearly six persons on an average in Osmanabad district. The literacy pattern shows that the beneficiary category is having a slight edge over others in Beed and, similar is the case with 'incomplete' category over the others in Osmanabad. The overall literacy level of the selected households is 46.9 per cent in Beed and 46.8 per cent in Osmanabad. The proportion of literacy among females is much less than that of males and it works out to around 30 per cent of the total. The average number of earners per household works out to 1.9 for the entire sample in Beed 2.0 for that of Osmanabad. While it is not less than 2.0 for beneficiary and control categories in either district, the households under the category of 'incomplete' cases report 1.6 in Beed and 1.8 in Osmanabad. The details are set in Table 4.2.

4.2 Size of Operational Holdings

Since no farmer from any category of the selected households has reported cultivating any piece of land leased-in from others, nor has leased-out to others any from the owned holding, the data presented here, obviously,

Table 4.2 : Average size of household, literacy proportion and average size of earners per household according to the categories of selected households

Category of selected households	District Beed					District Osmanabad						
	No. of households	Average size of family	Percentage of literacy			Average size of earners	No. of households	Average size of family	Percentage of literacy			Average size of earners
			Male	Fe- male	Total				Male	Fe- male	Total	
Beneficiaries	36	5.4	60.0	32.6	48.5	2.0	75	5.6	56.9	34.8	47.4	2.0
Incomplete	19	5.3	57.6	16.0	43.3	1.6	37	5.0	67.9	34.7	54.1	1.8
Control	21	4.9	54.8	34.1	46.6	2.1	27	5.9	42.7	28.6	37.1	2.1
All type	76	5.3	58.1	29.7	46.9	1.9	139	5.5	56.4	33.5	46.8	2.0

refer to wholly owned operational holdings. Furthermore, the selected farmers are classified according to three broad size groups, namely, small, medium and large. This classification is based on NABARD's definition as accepted by the Land Development Bank and applied to different agro-climatic zones in Maharashtra. The distribution of different categories of the selected households according to size of operational holding groups in Beed and Osmanabad districts is presented in Table 4.3.

The highlights of the pattern reveal that in Beed district all the selected households, except the two farmers with a medium sized holding each belonging to the beneficiary and to the category of 'incomplete' cases, are small farmers (97.4 per cent). It is in Osmanabad we find some medium and big farmers, mostly among the two categories of sample borrowers. In the 'beneficiary' category, the percentages of medium and big farmers work out to 20.0 and 10.6 respectively. Similarly, in the 'incomplete' category they form 10.8 per cent and 8.1 per cent respectively. In the 'control' category all but one household are small farmers, the lone case being a big farmer in Osmanabad district. In all, the small farmers dominate all the categories of households and the proportion of small farmers works out to 84.6 per cent of the entire sample of 215 households. It is followed by medium

Table 4.3 : Distribution of selected households according to broad size groups of operational holdings

Category of the sample	Beed district				Osmanabad district				Both districts			
	Small	Medium	Big	Total	Small	Medium	Big	Total	Small	Medium	Big	Total
Beneficiary	35	1	-	36	52	15	8	75	87	16	8	111
Incomplete	18	1	-	19	30	4	3	37	48	5	3	56
Control	21	-	-	21	26	-	1	27	47	-	1	48
All categories	74	2	-	76	108	19	12	139	182	21	12	215

farmers with 9.8 per cent and big farmers with 5.6 per cent.

The holdingwise distribution of borrowing farmers, that is, beneficiary and farmers of incomplete wells, according to type of loan obtained reveals that small farmers in both categories are quite prominent in being found with the two types of composite loans. It is quite remarkably so in the case of new well with pumpset type of the scheme. In the case of medium size group too, three-fourths of the farmers (other than the only pumpset cases) have availed off composite loans. It is even more so among the big farmers, almost all of them opting for composite types, mainly in combination with new wells. Apart from mere pumpset cases, the selection of which is being restricted to a total of 30 cases, the composite loan cases are quite predominant with both the categories of sample. The holdingwise distribution of sample borrowing households according to type of loan received may be seen in Table 4.4.

The average size of operational holding tends to be rather quite small in extent as the small farmers dominate the total sample in each category. Even among the small farmers the extent of average size works out to around 8 acres for beneficiary, 7 acres for 'incomplete' category and 6 acres for 'control' farmers. The average

Table 4.4 : Holdingwise distribution of sample borrowing households according to type of loan

Type of loan	Beneficiary				Incomplete				All borrowing households			
	Small	Medium	Big	Total	Small	Medium	Big	Total	Small	Medium	Big	Total
1) Only new well	6	2	1	9	2	-	-	2	8	2	1	11
2) Only old well	3	-	-	3	2	1	-	3	5	1	-	6
3) New well with pump-set	33	2	5	40	35	2	2	39	68	4	7	79
4) Old well with pump-set	23	5	1	29	9	2	1	12	32	7	2	41
5) Only pump-set	22	7	1	30	-	-	-	-	22	7	1	30
All types	87	16	8	111	48	5	3	56	135	21	11	167

size in respect of medium farmers is around 20 acres for beneficiary, and 19 acres for 'incomplete' category. For the big farmers, all being found in Osmanabad sample, the average size works out to 32.25 acres in the case of beneficiary, 35.67 acres in the case of 'incomplete' category and 28 acres in the one case of 'control'. It may also be observed that between the two districts the average size, in respect of each category and type of farmer, is slightly greater in Osmanabad than in Beed excepting the case of small farmers among the beneficiaries. The average size at the aggregate sample level broadly indicates that the beneficiary operates greater extent of land than the 'incomplete' and 'control' categories. The relevant data showing districtwise average size of holding in each of the three broad size groups are presented in Table 4.5.

4.3 Occupational Pattern

The type of subsidiary occupation (occupation other than cultivation) pursued and number of occupations in which the earners in the household are engaged may be one of the indicators of the socio-economic characteristics. Although the income accruing from a given occupation is more crucial, for the present, however, a broad idea can be obtained by looking into the general occupational pattern of the selected households.

Table 4.5 : The average size of operational holding (in acres) of the selected households according to the sample category

District	Sample category	Small farmer	Medium farmer	Big farmer	Total sample
Beed	Beneficiary	8.54	20.0	-	8.58
	Incomplete	5.68	19.0	-	6.38
	Control	5.62	-	-	5.62
Osmanabad	Beneficiary	7.47	20.43	32.25	12.54
	Incomplete	7.98	19.50	35.67	11.47
	Control	6.88	-	28.00	7.66
Both Districts	Beneficiary	7.92	20.42	32.25	11.25
	Incomplete	7.16	19.40	35.67	9.74
	Control	6.32	-	28.00	6.77

The distribution of entire sample according to number of occupations pursued by the household is presented in Table 4.6. It may be seen that the households pursuing just single occupation, that is, cultivation form 40 per cent of the entire sample. However, the pursuit of single occupation is more pronounced among sample borrowers (around 50 per cent) than is the case with 'control' farmers (8.3 per cent). Among the borrower households the beneficiary is slightly better placed than the category of 'incomplete' project cases, especially in regard to the proportion reporting the pursuit of third occupation in the household. On the other hand, the 'control' category is much better placed than the other two in terms of larger proportions reporting two and three occupation

Table 4.6 : Distribution of entire sample according to number of occupations pursued by the household

Category	Number of occupation			Total households
	One	Two	Three	
Beneficiary	54 48.7	47 42.3	10 9.0	111 100.0
Incomplete	28 50.0	26 46.4	2 3.6	56 100.0
Control	4 8.3	36 75.0	8 16.7	48 100.0
All categories	86 40.0	109 50.7	20 9.3	215 100.0

However, not many kinds are pursued as subsidiary occupations. Among these providing second or third source of income to the reporting households, agricultural labour, dairy and service are the most prominent ones. These three together account for about 94 per cent of the earners engaged in second or third occupation. In Beed district, two-thirds of the reporting earners pursue agricultural labour and a fifth is engaged in service. In Osmanabad, a little over three-fourths of the earners are seen pursuing agricultural labour and dairying. The distribution of reporting earners engaged in subsidiary occupations according to districts and categories of sample is presented in Table 4.7.

Table 4.7 : Distribution of reporting earners engaged in subsidiary occupations according to districts and categories of sample

Subsidiary occupation	Number of earners reporting					
	Osmanabad district	Beed district	Categories of entire sample (both districts)			Total all categories
			Beneficiary	Incomplete	Control	
Agricultural labour	59	46	22	16	67	105
Dairying	47	2	33	6	10	49
Trading	6	3	6	2	1	9
Service	24	14	14	14	10	38
Other professions	1	3	3	-	1	4
Total	137	68	78	38	89	205

It may also be seen that while dairying and agricultural labour are prominent ones for beneficiary and incomplete categories respectively, the agricultural labour is the most predominant one for the 'control' category of selected households. All the households of 'control' category being the cultivators of wholly rain-fed farms and, almost all of them being small farmers, they usually take recourse to farm labour. Even among the two categories of borrowers a considerable proportion has resorted to farm labour as subsidiary occupation. These households possibly are small farmers and may be from minority caste groups.

4.4 Pattern of Income Levels

A general idea about the levels of income is attempted here to provide another facet to our understanding of the socio-economic background of the selected households. Presently, for the limited purpose of analysis, the total households income accruing from all the sources during the agricultural year of 1983-84 has been considered here. For the sake of convenience, the data presented here take into account only the broad range of total incomes.

The distribution of entire sample households according to range of incomes reveals that a not-so-

insignificant proportion (10.2%) is in the lowest range of upto Rs.2,500. Relatively speaking, this lowest range has greater proportion (17.1%) in the case of Beed sample. While one half of the selected households from Beed district fall within the range of Rs.5,000, only a third of Osmanabad sample is in the same range with another third, the single largest group, being found in the range of Rs.5,000-10,000. Besides, nearly a tenth of the Osmanabad sample is having an income of over Rs,20,000. Significantly enough, nearly 40 per cent of the overall sample falls within the broad income group of upto Rs.5,000 only. The relevant details are presented in Table 4.8.

Table 4.8 : Distribution of sample farmers according to size of household incomes

Size of income (Rs.)	Beed		Osmanabad		Total	
	No.	%	No.	%	No.	%
Upto 2,500	13	17.1	9	6.5	22	10.2
2,501 to 5,000	27	35.5	36	25.9	63	29.3
5,001 to 10,000	18	23.7	46	33.1	64	29.8
10,001 to 15,000	11	14.5	28	20.1	39	18.1
15,001 to 20,000	5	6.6	7	5.0	12	5.6
20,001 and above	2	2.6	13	9.4	15	7.0
Total	76	100.0	139	100.0	215	100.0

It may be interesting to know separately the income levels of households belonging to the three categories of sample, viz., beneficiary, 'incomplete' project and 'control'. The relevant data are presented in Table 4.9. It may broadly be assumed, for the sake of convenience, that the

Table 4.9 : Incomewise distribution of entire sample households according to categories

Range of household income Rs.	Category of sample household			
	Beneficiary	Incomplete	Control	Total
Upto 2,500	4 (3.6)	8 (14.3)	10 (20.8)	22 (10.2)
2,501 - 5,000	19 (17.1)	24 (42.9)	20 (41.7)	63 (29.3)
5,001 - 10,000	39 (35.2)	13 (23.2)	12 (25.0)	64 (29.8)
10,001 - 15,000	26 (23.4)	7 (12.5)	6 (12.5)	39 (18.1)
15,001 - 20,000	9 (8.1)	3 (5.3)	-	12 (5.6)
20,001 & above	14 (12.6)	1 (1.8)	-	15 (7.0)
All income groups	111 (100.0)	56 (100.0)	48 (100.0)	215 (100.0)

first two ranges of income clubbed together represent low income group (upto Rs.5,000) the next two as middle income group (Rs.5,001-15,000) and the incomes over Rs.15,000 being upper middle or higher income group.

