Study No 68

IMPACT OF NATIONAL WATERSHED DEVELOPMENT PROJECT FOR RAINFED AREAS (NWDPRA)

(A STUDY IN RAIPUR AND KHARGON DISTRICTS, MADHYA PRADESH)

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CHAPTER-I
INTRODUCTION

1.1 The Watershed

Watershed is a geo-hydrological unit or a piece of land that drains at a common point. This natural unit is evolved through the interaction of rain water with land mass and typically comprises of arable land, non-arable land and natural drainage lines in rain-fed areas. Sustainable production depends on health, vitality and purity of production environment of which land and water are important constituents. Therefore, for scientific utilisation of the natural resource base of land and water, the ideal geographical unit would be the product of interaction of rain with land, i.e. the watershed.

1.2 Watershed Management

The watershed management focuses on conservation, use and improvement of land, water and other resources on a sustainable basis. It aims at slowing down or even reversing the run off and sedimentation of water resources. Its objective is to stop progressive removal of vegetative cover on non arable lands. It seeks to control flooding from a large number of seasonal streams. To achieve these objectives National Watershed Development Project for Rainfed Areas (NWDPRA) was structured during VIII five year plan (1992-97) in each development block where less than 30 per cent arable area was under assured irrigation. The watershed development project was an integrated project involving close coordination of departments such as agriculture, horticulture, forestry, veterinary and fishery.

The approach of watershed development is followed since early sixties aiming at control of siltation in reservoirs or mitigation of floods. However, after announcement of the New 20 Point Programme in the year 1982, this approach was adopted as a national strategy for integrated and comprehensive development of rainfed areas. Emphasising the role of local area planning, "Approach to VII five year plan 1990-95" prepared by the Planning Commission highlighted the role of dryland farming including

watershed development. This approach was further commended in the VIII five year plan (1992-93 to 1996-97).

1.3 Objectives of the NWDPRA

The objectives of Project are :

(i) Conservation, upgradation and utilisation of natural endowments like land, water, plant, animal and human resources in a harmonious and integrated manner.

(ii) Generation of massive employment during the project period and regular employment after the project completion for enhancing the employment opportunities in the backwards rainfed areas to ensure livelihood security particularly for under previleged sections of the rural population like small and marginal farmers, landless labourers, tribals, etc.

(iii) Improvement of production environment and restoration of ecological balance through scientific management of land and rain water.

(iv) Reduction of inequalities between irrigated and rainfed areas. This will reduce large scale migration from rural areas to the cities.

(v) In addition to food, fuel and fodder the project would endeavour to enhance cash flow to the rainfed farmers and landless agricultural labourers through increased casual employment, marketable surplus of agricultural and dairy produce, growing of cash crops like vegetables, coriander, cumin, medicinal plants, etc. in suitable areas.

Thus, the ultimate objective of this project is to develop the natural resource-base, sustain its productivity, improve the standard of living of millions of poor farmers and landless labourers and endeavour for restoration of ecological balance.

1.4 Sectors and Components of NWDPRA

The watershed development consisted of three physical sectors.

(i) Arable or cultivated lands which are privately owned

(ii) Non-arable lands which includes village pastures and grazing grounds, culturable wastelands and barren and unculturable lands, and,

(iii) Network of natural drainage lines

These three sub sectors are hydrologically interspersed and would be treated as one organic geohydrological entity for project planning and implementation to ensure sustainable use of natural resources of land and water.

The project will treat the following sub components of the household farming systems.

(i) Food sub-component
(ii) Fodder sub-component
(iii) Fuel sub-component, and
(iv) Income generation component-household production systems.

It is a totally Centrally Sponsored Scheme.

The National Watershed Development Project for Rainfed Areas (NWDPRA) was launched in VII five year plan covering 99 districts in 16 states. The approach was further commended in the VIII five year plan (1992-97). Thus the programme is in operation since last 4 years.

1.5 This Study

The Directorate of Economics & Statistics, Ministry of Agriculture, Govt. of India, desired that the impact of NWDPRA be studied by all the ten Agro-Economic Research Centres in one state each.

The broad objective was to assess the impact of National Watershed Development Programme for Rainfed Areas with the focus on new guidelines of 1992.

1.6 The Objective

The specific objectives were :

(1) To examine the present status of the available technology and the extent of its adoption by farmers
(2) To identify the factors responsible for productivity changes
(3) To locate the constraints in the project implementation in terms of infrastructure, technology and other factors

(4) To evaluate the impact of vegetative measures, soil and water conservation structures and other components as suggested in the 1992 guidelines of NWDPRA

(5) To suggest strategies for removal of the constraints faced in NWDPRA.

1.7 Sample Design

For the purpose of the study two watersheds falling under two different agro-climatic conditions were to be selected in a state.

In Madhya Pradesh two districts viz. Raipur and Khargon were selected. While Raipur district belonged to the agro-climatic region "Chhattisgarh plains including Balaghat district" Khargon belonged to "Nimar Plateau". In each district one watershed was selected and fifty beneficiaries and twenty five non-beneficiaries in each watershed were selected following two stages systematic random sampling design. Thus the total sample comprised 100 beneficiaries and 50 non-beneficiaries.

1.8 Reference Year

The analysis pertained to the data for the year 1993-94.

1.9 Field Work & Tabulation

Due to heavy rains in all parts of Madhya Pradesh, the field work could be completed only by 10.10.94. Simple tabulation technique was adopted for analysis of data.

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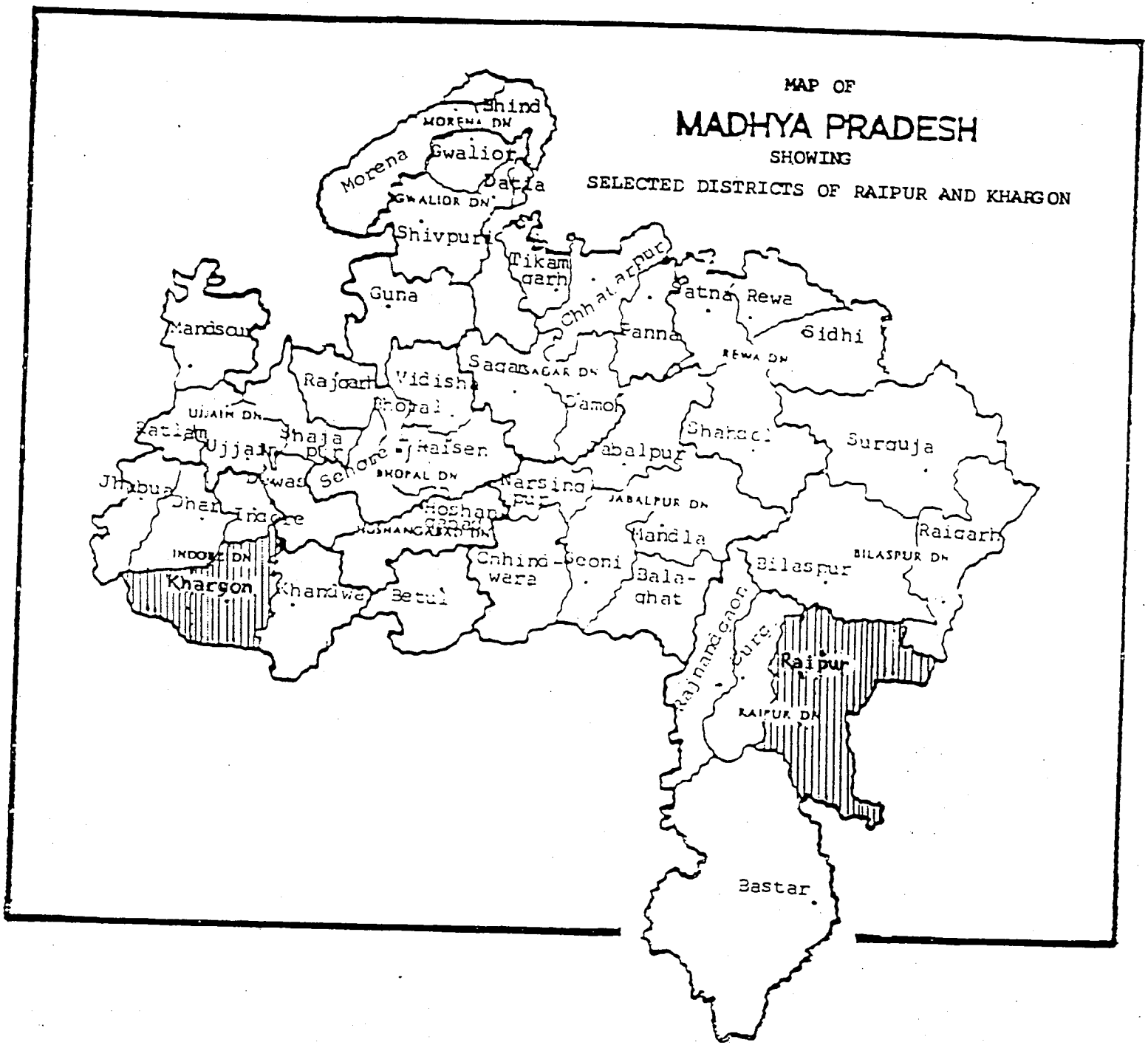

MAP OF
MADHYA PRADESH
SHOWING
SELECTED DISTRICTS OF RAIPUR AND KHARGON
Shind
MORENA DN
Morena
Gwalior
Datia
GWALIOR DN
Shivpur
Tikam garh
Chhatarpur
Guna
Patna
Rewa
Mandsour
Fanna
Sidhi
REWA DN
Sagar
SAGAR DN
Rajgarh
Vidisha
Bhopal
Damoh
UJJAIN DN
Ratlam
Ujjain
Shaja pur
Sehore
Raisen
Jabalpur
Shahdol
Surguja
BHOPAL DN
Jhabua
Dewas
Narsing pur
JABALPUR DN
Dhar
Indore
Hoshan gabad
Mandla
Raigarh
INDORE DN
Chhind wara
Seoni
Bala ghat
Bilaspur
BILASPUR DN
Khargon
Khandwa
Betul
Rajnandgaon
Durg
Raipur
RAIPUR DN
Bastar

CHAPTER - II
SELECTED DISTRICTS

As mentioned earlier Raipur and Khargon districts were selected for the study. While Raipur was located in the south east corner of the state in the agro-climatic sub region "Chhattisgarh Plains including Balaghat district", Khargon was in the south west corner belonging to the agro-climatic sub region "Nimar Plateau". A brief description of the selected districts will be useful to understand the agro-climatic conditions prevailing therein.

