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**EVALUATION STUDY OF LAND
DEVELOPMENT WORK (PART II)
IN COMMAND AREA OF THE BHIMA
(UJJANI) PROJECT**

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enters the State of Karnataka to meet the river Krishna.

The Irrigation Project

The site of the dam is near village Ujani in Madha Taluka of Sholapur District. It is a composite dam with masonry portion in the gorge 912 metres long, flanked on either side by earthen embankments. Total length of the dam is 2467 metres. The maximum height of masonry dam is 56.4 metres and that of earthen portion 25 metres. The length of overflow in the Central portion of masonry dam is 609 metres and the flood discharge will be regulated by 41 radial gates.

The Left Bank Canal takes off from the dam. The Right Bank Canal branches off from the Left Bank Canal at km 20, crosses the river near village Sangam via Bhima aqueduct and runs for a length of about 185 kms. Ujani left bank canal continues on left flank for the length of 139 kms where the Sina valley branch and Begampur branch take off from the main canal. The total length of Ujani Left Bank Canal alongwith its branches is about 269 kms. Both the canals will irrigate the land of 1,11,300 hectares while the command area is 1,23,600 hectares.

Agro-climatic Conditions

A) Soils

The soils are basically derived from Volcanic Trap. They are mostly sedatary except along the river banks, where

transported soils are deposited. Near the ridges, the soils are shallow, but the depths increase as one approaches the river.

In the Madha Taluka, medium black soils are formed along the banks of the Bhima and the land is fertile. Though the commanded area from the Pandharpur Taluka is interspersed by rocky spurs, the soils in general are fertile and fall in the category of medium black soils. The soils in the command from Mohol taluka are light shallow soils with reddish tinge. Area in the subsidiary valleys have medium black soils. Major portion of the soil in the North Sholapur Taluka is light shallow, though soils on the bank of Sina in a strip of about a mile are better soils, falling under the category of medium black soil. The command in Mangalwedha Taluka has deep black soils. In fact the lands are plain, fairly level, deep soil areas of uniform fertility. On the whole the lands under command are fertile and will be benefited by irrigation.

Land Utilization

The land utilization pattern before development for Sholapur, Madha, Pandharpur, Malshiras, Mangalwedha and Mohol Talukas together is presented in Table 1.1.

Table 1.1 : The Land Utilization in Sholapur, Madha, Pandharpur, Malshiras, Mangalwedha and Mohol Talukas of Sholapur District

Sr. No.	Land Utilization	Area ha.	Percentage
1.	Total Geographical Area	863979	100.00
2.	Area Under Forest Grazing	50801	5.88
3.	Barren & Uncultivable Land	38517	4.46
4.	Current Fallows & Other Fallows	105591	12.22
5.	Net Area Sown	655421	75.86
6.	Land Under Trees	1310	0.15
7.	Waste Culturable	10854	1.26
8.	Other	1485	0.17

Source: As for Table 1.2

Rainfall

The average annual rainfall (average for 1962 to 1975 - 15 years) in the command area is 586 mm. The distribution of annual average rainfall in different seasons in the command area is as under (in mm) :

Seasons	Month	Shola- pur	Madha	Pandhar- pur	Malshi- ras	Mohol	Mangal- wedha
Kharif (Monsoon)	June	100.0	86.5	74.9	63.7	75.7	66.4
	July	133.1	98.0	74.6	63.1	85.5	73.0
	Augu- st	127.1	102.8	106.9	84.9	95.8	77.5
	Sept.	193.4	160.1	185.0	165.7	179.7	178.1
	Oct.	87.0	66.4	99.2	76.1	70.9	92.6
Rabi	Nov. to Feb.	32.1	38.0	24.0	26.0	28.6	18.6
Summer	March to May	38.4	34.2	24.9	25.3	40.9	32.0
Total		711.1	586.0	589.5	514.8	577.1	538.2

Crops Grown and Proposed to be Grown

The existing cropping pattern in relation to soil and rainfall conditions in North Solapur, South Solapur, Mahda, Pandharpur, Malshiras, Mohol and Mangalwedha Talukas is shown in Table 1.2.

The command area of Bhima project lies in an area which is predominantly agricultural. The principal crops are Jawar and Groundnut. If timely water supply is assured, the area under command is very suitable for growing a number of varieties of crops including sugarcane.

Table 1.2 : Existing Cropping Pattern in Solapur North and South Mohol, Madha, Pandharpur, Malshiras and Mangalwedha Talukas

Sr. No.	Name of Crop	Area (ha.)	Percentage
1.	Rice	3634	0.51
2.	Wheat	24407	3.45
3.	Jawar Kharif	101	0.01
4.	Bajara	72996	10.31
5.	Other Cereals	14796	2.09
6.	Gram	16816	2.37
7.	Mug	2913	0.41
8.	Udid	407	0.06
9.	Tur	32340	4.57
10.	Sugarcane	13021	1.84
11.	Chillies	4245	0.60
12.	Turmeric	17	-
13.	Fruit Crops	554	0.08
14.	Jawar Rabi	455052	64.27
15.	Kh.Vegetables	4112	0.58
16.	Cotton	3941	0.56
17.	Groundnut	15863	2.24
18.	Sesamum	1789	0.25
19.	Other Oilseeds	33898	4.79
20.	Fodder	7157	1.01
Total		708059	100.00

Source: Project Report of Farm Development, Bhima-Ujani, Stage II Project, MLDC.

Table 1.3 : Proposed Crop Pattern (in Command Area)

Sr. No.	Name of Crop	Area in ha.	Percentage
<u>I Perennials</u>			
	1. Sugarcane	8904	8
<u>II Other Perennials</u>			
	2. L.S. Cotton	27825	25
<u>III Kharif Seasonals</u>			
	3. Jawar	16695	15
	4. Groundnut	11130	10
	5. Paddy	16695	15
<u>IV Rabi Seasonals</u>			
	6. Jawar	20034	18
	7. Wheat or Maize	10017	9
	8. Gram	16695	15
<u>V. Summer Seasonals</u>			
	9. Groundnut	27825	25
Total :		111300 + 44520	100 + 40

Source : Project Report of Farm Development, Bhima-Ujani Stage II Project, MLDC.

1.2 Objectives and Scope of the Evaluation Study

The land development work in the command area of the Bhima Ujjani Project commenced in 1980. The total area of land coming under the command of the Bhima Ujjani Project was around 1,23,600 hectares, spread over 124 villages from Malshiras, Pandharpur, Mangalwedha, South and North Solapur and Madha Talukas in Solapur district. Of the total geographical area coming under the project, the culturable command area was about 68,926 hectares. Deducting the flat area available in the culturable command for which Part II works of land development were not needed, an area of 34,463 hectares or about 50 per cent of the total area had to be developed in order to facilitate irrigation all over the land. Of this, 31921 hectares or about 92 per cent were developed by 1986. Three nationalized banks, viz., Bank of Baroda, Bank of India and State Bank of India have provided funds for the land development work of the Bhima Ujjani Project.

The present study is to evaluate the work of land development carried out on the above stated lands under the command area of the Bhima Ujjani Project. The objectives of the study may be stated as follows.

- (1) To assess the implementation of the land development scheme in the Bhima Ujjani command.
- (2) Net additional yield per hectare obtained by the cultivator due to land development works.

(3) Net additional incremental income per hectare accrued to the cultivators due to land development work.

(4) Whether the cost of land development work is commensurate with the resulting benefits accrued to the cultivators due to developmental works.

(5) Assessment of the repayment performance of the farmers and suggestions for the needed revisions in the lending terms, taking into account the time lag for reaching full development.

1.3 Methodology

The main task of land development in an area commanded by a major or medium irrigation project is two-fold : (a) to design and construct channels from the distributory or minor upto the field level and (b) to level and shape the land to receive irrigation water for crop production. It has been the experience that inadequate provision on these counts has resulted in wastage of irrigation/potential. Until recently the farmers were expected to undertake these works on their own; their failure to do so has resulted in special measures at the Government level to get these works attended and recover the cost from the farmers in instalments.

Our first task in the present study, therefore, was to ascertain how much of the work has in fact been completed. It is possible that incomplete execution of the works would lead to failure of full development of irrigated farming on the /water and less than full utilization of the total irrigation

lands. If, for example, the first type of works, mentioned above are completed, and the second type are largely left to the cultivators to execute, the benefits may not follow and the additional expenditure becomes infructuous. We, therefore, propose to collect relevant information on the actual work completed by the agency, the work, if any, carried out by the farmer, and the suitability of the lands for irrigated farming.

A related question would be the time involved in developing the land for irrigation. This would be relevant in judging the repayment performance of the cultivators.

Furthermore, the change in the cropping pattern and the extra income generated on the lands made fit for irrigation, will provide the basis for estimating the repaying capacity of the beneficiaries. The information on these aspects will be collected from the sampled farmers cultivating the lands.

Selection of Sample

The left and right bank canals have been laid to provide water for agriculture in Malshiras, Pandharpur, Mangalwedha, Mohol and Solapur Talukas of the Solapur district. As mentioned earlier, the total developed area of land from the canals of the dam was about 31,920 hectares. The total developed area belonged to about 16,730 cultivator families from 124 villages in the Solapur district. Considering the difficulties in undertaking a field investigations of such a large number of cultivating families, their developed land area and its spread

in a number of villages, we confined our enquiry to about five to ten per cent of the total developed land of about five to ten per cent of the total cultivators.

For the purpose of sampling, etc., we had collected data from the office of the Maharashtra Land Development Corporation Ltd., Pune.