The concise grouping reveals that the beneficiary category contains relatively smaller proportion of households in low income group as compared to incomplete and 'control' categories. It is in the last two mentioned categories that we find more than one-half of the households, that is, 57.2 and 62.5 per cents respectively, in the low income group. On the other hand, majority of households (53.6%) in the beneficiary category are found in middle income group, as compared to a little over a third (around 37 per cent) of the households of the other two categories in the same income group. However, only a few households in beneficiary category, a negligible number from 'incomplete' category and, none of the 'control' farmers belong to income ranges over Rs.15,000. Relatively speaking, the households in the beneficiary category is better placed than those of other two categories. The 'control' farmers are not as well placed as either of the borrowing category.

The pattern of income level, as viewed from the type of loans obtained under the scheme, does not show any clear relationship. However, 65.2 per cent of the low income level beneficiaries have been the recipient of the two types of composite loans, viz., new well with pumpset and renovation of old well with pumpset. Similar proportion for middle and other higher income groups works out to 61.5 per cent and 60.9 per cent respectively. For the

entire sample of beneficiary this works out to 62.2 per cent. In the case of 'incomplete' category all the three income groups overwhelmingly have been the recipients of the composite loans. Also it may be observed that the single purpose loans are mainly found among the farmers of middle income group in either category. The relevant details are presented in Table 4.10.

In sum, the social background of the selected farmers, by and large, confirms to the general rural scene, especially in regard to some demographic and caste patterns. The caste pattern, in particular, shows a fair mixture of minority communities among the borrowers covered under a general scheme. However, most of the farmers included in the study are small farmers, whose average operational holdings measure less than eight acres apiece. The farmers generally pursue more than one occupation and, being mostly small farmers, the agricultural labour as an additional occupation is more common while some households are engaged in dairying and service. Furthermore, about 40 per cent of the sample farmers belong to low income groups (upto Rs.5,000). This is more pronounced among the 'incomplete' and 'control' categories. However, comparatively speaking the beneficiaries of the scheme are somewhat better placed than other sample categories in terms of size of operational holdings and levels of household incomes.

Table 4.10 : Incomewise distribution of beneficiary and incomplete project borrowers according to items of loans

Range of household income Rs.	Beneficiary					Incomplete					
	Only well		Well with pumpset		Total	Only well		Well with pumpset		Total	
	New	Old	New	Old		New	Old	New	Old		
Upto 2,500	-	1	2	1	-	4	-	-	7	1	8
2,501 - 5,000	3	-	6	6	4	19	-	1	18	5	24
5,001 - 10,000	3	1	11	8	16	39	1	2	7	3	13
10,001 - 15,000	1	-	13	8	4	26	1	-	4	2	7
15,001 - 20,000	-	-	4	3	2	9	-	-	2	1	3
20,001 and above	2	1	4	3	4	14	-	-	1	-	1
Total	9	3	40	29	30	111	2	3	39	12	56

CHAPTER V

SOME ASPECTS OF INFRUCTUOUS INVESTMENT

The information presented here pertains to infructuous investment that has taken place in the selected villages. The data obtained from 56 households covered during the course of the survey provides the basis. These households are generally referred to as 'incomplete' cases of investment and some information concerning them have already been discussed in foregoing chapters of this study. These non-beneficiary borrowers are those who obtained the loans along with the beneficiary farmers but failed to complete the project by 30.6.1983 and could not derive any benefit in terms of irrigation facility even during the year 1983-84. This category of non-beneficiary borrowers, however, include cases of failed wells and wells remaining incomplete on account of partly or wholly mis-utilisation of loans under the terms and conditions of Land Development Bank.

Among the 56 cases falling under this category, 19 belong to selected villages in Beed and 37 to those of Osmanabad district. In Beed district 11 cases come under new well with pumpset, 7 cases of old well with pumpset and one case of renovation of old well. Similarly, in

Osmanabad district, the single purpose loans for only wells are in two cases each, 28 cases of new wells with pumpsets and five cases of old wells with pumpsets. In all, 51 out of 56 cases are of composite loans from both the districts.

There are different kinds of distinctions between the failed wells and incomplete wells depending upon the situations. According to the sources of Land Development Bank, a failed well may be defined as when water is not struck even though a depth of 40 feet has been reached. Besides, there is the definition of structural failure of wells. According to this, a dug well may be considered to have failed due to structural failure, if during excavation any unidentified sub-surface strata caves in to cause collapse of side walls to such an extent that reexcavation would be required for successful completion of the well, or where a sheet rock or basement rock is met with, which would make further digging futile due to non-availability of aquifer down below. However, all the cases of failed wells are invariably referred to the Ground-water Surveys and Development Agency (GSDA) and any relief or subsidy for failed well can be claimed only after it is duly certified by the GSDA. It is widely believed in official circles of the Land Development Bank that 5 to 10 per cent of cases end up as genuinely failed wells.

On the other hand, cases of incomplete/misutilisation

may arise (a) when the works are not completed according to minimum specifications for which loans are sanctioned and (b) when the time and work output schedules are not maintained as per the stipulations when loan instalments are periodically released. However, the subtle distribution between misutilisation and incomplete cases needs to be clearly understood. Misutilisation is, in essence, not using the loan for the purpose it is meant. Also, there are situations wherein the amount may be overspent or misspent on the project on account of increasing the diameter of the well beyond the specification, and or, payment made to the contractor in excess of the scheduled rates for work. But any such over expenditure is to be borne by the loanee himself and the same cannot be offered as an excess for not completing the required amount of work. Such cases are treated as partial misutilisation or partly incomplete work and further instalments, if any, may be withheld till the completion of the work as per the previous loan instalment released.

However, a well can remain incomplete even after properly utilising the loan funds. This may arise due to technical reasons such as achieving the specified depth but not striking water or ending up with very low level of water and in certain cases, the side walls may cave in to render the well incomplete. In such situations additional funds may be sought from the Bank for the

completion of the well subject to inspection and technical clearance by the officials and sanction by the head office. Technically, an incomplete well can be completed by increasing the depth and, beyond this effort, it will have to be treated as failed well. The official view is that a well can either be 'failed' or 'misutilised'. In short, an 'incomplete' well may remain so for the reason of inadequacy of funds or misutilisation of loan funds partly or otherwise.

The investment in dug well project is to be normally completed in a year's time from the date of the release of the first instalment of the loan. However, a considerable proportion of the works connected with the construction of dug wells and improvement of the old wells has remained incomplete beyond the time limit set for the completion. This is the situation in the villages which are selected on the basis of the presence of one or more beneficiary farmers of the completed projects. It has already been mentioned that the overall success rate of the apparently completed projects (excluding the cases of 'only pumpsets') works out to approximately 27 per cent of the total number of loans sanctioned for the works involving all types of dug wells from both the districts under consideration. Indeed, the general performance is alarmingly poor and the causes appear to be the usual physical constraints and the human factors.

In particular, the situation in respect of the sample borrowers with 'incomplete projects' has been caused by a variety of factors. The reasons for the individual projects to remain incomplete and inoperable, even during the survey year of 1983-84, varied from infrastructure failure like nonavailability of the promised electricity connection and clear cases of total failure of wells, despite proper utilisation of funds, to the other extreme cases of false claims and rank misutilisation of loan amounts. In between, there are shades of reasons that pertain to technical and partial misutilisation. The relevant data in respect of the concerned sample farmers are presented in Table 5.1. It gives distribution of cases according to the main reasons or combination of reasons, as stated by the informants themselves and clarified by the concerned officials and, the particulars about the stage at which the further instalment of the loan amount is suspended.

In all, the 56 sample farmers fall under one or the other often main reasons that have contributed to infructuous investment. Among the ten reasons, the first four listed in the table are of one broad kind, wherein there is no misutilisation of funds involved on the part of the concerned borrowers. The loanees are just the victims of natural causes (27%) and in two cases, unfortunate in not

Table 5.1 : Distribution of cases of infructuous investment (incomplete) in the

Main reason for the well to remain incomplete during the year 1983-84	Number of cases in distribution		
	Beed	Osmanabad	Total sample
1. Non-availability of electricity connection	1	1	2
2. Treated as clear case of failed well	-	6	6
3. Structural difficulties (caving in, hard base rock)	4	2	6
4. No water struck - Treated incomplete	1	2	3
5. No water struck - Voluntary withdrawal (raising costs, etc.)	3	2	5
6. Technical misutilisation (time lapse, excess of diameter, etc.)	1	11	12
7. Risky to carry out further work	1	-	1
8. No water struck - Partial misutilisation	1	1	2
9. False claim, deliberate misrepresentation to claim additional loan funds	-	6	6
10. Clear case of rank misutilisation of loan	7	6	13
Total	19	37	56

securing the power facility. The remaining cases fall under different kinds where, motives are of varying nature. In the following are given brief account of the reasonwise cases.

(1) Non-availability of Power Connection

There are two cases, one each from Beed and Osmanabad, who could not avail of the facility of irrigation during the year 1983-84, for want of electric power connection at the site of the wells. In fact, both come under new dug well with pumpset type and have lifted all the three instalments to complete the work on well construction. Till the power facility is made available, they are not allowed to obtain the electric pumpset component of the loan. Besides, the concerned farmers are reluctant to use the oil engines or any other device to irrigate their lands.

(2) Clear case of Failed Well

All the six cases belong to Osmanabad and all of them come under the composite loans for new well with pumpset. Even after properly utilising the loan amount for the purpose of digging wells, and reaching the desired level of depth, they have failed to strike the aquifers. These incomplete wells are treated as failed wells by the Land Development Bank and as per the requirement, four cases are referred to GSDA. In one case, the certificate from

GSDA and the subsidy for failed well have already been secured. In the remaining case, the GSDA's advice of further deepening work of 10' could not be carried out as the Land Development Bank refused to grant extra loan on the grounds of the concerned borrower having already reached his loan feasibility limit. Now the well is practically treated as failed well and in order to claim the subsidy final certificate from GSDA is still awaited. In all, the clear cases of failed wells account for nearly 11 per cent of the total sample of incomplete category.

(3) Structural Defects

The difficulties encountered under this head are (a) caving in of side walls and thereby rendering the entire well as useless and structurally unsafe and (b) striking hard base rock or sheet rock which prevents reaching the aquifer down below. There are six cases, four from Beed and two from Osmanabad, together accounting for 10.7 per cent. Two of these are old wells and failed after the release of final instalments. Among the four new wells, two got into structural difficulties after obtaining second instalment while the other two have met the similar fate before the pumpset component could be released. Presently, all these cases are treated as incomplete by the Land Development Bank. However, there is no instance of any misuse of funds on the part of the

loanees. Eventually, these cases may also end up as 'failed wells'.