2.1 Raipur District

2.1.1 Location

Raipur, the second largest district of the State in respect of population and third largest in area was situated in the south-eastern part of Madhya Pradesh between latitudes $19^{\circ}50'N$ and $21^{\circ}53'N$ and longitudes $81^{\circ}25'$ and $83^{\circ}38'$ E. The area of the district was 21,274 sq.km.

The district was bounded on the north by Bilaspur and Raigarh districts of M.P., in the east by Kalahandi and Sambalpur districts of Orissa State, in the south by Koraput district of Orissa State and by Bastar district and in the west by Durg district of M.P.

2.1.2 Topography

The district was divided into two more or less distinctly-marked tracts by the river Mahanadi which flowed through the district from south-west to north-east. The country to the west of the Mahanadi comprising about half of Baloda Bazar tahsil, the whole of Raipur tahsil and a small area of Dhamtari tahsil, constituted a part of the open Chhattisgarh plain, thickly populated and closely cultivated. The character of the open country lying to the east of river Mahanadi was different. This trans-Mahanadi area was hilly. Black soil was rare and yellow and red soils prevailed.

2.1.3 Climate and Rainfall

The climate of Raipur district was in general, warm and humid. Poorly wooded areas, the closeness of rocks to the surface and the red gravelly soil made the heat in summer excessive in the northern and central parts of the district ; the areas in the south

and east were not as hot because of sal forests. Winter months were not very cold in the plains but the forest areas were much cooler. December and May were coldest and hottest months respectively.

The district fell in the heavy rainfall belt of the State and the average annual rainfall was 1,375 mm. In the southern and south-eastern parts of the district the rainfall was usually copious. The tract around Simga often suffered from scarcity of rainfall.

The rainy season was spread over 4 months- June, July, August and September and July was usually the rainiest month. October also had 25 to 65 mm. of rain but the next 3 months-November to January had only 25 mm. of rain and the remaining four months had about 50 mm. in all.

2.1.4 Agriculture

2.1.4.1 Size of Holdings

The district had 5,78,928 holdings occupying 10,33,293 hectares or an avarage size of 1.784 hectares. Marginal size holdings predominated accounting for slightly more than half (51.93 per cent) of the total number of holdings. Small holdings accounted for 21.98 per cent of the total number. These two classes of holdings together accounted for 73.91 per cent of the holdings but occupied only 30.81 per cent of the area. On the other hand large holdings constituting 1.72 per cent of the total number occupied 16.53 per cent of the area.

This indicated the skewed distribution of holdings,(Table 2.1)

Table 2.1 Number and area of holdings,Raipur district, M.P.

S. No.	Size of holdings	Number of holdings		Area of holdings	
		Number	Percentage	Area (hectares)	Percentage
1.	Below 1 hectare	3,00,698	51.93	1,34,956	13.06
2.	1 to 2 hectares (Small)	1,27,200	21.98	1,83,459	17.75
3.	2 to 4 hectares (Semi medium)	89,950	15.54	2,46,793	23.88
4.	4 to 10 hectares (Medium)	51,113	8.83	2,97,254	28.78
5.	10 hectares & above (Large)	9,967	1.72	1,70,831	16.53
	Total	5,78,928	100.00	10,33,293	100.00

2.1.4.2 Soils

The local soil terminology was as follows-

1. Kanhar
2. Dorsa
3. Matasi
4. Bhata

The Kanhar was a black clay which was very retentive of moisture. As it was apt to suffer from water-logging it was a good soil for wheat but not for paddy. It was, however, capable of growing a second crop and from that point of view, was certainly the most valuable soil in the district. The Matasi was a yellow soil, not retentive of moisture, but with heavy rainfall, giving a far better outturn of paddy than any other soil. The Matasi could not grow a second crop and when unembanked was fit for little more than kodon and required long resting fallows. The Dorsa was a mixture of Kanhar and Matasi as the name itself suggested (Do ment two and rasa meant extracts). It was a good soil for paddy but gave only a moderate outturn of wheat or second crop.

The Bhata was a poor detritus of laterite, red in colour and containing numerous little pebbles. It did not have much consistency and hardly retained any moisture. With a heavy rainfall a crop of kodon could be grown over this but otherwise it was the poorest soil in the district.

2.1.4.3 Land Utilisation

Of the total geographical area of 15,25,824 hectares a little more than 60 per cent (61.52 per cent) was net area sown. The district had very little area under forest (11.50 per cent) and less than 10 per cent (9.46 per cent) area under permenent pastures and other grazing land (Table 2.2)

2.1.4.4 Cropping Pattern & Irrigated Crops

Paddy occupied about 75 per cent (72.94) of the cropped area of the district. Other pulses, mainly teora or lathyrus occupied 16.54 per cent. Among cereals wheat occupied 1.29 per cent and among pulses gram occupied 1.42 per cent. Among other crops only fruits and vegetables and linseed occupied more than 1 per cent.

Of the gross cropped area 34.82 per cent was irrigated. Of the irrigated cropped area 94.85 per cent was occupied by paddy. Wheat occupied 1.53 per cent and fruits and vegetables 1.85 per cent.

Paddy was irrigated to the extent 45.28 per cent and wheat, 41.33 per cent. (Table 2.3)

Table 2.2 Land utilisation, Raipur district, M.P.

S. No	Particulars	Area (hectares)	Percentage to geographical area
1.	Forest	1,75,519	11.50
2.	Land under non-agricultural uses	1,35,030	8.85
3.	Barren and unculturable land	21,782	1.42
4.	Permanent pastures and other grazing land	1,44,308	9.46
5.	Land under miscellaneous tree crops and groves	123	0.02
6.	Culturable waste land	46,280	3.03
7.	Old fallows	36,930	2.42
8.	Current fallows	27,179	1.78
9.	Net area sown	9,38,673	61.52
	Geographical area	15,25,824	100.00

Table 2.3 Cropping pattern and irrigated crops, Raipur district, M.P.

Crop	Area (hectares)	Percentage to gross cropped area(%)	Irrigated area (hectares)	Percentage to total irrigated area(%)	Percentage of irrigated cropped area to cropped area(%)
Paddy	8,54,058	72.94	3,86,728	94.85	45.28
Wheat	15,132	1.29	6,254	1.53	41.33
Other Cereals	31,937	2.73	61	0.02	
Total Cereals	9,01,127	76.96	3,93,043	96.40	43.62
Gram	16,632	1.42	875	0.21	5.26
Other Pulses	1,93,715	16.54	678	0.17	
Total Pulses	2,10,347	17.96	1,553	0.38	0.74
Total Foodgrains	11,11,474	94.92	3,94,596	96.78	35.50
Fruits & Vegetables	15,802	1.36	7,524	1.85	47.61
Other food crops	2,662	0.22	1,833	--	--
Total food crops	11,29,938	96.50	4,03,953	99.08	35.75
Linseed	18,910	1.61	3	--	0.01
Other Oilseeds	19,289	1.65	2,991	0.73	--
Total Oilseeds	38,199	3.26	2,994	0.73	7.84
Total non-food crops	40,986	3.50	3,756	0.92	9.16
Gross cropped area	11,70,924	100.00	4,07,709	100.00	34.82

2.1.4.5 Sources of Irrigation

The main sources of irrigation were government canals which commanded as high as 81.94 per cent of the irrigated cropped area. Tanks commanded 7.25 per cent and wells, 4.23 per cent. Other sources had 4.33 per cent of cropped area under the command and tubewells, 2.25 per cent (Table 2.4)

Table 2.4 Sources of irrigation, Raipur district, M.P.

Source	Irrigated area (hectares)	Percentage
Canals	3,34,061	81.94
Tanks	29,562	7.25
Tubewells	9,181	2.25
Wells	17,243	4.23
Others	17,662	4.33
Total	4,07,709	100.00

2.1.4.6 Methods of paddy cultivation

Methods of rice cultivation may be classified into three: Chhitaka (broadcasting), ropa (transplantation) and lahi (sowing after germination). Chhitaka or broadcasting was the commonest method of rice sowing. When thus sown, the fields were subjected to a process called biasi. The land was ploughed once before sowing and the seed was broadcast at the rate of about 1 quintal per hectare. When the plants were about 30 cm. high, the land was ploughed which uprooted many of the plants and covered some with mud. Biasi was thus a thinning process, the theory being that the broadcast rice grew up so close that the plants would kill each other out, if some of them were not deliberately destroyed. Five or six days later the plot was levelled by means of a kopar which flatened all the surviving plants in the mud. In five to six days more weeding operations were commenced; two or three weedings at intervals of about a fortnight were generally necessary.