In order to collect a representative sample of the developed land and its cultivators, we first classified all the 124 villages on the Right and Left canals of the dam into their three zones, viz., Head, Middle and Tail Zone. It was reported that by and large Malshiras and Pandharpur talukas from the Solapur district, which head the canals, form the head zone; Madha, Mohol and Mangalwedha talukas, form the middle zone and North and South Solapur talukas form the tail zone. It appeared from the data supplied to us that the land development works had been carried out mainly in Malshiras, Pandharpur, Mohol, Madha and Mangalwedha talukas, which form the head and middle zones. In North and South Solapur talukas, i.e., in the tail zone, land development works had not been undertaken. We were, therefore, required to take our sample villages from the head and middle zones only. To draw a proper representative sample, we arranged the villages in each zone in ascending order of their developed land area and then chose five villages at random from each zone as per the guidelines given to us. In this way a sample of 10 villages

was drawn from these two zones. However, we have actually covered 17 villages. The details are discussed in the next chapter.

When land development work is carried out, the top soil is disturbed which is the most fertile layer. It takes considerable time after the land development work for the levelled soil to regain fertility and therefore the true benefits of the land development accrue only after a period of 4-5 years. It was, therefore, decided to cover only those lands which were developed before 1986.

From each selected village, we chose the following three groups of sample cultivators for our study.

(1) the farmers in the five sample villages whose lands have been developed before 1986 by the Government agency.

(2) the farmers in the sample villages whose lands have been developed before 1986 by the cultivators themselves.

(3) the farmers in the sample villages whose lands have not been developed at all either by the cultivators themselves or by the Government agency.

CHAPTER II
THE SAMPLE COVERAGE

As explained in Chapter I for the purpose of sampling, etc., we had collected data from the Office of the Maharashtra Land Development Corporation Ltd., Pune and on the basis of the same the sample villages were selected from the head and middle zones. Subsequently, we had visited Solapur and consulted the Divisional Soil Conservation Officer (DISCO) for finalisation of the sample. On the basis of the discussions, the following 10 villages were finally selected.

List of Sample Villages

Head Zone

1. Pehe (Pandharpur)
2. Umbre (Pandharpur)
3. Kanhapuri (Pandharpur)
4. Wagholi (Malshiras)
5. Khedbhose (Pandharpur)

Middle Zone

1. Akole Bk. (Madha)
2. Malegaon (Madha)
3. Katewadi (Mohol)
4. Nandgaon (Mohol)
5. Takali (Madha)

As far as the actual coverage of villages is concerned, we had to cover 17 villages for different reasons. The details of this will be discussed later.

2.1 Land Development Works (Part-II)
(June 1986)

It may be mentioned here that after visiting Solapur, we had requested for the latest data on the land development works carried out by the Government, by the cultivators and also about the land development works carried out by the Divisional Soil Conservation Officer (DISCO). These data differ slightly from the data collected from the Maharashtra Land Development Corporation (MLDC), perhaps, because the data of MLDC was older. On the basis of the data collected from DISCO, we have prepared tables showing the area developed in different sub-divisions. The data on the land development works carried out by the Government is presented in Table 2.1 and about the works carried out by the farmers themselves is presented in Table 2.2. It may be observed that the area of 31,920.90 hectares was developed by the Government. The major work was carried out under the supervision of Development Soil Conservation Officer and some area was developed by the Bhima Development Division-II.

As has been mentioned earlier, we confined our survey for the land developed upto June 1986 and, therefore, the data on land developed presented in Tables 2.1 and 2.2 pertains to the period upto June 1986.

Table 2.1 : Land Development Works (Part-II) Carried out by the Government upto June 1986

Sub-Division	No. of Farmers	Area Developed (Hectares)
(A) Works carried out by DISCO (Soil Conservation Sub-Divisions)		
1. Pandharpur 1	2583	3101.67
2. Pandharpur 2	3444	6197.25
3. Pandharpur 3	3293	6407.34
4. Pandharpur 4	2090	3797.38
5. Mohol	3487	7942.74
6. Solapur	1522	3097.01
Sub-Total	16419	31343.39
(B) Work carried out by Bhima Development Division II		
1. Sub-Division No.5, Solapur	171	260.27
2. Sub-Division No.6, Mohol	77	198.35
3. Sub-Division No.7, Begampur	29	64.00
4. Sub-Division No.8, Begampur	34	54.89
Sub-Total	311	577.51
Total	16730	31920.90

Table 2.2 : Land Development Works (Part-II) carried out by the Farmers Themselves upto June 1986

Sub-Division (DISCO)	No. of Farmers	Area Developed (Hectares)
1. Solapur	365	416.40
2. Mohol	501	591.57
3. Pandharpur 1	13	22.00
4. Pandharpur 2	14	36.00
5. Pandharpur 3	14	14.49
6. Pandharpur 4	355	739.70
Total	1262	1820.16

2.2 Questionnaires

In order to get detailed information from the farmers regarding various aspects to be covered in the study, we designed 4 types of questionnaires as given below -

- 1) General Family Schedule
- 2) Schedule for lands developed by the Government Agencies
- 3) Schedule for lands developed by the Cultivators themselves, and
- 4) Schedule for the lands not developed either by the Government Agency or by the Cultivators

General family schedule is filled in for every sample family.

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General family schedule is filled in for every sample family.

exercise of preparing a list at the village level could not be carried out because of non-cooperation of the local people in helping us to prepare such a list. We, therefore, had to identify such farmers and include their names in the sample directly. Because of this difficulty, instead of random selection procedure, we had to adopt quota procedure.

iii) As far as the farmers whose lands have not been developed at all, it was, however, difficult to identify such cases since in the sample villages major portion of the land was developed. Our investigators, however, were able to locate some cases in this category. Because of this, the number of sample cases in this category was very small.

2.4 Difficulties in Contacting Sample Farmers

We have faced a number of difficulties in contacting the sample farmers due to the following reasons.

i) In a number of lists, the names of the farmers from neighbouring villages also appeared. When such farmer was among sample farmers, it was necessary to contact him in the neighbouring village. For example, in the list of village Khedbhose, the farmers from Shevate, Deode and Sugaon were included. In the list of Pehe, the farmers from Nandure and Badalkot were included.

ii) In certain cases, the lands were sold away by the farmers and therefore it became difficult to collect the information about these lands from new owners.

iii) Some of the sample farmers were not alive. Of them, in some cases their successors could be contacted and in some cases they were not available.

iv) Some farmers were staying at some other places for the purpose of service, etc. They would not be contacted.

v) Some farmers were out of station during the period of survey.

vi) Lastly, there were a large number of farmers who refused to give any information to us. We will discuss the reasons behind such refusal in detail later.

2.5 No. of Cases Covered

As mentioned above we prepared three different schedules for three categories of land development. A sample farmer may belong to more than one category. Such farmer was counted in each such category for the purpose of data on "number of cases covered" presented in Table 2.3. If a farmer had more than one plot, say, developed by the government agencies then his name appeared more than once in the lists but such a farmer was counted only once. In other words within any category a farmer is counted only once though he may have multiple plots. We have covered in all 1144 cases.

Table 2.3 : No. of Cases Covered

1. Land Developed by the Government Agencies	507
2. Land Developed by the Cultivators	183
3. Land Not Developed	32
4. Land Sold	30
5. Land Acquired by the Government	22
6. Out of Station	107
7. Refused to Give Information	263

Total:	1144

2.6 Coverage of 17 villages

As has been mentioned earlier, 10 villages were selected in the sample. In some of the villages, the list of farmers on whose lands the development works have been carried out by the government agencies, some names appeared of the farmers who were not staying in the same village. They were staying in neighbouring village and in some cases, they were staying in a new village developed for rehabilitation. When such a farmer appeared in random selection, it was required to contact him in the place of his stay. For these reasons, we had to visit 7 extra villages. We give below the list of 10 sample villages

along with 7 additional villages.

<u>Main Sample Village</u>	<u>Additional Villages Covered</u>
1. Pehe	Nandure, Badalkot
2. Umbre	--
3. Kanhapuri	--
4. Wagholi	--
5. Khedbhose	Deode, Sugaon
6. Akole Bk.	--
7. Malegaon	--
8. Katewadi	Sangvi
9. Nandgaon	Mundhewadi
10. Takali	Gar-Akole

We have already mentioned that in the absence of the list of farmers who have developed their own lands, it was becoming difficult to get required number of \sphericalangle farmers even in these 7 villages. Thus, practically speaking, we have covered in our survey a sample of 17 villages.

However, we continue to discuss in terms of 10 villages which have been included initially in sample and carry out tabulation in terms of these 10 villages.

2.7 Village-wise Sample Farmers Covered

We present in Table 2.4 the position of the coverage of farmers whose lands have been developed by the government \sphericalangle such farmers. We have, therefore, also tried to contact such

agencies. In 10 villages altogether, there were 1114 names in the list. There were 185 farmers whose names appeared more than once, 30 farmers had sold their land, the lands of 22 farmers were acquired by the government/banks, 107 farmers were out of station and could not be contacted and 263 farmers refused to give any information.

We present in Table 2.5 village-wise distribution of farmers who responds by land development group. We present here all the three categories, namely, cases where the development is done by the government agencies, cases where the development is done by the cultivators and cases where the development has not been done. We have been able to cover 507 cases in the first category, 183 in the second and 32 cases in the third, totalling to 722 cases.

As has been explained in the methodology, we have prepared 4 schedules for detailed data collection. When a particular farmer has got his land developed through government agency as well as by himself, we have to fill in two schedules for the land development data but only one general family schedule needs to be filled in. Different such combinations of land development could occur. If we count a particular farmer only once, the total number of farmers was 650 (total number of cases being 722). The number of cases contacted was 1144 as mentioned earlier. We present in Table 2.6 the village-wise distribution of farmers in different categories counting each farmer only once.