(4) Failure to Strike Water

The three wells under this head are almost similar to the cases of structural defects. The problem here is that more than prescribed level of depth has been reached in each case and still there is no sign of water. According to the officials there is no likelihood of striking water and further work is halted. Though two instalments in each case are properly utilised, the cases are presently treated as technically incomplete. Eventually, the cases will be referred to the GSDA for the technical advice as to further action. Curiously enough, two of the wells involved in this have been old wells and the loans are meant for deepening of wells and purchasing pumpsets. However, the pumpset component of the loan is withheld as there is no water. This may be a pointer to the general lowering of water table in that area.

(5) Voluntary Withdrawal

The decision to cease the work in the midway stages of the individual projects has been entirely made by the concerned borrowers themselves. In two of the old well cases from Beed, the loan instalments being insufficient to carry out the work of digging through the hard rock

condition, the borrowers have decided not to risk their own funds on the grounds of increasing costs. Hence the voluntary abandonment. However, there has not been any complaint of financial irregularity. In the third case of the old well, the work after the first instalment resulted in very low level of water. The concerned borrower has decided to abandon further work on the grounds of less prospect of finding sufficient quantity of water, even though the further instalment of loan is available. Similar is the case from Osmanabad for new well with pump-set, where the borrower has refused to lift the third instalment as no water is found after the full utilisation of first two instalments. The last case is a unique case in that the borrower from Osmanabad died after the sanction of the first instalment, and his successor is not interested in continuing the relationship with the Bank. Hence voluntary withdrawal.

(6) Technical Misutilisation

There are twelve cases, all but one belonging to Osmanabad district, coming under the category of technical misutilisation. The cases include mostly the violation of time schedule and exceeding the stipulated diameter of the well. Many a borrowers resorts to larger diameter than the one stipulated in the terms and conditions by the Bank, in order to benefit from the percolation effect and to

give more elbow room for the construction workers to operate while digging the well. However, this wider diameter necessarily involves additional expenditure on the part of the borrower. This in turn results in reduction in the depth of the well or delay in the time schedule of the work or for want of funds less amount of specified construction work for each instalment lifted. Consciously or otherwise, many farmers get themselves involved in these difficulties. Even the successful beneficiaries are also guilty of violating the norm of diameter. The Bank, however, disapproves only the reduction in the specified works.

The other kind of difficulty refers to not keeping up the time schedule of the work to be carried out for each instalment of loan amount received by the farmers. In most of the cases this situation arises as the contractor, entrusted with the work, allegedly plays truant or turns out less than the specified work. Also it is possible that the borrower himself may divert the funds for other purposes hoping to raise the same at a later date to complete the construction work of the well. When this does not take place or delayed, he gets himself into difficulties since the Bank would not release the next instalment under such circumstances.

In the lone case from Beed, the borrower has utilised just one instalment and subsequently allowed lapse of time in the schedule. He is now unable to obtain the next instalment as the matter has been referred to the headquarters of the Land Development Bank. Similarly, three cases from Osmanabad have been treated under technical misutilisation on account of lapse in the time schedule or inordinate delay in turning out the specified work expected of the instalment already lifted.

In all, eight cases (all in Osmanabad) have remained as incomplete on account of exceeding diameter and consequently unable to turn out the required quantity of work for the loan amount already received. The Bank has treated all these cases as partly misutilised and partly incomplete. While exceeding the diameter of the well may be a technical matter, the sanctioned funds being not used for required depth or other aspects of the construction of the well is construed as partial misutilisation. Among the twelve cases falling under this category, four are old wells and eight new wells. Three old wells are unable to receive the pumpset component and the remaining ones have still to receive one or two instalments for completing the construction of wells.

(7) Risky to Complete the Project

This is somewhat a unique case from Beed, the borrower

does not want to proceed with the work after lifting two instalments and reaching a depth of 25' without striking water. Though Bank is prepared to release the next instalment, the uncertainty associated with reaching any aquifer and not to risk the burden of loan further, the borrower has ceased to work on the project. On the other hand, the Bank cannot refer the matter to GSDA because the well has not reached the depth of 40'.

(8) Partial Misutilisation

The borrowers have failed to strike water after lifting two instalments and are inclined to complete the project only when the Bank releases the third instalment of the loan. However, the Bank is of the opinion that full utilisation of the funds released so far has not taken place and the cases come under partial misutilisation category. There are only two cases, one each from Beed and Osmanabad and, both are new dug well project.

(9) Incomplete due to Misrepresentation and False Claims

In this situation of near completion of projects, the penultimate instalment of well loan or the pumpset component is not being released by the Bank on the grounds that the concerned borrowers have misrepresented the fact and, have made false claims for additional funds to complete the projects. This has resulted in one case of

old well and two cases of new well projects denied of the release of pumpsets. The Bank is of the view that claims for additional loan funds or extra loan amount over and above the sanctioned amount cannot be granted as the loan feasibility of the concerned borrowers has already reached the maximum limit.

(10) Rank Misutilisation of Loans

The rank misutilisation accounts for 23.2 per cent of the sample cases from both the districts. However, the relative proportion is much greater in respect of Beed. Besides, the manifestation of misutilisation is relatively more in the case of new dug well cases than old wells. It is only in the case of improvement of old wells we find the misutilisation occurring after the release of the final instalment of the construction part of the loan. However, in such event, the issue of pumpset is invariably withheld in the case of composite loans.

In sum, the cases mentioned under the broad categories of main reasons for infructuous investment are both illustrative and indicative. They illustrate the types of difficulties and shades of motives for the individual projects to remain incomplete or improper use of funds borrowed. Also, they are indicative of genuine problems of physical or natural constraints to be encountered in the course of construction work. The constraints are

manifested, may be limited to some cases, in the form of caving in of sides, hard base rocks and inadequate quantity of water or absence of aquifers. Apparently, around 30 per cent of the cases reviewed may not be faulted for misutilisation. At the other extreme, we find varying extent of human factor being manifested in voluntary disenchantment with the scheme or voluntary withdrawal from the scheme, technical and partial misutilisation and, lastly the misuse of loan amounts. Apparently, the misutilisation in one form or other and technical or otherwise, takes a very large toll of the individual projects. The funds from the defaulters may eventually be recovered and some of the incomplete projects may be successfully completed at later dates. Nevertheless, what must be the cause for immediate concern is the sinking of considerable amount of previous funds without securing commensurate benefits in terms of enhanced resource base in the areas, especially, prone to successive droughts.

CHAPTER VI

ASPECTS OF INVESTMENT AND FINANCE

Before we deal with the benefits accruing from the investment, it is necessary to have a general idea about the opinions and experience of loanee farmers on certain aspects; physical manifestation of the investment and utilisation of finance. The present chapter, therefore, deals with the following aspects relevant to the implementation of the scheme on the part of the beneficiary farmers.

- (1) Opinions of the borrowers and their experience in regard to extension, technical facilities, credit and other infrastructure arrangements;
- (2) Physical dimensions of dug wells and type of lifting device installed;
- (3) Cost of investment and extent of loan financing.

6.1 Opinions and Experience

This section attempts to present some information that has been covered through a set of general questions. It is mostly in the form of opinions elicited from the informants included in the study. By and large, it covers

dissemination of information for investment decision, extension facilities, credit infrastructure, etc. In other words, adequacy or otherwise of the support facilities available to farmers are broadly mentioned here. The questions put to the informants have been in the form of multiple choice objective ones and often evoking simply 'yes' or 'no' response. The highlights of the information so obtained from the beneficiary, as well as, the other category of borrowers whose projects have been deemed 'incomplete', are provided in the following.

In regard to the decision on investment each sample borrower was asked to state whether it was his own or promoted by others, such as, official from Bank, extension service or any other agency and experience of the neighbour. The response from every one of the 111 households was that it was his own decision to seek the assistance of the Land Development Bank (LDB) for the investment. Further, none of the farmers experienced any difficulty at any stage in receiving the loan. Also everyone stated that he was given to understand the terms and conditions of loan by the concerned Bank officials. The decision about the selection of the site for construction of well, the dimensions of the well and the horse power of the pumpset was also exercised by the loanees themselves rather than the officials or

irrigation experts. No one admitted to have employed any water diviner especially in regard to the siting of well.

All the borrowers have stated that one or the other of the extension officials and the concerned officials from Land Development Bank have had visited the sites during the course of project implementation. The type of advice received from them pertained mostly to cropping pattern and investment work in the case of Osmanabad sample and, loan utilisation, investment work, input use and cropping pattern in the case of sample farmers in Beed district. Asked to state whether the advice so received was followed up, all the sample farmers from Osmanabad district responded positively. On the other hand, about 8.0 per cent of beneficiary and 26.0 per cent of 'incomplete' farmers from Beed district did not follow the same. All these negative response belonged to composite type loans, that is, old or new dug well with pumpset. The reason for not following up the advice, however, was uniformly the same - lack of funds. Asked to state whether or not the Land Development Bank officials, in particular, visited the site of well for inspection of work done and for providing technical guidance, all the informants gave positive answers. Further, they also have stated that they were satisfied with the technical

advice rendered by the Land Development Bank officials. No informant could make any other comment on financing bank and its procedures even when specifically asked to do so.

In regard to the general query as to whether the water supply was perennial or seasonal, the majority of the beneficiary found it to be only seasonal. In the case of sample from Beed, about 69 per cent reported it to be seasonal while 65 per cent in Osmanabad found it to be so. In all, only a third of the wells was regarded as perennial. It was also ascertained that the inadequate level in the wells was not due to over-clustering of wells. Actually, all the farmers interviewed were of the opinion that no well was constructed nearby since the completion of the investment.

The arrangements for servicing of pumpset were found to be satisfactory to all the sample farmers. However, when asked to state the proximity to the nearest servicing centre, the response was quite varied. About 12 per cent of informants in either district could not give any idea of distance. It was only in the case of 9.3 per cent in Osmanabad and 25.0 per cent in Beed that the nearest centre was within a distance of five kms. In the latter district, for another 47.2 per cent it was located within 6-10 kms. The farthest centre was over

15 kms. in the case of 5.6 per cent of the sample. Among the Osmanabad beneficiary farmers, only 20.0 per cent could find the service within 10 kms. and another 21.3 per cent at 11-15 kms. distance. The distance was 16-30 kms. in the case of 33.4 per cent of farmers. However, it was beyond 30 kms. in the case of 13.3 per cent of the beneficiary farmers. This infrastructure facility was rather inadequate especially for the Osmanabad sample farmers.

In so far as infrastructure needs and arrangements for short term credit, input supply etc. were concerned, the response of the sample farmers was rather a mixed one. Among the sample borrowers from both the districts, only 64 per cent farmers were members of cooperative credit societies. In Beed sample it accounted for 44.4 per cent for beneficiary, 26.3 per cent for 'incomplete' category and 38.2 per cent for both categories. In comparison, in Osmanabad district greater proportion of borrowers reported being members. It was 80 per cent for beneficiary, 70.2 per cent for 'incomplete' and 76.8 per cent for both put together. The reason for not being a member of any credit society (S.T. loans) in most cases was that there was no need for the same. However, a few non-members admitted that they were defaulters and hence no longer active members. Asked

about the adequacy of the crop loan obtained from the cooperative credit societies, majority of the sample answered in negative. Those answering in negative felt that both cash and kind components were inadequate for raising the crops. The present system of distributing inputs in terms of timely availability, adequacy and reasonableness of price was found satisfactory in all the reporting cases.