The biasi was usually carried on at the end of July or at the beginning of August and was a very important operation.

The weeding was done once before the biasi and once after it, the one subsequent to the biasi being repeated two or three times.

Ropa or transplanting of rice was perhaps the most elaborate method of cultivation. As its name implied, the seed was sown in one place and the seedlings, after they had grown a little, were transplanted to the field.

The lahi method was followed when there was extensive rain which would not permit the sowing of the seed at the proper time. The seed was steeped in water and kept for four to five hours, it was then placed in a heap, hot water was poured over it and it was covered with straw for the night. Next morning it was spread out on the ground and allowed to germinate. As soon as there was a break in the weather, the sprouted seed was sown and when the plants grew sufficiently high, the biasi operation was effected. In the district a system of double cropping was practised. It was known as utera. The rice land was not reploughed in order to sow spring crops but the seed was scattered in the slush of the paddy fields while the paddy crop was still standing. After the paddy was harvested, these seeds came up. Thus the only expense to be incurred was the cost of the seed. The outturn of utera crops so sown was about half that of similar crops sown in properly ploughed fields. The utera crops commonly grown in the district were gram, linseed, teora, urad and batra. Rice of a light variety was sown broadcast and was reaped early so as to allow the field to be prepared for the second crop. The double cropped area depended entirely on the rainfall of the last half of September and beginning of October and, therefore, exhibited the most extraordinary fluctuations. If the September rain was copious, the area sown was large.

2.2 Khargon District

2.2.1 Location

Khargon district lay in the south-west corner of Madhya Pradesh in Indore division between 21°22' and 22°35' north latitudes & 74°27'&76°14'east longitudes. It was encased between the Vindhyas on the north, and the Satpuras on the south, with the Narmada flowing in between. The district tended to assume the shape of a right-angled triangle. The northern boundary being the hypotenuse and the southern and eastern boundaries being the other two arms making the right angle. The south-western and southern boundary of the district marched respectively with the districts of Dhulia and Jalgaon of Maharashtra State. With the exception of a few kilometres of the boundary in the north-west which was along the Jhabua border, the districts of Dhar and Indore made the northern boundary of the district, the bulk of the former in the west and the latter in the east. The eastern boundary of the district, ran with those of Dewas (north-east) and Khandwa districts of Madhya Pradesh.

With an area of 13,458 sq.km. containing 3.0 per cent of the State's total area, the district ranked seventh in size in State.

2.2.2 Topography and Rivers

Physiographically Khargon district included most varied tracts; wild forest clad hills, rich alluvial plains and long stretches of barren plain and low rocky hills. A greater portion of the district lay south of the Narmada. From east to west parallel with the river lay well marked belts of the country. On the north of rich Narmada valley is the great Vindyan scarp while to the south of the valley lay hill systems of the Satpuras.

The Narmada entered the district from Khandwa. It made the northern boundary with Dhar district. The other rivers of the district were the Gomi, Chorai, Goi etc.

2.2.3 Climate and Rainfall

December and January were the coldest months of the year. The lowest mean minimum temperature in December was 11.4°C. After January the temperature started rising till the month of May which was the hottest month with maximum temperature of 45.7°C. After May the temperature started declining steadily till August.

Thereafter, it again increased till October. After October the temperature started declining. The climate of the district was thus quite warm. The onset of monsoon generally took place in the second or third week of June. July and August were the months of maximum rainfall. The district average was 747.4 mm. Khargon was thus a low rainfall area.

2.2.4 Agriculture

2.2.4.1 Size of Holdings

The cultivated area of the district was 6,83,808 hectares belonging to 1,84,740 holders. Thus the average size of holding was 3.701 hectares. It was nearly double that of Raipur district. The distribution was quite skewed. Nearly 40 per cent (41.41) holdings were below 2 hectares each but commanded only 12.61 per cent of the area. On the other hand 6.06 per cent of the holdings were above 10 hectares but occupied nearly one fourth (24.36 per cent) of area (Table 2.5)

Table 2.5 Number and area of holdings, Khargon district, M.P.

S. No	Size of holdings	Number of holdings		Area of holdings	
		Number	Percentage	Area (Hectares)	Percentage
1.	Below 1 hectare	30,457	16.49	16,391	2.40
2.	1 to 2 hectares	46,045	24.92	69,821	10.21
3.	2 to 4 hectares (Semi medium)	50,619	27.40	1,44,338	21.11
4.	4 to 10 hectares (Medium)	46,428	25.13	2,86,674	41.92
5.	10 hectares & above (Large)	11,191	6.06	1,66,584	24.36
	Total	1,84,740	100.00	6,83,808	100.00

2.2.4.2 Soils

The soils of the district were divided into two types:

a) Dry

b) Irrigated

Besides this general classification, soils were divided into three broad classes depending on the conformation, situation, use to which it was put and physical characteristics.

1. Conformation-Soils on this basis could be-
   a) even
   b) sloping
   c) cut up by ravines or water courses
2. Situation-Soils on this basis could be-
   a) land near village
   b) manured land close to house
3. Use-Soils on this basis could be-
   a) fit for kharif crops
   b) fit for rabi crops

Physical Characteristics- Soils on this basis could be-

a) Black Cotton Soil- Bearing two crops in a year without irrigation

b) Yellow Soil- Could bear rabi crops without irrigation

c) Grey Soil- Suitable for millets.

d) Loamy Soil- Fit for cotton and jowar

e) Stony Soil-Only rabi crops could be grown.

2.2.4.3 Land Utilisation

Land use pattern of Khargon district was similar to that of Raipur district. The net area sown was 64.92 per cent of the geographical area (61.52 per cent for Raipur district). Forest occupied 9.60 per cent of the area (11.50 per cent in Raipur district), Permanent pastures and grazing land constituted 9.71 per cent (9.46 per cent in Raipur district) and barren and culturable land, 6.02 per cent. The percentage of area under non-agricultural uses was 5.23. (Table 2.6)

Table 2.6 Land utilisation, Khargon district, M.P.

S. No	Particulars	Area (hectares)	Percentage
1.	Forest	95,142	9.60
2.	Land under non-agricultural uses	51,856	5.23
3.	Barren and unculturable land	59,818	6.02
4.	Permanent pastures and grazing land	96,327	9.71
5.	Land under miscellaneous tree crops and groves	4	-
6.	Culturable waste land	30,939	3.12
7.	Old fallows	8,711	0.88
8.	Current fallows	5,035	0.52
9.	Net area sown	6,44,527	64.92
	Geographical area	9,92,359	100.00

2.2.4.4 Cropping Pattern and Irrigated Crops

The district came under cotton-jowar tract, and rightly so because cotton occupied 26.30 per cent of the cropped area, closely followed by jowar with 25.57 per cent. Groundnut was the third important crop with 7.18 per cent area. Wheat (6.92 per cent) and maize (6.40 per cent) shared about equal percentage of area.

The irrigated cropped area was 23.16 per cent of gross cropped area. Cotton alone occupied 47.52 per cent of the irrigated cropped area and was irrigated to the extent of 41.06 per cent. Wheat occupied 29.78 per cent of the irrigated cropped area but was nearly fully irrigated (99.61 per cent). Gram had 3.98 per cent of the irrigated cropped area but the extent of its irrigation was 75.69 per cent. Sugarcane, spices and fruits and vegetables were other important irrigated crops/ crop groups, in which the extent of irrigation ranged between 90 to 100 per cent. (Table 2.7)

2.2.4.5 Sources of Irrigation

Unlike Raipur district Khargon district had wells as most important sources of irrigation commanding 63.85 per cent of irrigated area. Other sources like nalas, stop dams etc. commanded 24.32 per cent. Government canals also had significant (11.01) per cent of area under command (Table 2.8)

Table 2.8 Sources of irrigation, Khargon district, M.P.

Source	Irrigated area	
	Area (hectares)	Per Cent (%)
Government canals	18,220	11.01
Tanks	1,366	0.82
Wells	1,05,676	63.85
Others	40,271	24.32
Total	1,65,533	100.00

Table 2.7 Cropping pattern and irrigated crops, Khargon district, M.P.

Crop	Area (hectares)	Percentage to gross cropped area(%)	Irrigated area (hectares)	Percentage to total irrigated area(%)	Percentage of irrigated cropped area to cropped area(%)
Paddy	13,084	1.83	148	0.09	1.13
Jowar	1,82,788	25.57	302	0.18	0.16
Bajra	23,917	3.35	6	--	0.02
Maize	45,747	6.40	1,727	1.04	3.78
Wheat	49,481	6.92	49,290	29.78	99.61
Other Cereals	3,569	0.50	2	--	--
Total Cereals	3,18,586	44.57	51,475	31.09	16.16
Gram	8,707	1.22	6,590	3.98	75.69
Tur	23,782	3.33	809	0.49	3.40
Other Pulses	72,411	10.13	357	0.22	0.49
Total Pulses	1,04,900	14.68	7,756	4.69	7.39
Total Food grains	4,23,486	59.25	59,231	35.78	13.99
Sugarcane	3,850	0.54	3,850	2.33	100.00
Spices	12,413	1.73	11,170	6.75	89.99
Fruits and Vegetables	5,124	0.72	4,974	3.00	97.07
Total Food Crops	4,44,873	62.24	79,225	47.86	17.81
Groundnut	51,177	7.18	5,089	3.09	9.94
Soybean	14,673	2.05	92	0.05	0.63
Other Oilseeds	1,807	0.24	617	0.36	34.15
Total Oilseeds	67,657	9.47	5,798	3.50	8.57
Cotton	1,91,559	26.80	78,659	47.52	41.06
Fodder Crops	10,314	1.44	1,697	1.02	16.45
Other non-food crops	333	0.05	154	0.10	46.24
Total non-food crops	2,69,863	37.76	86,308	52.14	31.98
Total	7,14,736	100.00	1,65,533	100.00	23.16

CHAPTER-III

SELECTED WATERSHEDS

As mentioned earlier Raipur and Khargon districts were selected in Madhya Pradesh. While Raipur was located in the south eastern part of the state falling in the "Chattisgarh plains including Balaghat district", Khargon district was located in the south western part in the "Nimar Plateau" agro-climatic sub region.