As mentioned above we have actually covered 17 villages. In order to get a clear picture regarding how many farmers in what category were covered in terms of 17 villages, we present two tables, Table 2.7 and Table 2.8. Except these two tables all other tabulation presented is in terms of 10 main villages.

As mentioned above we have actually covered 17 villages. In order to get a clear picture regarding how many farmers in what category were covered in terms of 17 villages, we present two tables, Table 2.7 and Table 2.8. Except these two tables all other tabulation presented is in terms of 10 main villages.

Table 2.5 : Village-wise Distribution of Farmers Who Responded by Development Group

Sr. No.	Village	Development done by Govt. (1)	Development done by Cultivator (2)	Development not done (3)	Total (1+2+3)
1.	Pehe	45	25	4	74
2.	Akole Bk.	38	11	3	52
3.	Umbre	50	31	1	82
4.	Kanhapuri	66	22	2	90
5.	Wagholi	3	5	-	8
6.	Malegaon	25	12	3	40
7.	Katewadi	39	13	6	58
8.	Nandgaon	39	12	10	61
9.	Khedbhose	98	37	3	138
10.	Takali	104	15	-	119
Total		507	183	32	722

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6.	Malegaon	25	12	3	40
7.	Katewadi	39	13	6	58
8.	Nandgaon	39	12	10	61
9.	Khedbhose	98	37	3	138
10.	Takali	104	15	-	119
Total		507	183	32	722

Table 2.7 : Village-wise distribution of farmers who responded
by development group
(Additional 7 villages shown separately)

Sr. Village No.	Development done by Govt.	Development done by Cultivators	Development not done	Total
1 Takli	77	14	-	91
2 Gar-Akole	27	1	-	28
3 Malegaon	25	12	3	40
4 Akole Bk.	38	11	3	52
5 Wagholi	3	5	-	8
6 Kanhapuri	66	22	2	90
7 Umbré	50	31	1	82
8 Pehe	31	9	2	42
9 Nandure	8	15	2	25
10 Badalkot	6	1	-	7
11 Khedbhose	82	25	4	111
12 Devade	6	2	-	8
13 Sugaon	10	10	3	23
14 Katewadi	35	12	6	53
15 Sangvi	4	1	-	5
16 Nandgaon	37	9	5	51
17 Mundhewadi	2	3	-	6
Total	507	183	32	722

Table 2.7 : Village-wise distribution of farmers who responded
by development group
(Additional 7 villages shown separately)

Sr. No.	Village	Development done by Govt.	Development done by Cultivators	Development not done	Total
1	Takli	77	14	-	91
2	Gar-Akole	27	1	-	28
3	Malegaon	25	12	3	40
4	Akole Bk.	38	11	3	52
5	Wagholi	3	5	-	8
6	Kanhapuri	66	22	2	90
7	Umbre	50	31	1	82
8	Pehe	31	9	2	42
9	Nandure	8	15	2	25
10	Badalkot	6	1	-	7
11	Khedbhose	82	25	4	111
12	Devade	6	2	-	8
13	Sugaon	10	10	3	23
14	Katewadi	35	12	6	53
15	Sangvi	4	1	-	5
16	Nandgaon	37	9	5	51
17	Mundhewadi	2	3	-	6
Total		507	183	32	722

CHAPTER III
SAMPLE PROFILE

We present profile of the sample families in this chapter. The total cases covered in sample were 722 but counting each family only once, the number of sample families comes to 650. We have covered only those characteristics which are important in relation to the objectives of the study.

3.1 Family Size

Average family size for all 650 families together was 8.43. Average sample family size at the village level varied from 6.64 to 9.88 persons per family. The data on family size is presented in Table 3.1 and Table 3.2. The modal group was that with family size 5.

Table 3.1 : Distribution of Sample Families by Size

Size of the Family	No. of Families	%
1 to 3	52	8.00
4 to 6	259	39.84
7 to 9	132	20.31
10 to 12	82	12.61
13 to 15	62	9.54
Above 15	63	9.69
Total	650	100.00

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Size of the Family	No. of Families	%
1 to 3	52	8.00
4 to 6	259	39.84
7 to 9	132	20.31
10 to 12	82	12.61
13 to 15	62	9.54
Above 15	63	9.69
Total	650	100.00

Table 3.2 : No. of persons in the sample families (village-wise)

Sr. No.	Village	No. of Families	Total Males	Total Females	Total Children	Total Persons	Average Family Size
1	PEHE	62	175	154	234	563	9.08
2	AKOLE (BK)	45	97	91	111	299	6.64
3	UMBARE	77	215	194	273	682	8.87
4	KANHAPURI	77	227	184	265	676	8.78
5	WAGHOLI	8	23	18	22	63	7.88
6	MALEGAON	37	101	97	113	311	8.41
7	KATEWADI	58	143	110	122	375	6.47
8	NANDGAON	51	161	135	208	504	9.88
9	KHEDBHOSE	125	376	327	421	1124	9.00
10	TAKLI	110	291	241	350	882	8.02
Total		650	1809	1551	2119	5479	8.43

3.2 Earning Members

The data was also collected regarding the number of earning members. The distribution of families according to the number of earning members is presented in Table 3.3. As many as 230 (35.39%) families had only two earners. There were three families without any earning member. As shown in earlier Table 3.1, there were some large families in the sample. There were, thus, families with even more than 10 earning members.

Table 3.3 : Distribution of Sample Families by
Number of Earners

No. of Earners	No. of Families	%
0	3	0.46
1	38	5.85
2	230	35.39
3	79	12.15
4	83	12.77
5	56	8.62
6	58	8.92
7	40	6.15
8	26	4.00
9	16	2.46
10	9	1.38
More than 10	12	1.85
Total	650	100.00

Table 3.4 : No. of earners in sample families (village-wise)

Sr. No.	Village	No. of Families	Total Persons	Total Earners	Total Male Earners	Total Female Earners	Total Children Earners	Total Earners Per Family
1	PEHE	62	563	265	143	120	2	4.27
2	AKOLE(BR)	45	299	140	80	59	1	3.11
3	UMBARE	77	682	321	171	150	0	4.17
4	KANHAPURI	77	676	330	180	149	1	4.29
5	WAGHOLI	8	63	33	16	17	0	4.13
6	MALEGAON	37	311	161	87	74	0	4.35
7	KATEWADI	58	375	193	108	85	0	3.33
8	NANDGAON	51	504	216	132	84	0	4.24
9	KHEDBHOSE	125	1124	473	280	193	0	3.78
10	TAKLI	110	882	427	238	189	0	3.88
TOTAL		650	5479	2559	1435	1120	4	3.94

3.3 Land Ownership and Land Utilization

The sample farmers owned 2517.88 hectares of land. Of this, 386.77 hectares (15.36 p.c.) were permanent fallow, 25.35 hectares (1.01 p.c.) were current fallow. Average land owned was 3.87 hectares per family. Accounting for leasing-out and leasing-in the net cropped area was 2084.70 hectares. These data are presented in Table 3.5.

Table 3.5 : Land Utilization of Sample Families

	Area (ha.)	Percentage to land owned
Land owned	2517.88	100.00
Permanent fallow	386.77	15.36
Current fallow	25.35	1.01
Leased-out	57.64	2.29
Leased-in	36.58	1.45
Net Cropped Area	2084.70	82.80

The village-wise information on the land owned, land leased-out, land leased-in, land cultivated, etc., is given in Table 3.6 and village-wise information on fallow lands, double cropped, etc., is given in Table 3.7. Of the 650 families, 24 families leased-out 57.65 hectares of their land which was only 2.29 per cent of the total land owned. Similarly, 19 families leased-in 36.58 hectares of land. Average land cultivated per family was the lowest, (2.31 hectares) in the sample village

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Akole (Bk.) and the highest was (5.06 hectares) in Malegaon. Of the 12 families of Nandgaon who leased-out their land, 10 had leased-out their entire land. Thus, out of 650 sample families, 640 were cultivating families.

3.4 Size of Cultivated Holding

The sample families were grouped by size of cultivated holding in five groups. The data is presented in Table 3.8. Of the 640 cultivating families 12.81 per cent cultivated upto 1 hectare of land with their share in total cultivated land being only 2.08 per cent. The second group cultivated more than 1 hectare and upto 2 hectares and 27.66 families belonged to this group with their share at 12.15 per cent. These data can be read from Table 3.8. It may be noted that 18.44 per cent families had holding of more than 5 hectares with the land share of 44.73 per cent. The village-wise data is presented in Table 3.9.

Table 3.8 : Sample Families by Size of Cultivated Holding

Size of cultivated holding (ha)	No. of families	%	% share of the cultivated land
0 - 1	2	11.25	2.08
More than 1 to 2	177	27.66	12.15
More than 2 to 3	131	20.47	15.09
More than 3 to 5	142	22.18	25.95
<u>Above 5</u>	<u>118</u>	<u>18.44</u>	<u>44.73</u>
Total	640	100.00	100.00

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3.5 Sources and Extent of Irrigation

Of the total cultivated land of 2084.70 hectares, only 748.69 hectares (35.91 p.c.) was under dry cultivation, the remaining 64.09 p.c. was under irrigation. The data also show that 281 families were with all their cultivated land under irrigation; 601 families had full or part of their lands irrigated and 39 families with entire dry cultivation.

Of the total net irrigated area of 1336.01 hectares, 53.88 p.c. was under canal irrigation, 29.32 p.c. under well irrigation and the remaining 16.80 p.c. was irrigated by lift on river, water from streamlets using channels and tank. (There were only two cases of tank irrigation with 1.75 hectares of land irrigated). This information is presented in Tables 3.10 and 3.11.