When asked to state, whether or not the informants were satisfied with the present method of marketing of their produce, all the beneficiary farmers of Osmanabad, as well as, 'incomplete' cases of both districts responded positively. It was, however, only in the case of seven beneficiary farmers from Beed district, the marketing method was reportedly unsatisfactory. The only reason stated for their dissatisfaction was the low price offered to their produce at the market.

The type of assistance the farmers would like to get for better cultivation evoked somewhat unexpected response. Instead of uniformly mentioning the general option for 'more finance', the beneficiary from Beed preferred to have 'technical advice' (39 per cent), timely 'supply of quality inputs' (19 per cent), price support (3.0 per cent) and the rest simply 'more finance'. The incomplete category from Beed was almost equally

divided between 'more finance' and 'technical advice'. Similarly, the Osmanabad beneficiary expressed their preference in favour of 'more finance' (79 per cent) and 'technical advice' (20 per cent). The 'incomplete' category, however, totally preferred to have 'more finance'. Significantly enough, a substantial proportion of farmers did value 'technical advice' and 'timely supply of inputs' rather than mere funds.

6.2 Dug Well and Lifting Device

(a) Size of Completed Wells : Based on the suggestion by the hydro-geologist, the Land Development Bank has fixed the following sizes of wells as standard in deccan trap soils for varying extent of expected command areas.

<u>Command area of the well</u>		<u>Size of the well</u>		
		<u>Dia.</u>	<u>x</u>	<u>Depth</u>
Upto 5.00 acres	....	12'	x	35'
5.01 to 7.50 acres	.....	15'	x	40'
7.51 to 10.00 acres	.....	18'	x	40'

However, this norm has not been observed at all as it is evident from the survey data in respect of completed wells. Excluding the 30 cases of single purpose pumpset loans and, one well that has ended up in ablong shape, presently we are concerned with only 80 cases of new or old wells of the beneficiaries. In almost all these 80 cases, we may find deviation from the stipulated standard

size for the wells. This breach is observed both in respect of size of the diameter and the level of depth.

The deviation from the recommended norm has generally manifested in increase in the diameter and decrease in the depth of the wells. In a very few cases (16 per cent) the diameter of the wells may approximate to the standard fixed for the loanees. Similarly, the range of 35'-40' depth can be observed only in about 10 per cent of cases. Wells deeper than the standard depth are seen only in Beed. In Osmanabad, all the sample wells fall below the recommended depth. Since these wells have struck water at a lower level of depth than 35', the Bank apparently, may not have insisted upon the complete fulfilment of the project. A general idea about the frequency distribution of wells according to the varying size groups and deviation from the required depth may be obtained from the data set in Table 6.1.

The reasons for increased diameter, as given by the loanee farmers themselves, appear to be based on local experience, practical consideration and technique of sinking dug wells. According to the farmers, the broader diameter is helpful in securing the benefit of percolation effect during the monsoon season and this helps them to have more water for the rabi crops. The construction work of dug wells is invariably given to

Table 6.1 : Standard size of wells prescribed and deviation from the standard by sample dug wells

Combination of diameter and depth	Depth level of dug well	Beed No.	Osmanabad No.	Both districts No.
Dia 12'-15' x depth 35'	Below	5	-	5
	Above	4	-	4
Dia 16'-18' x depth 40'	Below	2	1	3
	Above	1	-	1
Dia 19'-20' x depth 40'	Below	7	1	8
	Above	-	-	-
Dia above 20' x depth 40'	Below	8	49	57
	Above	2	-	2
Total wells	Below	22	51	73
	Above	7	-	7
		29	51	80

specialist private contractors whose gang of skilled workers requires more operating space than 12'-15' diameter. It is believed that larger diameter gives more elbow room for workers and the fear of caving in of side walls and possibility of workers being trapped in, are greatly eliminated. Further more, the sub soil

is so rocky that most of the construction works require blasting operation and this necessarily affects the diameter and shape of the wells. Under these circumstances, it is very difficult for the concerned staff of the Bank to strictly enforce the standard requirements. Nevertheless, it is tacitly understood that the loanee farmers themselves would bear extra expenditure arising from the increase in diameter of the wells.

However, one of the implications is that the loanee farmers may get into financial difficulties by increasing the diameter and hence the greater quantum of excavation. In some cases this may be offset by lesser level of depth, provided the water is struck and the quantity would be adequate. If they are not able to strike water at a lesser level of depth, the total cost of the project would increase as they are required to excavate deeper with larger diameter. Otherwise, the well might remain incomplete on technical default. The experience of the some of the borrowers with the 'incomplete' wells proves this point.

(b) Types of Water Lifting Device : Among the 111 beneficiary borrowers, only 12 have obtained single purpose dug well loans, nine for new wells and three for renovation of old wells, the others having obtained composite loans with electric motor pumpsets (69 cases)

and only electric motor pumpsets (30 cases) for their existing wells. Thus, 99 wells are equipped with electric motor pumpsets to lift the water. The remaining 12 wells, 10 from Osmanabad and two from Beed have their own devices without the help of the Bank loans. In Osmanabad six of these wells are equipped with oil engines and the remaining four with electric pumpsets. Of the six oil engines, three are owned and the other three are hired ones. All the four electric pumpsets, however, are owned ones. In Beed one well is equipped by owned oil engine and the other with a mhot. The frequency distribution of wells according to lifting device is shown in Table 6.2.

Table 6.2 : Distribution of wells according to type of water lifting device

Type of device	District		
	Beed No.	Osmanabad No.	Both No.
i) Electric pumpset	34	69	103
ii) Oil engine	1	6	7
iii) Mhot	1	-	1
Total	36	75	111

6.3 Cost of Investment and Adequacy of Loan

The details of the actual costs incurred on broad items of investment, namely, (a) construction of dug well or renovation of old well, (b) cost of the pumpset and (c) the connected works like switch room and installation of pumpset units, are presented in Tables 6.3 to 6.7. The data refer to average expenses per reporting borrower classified separately according to the five types of the loan. Under each type, the data are further disaggregated according to the three broad size groups of the beneficiary farmers separately for Osmanabad and Beed districts. The data also refer to the total amount of loans received from the Land Development Bank and the difference between the amount of loan and the actual cost of investment. However, in five cases of the composite type, the amount sanctioned for pumpsets is not being considered for, at the time of the interview, the concerned loanee-farmers had not actually lifted the same but subsequently expected to do so any moment. In point of fact, their wells are operational as they are fitted with the pumpsets procured on their own and now expecting Land Development Bank to release the funds.

The highlights of the data as revealed by the tables are broadly summarised in the following. The average expenditure on construction varies from a minimum

Table 6.4 : Details of average cost of investment and the extent of average loan financing (Renovation of old well)

Size group	Number of reporting farmer	Price paid for the pumpset	Engine shed and other concerned expenditure	Expenditure on the construction of the well	Total expenditure	Total loan amount received	(Amount in Rs.)	
							Difference between total expenditure and total loan amount received	Loan amount as % of total cost
Osmanabad								
1) Small farmers	-	-	-	2000	2000	2100	100	105
2) Medium farmers	-	-	-	-	-	-	-	-
3) Large farmers	-	-	-	-	-	-	-	-
Total	1	-	-	2000	2000	2100	100	105
Beed								
1) Small farmers	2	-	-	4138	4138	3500	638	85
2) Medium farmers	-	-	-	-	-	-	-	-
Total	2	-	-	4138	4138	3500	638	85

Table 6.5 : Details of average cost of investment and the extent of average loan financing (New well plus pumpset)

Name of the District	Number of reporting farmer	Price paid for the pumpset	Engine shed and other concerned expenditure	Expenditure on the construction of the well	Total expenditure	Total loan amount received	Difference between total expenditure and total loan amount received	Loan amount as % of total cost
Osmanabad								
1) Small farmers	18	6230	309	11405	17598	15163	2435	86
2) Medium farmers	2	5000	450	8750	11475	10700	775	93
3) Large farmers	5	5595	160	12770	18525	15400	3125	83
Total	25	6038	297	11466	17294	14853	2440	86
Beed								
1) Small farmers	15	5004	454	11820	16609	11953	4655	72
2) Medium farmers	-	-	-	-	-	-	-	--
Total	15	5004	454	11820	16609	11953	4655	72

Table 6.6 : Details of average cost of investment and the extent of average loan financing (Renovation of old well plus pumpset)
(Amount in Rs,)

Name of the District	Number of reporting farmer	Price paid for the pumpset	Engine shed and other concerned expenditure	Expenditure on the construction of the well	Total expenditure	Total loan amount received	Difference between total expenditure and total loan amount received	Loan amount as % of total cost
Osmanabad								
1) Small farmers	11	5236	377	7639	13253	10114	3139	76
2) Medium farmers	4	6550	175	5250	11975	9565	2410	80
3) Large farmers	1	5500	600	5480	11580	9000	2580	78
Total	16	5581	341	6907	12829	9907	2922	77
Beed								
1) Small farmers	12	4922	333	9051	12993	9917	3076	76
2) Medium farmers	1	6000	-	5000	11000	11300	300	103
Total	13	5030	333	8739	12839	10023	2816	78

Table 6.7 : Details of average cost of investment and the extent of average loan financing (only pumpset)

(Amount in Rs.)								
Name of the district	Number of reporting farmer	Price paid for the pumpset	Engine shed and other concerned expenditure	Expenditure on the construction of the well	Total expenditure	Total loan amount received	Difference between total expenditure and total loan amount received	Loan amount as % of total cost
Osmanabad								
1) Small farmers	16	5478	486	-	5965	5656	309	95
2) Medium farmers	7	5461	186	-	5646	5642	4	100
3) Large farmers	1	9000	350	-	9350	9000	350	96
Total	24	5620	393	-	6013	5791	221	96
Beed								
1) Small farmers	6	5017	1084	-	6101	4917	1184	81
2) Medium farmers	-	-	-	-	-	-	-	-
Total	6	5017	1084	-	6101	4917	1184	81

of Rs.8,750 in the case of medium size group to a maximum of Rs.13,150 in that of large holding group (single purpose loan for new well). The average in the case of small farmers in Beed works out to Rs.11,620. In the case of average investment on improvement of old well, it varies from as low as Rs.2,000, in a solitary case of a small farmer to Rs.9,051 in the case of small holdings group in Beed. In the case of electric motor pumpset, it varies with the horse power of the motor, the average being Rs.5,000 and Rs.6,000 in most cases. In the case of expenditure on pump house or other works connected with the installation of the pumpset, there are large variation from Rs.300 to over Rs.1,000 especially, in cases where construction of shed or switch room is involved. In all, the average total expenditure varies from Rs.2,000 in the case of deepening the old well to as high as Rs.18,525 for the large holding group for composite loan in Osmanabad district.

Adequacy of the Loan

The actual loan amount received depends upon the type of the scheme, quantity of physical work involved and the cost of the pumpset of the varying capacity. However, the total loan amount is subject to loan feasibility limit worked out for each case. Nonetheless, the average amount of receipt may provide a broad idea

in regard to the adequacy or otherwise of the loan in the light of the amount actually incurred by the beneficiary farmers (see Tables 6.3 to 6.7).