Raipur district had 14 Development Blocks and a NWDPRA watershed in each. Of the 14 watersheds Silyari nala watershed in Simga block had second largest geographical area and largest cultivated area. It was,therefore, selected for the study.

Khargon district had 11 Development Blocks with an equal number of NWDPRAs. Of the 11 watersheds Chanderi nala in Segaon Development Block had largest geographical area and largest cultivated area. It was, therefore, selected for this study.

In the following pages description of the selected two watersheds is given.

3.1 Silyari nala Watershed

3.1.1 Location

The watershed was situated at a distance of 60 km. north of Raipur town and 16 km. north of Simga, the block headquarter. The watershed was rectangular in shape. It came under Mahanadi basin. The watershed had 8 villages of Mohbhata, Manohara, Motiyaridih, Lawar, Dhabadih, Devanpuri, Manikchori and Khargadih The slope of the watershed was from south to north.

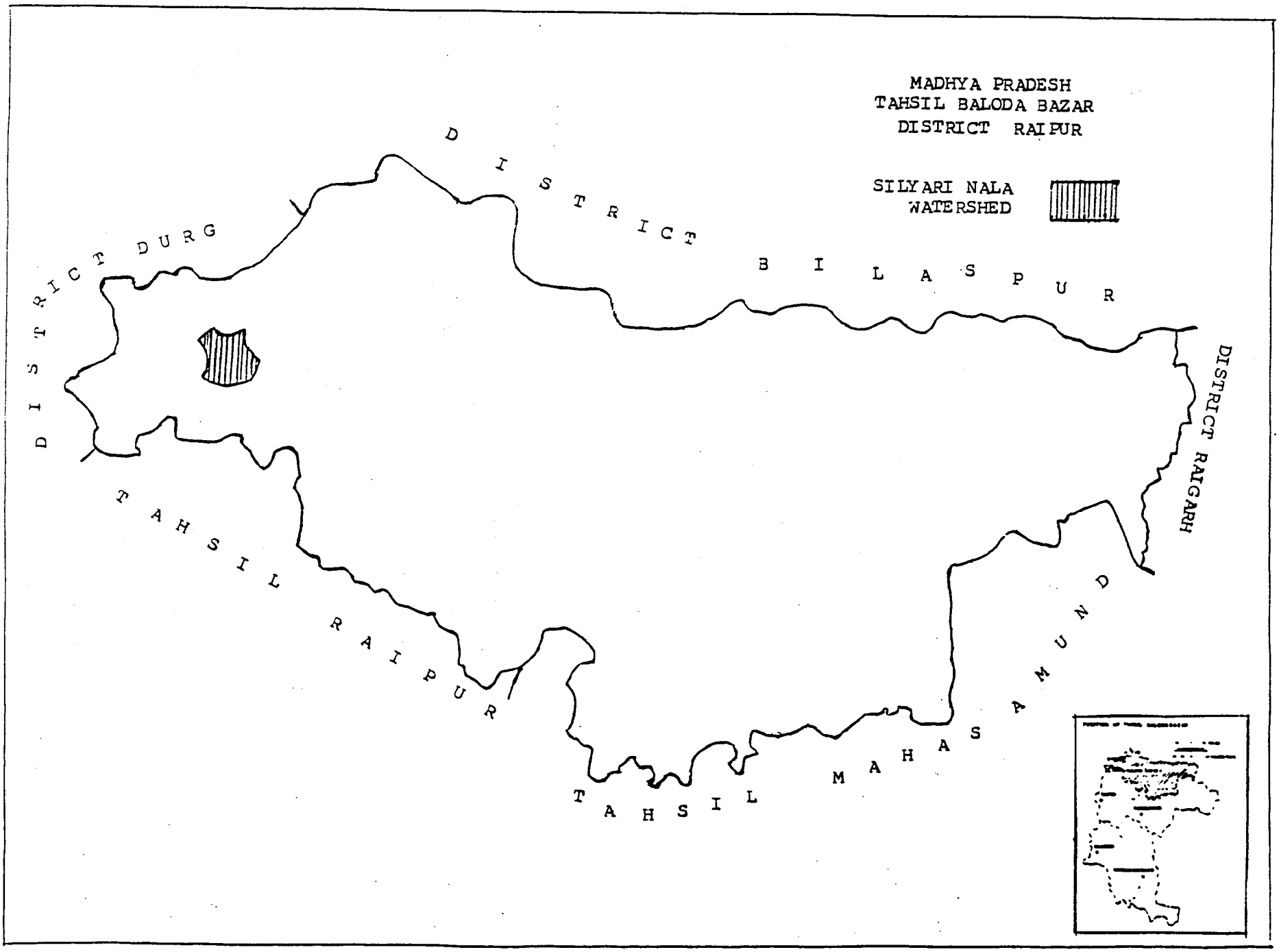
The Silyarinala joined the Sheonath river.

3.1.2 Administration

The Department of Agriculture was the principal implementing agency, under the Chairmanship of Collector, Raipur.

The four sectors involved were -

1. Agriculture
2. Horticulture
3. Forest
4. Veterinary

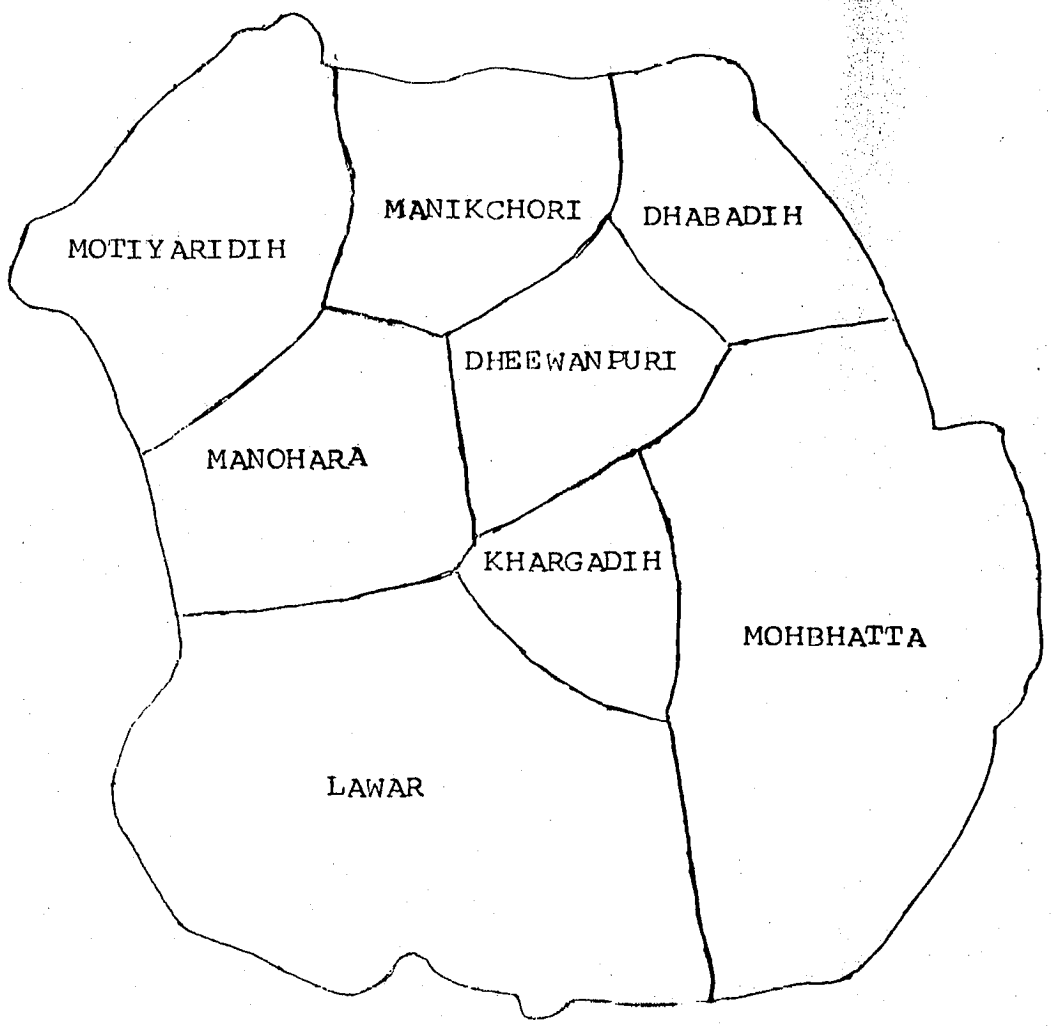

MADHYA PRADESH
TAHSIL BALODA BAZAR
DISTRICT RAIPUR
SILYARI NALA
WATERSHED
DISTRICT DURG
DISTRICT BILASPUR
DISTRICT RAIGARH
TAHSIL RAIPUR
TAHSIL MAHASAMUND

MAP SHOWING VILLAGES

OF

SILYARINALA WATERSHED

TAHSIL BALODA BAZAR, DISTRICT RAIPUR, M. P.