Table 3.10 : Sources and Extent of Irrigation

Land/Source	No. of Families	Area
Cultivated land	640	2084.70
Dry cultivation	359	748.69
Net irrigated	601	1336.01
Canal irrigation	425	719.79
Well irrigation	217	391.70
Other sources of irrigation	173	224.52

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3.6 Extent of Irrigation and Size of Cultivated Holding

The data on irrigation was classified according to size of cultivated holding. This is presented in Table 3.12 for entire sample and the same is presented village-wise in Table 3.13. At the aggregate level average land irrigated was 2.22 hectares. The average area irrigated per family is computed by considering only those families who had irrigated and is shown in Table 3.12.

In the last column of this table we present the extent of irrigation achieved in percentage terms considering the total cultivated holding in each group. At the aggregate level the percentage of irrigation was 64.09 which is already reported in Section 3.5. The second group (1 to 2 ha.) has the maximum percentage of 76.15. Village-wise and sizegroup-wise data is presented in Table 3.13. (See also Tables A1, A2 and A3 at the end)

Table 3.12 : Area Irrigated in the Sample Villages
According to Size of Cultivated Holding
Group

Size of Cultivated Holding Group	No. of Families	Area Irrigated	Area Irrigated per family	Extent of Irrigation %
I Less than 1 hectare	58	31.01	0.53	71.53
II 1 to 2 hectares	167	192.88	1.15	76.15
III 2 to 3 hectares	125	207.32	1.66	65.92
IV 3 to 5 hectares	137	374.23	2.73	69.17
V Above 5 hectares	114	530.57	4.65	56.90
Total	601	1336.01	2.22	64.09

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Total	601	1336.01	2.22	64.09

3.7 Land Development Done

We have presented statistics about entire land owned by the sample families in the above sections. Now, we shall look into the question of how much of this land is under Bhima command. The statistics was collected through the questionnaire on the basis of information given by the respondents. Accordingly, it was revealed that of the total land owned (2517.88) by these 650 sample families only 1728.28 hectares (68.64%) was under command. Of this, 1179.09 hectares or 68.22 percent has been developed. The village-wise data of land under command and land developed are presented in Table 3.14.

Table 3.14 : Land Under Command and Land Developed
(Village-wise)

Village	No. of families	Land Under Bhima Command	Developed Area	Undeveloped Area
1. Pehe	62	207.12	147.59	59.53
2. Akole (Bk.)	45	82.78	56.31	26.47
3. Umbre	77	191.99	141.71	50.28
4. Kanhapuri	77	219.28	153.10	66.18
5. Wagholi	8	10.57	8.50	2.07
6. Malegaon	37	89.18	57.66	31.52
7. Katewadi	58	136.08	82.14	53.94
8. Nandgaon	51	154.35	84.55	69.80
9. Khedbhose	125	313.38	200.86	112.52
10. Takli	110	323.55	246.67	76.88
Total	650	1728.28	1179.09	549.19

3.8 Ownership of Livestock and Agricultural Implements

We present in Tables 3.15 and 3.16 the data on ownership of livestock and agricultural implements for the entire sample together. The tables are self explanatory. In the category of other implements tractors, threshers, etc., are included. In the judgement of our field staff there had been under reporting on the possession of these items.

Table 3.15 : Ownership of Livestock

Animal	No. of families who own	No. of animals owned
Bullocks	226	503
Cows	244	541
She-buffaloes	242	549
He-buffaloes	30	37
Sheep/goat	214	1491

Table 3.16 : Ownership of Agricultural Implements

Implement	No. of families who own	No. of implements owned
Bullock cart	136	142
Plough	129	188
Seed drill (4 way)	23	24
Seed drill (3 way)	143	165
Kolpe (for harrowing)	77	101
Aut	168	208
Others	86	102

CHAPTER IV

LAND DEVELOPMENT WORK CARRIED OUT AND ITS GENERAL IMPACT

In the present chapter we plan to present more detailed information regarding the land development works carried out and also discuss general impact of land development, such as change in cropping pattern, change in the extent irrigation, ownership of livestock, ownership of agricultural implements, etc.

4.1 Land Development Work Carried Out

For the entire sample, the total developed land was 1179.09 hectares. Of this, 935.52 hectares (79.34 percent) was developed by the government agencies and the remaining 243.57 hectares was developed by the cultivators themselves. We present in Table 4.1 and 4.2 the data on the land development works carried out by the Government agencies and by the cultivators themselves respectively according to the size of cultivated land holding size group and also village-wise. The number of families and the area developed is given. The area of 935.52 hectares developed by the Government agencies belonged to 507 families. On an average, an area of 1.8452 hectares had been developed per family. Of course, the average area developed in each cultivated land holding group differed. There were 182 cultivators who developed the land themselves. The average land developed was 1.3383 hectares per family at the aggregate level.

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As for the development work, it was carried out only in the command area. Table 3.4 in Chapter III gives the area under command. The area statistics presented earlier giving area owned, net area cultivated, etc. covers the entire land of the sample farmers, under command and outside command also.

Our main objective is to investigate into the benefits of land development in terms of incremental yield, returns, etc. For this purpose, comparison between developed and non-developed land is required. When we consider non-developed land, some of the land of sample farmers would be outside the command area. Since such land belongs to the sample villages, it would be useful as control group along with the undeveloped land from the command area. This approach was necessary, since it was not possible to obtain separate data for cultivation on undeveloped land from and outside the command area. Therefore, the data on cultivation include the land under command and from outside the command as well.

The detailed data on yield and cost of cultivation was obtained for each crop separately for irrigated, dry and for developed and not developed land and also for land not requiring development. These data are used to make comparisons in terms of yield and return between different development categories in order to infer about the benefits of development works. This will be taken up in the next chapter.

In the present chapter we will take up the discussion

regarding change in cropping pattern, change in the extent of irrigation, change in the ownership of livestock and agricultural implements. Land development works facilitate proper extension of irrigation which in turn makes it possible for the farmers to choose a wide range of crops and also makes it possible to have double cropping as well. It is, therefore, necessary to examine whether such changes have taken place on the basis of sample study.

4.2 Change in the cropping pattern

As mentioned earlier, all the details of the crop cultivation during the reference year of the survey were collected for all the sample families. In order to understand the change in cropping patterns due to land development works, the data on cropping pattern before the land development works were carried out was also collected in respect of developed land. For examining the impact of land development on cropping pattern we compare the cropping pattern only on developed lands before and after development. These data are tabulated and presented in Table 4.3.

As reported earlier, total area of 1179.09 hectares belonging to the sample farmers was developed. The Table 4.3 gives cropping pattern on this area. It can be observed that the gross cropped area before development was less than 1179.09 indicating clearly that some land was not under cultivation before development and the same had come under cultivation

after development.

Gross cropped area of 1154.27 hectares before development had increased to 1431.27 hectares after development. That means an increase of 24 per cent took place in the gross cropped area which is mainly due to double cropping and partly due to some land being brought under cultivation newly due to development. The percentage of double cropping during the reference year for this group works out to 21.39, which is still short by about 18 percent compared to the target of 40 percent visualized in the project report on land development (Table 1.3, Chapter I).

It is revealed from the Table 4.3 that there has been quite significant change in the cropping pattern due to land development works since that facilitated the irrigation. Firstly, the gross irrigated area increased from 136.05 to 1248.36 hectares.

We present in Table 4.4 the area in percentage under each crop before and after development. The share of Rabi jowar was 83.96 percent of total gross cropped area before development which was reduced to 38.86 percent after development taking into consideration dry and irrigated crops together. The other major crops next to Rabi Jowar, before development were Bajra (6.01) percent, Kh.pulses (2.95 percent), Wheat Hy. (1.21 percent) and Bajra Hy. (1.16 percent). These crops and Rabi Jowar together accounted for 95.29 percent of the gross cropped area.

The major crops after development were Rabi Jowar (38.86 percent), Sugarcane (16.19 percent), Groundnut Hy.(12.37 percent), Wheat Hy. (6.54 percent), Sunflower Hy. (4.36 percent), Maize

Table 4.4 : Cropping pattern before and after land development
(Area under crops in hectare)

Crop Code	Crop	Before Development			After Development		
		Dry	Irrigated	Total	Dry	Irrigated	Total
1	Kh. Jowar (Hy.)	0.00	0.40	0.40	0.50	35.55	36.05
2	Rb. Jowar (Local)	879.86	89.25	969.11	166.24	390.03	556.27
3	Rb. Jowar (Hy.)	3.20	0.00	3.20	0.89	5.60	6.49
4	Bajara (Local)	64.32	5.05	69.37	2.75	13.00	15.75
5	Bajara(Hy.)	13.38	0.00	13.38	1.60	26.70	28.30
6	Maize (Local)	0.80	4.00	4.80	1.00	39.77	40.77
7	Maize (Hy.)	0.00	0.00	0.00	0.00	12.56	12.56
8	Wheat (Hy.)	1.30	12.63	13.93	0.20	93.46	93.66
9	Wheat (Local)	1.00	2.80	3.80	0.00	19.71	19.71
10	Tur (Local)	4.73	0.20	4.93	0.80	2.10	2.90
11	Tur (Hy.)	0.00	0.00	0.00	1.16	1.30	2.46
12	Mung	0.90	0.00	0.90	0.35	2.20	2.55
13	Gram(Hy.)	0.20	2.40	2.60	0.24	16.19	16.43
14	Gram(Local)	6.45	2.10	8.55	0.90	16.68	17.58
15	Kharif Pulses	34.20	0.00	34.20	1.37	0.00	1.37
16	Groundnut (Local)	2.90	3.80	6.70	0.00	11.45	11.45
17	Groundnut (Hy.)	0.18	3.70	3.88	0.00	177.11	177.11
18	Safflower (Local)	2.40	0.00	2.40	0.00	0.00	0.00
19	Sunflower (Hy.)	0.40	0.40	0.80	2.20	60.14	62.34
20	Sunflower (Local)	0.00	0.20	0.20	0.00	3.13	3.13
21	Other Oilseeds	0.40	0.00	0.40	1.20	0.10	1.30
22	Sugercane (Hy.)	0.00	2.00	2.00	0.70	231.08	231.78
23	Cotton (Hy.)	0.40	0.00	0.40	0.00	2.27	2.27
24	Fruits	0.00	0.40	0.40	0.00	7.90	7.90
25	Watermelon	0.00	0.00	0.00	0.00	0.60	0.60
26	Vegetables	1.00	0.82	1.82	0.00	8.78	8.78
27	Fodder Crops	0.20	5.90	6.10	0.90	70.95	71.85
Total		1018.22	136.05	1154.27	183.00	1248.36	1431.36

local (2.85 percent), Kh. Jowar Hy. (2.52 percent), Bajra Hy. (1.98 percent). The substantial shift can be seen towards Sugarcane, Groundnut Hy., Wheat Hy., Jowar Hy., Bajra Hy., etc. Thus, there had been a significant change in cropping pattern.