The pattern of typewise and holdingwise average receipt and expenditure reveals that except in two cases (old well and old well with pumpset from Beed) the actual expenditure invariably exceeds the loan amount received. The average amount of loan received as proportion of the total expenditure works out to 93 per cent for new dug wells and 85 per cent for improvement of old wells. In the case of composite loans, it varies between 72 and 86 per cent for new well with pumpset and it is around 78 per cent for old well with pumpset. In the case of single purpose pumpset type the proportion varies between 81 and 96 per cent. Anyway, the excess expenditure is mainly incurred on account of the construction of well and, to some extent, works connected with installation of pumpset.

Whether or not justified, the tendency on the part of the borrowers appears to be in favour of incurring extra expenditure on the project. On their part, it is claimed that the extra work of excavation on account of necessary increase in the diameter of the well, hard rock conditions and cost escalation in the construction works result in imbalance between sanctioned loan and actual cost of investment. In most cases the project

involving new wells are completed within the upper limit of unit cost (Rs.17,000) fixed by the Bank. However, the deficit arises mainly on account of loan feasibility limit worked out for each case of individual borrowers. In most cases, this ceiling on loan eligibility amount may result in some compromise with the specified construction work or strain on the loanee-farmer to raise additional funds elsewhere. Almost all the farmers interviewed have managed to make good the deficit on their own resources inclusive of the component of family labour inputs.

CHAPTER VII

ASSESSMENT OF POST INVESTMENT BENEFITS

In the present chapter an attempt is made to bring out the relevant changes that have taken place arising from the investment. The benefits have not accrued to the extent of assumptions made under the economics of the scheme and, the data are not ideally amenable to any sophisticated exercises like cost-benefit analysis. Nevertheless, the information analysed here includes such aspects as area benefited, intensity of irrigation, cropping intensity, changes in the cropping pattern and the deviation from the recommended pattern which could ensure adequate incremental output. Also are given whatever the benefits accruing from the investment by way of net incremental income, incremental employment, return on the investment etc.

7.1 Area Under Irrigation

One of the major benefits of the successful dug well project is the enhancement of the physical resource of the beneficiary farmer. The rainfed dry land gets converted into more valuable irrigable land under the command of the well. The very presence of a well, which is a durable asset, enhances the value of land enormously. The extent

of irrigable land mainly depends upon the factors like size of the fragment in which the well is located, quantity of water available, efficiency of the water lifting device and the cropping pattern to be adopted. The area actually irrigated in a given season or year largely depends upon the above mentioned factors as well as the capacity of the farmer to raise other resources necessary for cultivation. Also a factor that assumes alarming proportion in certain areas is the successive drought condition brought upon by lean monsoons. This periodical occurrence causes uncertainty and considerably affects, among other things, the extent and intensity of irrigation.

The benefit accruing to the sample beneficiary farmers, in terms of increase in the area under irrigation, may be seen in Table 7.1. The table also gives the comparative position between the pre-investment (1982-83) and post-investment period (1983-84). It may well be noted that the reference year being the very first year of the flow of the benefit and also a drought period, the extent of benefit may not reflect the expected normal or ideal situation.

In absolute terms, the net area irrigated by sample farmers has increased from 174.38 acres in pre-investment year to 630.13 acres in post-investment year, representing 261.35 per cent net increase on account of investment at

Table 7.1 : Changes in the area under irrigated between pre-investment and post-investment periods

District/ Type of the farmer	Number of farmers	(Area in acres)					
		Pre-investment period (1982-83)			Post-investment period (1983-84)		
		Net irrigated area	Double cropped irrigated area	Gross irrigated area	Net irrigated area	Double cropped irrigated area	Gross irrigated area
<u>Beed</u>							
Small farmer	35	52.88 (1.51)	20.38 (0.58)	73.26 (2.09)	162.33 (4.64)	70.80 (2.02)	233.13 (6.66)
Medium farmer	1	2.00	-	2.00	10.00	10.00	20.00
Total	36	54.88 (1.52)	20.38 (0.57)	75.26 (2.09)	172.33 (4.79)	80.80 (2.24)	253.13 (7.03)
<u>Osmanabad</u>							
Small farmer	52	48.50 (0.93)	4.00 (0.08)	52.50 (1.01)	220.80 (4.25)	23.33 (0.45)	244.13 (4.69)
Medium farmer	15	58.00 (3.87)	-	58.00 (3.87)	123.00 (8.2)	10.00 (0.67)	133.00 (8.87)
Large farmer	8	13.00 (1.63)	-	13.00 (1.63)	114.00 (14.25)	6.00 (0.75)	120.00 (15.00)
Total	75	119.50 (1.59)	4.00 (0.06)	123.50 (1.65)	457.80 (6.10)	39.35 (0.53)	497.13 (6.63)
Grand Total	111	174.38 (1.57)	24.38 (0.22)	198.76 (1.79)	630.13 (5.68)	120.13 (1.08)	750.26 (6.76)

N.B. : Figures in parentheses refer to average area per beneficiary farmer.

the aggregate level. This percentage increase is relatively greater in Osmanabad district (283.65) as compared to Beed (213.33). The net change in terms of average per beneficiary farmer, during the corresponding period, as revealed by the table (7.1) is summarised in Table 7.2.

Table 7.2 : Net increase in the average irrigated area per beneficiary farmer in the post-investment period

District/ Type of the farmer	No. of farmers	Net increase in (acres)		
		Net irrigated area	Area cropped more than once	Gross irrigated area
Beed				
Small	35	3.13	1.44	4.57
Medium	1	8.00	10.00	18.00
Total	36	3.26	1.68	4.94
Osmanabad				
Small	52	3.31	0.38	3.69
Medium	15	4.33	0.67	5.00
Big	8	12.63	0.75	13.38
Total	75	4.51	0.47	4.98

The average net increase in net irrigated area per farm broadly varies with the size group of the holding. Excluding the solitary case of a medium farm, as an exceptional case, we find that the average increase is around

three acres for the small farm, four acres for the medium farm and 12.6 acres for the big farms. At the aggregate level it is 3.3 acres in Beed and 4.5 acres in Osmanabad district. The net increase in the average area cropped more than once per farm is relatively higher in Beed (1.7 acres) as compared to Osmanabad, where it is less than one acre. The net increase in the gross irrigated area, in the very first year of the benefit, has worked out to just about five acres on an average per farm (Table 7.2).

7.2 Intensity of Irrigation

Beneficiary farmers have been feeling that the benefits from the investment are not upto their own expectations and the main reason adduced is invariably the low level of water column in the wells at their disposal. Eventually, it is traced to the low and irregular rainfall. Nevertheless, as revealed by data in respect of capacity and operation of wells, during the three seasons of 1983-84, it appears to be somewhat in a low key and justify the contention of the farmers to a considerable extent. However, the data furnished by the informants may be taken, at the most, as only an approximation especially, in regard to levels of depth of water before and after pumping out operation and also the other details like the number of days and duration of pumping and recuperation period. The seasonwise relevant details for reporting cases are shown in Table 7.3.

Table 7.1 : Seasonwise particulars of average level of water before and after operation of wells and average recuperation time (1983-84)

Particulars	Beed			Osmanabad		
	Kharif	Rabi	Summer	Kharif	Rabi	Summer
Number of wells	23	32	8	60	71	24
Average area irrigated (acres)	4.52	4.62	1.96	3.61	4.85	3.15
Average static depth (in feet)	18.0	14.3	9.9	19.8	13.0	9.8
Low	10.0	8.0	2.0	7.0	5.0	2.0
High	30.0	20.0	15.0	35.0	20.0	10.0
No. of days of pumping	5.3	6.8	8.4	14.9	17.2	12.2
Hours of pumping on days pump operated	6.8	8.5	6.8	8.4	9.4	8.5
Level after pumping (in feet)	12.6	7.3	3.3	10.9	4.1	2.2
Low	4.0	2.0	2.0	5.0	2.0	2.0
High	20.0	6.8	6.0	20.0	10.0	4.0
Recuperation time (hours)	10.0	14.4	20.9	11.2	14.8	19.4
Low	8.0	12.0	16.0	8.0	12.0	18.0
High	20.0	24.0	36.0	12.0	24.0	36.0

N.B. : Area under perennial crop (sugarcane) is included in the average area for all the three seasons.

Even though all the wells are operational, only about 6.4 per cent in Beed and 80 per cent of sample farmers in Osmanabad have used their wells for irrigation in kharif season. However, in the selected districts rabi is the most important season for raising irrigated crops. This is because some farmers do not like to use well water in kharif season only to take advantage of monsoon rains and conserve water in their wells for the use in rabi season. Nonetheless, even in rabi season about five per cent in Osmanabad and 11 per cent in Beed do not figure in view of very low level of water columns in their wells. In the summer season only about 22 per cent in Beed and 32 per cent in Osmanabad sample are able to utilise the wells for irrigation. Anyway, every well has been utilised for atleast one season during the reference year.

The average area irrigated per reporting well (inclusive of perennial area repeated for all the seasons) is very nearly same for kharif and rabi (around 4.5 acres) and just under two acres in summer season in Beed district. In Osmanabad, it is nearly five acres in rabi and much lesser extent in other seasons.

The average level of static depth is almost similar in both districts and generally below 20' in kharif, below 15' in rabi and around 10' in summer season for the reporting wells. Comparatively speaking, the average total hours of

operating the wells is in a considerably lower side in the case of Beed than Osmanabad. This is true in all the seasons of the reference year. The average level of water, after pumping operation, reveals that around five to seven feet level of water being utilised in different seasons in Beed district. Similarly, in Osmanabad district it is around nine feet in kharif and rabi and 7.6 feet in summer season. The reported duration for recuperation of water varies considerably from well to well. In terms of hours, it varies from eight to 20 hours in kharif, 12-24 hours in rabi and 16-36 hours in summer season. The average time, however works out to around 11 hours in kharif, 15 hours in rabi and 20 hours in summer.

It may not be desirable to attempt any meaningful estimates or analyses based on this kind of data in view of uneven shape of well due to rocky sub-strata, rather long recall period resulting in answers being widely at variance and inconsistent with the same informant and the abnormal seasonal conditions.

7.3 Intensity of Cropping

According to the assumption of the scheme, the gross cropped area in the post-investment period can be increased considerably by raising two or even three crops annually in a substantial portion of the irrigated areas. The post-development cropping pattern, as recommended by the scheme,

has worked out that the cropping intensity as measured by the percentage of gross cropped area to net cropped area to be 150-160 for irrigated area upto five acres and 130-140 for the area five to ten acres. This intensity is worked out without assigning any weightage to the perennial crop like sugarcane, which is irrigated all through the seasons of the year.

The expectation, however, has not been realised by the beneficiary farmers during the reference period (1983-84). In point of fact, the increase in the net irrigated component of the holding has not been accompanied by substantial increase in the gross cropped area. As compared to the crop intensity in the pre-investment period for the irrigated areas, the post-investment period records only marginal increase, and, quite below the level assumed, especially in the case of Osmanabad. The details of net cropped and gross cropped irrigated areas and the crop intensities for pre-investment and post-investment years are presented in Table 7.4. It also gives separately the gross cropped area weighted for sugarcane crop and accordingly the crop intensity as well.