In the agricultural sector the staff involved included Assistant Soil Conservation Officer, Agricultural Development Officer (Soil Conservation) Called" Team leader", surveyor and Rural Agricultural Extension Officer.

In horticultural sector Horticultural Development Officer and Rural Agricultural Extension Officer were included.

In forest sector Range Forest Officer and Forester were included. Veterinary sector had Veterinary Surgeon and Veterinary Field Officer.

3.1.3 Rainfall and Groundwater Availability

The nearest raingauge station was located at Tilda, 8 km. away from the watershed. The annual rainfall was generally more than 1,000 mm. (Table 3.1)

Table 3.1 Rainfall recorded at Tilda during the last five years

Year	Rainfall(mm.)
1986-87	1,037.00
1987-88	930.00
1988-89	1,031.80
1989-90	1,265.10
1990-91	1,205.00

The groundwater availability was poor.

There was no waterlogging problem.

3.1.4 Area and Size of Holdings

The geographical area of the watershed was 3,151 hectares. The effective project area was 3,066 hectares. Of this 2,611 hectares were arable and 540 hectares, non-arable. The irrigated area was 152 hectares or 5.82 per cent of the arable land.

The watershed had 1,138 holdings. Of these about 40 per cent were marginal and covered about 15 per cent of the area. Another 35 per cent were small and covered about 25 per cent of the area. The remaining 25 per cent had a holding size of 2 hectares and above but covered nearly 60 per cent of the area. Thus the

overall size of holdings was quite small. (Table 3.2)

Table 3.2 Size and area of holdings, Slyarinala watershed, Raipur district, M.P.

S. No.	Size of holdings (Hectares)	Number		Area	
		Number	Percentage	Area (Hectares)	Percentage
1.	0 - 1	463	40.68	409.755	15.69
2.	1 - 2	392	34.45	686.000	26.27
3.	Above 2	283	24.87	1,515.827	58.04
	Total	1,138	100.00	2,611.582	100.00

3.1.5 Soils

The soil classification of the district was given in chapter II. In Silyarinala watershed Matasi constituted 35 per cent and Kanhar 30 per cent. Dorsa formed 25 per cent and Bhata, 10 per cent. (Table 3.3)

Table 3.3 Constitution of soils, Silyarinala watershed, Raipur district, M.P.

Soil Type	Percentage to total
Kanhar	30
Dorsa	25
Matasi	35
Bhata	10
Total	100

3.1.6 Cropping Pattern and Irrigated Crops

The gross cropped area of the watershed was 2,851 hectares. Paddy occupied the highest percentage (67.17). Kodo (10.59 per cent) and teora (9.68 per cent) were other important crops (Table 3.4) While paddy was irrigated to the extent of 7.6 per cent, wheat was irrigated to the extent of 16.66 per cent.

The productivity of both kharif and rabi crops was quite low. It was lower than the district and block averages.

Table 3.4 Cropping pattern, Silyarinala watershed, Raipur district, M.P.

Crop	Area (Hectares)	Percentage to gross cropped area
Paddy	1,915	67.17
Kodo	302	10.59
Teora	276	9.68
Gram	74	2.60
Groundnut	65	2.28
Linseed	57	2.00
Til	55	1.93
Arhar	54	1.89
Wheat	30	1.05
Urad	16	0.56
Soybean	7	0.25
Total	2,851	100.00

3.1.7 Targets and Achievements of Expenditure

For the entire plan period of 1990-91 to 1994-95 the target amount to be spent was Rs.50.864 lakhs. Of this, the amount spent in the first four years was Rs.14.855 lakhs or 29.21 per cent. This clearly indicated that a lot remained to be done. Of the various activities the percentage of amount of expenditure to target amount to be spent was highest (81.65) for "drainage line treatment" and lowest (0.21) for livestock management. It is true that in the year 1993-94 (the last year for which data was available) the expenditure shot up suddenly but even so the scope for programme implementation was quite large.(Table 3.5)

In the case of "Preliminary Activities" the percentage of expenditure to target was highest (60.53) for sub activity "nursery establishment", followed by "Survey Projectisation" (56.86)and lowest (nil) for sub activity "innovative research" (Table 3.6)

Table 3.5 Financial targets and achievements, Silyarinala watershed, Raipur district, M.P.

(Unit-Rs.Lakhs)

S. No	Activity	Target for 1990-91 to 1994-95	Total achievement till 93-94	Achievement during 90-91	91-92	92-93	93-94
1.	Preliminary Activities	22.534	5.120 (22.72)	0.081	0.358	1.190	3.491
2.	Agricultural Land Development	12.810	4.386 (34.24)	0.525	0.337	1.337	2.187
3.	Non-Agricultural Land Development	4.625	1.034 (22.36)	--	--	0.239	0.795
4.	Drainage Line Treatment	5.270	4.303 (81.65)	--	1.508	0.694	2.101
5.	Livestock Management	5.625	0.012 (0.21)	--	--	0.012	--
	Total	50.864	14.855 (29.21)	0.606	2.203	3.472	8.574

Table 3.6 Financial targets and achievements under Preliminary Activies, Silyarinala watershed, Raipur district, M.P.

(Unit-Rs.Lakhs)

S. No.	Activity	Target for 1990-91 to 1994-95	Total achievement till 93-94	Achievement during 90-91	91-92	92-93	93-94
1.	Survey Projectisation	2.800	1.592 (56.86)	0.040	0.047	--	1.505
2.	Nursery Establishment	1.500	0.908 (60.53)	--	0.240	0.296	0.372
3.	Dryland Chetana Kendra	--	0.756 (-)	--	--	0.730	0.026
4.	Training of Mitra Kisans	10.734	1.039 (9.68)	0.041	0.016	0.096	0.886
5.	Salary of Guard	3.220	0.784 (24.35)	--	0.055	0.068	0.661
6.	Research	1.600	0.041 (2.56)	--	--	--	0.041
7.	Innovative Research	2.680	--	--	--	--	--
	Total	22.534	5.120 (22.72)	0.081	0.358	1.190	3.491

Among the agricultural land development programmes the achievement exceeded the target by 47.11 per cent in sub-activity "single crop demonstration". The percentage of expenditure to estimate was 73.68 on sub activity "Repairs of old Structures", Organic Farming System, popularly known as preparation of"Nadef" compost tanks proved satisfactory as the percentage of expenditure to target under it was 46.88. It was around 20 per cent under contour vegetative hedges,(22.33), intercropping (18.82) and kitchen gardening (23.33). The percentage of achievement to target was around 10 per cent under the following programmes.

a. Double crop demonstrations (11.25)
b. Agro-forestry (12.00)
c. Dryland horticulture (12.00)

However, no work was done under the following programmes

a. Vegetative filter stripes
b. Contour vegetative hedges with earthen support
c. Gully control
d. Household production system (Table 3.7)

Table 3.7 Financial targets and achievements under Agricultural Land development,Silyarinala watershed,Raipur district,M.P.

(Unit Rs-Lakhs)

S. No.	Activity	Target for 1990-91 to 1994-95	Total achievement till 93-94	Achievement during 90-91	91-92	92-93	93-94
1.	Conservation measures						
	a. Vegetative filter stripes	1.050	--	--	--	--	--
	b. Contour Vegetative Hedges	2.400	0.536 (22.33)	--	--	--	0.536
	c. Contour Vegetative Hedges with earthen support	0.080	--	--	--	--	--
	d. Repairs of Old Structures	0.500	0.368 (73.60)	--	--	--	0.368
	e. Gully Control	0.500	--	--	--	--	--

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2.	Crop Demonstrations (½ ha.)						
	a. Single crop	1.575	2.318 (147.17)	0.525	0.243	0.870	0.680
	b. Double crop	0.480	0.054 (11.25)	--	--	0.054	--
	c. Inter-cropping	1.950	0.367 (18.82)	--	--	0.367	--
3.	Agro-Forestry	0.375	0.045 (12.00)	--	--	--	0.045
4.	Dryland Horticulture	1.500	0.183 (12.00)	--	--	--	0.183
5.	Organic Farming System(Nadef)	0.800	0.375 (46.88)	--	--	0.046	0.329
6.	Kitchen Garden	0.600	0.140 (23.33)	--	0.094	--	0.046
7.	Household Production Systems	1.000	--	--	--	--	--
	Total	12.810	4.386 (34.24)	0.525	0.337	1.337	2.187

Under non-agricultural land development measures over seeding of grasses was undertaken and the percentage expenditure on this item was 53.13 of the target. Among other programmes vegetative hedges with furrows (21.19 per cent) and live fencing (14.80 per cent) only need mention. No work was done under gully control, planting of hedges and plantation on nala banks. It may be mentioned that although no target was fixed for "loose bolder checks" the amount spent was Rs.0.196 lakhs. (Table 3.8)

Under drainage line treatment significant amount was spent on the following items.

1. Loose bolder checks with vegetative support(690.00)
2. Live check dams (180.00)
3. Brushwood check dams (129.33)
4. Loose bolder structures (99.80)
5. Run off Management System-Sunken Ponds(95.15)
6. Small dug out ponds (84.53)

Very little work was done under nala bank stabilisation and no work was done under earthen bunds with vegetative support (Table 3.9)

Table 3.8 Financial targets and achievements under non-agricultural land development, Silyarinala watershed, Raipur district, M.P.