For a quick look, we present in Table 4.5 the important crops in descending order of the percentage of area (irrigated + dry) under them before and after development.

Table 4.5 : Important Crops before and after development in descending order of percentage of area (irrigated + dry) under them

<u>Before Development</u>		<u>After Development</u>	
<u>Crop</u>	<u>Area(%)</u>	<u>Crop</u>	<u>Area(%)</u>
1. Rabi Jowar L	83.96	1. Rabi Jowar L	38.86
2. Bajra Local	6.01	2. Sugarcane	16.19
3. Kh.Pulses	2.95	3. Groundnut Hy.	12.37
4. Wheat Hy.	1.21	4. Wheat Hy.	6.54
5. Bajra Hy.	1.16	5. Sunflower Hy.	4.36
Sub Total	95.29	6. Maize L	2.85
		7. Kh. Jowar Hy.	2.52
		8. Bajra Hy.	1.98
		9. Wheat Local	1.38
		10. Gram Local	1.29
		11. Gram Hy.	1.15
		12. Bajra Local	1.10
		Sub Total	90.59
Other Crops with less than 1% area	4.71		9.41
Total	100.00		100.00

4.3 Increase in Land Under Irrigation

A change-over from dry to wet farming is not simple. In order to introduce irrigation, land in the command area has to be prepared to receive irrigation water and to utilize it more optimally and economically. The land has to be developed to bring it under some regularity in its shape, gradient and size in order to facilitate easy and smooth spread of the costly water resource in the entire command area. It is also essential to have field drains to remove sub-soil water and provide for surface run off, to forestall and to prevent the occurrence of problems like water-logging, soil erosion and damage to land under command. Thus, development of land under command assumes crucial priority and has to be completed before the introduction of irrigation.

The information on cropping pattern presented in Table 4.4 reveals that substantial area had been brought under irrigation after the land development works were carried out. We present in Table 4.6 the data for quick reference. We continue the comparison in terms of before and after land development works ^{were} carried out. Before the land development only 136.05 hectares were under irrigation (11.79 percent) whereas after development 1248.38 (87.21 percent) hectares were brought under irrigation. Gross area cultivated and gross irrigated area are considered. There has been substantial achievement in bringing the land under irrigated cultivation. However, all the developed land ultimately should be

irrigated. We hope this would be achieved shortly or perhaps already achieved by the farmers by this time.

Table 4.6 : Increase in Irrigation

	(Land in Ha.)	
	Before development	After development
Gross Area Irrigated	136.05	1248.36
Gross Area Cultivated	1154.27	1431.36
Percentage of Irrigation	11.79	87.21

4.4 Change in the Livestock Owned

Livestock and agricultural implements of a farmer can not be separated as those for a particular plot of land. Since some farmers own lands developed as well as not developed, the type of tabulation carried out for the sections 4.2 and 4.3 based on land categories could not be done for these two assets. We had asked questions regarding the number possessed before the land development and after the land development to all the sample farmers. If a farmer did not have developed land, the meaning of the question was before and after the land development works were carried out in his village. Thus, for livestock as well as agricultural implements comparison of possessed stock before development and after development is made on the basis of entire sample of 650 farmers. This is good enough to assess the impact of land development and

irrigation.

Table 4.7 gives the data at the aggregate level and Table 4.8 gives the village-wise data. At the aggregate level only 169 (26 percent) farmers owned 370 bullock before development. Average number of bullocks owned per family was 2.19. As many as 226 families (34.77%) owned bullocks after development with average ownership of 2.22 bullocks. Thus, it is observed that though the average number owned has not improved much the number of farmers who owned bullocks has increased by 118.93 per cent. It can be seen from Table 4.7 that there has been substantial increase in the number of farmers who owned he-buffaloes, cows, she-buffaloes as well as sheep and goat. All the increase may not be attributed to land development and irrigation, there may be other factors like government schemes and general development activities over time, etc.

Table 4.7 : Ownership of Animals

Animals	Before Land Development		After Land Development	
	No. of families owning	No. of animals owned	No. of families owning	No. of animals owned
Bullocks	169	370	226	503
He-buffaloes	11	19	30	37
Cows	195	329	244	541
She-buffaloes	136	221	242	563
Sheep or goats	114	1298	214	1491

4.5 Change in the Agricultural Implements Owned

The position regarding the ownership of agricultural implements before and after development is presented in Table 4.9 at the aggregate level. The village-wise information is presented in Table 4.10. It is observed that there had been substantial increase in the number of farmers who owned various agricultural implements after the development. For example, only 90 (13.85%) farmers owned bullock cart before whereas 136 (20.92%) farmers owned bullock cart after development. Only 113 (17.38%) farmers owned 'aut' before development and 168 (25.85%) farmers owned 'aut' after development. The category of 'others' include tractors, threshers, etc. There had been substantial increase in their number after development.

Table 4.9 : Ownership of Agricultural Implements

Implements	Before Land Development		After Land Development	
	No. of families owning	No. of implements owned	No. of families owning	No. of implements owned
1. Bullock cart	90	92	136	142
2. Aut	113	133	168	208
3. Seed-drill (4-way)	11	12	23	24
4. Seed-drill (3-way)	108	120	143	165
5. Kolpe	67	90	77	101
6. Plough	83	97	129	188
7. Others	17	18	86	102

CHAPTER V

IMPACT OF LAND DEVELOPMENT ON PRODUCTIVITY AND RETURNS

We take up the most important aspect of the present study in this chapter, namely, the impact of land development works carried out in terms of incremental yield and incremental incomes. The detailed data was collected regarding cost of cultivation covering all the items, such as, seeds, fertilizers, pesticides, labour charges paid for various operations from preparation of land till harvesting, water charges, electricity expenses, land revenue, hiring charges for implements/animals and also the family labour input. The value of crop produced and also by the value of by-products was considered. The data was collected using different schedules depending upon the development category of land. These data were collected for each crop and for dry and irrigated land separately in each development category. For the purpose of examining the impact of land development, we have chosen major crops. Before we go into the discussion on these data, we shall look into the cropping pattern in different development groups.

5.1 Cropping pattern according to development groups during the reference year (1991-92)

We present in Table 5.1 the area under different crops according to cultivated holding size group for all development groups together and then present the same for the development groups separately, namely, land development not required, land

development done by Government, land development done by cultivators themselves and land development not done in the Tables 5.2, 5.3, 5.4 and 5.5 respectively. There were in all 27 crops grown. The list of these crops along with their code numbers is presented on the next page. Only the code numbers are presented in the above tables and therefore this list is necessary for reference. These tables are self-explanatory.

For the sake of examining the impact of land development, the selection of major crops was done by considering their presence in different development categories. The major crops chosen for this purpose were Kh.Jowar (Hy.), Rabi Jowar (Local), Bajra (Hy.), Maize (Local), Wheat (Hy.), Wheat (Local), Gram (Hy), Gram (Local), Groundnut (Hy.), Sunflower (Hy.) and sugarcane for irrigated crops. The major crops selected for dry cultivation were Rabi Jowar (Local), Bajra (Local), Bajra (Hy.) and Sunflower (Hy.).

Hereafter we shall refer to the development group as follows.

- | | |
|---------|---|
| Gr. I | development not required |
| Gr. II | development done by the government agencies |
| Gr. III | development done by the cultivators (self) |
| Gr. IV | development not done |

List of crops with their code number.