The conventional crop intensity (unweighted) works out to 147 per cent for Beed and 109 per cent for Osmanabad in the post-investment year. This, despite deepening of old wells, fitting electric motor pumpsets as also the new

Table 7.4 : Cropping intensity of the irrigated areas of the beneficiary farmers

District/ Size of holding	Pre-investment year (1982-83)					Post-investment period (1983-84)				
	Net cropped area	Gross cropped area	Crop inten- sity (%)	G.C.area weighted for pere- nnial crop	Weighted crop inten- sity (%)	Net cropped area	Gross cropped area	Crop inten- sity (%)	G.C.area weighted for pere- nnial	Weighted crop inten- sity (%)
(Area in acres)										
Beed										
Small	52.88	73.26	139	81.26	154	162.33	233.13	144	247.47	152
Medium	2.00	2.00	100	2.00	100	10.00	20.00	200	20.00	200
Total	54.88	75.26	137	83.26	152	172.33	253.13	147	267.47	155
Osmanabad										
Small	48.50	52.50	108	76.50	158	220.80	244.13	111	319.13	145
Medium	58.00	58.00	100	88.00	152	123.00	133.00	108	177.00	144
Big	13.00	13.00	100	19.00	146	114.00	120.00	105	140.00	123
Total	119.50	123.50	103	183.50	154	457.80	497.13	109	636.13	139

wells with pumpsets, is well below the crop intensity assumed by the scheme. The situation in Osmanabad, in particular, where two-thirds of the total sample beneficiaries are located, the crop intensity has increased from 103 per cent in pre-investment year to mere 109 per cent in the post-investment year. Relatively speaking, the crop intensity is slightly greater in smaller holdings, the exception being the single case of a medium size holding from Beed.

On the other hand, the weighted crop intensity method adopted here takes into account, the use of land by the same crop over more than one season and, it is accordingly weighted to that extent. In the case of sugarcane the area is counted thrice as it is cultivated through all the three seasons of the year. Besides, if it were not for this high water consuming crop, the farmer could have raised, in the same area, three other crops such as cereals or oil-seeds. This weighted crop intensity works out to 152 per cent in pre-investment and 155 per cent in post-investment period for Beed and 154 per cent and 139 per cent respectively for Osmanabad. Even this falls short of the intensity assumed in the cropping pattern of the scheme, if the latter is also given due weightage to the recommended area under sugarcane.

7.4 Changes in the Cropping Pattern

General Change in the Seasonal Cropping : Before we consider the changes in the area under specific crops arising from the benefits of investment, it may be worth taking a brief look at the broad changes in the area under cropping seasons between the pre-investment and post-investment points of time. The relevant details are presented in Table 7.5.

The pattern in the pre-investment period reveals that the rabi season accounts for major proportion (around 58%) of the irrigated area and kharif dominates the unirrigated cropped area, accounting for about 70 per cent in Beed as well as Osmanabad. The summer cropping is very negligible and the perennial cropping is somewhat considerable only in Osmanabad. The overall pattern shows kharif as the major season, accounting for about 60 per cent of the gross cropped area, with rabi season accounting for only a little over a third of the total area.

In the post-investment period, the increase in the irrigated area consequent to conversion of some unirrigated portion into irrigated area, has resulted in some changes in the seasonwise cropping. The kharif sown area has increased in the irrigated portion in respect to absolute acreage, as well as relative proportion of the gross cropped

Table 7.5 : Seasonwise cropped area during pre-investment and post-investment years

Season	District Beed						District Osmanabad					
	Pre-investment			Post-investment			Pre-investment			Post-investment		
	Irrigated	Non-irri- gated	Total	Irrigated	Non-irri- gated	Total	Irrigated	Non-irri- gated	Total	Irrigated	Non-irri- gated	Total
	(Area in acres)											
Kharif	24.38 (32.4)	134.88 (70.7)	159.26 (59.9)	96.88 (38.3)	56.97 (96.6)	153.85 (49.3)	19.00 (15.4)	512.30 (69.3)	531.30 (61.6)	146.83 (29.5)	427.67 (86.0)	574.50 (57.8)
Rabi	43.38 (57.6)	55.80 (29.3)	99.18 (37.3)	140.58 (55.5)	2.00 (3.4)	142.58 (45.7)	72.50 (58.7)	226.51 (30.7)	299.01 (34.7)	274.80 (55.3)	69.50 (14.0)	344.30 (34.6)
Summer	3.50 (4.7)	-	3.50 (1.3)	8.50 (3.4)	-	8.50 (2.7)	2.00 (1.6)	-	2.00 (0.2)	6.00 (1.2)	-	6.00 (0.6)
Perennial	4.00 (5.3)	-	4.00 (1.5)	7.17 (2.8)	-	7.17 (2.3)	30.00 (24.3)	-	30.00 (3.5)	69.50 (14.0)	-	69.50 (7.0)
Total	75.26 (100.0)	190.68 (100.0)	265.94 (100.0)	253.13 (100.0)	58.97 (100.0)	312.10 (100.0)	123.50 (100.0)	733.81 (100.0)	862.31 (100.0)	497.13 (100.0)	497.17 (100.0)	994.30 (100.0)

N.B. : Figures in parenthesis refer to percentages to total cropped area.

area. In the unirrigated portion, kharif continues to be the dominant season on account^{of}/rainfall during the season. Especially in the case of Beed, almost the entire unirrigated portion is cropped only during the kharif season (97 per cent). In the rabi season absolute acreage cropped in unirrigated lands has shown increase even though the relative proportion has registered a marginal decline. Similar is the pattern in the case of irrigated cropping for summer and perennial. The overall cropping pattern shows relative decline in kharif season.

Post-investment Change in Cropping Pattern : In the very first year of the project benefits, there are some significant changes or shifts, as compared to the pre-investment period, in the cropping pattern adopted by the beneficiary farmers. Although there has been considerable increase in the absolute area under each irrigated crop on account of investment as well as the intensity in cropping, we must actually consider the relative proportion of the area under each crop to assess the change in the pattern. In point of fact, it is the previously unirrigated portion of cultivable land that has presently come under irrigation to a very large extent. This is particularly so in the case of beneficiary farmers under new dugwell projects.

Anyway, what is pertinent here is that in order to derive maximum benefits and, thereby obtain net incremental incomes to offset the cost of investment over a period of time, the choice of cropping pattern in the benefited area assumes considerable importance. The cropping pattern for the irrigated areas adapted during the reference year (1983-84), as compared to the one in pre-investment year (irrigated and unirrigated areas), may be seen from the data set in Table 7.6. The highlights of the changes in the relative proportions of the cropping pattern between the two points of time are as mentioned below.

The kharif jowar, hitherto confined to unirrigated areas, is now being cultivated in the irrigated areas. However, the HYV of jowar (kharif) has relatively declined in proportion in the post-investment year. The rabi jowar, too, shows relative decrement but only marginally. Nevertheless, the proportion of total area under jowar shows considerable increase in the irrigated portion of the post-investment period. On the other hand, wheat has registered some decline in the relative proportion in both districts, whereas, minor cereals like bajra and maize show slight increase only in Osmanabad. The position of total cereals in the irrigated areas shows some decline in proportion in Beed but a slight increase in Osmanabad in the post-investment year. Similar is the case in regard

Table 7.6 : Percentage distribution of cropwise area in pre-investment and pro-investment years

Crop	Beed district			Osmanabad district		
	Pre-investment	Post-		Pre-investment	Post-	
	Dry	Irrigated	investment irrigated	Dry	Irrigated	investment period irrigated
Kharif jowar	19.5	-	11.9	9.6	-	4.6
Kharif jowar (hybrid)	6.0	11.3	5.9	17.1	8.0	7.4
Rabi jowar	25.6	15.8	15.0	25.4	31.6	31.0
Total jowar	51.1	27.1	32.8	52.1	39.6	43.0
Rabi wheat	-	27.9	22.8	4.6	23.1	19.7
Other cereals	25.2	10.5	5.6	12.0	6.5	8.0
Total cereals	76.3	65.5	61.2	68.7	69.2	70.7
Pulses	9.6	16.6	14.9	19.1	-	3.8
Sugarcane	-	5.3	2.8	-	24.3	14.0
Others	-	-	-	0.4	0.8	0.8
Total foodcrops	85.9	87.4	78.9	88.2	94.3	89.3
Oilseeds	14.1	12.6	21.1	11.8	5.7	10.7
Total crops	100.0	100.0	100.0	100.0	100.0	100.0
Actual area (in acres)	190.68	75.26	253.13	738.81	123.50	497.13

to pulses, slight decrease in Beed but some increase in Osmanabad. In the latter case, pulses as irrigated crops are reported only in the post-investment year. Sugarcane too has relatively declined in both districts. However, oilseeds (mainly composed of sunflower) have increased very considerably in both districts. In short, it is kharif jowar and on account of it the total jowar and, oilseeds in both districts and 'other cereals' and pulses only in Osmanabad have relatively gained in irrigated areas. However, in terms of absolute area, all the crops under irrigation show increase in the post-investment year.

In the post-investment period too, the cereal crops especially jowar and wheat dominate the irrigated cropping pattern, with a little over 60 per cent in Beed and 70 per cent of the gross area in Osmanabad. Sugarcane, oilseeds and pulses as main cash fetching crops together account for remaining portion. In point of fact, only five crops, namely, jowar, wheat, sugarcane, sunflower and gram dominate the cropping pattern in both pre- and post-investment years to the extent of around 80 per cent in Beed and 90 per cent of gross irrigated area in Osmanabad.

All these crops, excluding wheat and sugarcane, have been raised even under rainfed conditions and, more or less, in similar proportions in the pre-investment period. The post-investment development has enabled the beneficiary

farmers to extend the physical area for the familiar irrigated crops and by and large, retaining the pattern in tact. However, one notable feature is that the recently introduced oilseed crop, vis., sunflower has been gaining momentum.

7.5 Deviation from the Recommended Cropping Pattern

The economics of the scheme has made assumptions as to incremental income arising from adopting particular cropping pattern, so that the loanee farmers would comfortably make the repayment of loans according to the schedule. The patterns differ according to the agro-climatic characteristics of the zones and varying extent of area for each recommended crop is provided with regard to the command area. The pattern relevant to our study area assumes crop intensity of 150-160 per cent and recommends the range for eight crops. The particular crops considered for the three seasons are :

- (a) Kharif : Hybrid jowar, hybrid bajra, groundnut and vegetable.
- (b) Rabi : HYV wheat, hybrid jowar, gram and vegetable.
- (c) Summer : Hybrid maize and vegetable.

The pattern also provides for sugarcane in Ashti and Kalamb talukas and cotton in Ambajogai, Omarga and Tuljapur talukas. Roughly speaking, the recommended cropping pattern

amounts to 65 to 70 per cent of cereals, all being high yielding varieties, 12 per cent of groundnut, about 8 per cent each of gram and cotton and four per cent each of vegetable and sugarcane.

By and large, the sample beneficiary farmers have not adhered to the recommended cropping pattern in their irrigated lands. Even though, 60-70 per cent of the cropped area is under cereals, only about six to seven per cent is under high yielding varieties. Apart from this rather serious deviation, bajra and maize are relatively neglected and more of local variety of jowar is raised. Instead of suggested cotton crop, as much as 14 per cent of the cropped area has gone to high water consuming sugarcane cultivation in Osmanabad. In the place of groundnut crop suggested for about 12 per cent of the area, it is mainly the sunflower that finds favour. Vegetable crop is raised only in less than one per cent of the area in Osmanabad as against recommended four per cent. In short, the adopted cropping pattern is quite different from the one recommended, not only in regard to extent of area under each crop but also the varieties of the crops. In fact, the relative proportion of area under hybrid jowar has declined in the post-investment year. The deviation is so considerable that it is a moot point whether the pattern eventually adopted would ensure expected incremental income to the beneficiary

farmers. However, it may be worth approaching this problem from the point of view of the farmers themselves.