(Unit Rs. Lakhs)

S. No.	Activity	Target for 1990-91 to 1994-95	Total achievement 1993-94	Achievement during 90-91	91-92	92-93	93-94
1.	Conservation measures						
	a. Live Fencing	0.500	0.074 (14.80)	--	--	0.003	0.071
	b. Vegetative hedges with furrows	1.600	0.339 (21.19)	--	--	0.020	0.319
	c. Gully control	0.950	--	--	--	--	--
	d. Loose bolder checks	--	0.196 (-)	--	--	--	0.196
2.	Production Systems						
	a. Over seeding of grasses	0.800	0.425 (53.12)	--	--	0.216	0.209
	b. Planting of Hedges	0.400	--	--	--	--	--
	c. Plantation on the nala banks	0.375	--	--	--	--	--
	Total	4.625	1.034 (22.36)	--	--	0.239	0.795

Under livestock management programme the work done was very unsatisfactory (Table 3.10)

Table 3.9 Financial targets and achievements under drainage line treatment, Silyari nala watershed, Raipur district, M.P.

S. No.	Activity	Target for 1990-91 to 1994-95	Total achievement till 93-94	Achievement during 90-91	91-92	92-93	93-94
1.	Nala bank stabilisation	0.500	0.093 (18.60)	--	--	0.019	0.074
2.	Upper reaches treatment						
	a. Live Check dams	0.020	0.036 (180.00)	--	--	--	0.036
	b. Brush Wood Check dams	0.075	0.097 (129.33)	--	--	--	0.097
	c. Loose bolder checks with vegetative support	0.050	0.345 (690.00)	--	0.061	--	0.284
	d. Sunken pond	0.375	0.197 (52.53)	--	0.020	--	0.177
3.	Middle reaches Treatment						
	a. Earthen bunds with vegetative support	0.500	--	--	--	--	--
	b. Loose bolder structures	1.000	0.998 (99.80)	--	0.474	0.219	0.305
	c. Small dugout ponds	0.750	0.634 (84.53)	--	0.272	0.128	0.234
4.	Lower Reaches Treatment						
	a. Run off management system	2.000	1.903 (95.15)	--	0.681	0.328	0.894
	Total	5.270	4.303 (81.65)	--	1.508	0.694	2.101

Table 3.10 Financial targets and achievements under livestock management, Silyari nala watershed, Raipur district, M.P.

(Unit-Rs.Lakhs)

S. No.	Activity	Target for 1990-91 to 1996-97	Total achievement till 93-94	Achievement during 90-91	91-92	92-93	93-94
1.	Castration of nonuseful bulls	0.250	--	--	--	--	--
2.	Measures to check livestock population	0.375	0.012 (3.20)	--	--	0.012	--
3.	Fodder Production on farmers' fields	5.000	--	--	--	--	--
		5.625	0.012 (0.21)	--	--	0.012	--

3.2 Chanderi nala Watershed

3.2.1 Location

The watershed came under sub basin of Borat river of the Narmada basin. The watershed belonged to Segaon development block of the same tehsil. It was 10 km. away from Segaon block head quarters. The five villages included were Panali, Upadi, Bori, Devli and Keli.

The shape of the watershed was rectangular. The length of the watershed from north to south was 12 km. and breadth from west to east was 4 km.

The main problems of the area were poverty, increasing population, soil erosion, low productivity, weak animal power and low percentage of irrigation

3.2.2 Amenities

Village Keli was the most important village of the watershed. While other villages had primary school each, village Keli had a Higher Secondary School. Keli was approachable by bus from Khargon. Weekly market was held at Keli. The cooperative society was located at Keli, Branches of commercial banks were located at Segaon 19 km. away.

There were two gram panchayats one at Keli and another at Paneli.

3.2.3 Administration

For the implementation of the programme a group of following officers was organised.

1. Agricultural Development Officer (Soil Conservation) Group Leader
2. Surveyor (Soil Conservation)
3. Rural Agricultural Extension Officer
4. Rural Horticultural Development Officer
5. Assistant Veterinary Surgeon
6. Forest Guard

3.2.4 Rainfall and Irrigation

The average rainfall was 579.7 mm. occuring in 60 rainy days. The area irrigated was 254.000 hectares or 10.14 per cent of the arable land. There were 141 wells and 5 stop dams in the watershed. The water holding capacity was very low. Due to insufficient rains and irrigation kharif crops predominated.

3.2.5 Area and Size of Holdings

While the geographical area of the watershed was 3,227.710 hectares the arable land was 2,505.057 hectares. The remaining 722.653 hectares were non arable. There was no area under forest.

There were 911 farmers. Of these 103 or 11.30 per cent were marginal and 227 or 24.92 per cent, small. Others, including medium and large farmers were 581 or 63.78 per cent. (Table 3.11)

Table 3.11 Size of holdings, Chanderinala watershed, Khargon district, M.P.

Particulars	Number of holdings	Percent
Marginal	103	11.30
Small	227	24.92
Others	581	63.78
Total	911	100.00

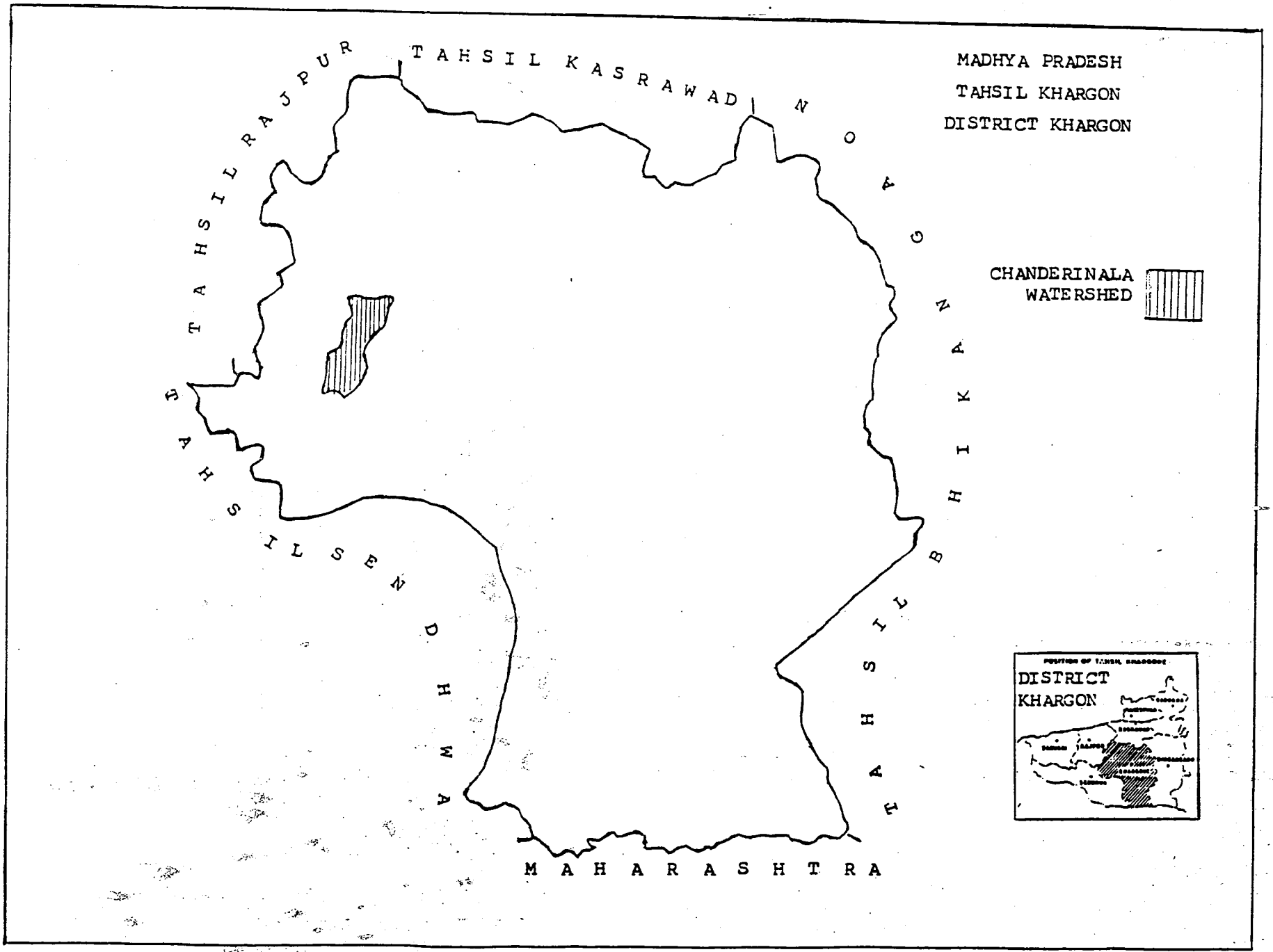
3.2.6 Soils

The soils of the watershed were medium to dark black. In the hills region these were yellow and shallow. The water level in the wells was low and an average well could irrigate half hectare.

The land of the watershed could be categorised into 4 slope classes. (Table 3.12)

Table 3.12 Slope of land, Chanderinala watershed, Khargon district, M.P.