CODE	CROP
1	Kh. Jowar (Hy.)
2	Rb. Jowar (Local)
3	Rb. Jowar (Hy.)
4	Bajara (Local)
5	Bajara (Hy.)
6	Maize (Local)
7	Maize (Hy.)
8	Wheat (Hy.)
9	Wheat (Local)
10	Tur (Local)
11	Tur (Hy.)
12	Mung
13	Gram (Hy.)
14	Gram (Local)
15	Kharif Pulses
16	Groundnut (Local)
17	Groundnut (Hy.)
18	Safflower (Local)
19	Sunflower (Hy.)
20	Sunflower (Local)
21	Other Oilseeds
22	Sugercane (Hy.)
23	Cotton (Hy.)
24	Fruits
25	Watermelon
26	Vegetables
27	Fodder Crops

Table 5.1
 Cropping Pattern according to size of cultivated holding in all villages & all D

Crop Code	DRY Holding Group					Total	%	1
	1	2	3	4	5			
1	0.48	0.00	1.50	0.00	0.00	1.98	0.26	1.90
2	12.74	56.45	96.77	144.24	346.88	657.08	86.87	14.72
3	0.10	0.00	0.00	0.89	0.00	0.99	0.13	0.70
4	0.00	0.90	0.80	3.95	8.00	13.65	1.80	0.20
5	0.10	1.55	0.80	0.80	1.90	5.15	0.68	1.50
6	0.17	0.40	0.80	0.40	0.60	2.37	0.31	2.40
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
8	0.00	0.00	0.20	0.20	0.00	0.40	0.05	2.20
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53
10	0.00	0.00	0.40	1.80	3.10	5.30	0.70	0.00
11	0.00	0.00	0.00	1.16	0.00	1.16	0.15	0.00
12	0.20	0.00	0.15	0.00	0.50	0.85	0.11	0.00
13	0.00	0.00	0.00	0.00	0.24	0.24	0.03	0.00
14	0.00	0.30	1.30	1.05	0.40	3.05	0.40	0.30
15	0.00	1.50	2.00	7.32	29.88	40.70	5.38	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47
17	0.00	1.00	0.00	0.00	0.00	1.00	0.13	5.27
18	0.00	0.35	1.50	4.60	4.14	10.59	1.40	0.00
19	0.00	0.20	0.30	4.00	1.60	6.10	0.81	2.40
20	0.00	0.00	1.10	0.00	0.30	1.40	0.19	0.80
21	0.00	0.10	0.00	1.20	0.00	1.30	0.17	0.00
22	0.00	0.70	0.00	0.00	0.00	0.70	0.09	5.38
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.05	0.00	0.00	0.10	0.40	0.55	0.07	0.55
27	0.60	0.20	0.80	0.00	0.20	1.80	0.24	2.35
TOTAL	14.44	63.65	108.42	171.71	398.14	756.36	100.00	44.77

Holding Groups : 1 : Less than 1 Ha. 2 : 1 to 2 Ha. 3 : 2 to 3 Ha. 4 :

Table 5.1
 Cropping Pattern according to size of cultivated holding in all villages & all D

Crop Code	DRY Holding Group					Total	%	1
	1	2	3	4	5			
1	0.48	0.00	1.50	0.00	0.00	1.98	0.26	1.90
2	12.74	56.45	96.77	144.24	346.88	657.08	86.87	14.72
3	0.10	0.00	0.00	0.89	0.00	0.99	0.13	0.70
4	0.00	0.90	0.80	3.95	8.00	13.65	1.80	0.20
5	0.10	1.55	0.80	0.80	1.90	5.15	0.68	1.50
6	0.17	0.40	0.80	0.40	0.60	2.37	0.31	2.40
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
8	0.00	0.00	0.20	0.20	0.00	0.40	0.05	2.20
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53
10	0.00	0.00	0.40	1.80	3.10	5.30	0.70	0.00
11	0.00	0.00	0.00	1.16	0.00	1.16	0.15	0.00
12	0.20	0.00	0.15	0.00	0.50	0.85	0.11	0.00
13	0.00	0.00	0.00	0.00	0.24	0.24	0.03	0.00
14	0.00	0.30	1.30	1.05	0.40	3.05	0.40	0.30
15	0.00	1.50	2.00	7.32	29.88	40.70	5.38	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47
17	0.00	1.00	0.00	0.00	0.00	1.00	0.13	5.27
18	0.00	0.35	1.50	4.60	4.14	10.59	1.40	0.00
19	0.00	0.20	0.30	4.00	1.60	6.10	0.81	2.40
20	0.00	0.00	1.10	0.00	0.30	1.40	0.19	0.80
21	0.00	0.10	0.00	1.20	0.00	1.30	0.17	0.00
22	0.00	0.70	0.00	0.00	0.00	0.70	0.09	5.38
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.05	0.00	0.00	0.10	0.40	0.55	0.07	0.55
27	0.60	0.20	0.80	0.00	0.20	1.80	0.24	2.35
TOTAL	14.44	63.65	108.42	171.71	398.14	756.36	100.00	44.77

Holding Groups : 1 : Less than 1 Ha. 2 : 1 to 2 Ha. 3 : 2 to 3 Ha. 4 :

Table 5.3

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Cropping Pattern according to size of cultivated holding in all villages together

Crop Code	DRY Holding Group					Total	%	1	
	1	2	3	4	5			1	5
1	0.00	0.00	0.50	0.00	0.00	0.50	0.30	0.00	5
2	8.05	17.90	36.69	37.65	52.08	152.37	91.55	10.03	54
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4	0.00	0.00	0.20	0.55	2.00	2.75	1.65	0.20	1
5	0.00	0.00	0.80	0.80	0.00	1.60	0.96	0.90	5
6	0.00	0.40	0.20	0.30	0.00	0.90	0.54	0.80	4
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
8	0.00	0.00	0.20	0.00	0.00	0.20	0.12	1.10	10
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	3
10	0.00	0.00	0.40	0.20	0.20	0.80	0.48	0.00	0
11	0.00	0.00	0.00	1.16	0.00	1.16	0.70	0.00	1
12	0.20	0.00	0.15	0.00	0.00	0.35	0.21	0.00	0
13	0.00	0.00	0.00	0.00	0.24	0.24	0.14	0.00	1
14	0.00	0.10	0.80	0.00	0.00	0.90	0.54	0.00	1
15	0.00	0.00	0.20	0.77	0.40	1.37	0.82	0.00	0
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	3
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.47	26
19	0.00	0.00	0.00	0.60	0.00	0.60	0.36	1.00	5
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0
21	0.00	0.00	0.00	1.20	0.00	1.20	0.72	0.00	0
22	0.00	0.70	0.00	0.00	0.00	0.70	0.42	3.57	21
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0
27	0.00	0.00	0.80	0.00	0.00	0.80	0.48	1.00	7
TOTAL	8.25	19.10	40.94	43.23	54.92	166.44	100.00	25.11	159

Holding Groups : 1 : Less than 1 Ha. 2 : 1 to 2 Ha. 3 : 2 to 3 Ha. 4 : 3

Table 5.4

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Cropping Pattern according to size of cultivated holding in all villages together

Crop Code	DRY Holding Group					Total	%	1
	1	2	3	4	5			
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40
2	1.48	4.55	7.84	0.00	0.00	3.87	83.76	3.09
3	0.00	0.00	0.00	0.89	0.00	0.89	5.37	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
6	0.10	0.00	0.00	0.00	0.00	0.10	0.60	1.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.90
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
19	0.00	0.20	0.00	1.40	0.00	1.60	9.66	0.60
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
27	0.10	0.00	0.00	0.00	0.00	0.10	0.60	1.05
TOTAL	1.68	4.75	7.84	2.29	0.00	16.56	100.00	12.19

Holding Groups : 1 : Less than 1 Ha. 2 : 1 to 2 Ha. 3 : 2 to 3 Ha. 4 : 3 to 4 Ha.

Table 5.4

64

Cropping Pattern according to size of cultivated holding in all villages together

Crop Code	DRY Holding Group					Total	%	1
	1	2	3	4	5			
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40
2	1.48	4.55	7.84	0.00	0.00	3.87	83.76	3.09
3	0.00	0.00	0.00	0.89	0.00	0.89	5.37	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
6	0.10	0.00	0.00	0.00	0.00	0.10	0.60	1.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.90
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
19	0.00	0.20	0.00	1.40	0.00	1.60	9.66	0.60
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
27	0.10	0.00	0.00	0.00	0.00	0.10	0.60	1.05
TOTAL	1.68	4.75	7.84	2.29	0.00	16.56	100.00	12.19

Holding Groups : 1 : Less than 1 Ha. 2 : 1 to 2 Ha. 3 : 2 to 3 Ha. 4 : 3 to 4 Ha.

5.2 Impact of land development on Productivity and returns

It is essential to analyse the impact of land development at crop level. We have, therefore, carried out crop-wise analysis of costs of cultivation, production, returns, etc. For the selected major crops, as mentioned above, we present data on these items in Tables 5.6 to 5.20.

To begin^{with}, let us look into the category 'development not done'. The land under this category requires development but it was not done. This was chosen in the sample as control group. It can be observed from these tables that in most of the crops the yield per hectare and the returns per hectare in this category are substantially lower than the other categories. For example, the per hectare yield of irrigated Kh.Jowar (Hy.) was only 5.33 quintals on undeveloped land whereas the same was 12.01 quintals on land not requiring development, 14.17 quintals on land developed by the Government agencies and 14.26 quintals on the lands developed by the cultivators themselves. The net returns from this crop per hectare were meagre Rs. 589 from undeveloped land whereas the other lands gave net return per hectare of Rs. 2868 (Gr.I), Rs. 1493 (Gr.II) and Rs. 1337 (Gr.III).

The similar significant benefits of developments works can be observed clearly in the many other irrigated crops. In the case of Rabi Jowar (Local), the yield was only 7.35

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quintals per hectare from undeveloped (Gr.IV) land and that from other categories was 9.41, 10.08 and 10.08 quintals from Gr.I, II and III respectively. The net return on undeveloped land was Rs. 1543 per hectare whereas the same was Rs. 2366, Rs. 2785 and Rs. 2713 from Gr. I, II and III respectively. It can be seen from the tables that there were clear benefits in the case of Bajra (Hy.), Wheat (Hy.), Wheat (Local) and Groundnut (Hy.) in yield as well as net income per hectare. Though the picture is not very clear in the case of Maize (Local) and Groundnut (local), the above crops give enough evidence of the benefits of land development.