Reasons for Deviation

The farmers are quite aware of the implications of not adhering to the recommended cropping pattern. Nevertheless, they are of the opinion that the constraints, both natural and human, have rendered them unable to follow the pattern suggested by the concerned officials. The reasons mentioned by the informants interviewed are not many but quite familiar ones and, these are summarised below.

(i) The inadequacy of ground water, on account of low water table compounded by insufficient and uncertain rainfall, has acted as deterrent from raising high yielding varieties of cereal crops as these require considerably more water input than the other varieties. Hence avoidance of risk on the part of the loanee-farmers.

(ii) The inadequacy of financial resources, required for procuring high-cost material inputs and labour charges to cultivate cash crops and high yielding variety food-grains, on account of lack of own funds and difficulties in obtaining credit on easy terms.

(iii) Also mentioned are the minor factors like

household consumption needs, the preference being the local variety of foodgrains and, the lack of familiarity with the technique and agronomic practices required for farming HYV crops and cash crops, on the part of those very small farmers who have obtained the irrigation facility for the first time.

In other words, most of them being small farmers, financially ill-equipped and not being members of the cooperative societies for the short-term credit, could not take risks vis-a-vis inadequate and uncertain water input and lack of other essential resources. Perhaps, the desired switch over will gradually take place with the rise in water table and other resource position.

7.6 Post-investment Benefits

Incremental Employment : Increase in the farm employment is one of the main benefits expected to be generated on continuing basis in the post-investment years. It is but natural to assume that normally irrigation facilitates intensive farming operations leading to greater employment of human labour. However, the survey data in respect of irrigated areas of the beneficiary farmers do not reveal any significant level of incremental employment during the reference year. If anything, it is more or less same as compared to the non-irrigated areas of beneficiary farms and rainfed control farms.

The data presented in Table 7.7 give the per acre average labour days of family and hired labour employed during the year 1983-84. However, in the case of employment on control farms, the available average employment in small farms is assumed to hold good for the purpose of comparison with the other two holding groups, for want of observations from the control farms. The solitary case of medium farm from Beed sample has been omitted from the consideration since the farm operations have been carried out on the basis of contractual work.

Anyway, the average incremental labour employment per acre works out to a meagre four and ten days as compared to non-irrigated and rainfed control areas respectively for Osmanabad beneficiary farms. On the other hand, the similar average works out to 4.5 days and minus one day for the sample beneficiary farms in Beed. The decremental employment in benefited area, though marginal, may be seen in respect of large farms in comparison with the non-irrigated areas of the beneficiary farms in Osmanabad. However, the insignificant marginal increase that has come about is mainly due to considerable employment of hired labour for raising sugarcane crop. In short, the deviation from the recommended cropping pattern as a result of low levels of water columns has contributed to this abnormal situation of near stagnancy despite considerable investment.

Table 7.7 : Holdingwise pattern of incremental farm employment in the post-investment period

Type of the farmer and district	(Average labour days per acre)														
	Irrigated			Non-irrigated			Control farmers			Incremental labour days as per non-irrigated area			Incremental labour days as per control farmers		
	Family labour	Hired labour	Total labour	Family labour	Hired labour	Total labour	Family labour	Hired labour	Total labour	Family labour	Hired labour	Total labour	Family labour	Hired labour	Total labour
<u>Osmanabad</u>															
Small farmer	5.01	17.21	22.22	5.51	10.80	16.31	2.98	3.43	6.41	-0.5	6.41	5.91	2.03	13.78	15.81
Medium farmer	3.47	11.31	14.78	3.13	4.83	7.96	2.98	3.43	6.41	0.34	6.48	6.82	0.49	7.88	8.37
Large farmer	1.89	5.28	7.17	2.74	9.44	12.18	2.98	3.43	6.41	-0.85	-4.16	-5.01	-1.09	1.85	0.76
Total	3.85	12.75	16.60	4.04	8.64	12.68	2.98	3.43	6.41	-0.19	4.11	3.92	0.87	9.32	10.19
<u>B e e d</u>															
Small farmer	1.91	3.98	5.89	.20	1.15	1.35	2.89	3.70	6.59	1.71	2.83	4.54	-0.98	0.28	-0.7
Total	1.91	3.98	5.89	.20	1.15	1.35	2.89	3.70	6.59	1.71	2.83	4.54	-0.98	0.28	-0.7

Incremental Income : The estimation of incremental income is the most important indicator of the degree of financial success of the investment. In fact, the loan feasibility is worked out on the assumption of generation of adequate incremental income (over the 'without project condition) to ensure the repaying capacity with a considerable margin available to the loanee-farmer. However, the expected incremental income is based on certain levels of crop intensity, intensity of irrigation and specific cropping pattern to be adopted in the benefited area. The survey data, on the other hand, have already revealed that none of these has been adequately fulfilled to achieve the desired results. Nevertheless, the situation of low key development under the abnormal seasonal conditions may be seen in the following.

The data presented in Table 7.8 show the per acre average net incomes derived separately for (a) benefited area (b) unirrigated area of the beneficiary operated holdings and (c) rainfed areas of control farms. The last two are taken to represent the 'without project condition' so as to provide basis for arriving at the incremental income. The data are further disaggregated according to the three main size groups of operational holdings. Also, in order to differentiate the types of loans or the size of investment, the cases of pumpset only

Table 7.8 : Per acre average net income and incremental income from benefited area over unirrigated areas of loanee-farmers and control farmers.

(Amount in Rs.)

District/ Size group	All beneficiaries					Beneficiaries with wells and composite loans					Only pumpset cases				
	Per acre net income from			Incremental income		Per acre net income from			Incremental income		Per acre net income from			Incremental income	
	(A)	(B)	(C)	(A)-(B)	(A)-(C)	(A)	(B)	(C)	(A)-(B)	(A)-(C)	(A)	(B)	(C)	(A)-(B)	(A)-(C)
Osmanabad															
Small farm	552	175	185	377	367	581	206	185	375	396	462	109	185	353	277
Medium farm	527	121	185	406	342	500	154	185	346	315	555	94	185	461	370
Big farm	270	183	185	87	85	187	195	185	-8	2	955	68	185	887	770
All size groups	477	161	185	316	292	448	187	185	261	263	553	98	185	455	368
B e e d															
Small farm	608	126	124	482	484	605	130	100	475	505	618	106	100	512	518
Medium farm	621	-	124	-	497	621	-	100	-	521	-	-	-	-	-
All size groups	609	126	124	483	485	607	130	100	477	507	618	106	100	512	518

- N.B. : 1. (A) = Benefited area
 (B) = Non-benefited area of loanees (unirrigated)
 (C) = Rainfed area of control farms.
2. Net income from S.F.(control) assumed to hold good for other sizes for want of observation.
3. No unirrigated area for M.F. in Beed sample of beneficiaries.

(installed on pre-existing operational wells) and those with considerable investment on wells and composite types are separately shown.

The highlights of the table reveal that because of local varieties of cereal crops being in a dominant position, the net incomes generally are on lower side. In the case of pumpset only, the incremental incomes are higher with the larger size of holdings, especially in Osmanabad district. The big farms, excepting only well cases, have relatively shown much lower incremental incomes than the other size groups. Especially in the case of wells and composite type, the incremental income is practically nil for the big farms while the small farms show nearly Rs.400 per acre. By and large, the sample beneficiaries from Beed in general and the small farms in particular have relatively fared better. Anyway, at the aggregate level, the average incremental income amounts to around Rs.300 and Rs.480 per acre for Osmanabad and Beed respectively.

Although the benefited areas show varying extent of incremental incomes over those of unirrigated areas, they fall woefully short of expectations made under the economics of the scheme. According to the Land Development Bank, the anticipated incremental income works out to a little over Rs.980 per acre in the scarcity zone areas for a plot of

2.5 acres. The survey results show deficits amounting to two-thirds in Osmanabad to one half in Beed district. However, the drought conditions and the deviation in varietywise cropping pattern have largely contributed to the shortfall in the expectations.

Returns and Repayment Capacity

Prima facie, any exercise on returns to investment and repayment capacity would be futile especially, with the data we have before. The loan eligibility calculation assumes Rs.980 as incremental income per acre for a 2.5 acre benefited plot and further assumes that 75 per cent of this incremental income as repaying capacity. While the data from the present survey indicate that the incremental income works out to less than Rs.300 per acre, the assumption above requires Rs.736 per acre as the incremental income for repaying capacity (at 75 per cent of the assumed total incremental income). Thus on the face of it, the first full year's incremental income from the investment is far below this norm. At the most the rough calculation of return to investment i.e. the incremental income as per cent of the capital expenditure, may just about suffice to pay interest charges in some cases. The drought conditions which affected the selected villages have also helped the farmers to the extent of obtaining remission of land revenue and postponement of instalment due to Land Development

Bank. However, the fact remains that the performance during the reference year does not reflect the normal conditions. As most of the loanee-farmers are not in a position to repay the current loan instalments for the obvious reasons, no attempt is made to study the same.

APPENDIX-I

TIME LAG IN LOANING OPERATION

In this brief note, an attempt is made to give a general idea about the time lag from the stage of application for loans to that of sanction of the scheme and subsequent stages of release or lifting of loan instalments by the reporting beneficiary farmers. The data presented here are based on the information furnished by the beneficiary farmers themselves. The relevant data concerning time lag in terms of months from stage to stage of the loaning operation are presented in Table A-1.

It may be observed that the time taken for sanction of loan from the date of application does not exceeded 2-3 months in most of the cases. In Osmanabad district, about 88 per cent of cases have been sanctioned within three months of the date of application. However, in about 40 per cent of the cases in Beed, the time lag is reportedly over four months. The time lag from the stage of loan sanction to that of release of the first instalment is relatively very brief, as it has taken two to three months to clear nearly 87 per cent of cases in Beed and 96 per cent in Osmanabad. The next stage of operation,

Table A-1 : Percentage distribution of beneficiary farmers opting for wells and composite loans according to time lag in loaning operation

Stage	Dist- rict	No. of report- ing cases	Time lag (in months)					Total
			Upto two	Upto three	Upto four	Upto six	Over six	
Time of application to sanction of loan	Beed	30	20.0	26.7	13.3	3.3	36.7	100.0
	Osma- nabad	51	45.1	43.1	2.0	5.9	3.9	100.0
Sanction to 1st instalment	Beed	30	56.7	30.0	3.3	3.3	6.7	100.0
	Osma- nabad	51	90.2	5.9	-	-	3.9	100.0
First to 2nd instalment	Beed	30	23.3	33.3	10.0	20.0	13.4	100.0
	Osma- nabad	51	39.2	41.2	7.8	-	11.8	100.0
Second to 3rd instalment	Beed	15	33.3	13.3	-	6.7	46.7	100.0
	Osma- nabad	34	17.6	32.4	26.5	8.8	14.7	100.0
Pumpset component of composite loans (final)	Beed	26	19.2	11.5	7.7	7.7	53.9	100.0
	Osma- nabad	38	39.5	21.0	7.9	5.3	26.3	100.0

that is, release of second instalment involving both old wells (final instalment) and new wells, reveals considerably longer time lag as the proper utilisation of funds already released is a precondition for lifting the second instalment. However, majority of the loanees in either district is in receipt of the second instalment within about three months time. The next stage, that is, second to third instalment involving only the new wells (with or without pumpsets) show over four months of lag in the case of nearly 54 per cent in Beed. However, one half of the reporting cases in Osmanabad has received the instalment in three months. The final instalment, account for only pumpset in respect of composite loans shows over six month time lag for 53.9 per cent of reporting cases in Beed. In the case of Osmanabad, 60.5 per cent of the reporting cases, the time lag extends upto three months. By and large, the time lag is relatively shorter for sample cases in Osmanabad than is the case with Beed district.