Category of slope	Area (Hectares)	Per cent
0 to 1 per cent	100.107	3.99
1 to 4 per cent	400.000	15.96
4 to 8 per cent	900.000	35.93
8 per cent and above	1,104.950	44.12
Total	2,505.057	100.00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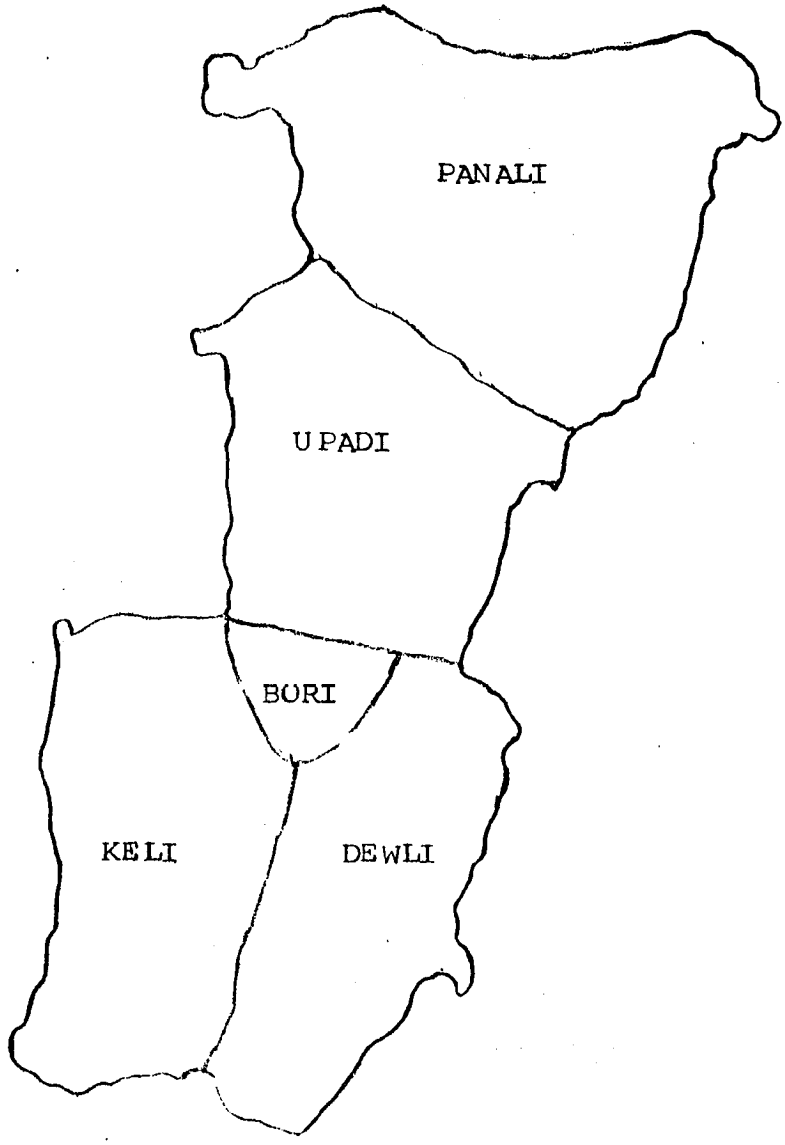
TAHSIL KHARGON
DISTRICT KHARGON
CHANDERINALA
WATERSHED
TAHSIL KASRAWAD
TAHSIL RAJPUR
TAHSIL SENDHWA
TAHSIL BHIKANGAON
MAHARASHTRA
DISTRICT
KHARGON

MAP SHOWING VILLAGES

OF

CHANDERINALA WATERSHED

TAHSIL & DISTRICT KHARGON, M. P.



3.2.7 Population

The population of the 5 villages of the watershed was 5,027 consisting of 2,790 males, 2,000 females and 237 children. Scheduled tribes population constituted 72.75 per cent and others, 26.85 per cent. (Table 3.13)

Table 3.13 Population by castes, Chanderinala watershed, Khargon district, M.P.

Caste	Number	Percentage
Scheduled castes	20	0.40
Scheduled tribes	3,657	72.75
Others	1,350	26.85
Total	5,027	100.00

The socio-economic condition of the population was not good.

The livestock population was 5,150. Of this 830 were milch cattle.

3.2.8 Crops Grown

The area under kharif crops was 2,371.675 hectares and that under rabi, 70.435 hectares. The intensity of cropping was low. The main kharif crops were cotton, groundnut, jowar and bajra. The rabi crops were wheat, gram and jowar.

3.2.9 Targets and Achievements of Expenditure

The estimated expenditure for the five year period for all the activities was Rs. 45.770 lakhs. Against this the expenditure was Rs. 10.109 lakhs or 22.09 per cent. This showed that a lot remained to be done in the project.

The percentage of expenditure to allotment was highest (52.86) under the activity drainage line treatment. The percentage for agricultural land development and production systems was 29.14. Soil conservation measures and gully control used 23.18 per cent of the allotment. Non agricultural land development claimed 20.54 per cent and preliminary activities, 13.62 per cent. No expenditure was incurred on livestock development. (Table 3.14)

Table 3.14 Financial targets and achievements, Chanderinala Watershed, Khargon district, M.P.

(Unit- Rs.lakhs)

S. No.	Activity	Target for 1990-91 to 1994-95	Total Achievement till 93-94	Achievement during 90-91	91-92	92-93	93-94
1.	Preliminary Activities	15.690	2.137 (13.62)	0.025	0.225	1.490	0.397
2.	Soil Conservation measures and gully control	7.290	1.690 (23.18)	--	--	0.294	1.396
3.	Agricultural land development and production systems	12.930	3.768 (29.14)	--	--	2.154	1.614
4.	Non-agricultural land development	4.055	0.833 (20.54)	--	--	0.263	0.570
5.	Drainage line treatment	3.180	1.681 (52.86)	--	--	0.001	1.680
6.	Livestock management	2.625	-- (-)	--	--	--	--
	Total	45.770	10.109 (22.09)	0.025	0.225	4.202	5.657

Thus it was observed that the overall progress was not satisfactory and the highest percentage of expenditure to target was 52.86. Other activities claimed still lower percentage of the budget and in livestock management nothing was done.

In the following paragraphs progress of sub activities is reviewed.

Among sub activities of the main activity "preliminary preparation" some work was done on survey projectisation. The percentage of expenditure to allotment on this item was 41.17. On the sub activity construction of Chetna Kendra and the quarter for guard the expenditure incurred was 34.06 per cent of the allotment. On training of mitra kisans only 7.80 per cent expenditure of the allotment was incurred. On following sub activities no expenditure was incurred,

a. Nursery establishment
b. Salary for guard
c. Research (see table 3.15)

Table 3.15 Financial targets and achievements, preliminary activities, Chanderinala watershed, Khargon district, M.P.

(Figures- Rs. lakhs)

S. No.	Activity	Target upto 1994-95	Achievement till 1993-94	Achievement during			
				1990-91	1991-92	1992-93	1993-94
1.	Survey Projectisation	3.000	1.235 (41.17)	0.025	0.225	0.700	0.285
2.	Nursery Establishment	1.500	-	-	-	-	-
3.	Dryland Chetna Kendra & quarter for guard	2.190	0.746 (34.06)	-	-	0.746	-
4.	Training of Mitra Kisans	2.000	0.156 (7.80)	-	-	0.044	0.112
5.	Salary of guard	-	-	-	-	-	-
6.	Research	7.000	-	-	-	-	-
		15.690	2.137 (13.62)	0.025	0.225	1.490	0.397

Of the subactivities of soil conservation and gully control significant work was done for gully control. The percentage of expenditure to allotment was 80 for live checks, 35 for earthen checks and 59 for vegetative checks.

On sub-activity of repairs of old structures 50 per cent expenditure was incurred. On contour vegetative hedges with earthen support 38.47 per cent expenditure was made. Among other sub activities only contour dead furrow was important as expenditure incurred on that was 34.80 per cent (Table 3.16)

Table 3.16 Financial targets and achievements, soil conservation measures and gully control, Chanderi nala watershed, Khargon district, M.P.

(Unit - Rs. lakhs)

S. No.	Activity	Target upto 1994-95	Achievement till 1993-94	Achievement during 90-91	91-92	92-93	93-94
1.	Conservation Measures						
	a. Vegetative Filter Stripes	0.300	0.071 (23.67)	--	--	--	0.071
	b. Contour Vegetative Hedges	4.800	0.707 (14.73)	--	--	0.107	0.600
	c. Contour Vegetative Hedges with earthen support	1.500	0.577 (38.47)	--	--	--	0.577
	d. Repairs of old structures	0.150	0.075 (50.00)	--	--	0.030	0.045
	e. Contour dead furrow	0.250	0.087 (34.80)	--	--	0.087	--
	f. Contour cultivation	--	--	--	--	--	--
2.	Gully Control						
	a. Live checks	0.050	0.040 (80.00)	--	--	0.010	0.030
	b. Earthen checks	0.040	0.014 (35.00)	--	--	0.010	0.004
	c. Vegetative checks	0.200	0.119 (59.50)	--	--	0.050	0.069
	d. Loose Bolder checks	--	--	--	--	--	--
	Total	7.290	1.690 (23.18)	--	--	0.294	1.396

Among sub activities of the main activity "agricultural land development and production systems" homstead garden and agricultural based production system were important as the expenditure incurred on these to budget was 46.75 and 45.67 per cent respectively. While the percentage of expenditure incurred on crop demonstrations was 30.88 that on compost preparation was 27.44. On other subactivities not much work was done.

It may be mentioned that although no target was fixed for bio fertilizers, animal husbandry based and service sector production systems, some expenditure was incurred. (Table 3.17)

Table 3.17 Financial targets and achievements on agricultural land development and production systems, Chanderi nala watershed, Khargon district, M.P.