It may be noted that the land not requiring development had given good results comparable to developed land. In some cases, for example, Kh.Jowar (Hy.) this category had given the best returns. This shows that the land plots identified as not requiring development had been appropriately identified. The above observations show that the development is quite crucial to reap full benefits of irrigation.

The figures of net returns per hectare indicate distinct advantage in growing sugarcane. The net returns from Sugarcane were Rs. 18,183, Rs. 14,799 and Rs. 17,821 from the land categories I, II and III respectively.

After going into the crop-wise figures, it is worthwhile to consider overall picture. For this, we have computed per hectare net returns from all irrigated crops (Even those crops

for which the data have not been presented in the above Tables have been included in this exercise.) for Groups II and III together and for Group IV, it was found that net returns per hectare for all crops together were Rs. 5,026 on the developed land and Rs. 1,662 on the undeveloped land. Thus, the benefits due to development can be considered to be Rs.3,364 per hectare. It may be mentioned here that these include sugarcane crop which gave much higher returns than other crops. If sugarcane is excluded, the net returns per hectare on developed land work out to Rs. 2,577 and in that case the net benefit of land development works out to Rs. 787 only.

In the above comparisons, there is one limitation that the total area in the Gr.IV, i.e., undeveloped land was very small and as such the estimates of yield as well as net returns in this category suffer the weakness of small sample size. As explained in the earlier chapter, this was inevitable under the field level circumstances. The required sample in this category was of the land requiring development but was not developed. Firstly, such area was small and then getting the names of the concerned farmers was not easy. However, the results obtained are quite useful.

It is also interesting to note that the land development shows good benefits even under dry farming. Major dry crop Rabi Jowar (local) shows that per hectare net return of Rs.111 as against per hectare return of Rs. 343, Rs.460 and Rs.394

from Gr.I, Gr.II and Gr.III respectively. Thus, the land development helped farmers to earn more net income even in the case of dry farming specially for Rabi Jowar (local).

We may now examine the net returns in two development categories, namely, Gr.II (Govt.) and Gr.III (self). It can be seen that in the case of irrigated Bajra (Hy.), Wheat (Hy.), Wheat (local), Groundnut (Hy.), Sunflower (Hy.) and sugarcane the net returns per hectare were substantially higher in the Self group than in the Government group. In the case of irrigated Kh.Jowar (Hy.), Rabi Jowar (local), Maize (local), Gram (Hy.) and Gram (local) the position was other way round.

If all the irrigated crops are considered together, it is observed that net return of Rs. 6627 was obtained from self developed land and Rs. 4568 was obtained from lands developed by Government agencies. Thus, the net returns are much higher if the cultivators have developed their land by themselves. This is quite astonishing. Since the Government agencies have all the technical know-how, technical personnel, sufficient infrastructure, and there is no dearth of finance, the land development work should be much better giving better net returns to the farmers. On the other hand, the cultivator is not competent and does not have technical support. It, however, appears that the farmers have been able to achieve good quality of land development. This may be due to a reason that they were internally motivated and therefore saw to it that

they get the quality work done. The quality of work is being conjectured here through the level of net returns per hectare.

In the case of dry cultivation, only two crops were grown on self developed land, namely, Rabi Jowar (local) and Sunflower. In each of these cases the net returns were lower on self developed lands than on the lands developed by the Government. However, the differences were small. Considering all the crops together, the net returns on self-developed land were Rs. 447 and on lands developed by Government were Rs. 465. This difference being small on the whole, we can say that the self developed land gave more net returns than the land developed by the Government agencies.

Table 5.6 : Average yield and returns for major crops : Kh. Jowar (Hy.) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	15.24	32.50	3.05	0.75
Total production	183.00	460.50	43.50	4.00
Yield per Hectare	12.01	14.17	14.26	5.33
Value of crop	73950	188000	14850	1400
Value of by-products	25300	57450	4200	700
Total value	99250	245450	19050	2100
Value of produce/ha.	6512	7552	6246	2800
Total cost of cult.	55537	196935	14973	1658
Cost of cult./ ha.	3644	6060	4909	2211
Net returns per ha.	2868	1493	1337	589

Table 5.7 : Average yield and returns for major crops : Ra.Jowar(Local) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	166.76	302.32	87.71	4.22
Total production	1569.50	3046.50	884.10	31.00
Yield per Hectare	9.41	10.08	10.08	7.35
Value of crop	665000	1362975	388920	12800
Value of by-products	319900	602900	183875	5800
Total value	984900	1965875	572795	18600
Value of produce/ha.	5906	6503	6531	4408
Total cost of cult.	590392	1123882	334799	12090
Cost of cult./ ha.	3540	3718	3817	2865
Net returns per ha.	2366	2785	2713	1543

Area in hectares, production and yield in quintals and value in Rs.

Table 5.8 : Average yield and returns for major crops : Bajara (Hy.) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	9.81	24.80	1.90	1.15
Total production	135.00	440.50	34.50	3.50
Yield per Hectare	13.76	17.76	18.16	3.04
Value of crop	53400	170100	13800	1400
Value of by-products	9625	27687	2700	500
Total value	63025	197787	16500	1900
Value of produce/ha.	6424	7975	8684	1652
Total cost of cult.	40551	120582	9005	2276
Cost of cult./ ha.	4134	4862	4739	1979
Net returns per ha.	2291	3025	3945	-327

Table 5.9 : Average yield and returns for major crops : Maize (Local) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	19.79	30.45	9.32	0.50
Total production	126.00	308.00	57.30	3.00
Yield per Hectare	6.37	10.11	6.15	6.00
Value of crop	41700	105850	20690	1200
Value of by-products	82525	92320	28325	1200
Total value	124225	198170	49015	2400
Value of produce/ha.	6277	6508	5259	4800
Total cost of cult.	82358	122953	34841	1447
Cost of cult./ ha.	4162	4038	3738	2894
Net returns per ha.	2116	2470	1521	1906

Area in hectares, production and yield in quintals and value in Rs.

Table 5.10 : Average yield and returns for major crops : Wheat (Hy.) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	38.57	76.32	17.14	0.60
Total production	542.00	1104.50	309.00	5.00
Yield per Hectare	14.05	14.47	18.03	8.33
Value of crop	256925	507925	133050	2250
Value of by-products	-	12400	-	-
Total value	256925	520325	133050	2250
Value of produce/ha.	6661	6818	7763	3750
Total cost of cult.	191807	393052	93183	2615
Cost of cult./ ha.	4973	5150	5437	4359
Net returns per ha.	1688	1668	2326	-690

Table 5.11 : Average yield and returns for major crops : Wheat (Local) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	13.33	11.31	8.40	0.40
Total production	181.50	145.50	159.50	4.00
Yield per Hectare	32.62	12.86	18.99	10.00
Value of crop	83225	69200	67650	1600
Value of by-products	9400	4000	7000	-
Total value	92625	73200	74650	1600
Value of produce/ha.	6949	6472	8887	4000
Total cost of cult.	66441	57466	54283	1272
Cost of cult./ ha.	4984	5081	6462	3179
Net returns per ha.	1964	1391	2425	821

Area in hectares, production and yield in quintals and value in Rs.

Table 5.12 : Average yield and returns for major crops : Gram (Hy.) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	6.63	13.24	2.95	-
Total production	48.50	107.25	19.50	-
Yield per Hectare	7.32	8.10	6.61	-
Value of crop	39730	86350	15650	-
Value of by-products	-	2600	-	-
Total value	39730	88950	15650	-
Value of produce/ha.	5992	6718	5305	-
Total cost of cult.	26085	60954	12152	-
Cost of cult./ ha.	3934	4604	4119	-
Net returns per ha.	2058	2114	1186	-

Table 5.13 : Average yield and returns for major crops : Gram (Local) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	7.55	12.83	3.85	0.20
Total production	50.35	90.15	21.00	1.00
Yield per Hectare	6.67	7.03	5.45	5.00
Value of crop	40700	69310	15550	750
Value of by-products	100	-	900	-
Total value	40800	69310	16450	750
Value of produce/ha.	5404	5402	4273	3750
Total cost of cult.	31213	55322	16444	612
Cost of cult./ ha.	4134	4312	4271	3059
Net returns per ha.	1270	1090	2	691

Area in hectares, production and yield in quintals and value in Rs.

Table 5.14 : Average yield and returns for major crops : Groundnut (Hy.) Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	73.14	145.17	31.94	1.20
Total production	691.50	1428.00	330.00	7.00
Yield per Hectare	9.45	9.84	10.33	5.83
Value of crop	629300	1286200	308350	6300
Value of by-products	51065	87009	21700	500
Total value	680365	1373209	330050	6800
Value of produce/ha.	9302	9459	10333	5667
Total cost of cult.	471558	967389	225081	5691
Cost of cult./ ha.	6447	6664	7047	4742
Net returns per ha.	2855	2795	3286	924

Table 5.15 : Average yield and returns for major crops : Sunflower(Hy.)Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	25.35	49.14	11.00	-
Total production	211.55	423.75	96.00	-
Yield per Hectare	8.35	8.62	8.73	-
Value of crop	187300	388775	90225	-
Value of by-products	900	1600	-	-
Total value	188200	390375	90225	-
Value of produce/ha.	7424	7944	8202	-
Total cost of cult.	125984	255375	53845	-
Cost of cult./ ha.	4970	5197	4895	-
Net returns per ha.	2454	2747	3307	-

Area in hectares, production and yield in quintals and value in Rs.

Table 5.16 : Average yield and returns for major crops : Sugarcane Irri.