Another way of looking at the time lag in loan operation is to find the total period of time from the date of sanction of the loan to the receipt of the final instalment. The total period reveals over 9 month time lag in respect of two-thirds of the reporting cases in Beed and under nine months in the case of nearly 55 per cent in Osmanabad. The percentage distribution of beneficiary farmers according to total time lag from date

of sanction to date of final instalment may be seen in Table A-2.

Table A-2 : Percentage distribution of beneficiary farmers according to total time lag from date of sanction to final instalment

Time lag	Beed	Osmanabad	Both
Upto 6 months	16.7	37.3	29.6
6.1 - 9 months	16.7	17.6	17.3
9.1 - 12 months	26.6	9.8	16.1
12.1 and above	40.0	35.3	37.0
Total (Actual cases)	100.0 (30)	100.0 (51)	100.0 (81)

However, much of the time lag in initial stage is ascribed to verification of documents, inspection of site, appraisal work etc. The time lag after the sanction of the first instalment to the final one depends upon the degree of utilisation of loan or stage of the progress of work.

In the case of 'pumpset only' scheme, where the procedure is much simpler, the single instalment has been lifted within two month period by 53.3 per cent of the 30 cases included in the survey of both districts. The time lag is slightly longer in 30 per cent of cases where it exceeds four month period. The relevant data concerning

'only pumpset' cases are presented in Table A-3.

Table A-3 : Distribution of 'only pumpset' cases according to time lag from date of application to disposal of the instalment

Stage	District	Time lag			Total
		Upto 2 month	2-4 months	Above 4 months	
I Applica- tion to sanction	Beed	-	1	5	6
	Osmanabad	13	7	4	24
From sanc- tion to first and final instalment	Beed	1	2	3	6
	Osmanabad	15	3	6	24

Table No. 15A - Cost of production and yield, per acre

(Centre Deulghat)

(Rupees)

Size of cultivated holding	No. of families	Gross cropped area in acres	Cost per acre							Total	Value of yield per acre	
			Seeds	Manure	Labour		Land Revenue and other taxes	Rent	Inter-est			Other expenses
					Human	Bullock						
- 5	13	45.8	2.3	3.1	26.6	9.1	1.5	16.2	2.5	1.1	62.4	87.8
5 - 10	29	227.8	2.8	0.8	25.1	9.2	1.4	17.2	2.2	1.4	60.1	76.1
10 - 15	22	277.9	2.4	0.0	17.2	5.6	1.6	16.8	1.4	1.1	46.1	65.8
15 - 20	17	306.9	2.5	0.0	20.2	8.8	1.6	15.5	1.6	1.8	52.0	66.4
20 - 30	18	444.5	2.9	0.3	13.1	7.4	1.4	16.4	1.1	1.0	43.6	52.9
30 - 40	11	400.8	2.4	-	12.3	5.8	1.5	15.1	1.0	0.7	38.8	47.1
40 - 50	5	227.5	3.0	0.6	12.6	7.0	1.6	13.9	1.1	0.4	40.2	54.7
50 -	2	195.0	1.2	-	7.9	3.2	1.6	12.6	0.8	0.8	28.1	30.2
Total	117	2126.2	2.5	0.3	15.6	6.9 6.9	1.5 1.5	15.6	1.3	1.0	44.7	56.8

Table No. 15A.1 - Cost of production and yield, per acre of cotton

(Centre Deulghat)

(Rupee)

Size of cultivated holding	No. of families	Gross cropped area in acres	Cost per acre in Rs.								Total
			Seeds	Manure	Labour		Land Revenue and other taxes	Rent	Interest	Other expenses	
					Human	Bullock					
- 5	13	15.6	2.5	1.1	34.9	8.2	2.9	21.3	2.0	0.9	7
5 - 10	29	53.0	1.4	1.0	30.5	8.5	2.2	20.4	1.8	1.1	6
10 - 15	22	90.0	1.4	-	18.4	3.9	2.1	21.0	0.9	0.7	4
15 - 20	17	87.1	1.3	0.1	17.4	6.3	2.2	20.3	1.1	1.2	4
20 - 30	18	80.4	1.3	0.2	16.1	7.5	2.0	19.4	1.1	1.0	4
30 - 40	11	97.6	1.1	-	13.0	3.6	2.0	17.9	0.8	0.6	3
40 - 50	5	50.9	1.0	-	7.9	4.1	2.3	15.6	0.8	0.3	3
50 -	2	61.1	0.8	-	3.8	1.5	1.6	21.3	0.5	0.5	3
Total	117	535.7	1.2	0.2	15.6	5.1	2.1	19.4	1.0	0.8	4

Table No. 15A2- Cost of production and yield, per acre of Jawar

(Centre Deulghat)

(Rupees)

Size of cultivated holding in acres	No. of families	Gross cropped area in acres	Cost per acre							Total	Value of yield per acre	
			Seeds	Manure	Labour		Land revenue and other taxes	Rent	Interest			Other expenses
					Human	Bullock						
- 5	13	15.8 15.8	0.8	-	26.8	10.4	1.0	17.8	2.1	0.9	59.8	84.2
5 - 10	29	69.5	0.8	-	22.8	8.4	1.1	18.3	1.8	1.2	54.4	70.8
10 - 15	22	72.7	0.7	-	17.1	5.6	1.0	19.4	1.5	1.1	46.4	68.4
15 - 20	17	74.0	0.8	-	18.9	7.1	1.1	16.6	1.7	2.0	48.2	66.6
20 - 30	18	119.9	0.7	0.2	12.2	6.0	1.0	18.2	1.1	1.0	40.4	54.1
30 - 40	11	102.3	0.7	-	12.2	4.5	1.0	16.7	1.0	0.8	36.9	56.9
40 - 50	5	37.7	0.8	-	14.1	9.2	1.0	21.3	2.3	0.8	49.5	84.5
50 -	2	65.5	0.4	-	6.3	2.0	0.7	14.1	0.5	0.5	24.5	16.3
Total	117	557.4	0.7	0.0	14.5	5.8	1.0	17.4	1.3	1.0	41.7	56.5

Table No. 15B - Cost of production and yield, per acre

(Centre Chendiye)

Size of cultivated holding in acres	No. of families	Gross cropped area in acres	Cost per acre								Total
			Seed	Manure*	Labour		Land re-venue and other expenses	Rent taxes	Interest	Other expenses	
					Human	Bullock+					
- 2	13	18.1	10.4	29.0	73.7	78.7	3.5	49.8	26.7	3.8	275.6
2 - 3	27	62.7	9.8	27.9	68.0	65.2	4.2	56.3	32.4	4.0	267.8
3 - 4	19	60.7	10.7	30.6	64.0	75.4	4.1	62.6	27.3	3.5	278.2
4 - 5	9	36.8	12.0	27.3	62.4	65.5	4.0	58.3	19.6	3.2	252.3
5 - 10	30	170.4	10.9	23.7	58.0	67.7	3.7	60.6	25.6	3.8	254.0
10 - 15	2	13.3	11.8	44.2	86.0	95.1	4.0	71.0	27.1	8.0	347.1
15 -	3	40.3	6.8	10.0	36.3	47.9	4.2	40.7	28.6	0.5	175.1
Total	103	402.3	10.4	25.3	59.7	68.3	3.9	57.9	26.8	3.6	255.1

* Mostly dry leaves and twigs spread and burnt on the farm - evaluated on the basis of hours of human labour in collecting dry leaves and twigs.

+ In arriving at the cost of maintenance of bullocks, grass collected, free from the forest to feed them, evaluated on the basis of hours of human labour employed in collecting grass.

Table No. 15B.1 - Cost of production and yield per acre of paddy

(Centre Chendiye)

Size of cultivated holding in acres	No. of families	Gross cropped area in acres under paddy	Cost per acre								Total
			Seed	Manure*	---labour---		Land revenue and other taxes	Rent	Interest	Other expenses	
					Human	Bullock**					
- 2	13	14.77	11.0	30.8	63.3	85.9	2.9	45.0	22.2	1.5	262.6
2 - 3	27	49.20	9.9	31.5	60.6	70.2	6.3	46.7	25.5	0.7	251.4
3 - 4	19	53.06	10.4	30.2	50.1	77.7	3.5	53.2	20.4	0.5	246.0
4 - 5	9	31.01	11.5	27.1	53.1	72.7	3.6	58.9	17.0	0.5	244.6
5 - 10	30	145.79	10.8	23.6	47.7	71.9	3.2	56.7	21.5	0.8	236.2
10 - 15	2	11.62	10.6	34.2	55.4	98.6	3.8	63.3	26.1	3.7	295.7
15 -	3	38.73	^{4.0} 4.0	7.8	28.6	52.4	3.8	36.8	25.8	0.2	159.4
Total	103	344.18	9.9	25.0	49.2	72.0	3.8	52.4	22.2	0.8	235.3

* Mostly dry leaves and twigs spread and burnt on the farm - evaluated on the basis of hours of human labour in collecting dry leaves and twigs.

+ In arriving at the cost of maintenance of bullocks, grass collected, free from the forest to feed them, has been evaluated on the basis of hours of human labour employed in collecting grass.

Table No. 16A - Human and bullock hours of farm work, per acre and their value.

(Centre Deulghat)

Size of cultivated holding in acres	No. of families	Gross cropped area in acres	Number of labour hours per acre				Cost of labour in Rupees per acre				Total labour cost per acre
			Human		Bullock		Human		Bullock		
			Hired	Domestic	Hired	Domestic	Hired	Domestic	Hired	Domestic	
- 5	13	45.8	55.2	200.3	1.4	90.6	4.0	22.6	0.2	8.9	35.7
5 - 10	29	227.8	90.3	167.0	4.1	91.4	6.3	18.8	0.3	8.9	34.3
10 - 15	22	277.9	71.8	104.5	1.6	56.6	5.4	11.8	0.1	5.5	22.8
15 - 20	17	306.9	86.9	126.1	-	90.5	6.0	14.2	-	8.8	29.0
20 - 30	18	444.5	66.3	72.2	6.3	74.2	5.0	8.1	0.1	7.3	20.5
30 - 40	11	400.8	46.4	80.6	-	58.9	3.2	9.1	-	5.8	18.1
40 - 50	5	227.5	57.2	73.9	-	72.1	4.3	8.3	-	7.0	19.6
50 -	2	195.0	59.1	33.0	0.2	30.9	4.2	3.7	0.2	3.0	11.1
Total	117	2126.2	66.9	95.3	0.8	69.4	4.8	10.8	0.1	6.8	22.5