Item	Development Group			
	I	II	III	IV
Area under crop	74.19	163.31	67.77	-
Total production	7008.70	14044.50	6690.00	-
Yield per Hectare	94.47	86.00	98.72	-
Value of crop	2534660	5021361	2271825	-
Value of by-products	85026	108775	75750	-
Total value	2619686	5130136	2347575	-
Value of produce/ha.	35311	31413	34640	-
Total cost of cult.	1270667	2713265	1139839	-
Cost of cult./ ha.	17127	16614	16819	-
Net returns per ha.	18183	14799	17821	-

Area in hectares, production and yield in tons and value in Rs.

Table 5.17 : Average yield and returns for major crops : Ra..Jowar(Local) Dry

Item	Development Group			
	I	II	III	IV
Area under crop	463.12	152.37	13.87	27.72
Total production	1115.37	313.90	43.00	56.55
Yield per Hectare	2.41	2.06	3.10	2.04
Value of crop	462357	140965	18750	23005
Value of by-products	374445	117750	14450	18445
Total value	836802	258715	33200	41450
Value of produce/ha.	1807	1698	2394	1495
Total cost of cult.	678084	188610	27734	38382
Cost of cult./ ha.	1464	1238	2000	1385
Net returns per ha.	343	460	394	111

Table 5.18 : Average yield and returns for major crops : Bajara(Local) Dry

Item	Development Group			
	I	II	III	IV
Area under crop	10.50	2.75	-	0.40
Total production	34.20	21.50	-	1.50
Yield per Hectare	3.26	7.82	-	3.75
Value of crop	11295	6650	-	450
Value of by-products	3945	1675	-	200
Total value	15240	8325	-	650
Value of produce/ha.	1451	3027	-	1625
Total cost of cult.	13443	6199	-	636
Cost of cult./ ha.	1280	2254	-	1591
Net returns per ha.	171	773	-	35

Area in hectares, production and yield in quintals and value in Rs.

Table 5.19 : Average yield and returns for major crops : Bajara(Hy.) Dry

Item	Development Group			
	I	II	III	IV
Area under crop	3.55	1.60	-	-
Total production	12.40	16.00	-	-
Yield per Hectare	3.49	10.00	-	-
Value of crop	4710	6400	-	-
Value of by-products	1400	1200	-	-
Total value	6110	7600	-	-
Value of produce/ha.	1721	4750	-	-
Total cost of cult.	5091	4539	-	-
Cost of cult./ ha.	1434	2837	-	-
Net returns per ha.	287	1913	-	-

Table 5.20 : Average yield and returns for major crops : Sunflower(Hy.) Dry

Item	Development Group			
	I	II	III	IV
Area under crop	3.90	0.60	1.60	-
Total production	7.00	2.00	5.00	-
Yield per Hectare	1.79	3.33	3.13	-
Value of crop	7900	1800	4500	-
Value of by-products	-	-	-	-
Total value	7900	1800	4500	-
Value of produce/ha.	2026	3000	2813	-
Total cost of cult.	4910	1131	3056	-
Cost of cult./ ha.	1259	1885	1910	-
Net returns per ha.	767	1115	903	-

Area in hectares, production and yield in quintals and value in Rs.

5.3 Employment Generation

Since land development facilitates irrigation and since irrigated cultivation needs higher labour input, it is expected that the land development followed by irrigation generates significant employment. In order to estimate employment generated due to land development a comparison of labour input utilized for cultivating the developed land and the undeveloped land under irrigation may be done. We carried out this exercise by taking developed irrigated land (Government + Self) in one group and undeveloped irrigated land in the second group. It was observed that the labour input per hectare of gross cultivated-land was more by 21 mandays of male labour and by 37 mandays of female labour. Thus, the estimate of employment generation due to land development was 58 mandays per hectare of gross cultivated land (irrigated).

The above estimate can be used for estimating the total employment generated in the command area. The total area developed (Government + Self) was 33741 hectares in the command area. As the sample study revealed all this area can not be considered as irrigated. We look into the sample data presented in Table 4.6, it can be seen that 183.00 hectare of total developed land of 1179.09 hectares was under dry cultivation. That means the net irrigated area was 996.09 hectares. The extent of irrigation in terms of net areas was therefore 84.48 per cent. At the same time the gross irrigated area was

1248.36 hectares which comes to 5.84 per cent more than the figure of total developed land which was 1179.09 hectares. Therefore, based on the sample, the estimate of gross irrigated area for the entire command area can be obtained by taking 5.84 per cent more area than the total developed area of 33741 hectare, which works out to 35590 hectares.

The estimate of increase in labour employment due to development has to be based on 35590 hectares gross irrigated cultivated land in the entire command. This gives the estimate of employment generation of 7,47,390 mandays of male labour and 13,16,830 mandays of female labour.

5.4 Net incremental income and cost of land development

On the basis of the data provided to us the average cost of land development works carried out by the Government agencies worked out Rs. 1607 per hectare. We had asked a question to the farmers who have carried out the development works themselves about the expenditure they have incurred but most of them could not report the same properly. Therefore, we may consider Rs.1607 as an average expenditure per hectare for land development for both the categories. The incremental income due to land development under irrigated conditions was Rs. 3364 per hectare when all crops were considered and Rs.787 when crops other than sugarcane are considered. Thus, it is very clear that very good returns are obtained by the farmers due to land development.

The land development works were carried out before June, 1986 and the reference year of the study was 1991-92. Therefore, the benefits estimated are in terms of 1991-92 prices. If we consider that the prices have doubled during this period the cost of development will work out to Rs. 3214 per hectare at 1991-92 prices. It is clear that in just one year this cost gets recovered if we consider the net incremental income (all crops). If we consider crops other than sugarcane the cost can be recovered in 5-6 years period. It is clear from the results of the survey that the benefits of land development being quite good it is possible for the farmer to make the repayment through incremental incomes.

In the above analysis the expenses incurred by the farmers on items of investment such as, pipe line, new well, repair of old well, electric/diesel pump, etc. has not been considered. We had collected information on these items. It was reported by 229 farmers. Since all above analysis is on average basis, the average of this type of expenditure was computed and it worked out to 4650 rupees per hectare. Now, we may consider the benefit of land development (all crops together) which was Rs.3364. Expenditure on development was Rs. 1607 per hectare, add to that the above investment of Rs. 4650. Then the total expenditure was Rs.6257. Even then this can be recovered by the farmers in a period of two-three years.

5.5 Repayment Performance

The questions on repayment of loan for the land development

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5.5 Repayment Performance

The questions on repayment of loan for the land development

were included in the questionnaire. However, the farmers did not give proper information on this item. It was quite obvious that many of them did not make any repayment. They did not want to say that and instead took a position that they do not remember. A view was most prevalent among them that the loans might be waived. The callous attitude towards the repayment of loans in respect of Government schemes was observed. The repayment done was reportedly meagre. As far as the capacity to repay through incremental benefits is concerned we have seen in the previous section that it was adequate. Proper orientation and passing on full information about the scheme and motivational efforts are necessary before the expenditure is increased on such schemes on behalf of the farmers. A new approach to recovery may also have to be evoked by taking into confidence the beneficiaries.

5.6 Farmers Opinions

We have asked a number of questions to the sample farmers regarding the land development work carried out by the Government agencies and also regarding the availability of water. Some of these are reported here in brief.

1. On the consent regarding the loan for land development
350 (69%) reported that their consent was taken, 131 (25.84%) reported that their consent was not taken and the remaining did not remember.

2. On the quality of land development work done, the following were the responses :

(i) Land development work was done properly	8.28%
(ii) Land development work not done properly	53.85%
(iii) Work done on paper only	4.14%
(iv) Shown more area than actually worked	6.31%
(v) Bunds constructed by Government damaged due to rains	3.55%
(vi) Constructed bunds only	16.17%

3. They were asked about the difficulties faced in receiving water during the first year of irrigation. Their responses are presented in Table 5.21. The table is self explanatory.

4. They were asked whether they received adequate water during the reference year (1991-92) of the study. The responses were as follows :

(i) Received adequate water	81.69%
(ii) Big farmers do not allow water to reach our farms	5.23%
(iii) Did not receive adequate water due to damaged chasis	7.08%
(iv) Adequate water was not received because the land is at the tail of the minor	3.54%
(v) Water was not provided because of overdues	0.61%
(vi) Land was fallow because of water-logging	0.31%
(vii) Did not receive water at appropriate time	1.54%

5. There were 177 farmers who had wells for irrigation. They were asked if the water level in their wells had improved because of canal water. One hundred and two (57.63%) farmers reported increase in water level, 66 (37.29%) reported no rise in the level, the remaining did not give any response. It may be noted here that in many cases the well irrigation became possible only due to canal water.
6. The number of farmers who had irrigated cultivation for the first time were 475 (73.08%).

5.7 General Observations

The general observations of the field staff who carried out the field survey are presented here. It was more or less known to the beneficiaries that the expenses for the land development works carried out by the Government agencies would be treated as loans to them and they would be required to repay the same. However, they felt that eventually the Government might waive these loans. It appeared that many gave consent with this in mind. Many of these farmers did not have experience of irrigated farming and therefore did not properly understand the process of land levelling and also its importance. They did not care to visit their farms in order to have the works done properly. Some of the farmers were wage earners as well and worked for land development. Many of them worked on others' farms when their farms were levelled by other labourers. In some cases the farmers worked for land levelling on their own

farms and received wages for the same. But ultimately they were naturally included in their debt. Some farmers reported that ~~they~~ they have filed the cases in the court.

When our field staff visited the sample villages, they faced many difficulties in getting responses from the sample farmers. It took considerable time in every village for them to establish rapport. At the outset they took ~~over~~^{over} field investigation as Government employeed and made several complaints and protests. It was only the zeal and skill of our field workers that they could slowly establish the rapport and elicit the information.

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