(Unit - Rs. lakhs)

S. No.	Activity	Target upto 1994-95	Achievement till 1993-94	Achievement during 90-91	91-92	92-93	93-94
1.	Crop Demonstrations						
	a. Single crop b. Double crop c. Intercropping	6.820	2.106 (30.88)	--	--	1.582	0.524
2.	Agro Forestry	0.600	0.066 (11.00)	--	--	0.056	0.010
3.	Dryland Horticulture	1.200	0.192 (16.00)	--	--	0.042	0.150
4.	Organic Farming System						
	a. Compost Preparation	0.910	0.250 (27.44)	--	--	0.250	--
	b. Nadef compost	--	--	--	--	--	--
	c. Bio fertilisers	--	0.050	--	--	0.050	--
	d. Micro fertilisers	--	--	--	--	--	--
5.	Homestead Garden	0.400	0.187 (46.75)	--	--	0.087	0.100
6.	Household Production Systems						
	a. Agriculture Based	3.000	0.137 (45.67)	--	--	0.087	0.050
	b. Animal Husbandry Based	--	0.590	--	--	--	0.590
	c. Service Sector	--	0.190	--	--	--	0.190
	Total	12.930	3.768 (29.14)	--	--	2.154	1.614

On the activity of "non-agricultural land development" work was done on live fencing and loose bolder checks. While the percentage of expenditure to target on the former was 25.00 that on the latter was 37.90. No work was done on the following activities.

a. Over seeding of grasses
b. Planting of bushes
c. Afforestration (Table 3.18)

Table 3.18 Financial targets and achievements, non-agricultural land development, Chanderi nala watershed, Khargon district, M.P.

S. No.	Activity	Target upto 1994-95	Achievement till 1993-94	Achievement during			
				90-91	91-92	92-93	93-94
1.	Live Fencing	0.300	0.075 (25.00)	--	--	--	0.075
2.	Loose Bolder Checks	2.000	0.758 (37.90)			0.263	0.495
3.	Over seeding of grasses	1.030	--	--	--	--	--
4.	Planting of bushes	0.500	--	--	--	--	--
5.	Afforestation	0.225	--	--	--	--	--
	Total	4.055	0.833 (20.54)	--	--	0.263	0.570

As mentioned earlier maximum percentage of expenditure to allotment was incurred for activity "drainage line treatment" (52.86)

Among the sub activities the percentage was highest (74.00) on sunken ponds on the lower reaches. Next important sub activity was small ponds on upper reaches (68.67).

Following activities claimed about equal percentage of expenditure to allotment

a) brush wood checks (46.67)
b) bolder checks with vegetative support (47.67)
c) earthen bund with vegetation (46.25)
d) small dug ponds on middle reaches (46.80)

Nala bank stabilisation and loose bolder checks claimed 39.56 and 35.75 per cent each (Table 3.19)

Table 3.19 Financial targets and achievements, drainage line treatment, Chanderi nala watershed, Khargon district, M.P.

S. No.	Activity	Target upto 1994-95	Achievement till 1993-94	Achievement during 90-91	91-92	92-93	93-94
1.	Nala bank stablisation	0.200	0.079 (39.50)	--	--	--	0.079
2.	Upper reaches treatment						
	a. Live Check dams	0.020	--	--	--	--	--
	b. Brush wood checks	0.060	0.028 (46.67)	--	--	0.001	0.027
	c. Bolder checks with vegetative support	0.300	0.143 (47.67)	--	--	--	0.143
	d. Small ponds	0.150	0.103 (68.67)	--	--	--	0.103
3.	Middle reaches treatment						
	a. Earthen bund with vegetation	0.400	0.185 (46.25)	--	--	--	0.185
	b. Loose bolder checks	0.800	0.286 (35.75)	--	--	--	0.286
	c. Small dug ponds	0.250	0.117 (46.80)	--	--	--	0.117
4.	Lower reaches treatment sunken ponds	1.000	0.740 (74.00)	--	--	--	0.740
	Total	3.180	1.681 (52.86)			0.001	1.680

The target amount on livestock management was Rs.2.625 lakhs. However, no expenditure was incurred on this activity (Table 3.20)

Table 3.20 Financial targets and achievements, livestock management, Chanderi nala watershed, Khargone district, M.P.

S. No.	Activity	Target upto 1994-95	Achievement till 1993-94	Achievement during			
				90-91	91-92	92-93	93-94
1.	Livestock Management	2.625	--	--	--	--	--

On the basis of above discussion for both the selected watersheds following conclusions could be drawn.

a) Maximum percentage of expenditure to allotment was incurred on item "drainage line treatment"

b) Minimum percentage of expenditure to allotment was incurred for item "livestock management."

c) Most of the expenditure incurred was during the last two years viz. 1992-93 and 1993-94 and very little or no expenditure was incurred during the first two years of 1990-91 and 1991-92.

-x-x-x-x-x-x-

CHAPTER IV

CHARACTERISTICS OF SAMPLE BENEFICIARIES AND NON BENEFICIARIES

4.1 Introductory

As mentioned earlier Raipur and Khargon districts were selected for the study. In Raipur district Silyari nala watershed and in Khargon district Chanderi nala watershed were selected. For the collection of primary data 50 beneficiaries and 25 non beneficiaries were selected from each of the selected watersheds. Thus the total sample consisted of 100 beneficiaries and 50 non beneficiaries.

Beneficiaries were those who got some material input such as seed or sapling, technical help in the form of crop demonstrations, loan and subsidy for the construction of compost tanks, equipments and help in starting non agricultural occupations.

Non beneficiaries were those who remained out of the activities of NWDPRA.

In this chapter the characteristics of beneficiaries and non beneficiaries are described. The description of the beneficiaries and non beneficiaries under Silyari nala watershed, Raipur district, follows.

4.2 Beneficiaries and Non Beneficiaries of Raipur District

4.2.1 Distribution According to Benefits

Of the 50 beneficiaries 17 (34.00 per cent) received saplings of different horticultural crops. Nine beneficiaries were helped by providing saplings and construction of Nadef compost tanks. Six beneficiaries (12.00 per cent) got help for construction of Nadef and 5 (10.00 per cent) got saplings and weedicides. (Table 4.1)

Table 4.1 Distribution of beneficiaries according to types of benefits received, Raipur district, M.P.

Type of benefit	No.of beneficiaries
Saplings	17
Saplings + Nadef construction	9
Demonstration of Gram	1
Weedicides+Irrigation Pipes	1
Saplings + Weedicides	5
Construction of Nadef	6
Irrigation	1
Gram demonstration + Saplings + Weedicides	2
Saplings + Weedicides + Nadef construction	3
Composit Kit	1
Weedicides	2
Weedicides + Nadef construction	2

4.2.2 Population and Literacy

The total population of the selected beneficiary households was 373. Of these 127 were males, 120 females and 126 children. About half (51.47 per cent) family members were illiterates. About 17 per cent (16.89) were educated upto primary level and 16.35 per cent were below primary level. The literacy percentage was 48.53. The literacy among females (25.83 per cent) was much lower than males (77.17 per cent) (Table 4.2).

Table 4.2 Educational status of family members of beneficiary families, Raipur district, M.P.

S. No.	Educational Status	Males		Females		Children		Total	
		No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
1.	Illiterate	29	22.83	89	74.17	74	58.73	192	51.47
2.	Below Primary	23	18.11	8	6.67	30	23.81	61	16.35
3.	Primary (5th to 7th)	31	24.41	11	9.17	21	16.67	63	16.89
4.	Middle(8th & 9th)	22	17.32	7	5.82	1	0.79	30	8.04
5.	High School (10th & 11th)	18	14.17	5	4.17	-	-	23	6.17
6.	Higher Secondary (12th)	2	1.58	-	-	-	-	2	0.54
7.	College	2	1.58	-	-	-	-	2	0.54
Total Population		127	100.00	120	100.00	126	100.00	373	100.00

The population of non beneficiary households was 153. About equal number of these (51,50 and 52) were males, females and children. Of the total number 87 (56.86 per cent) were illiterate. Another 22 (14.38 per cent) were educated below primary level and 24 (15.68 per cent) were educated upto primary level. The literacy percentage was 43.14. The literacy percentage was lower (24.00) among females than males (64.71). (Table 4.3)

It was thus observed that literacy percentage among beneficiaries was higher (48.53) than non-beneficiaries (43.14). It was also observed that literacy percentages of males and females of beneficiary families were higher than those of non-beneficiary families. In both categories literacy percentage among males was higher than females.

Table 4.3 Educational status of family members of non-beneficiary families, Raipur district, M.P.

S. No.	Educational Status	Males		Females		Children		Total	
		No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
1.	Illiterate	18	35.29	38	76.00	31	59.62	87	56.86
2.	Below Primary	8	15.69	3	6.00	11	21.15	22	14.38
3.	Primary(5th to 7th)	10	19.61	5	10.00	9	17.31	24	15.68
4.	Middle (8th & 9th)	5	9.80	4	8.00	1	1.92	10	6.54
5.	High School (10th & 11th)	8	15.69	-	-	-	-	8	5.23
6.	Higher Secondary (12th)	2	3.92	-	-	-	-	2	1.31
	Total Population	51	100.00	50	100.00	52	100.00	153	100.00

4.2.3 Occupational Distribution

Among beneficiaries, of the 247 persons 125 (50.61 per cent) had agriculture as main occupation. Another 80 (32.40 per cent) had household work as main occupation. Twenty one (8.50 per cent) persons had no occupation. Of the 127 males the occupation of 101 (79.53 per cent) males was agriculture. Another 10 (7.87 per cent) were non workers. Among females 66.67 per cent of the 120 females had household work as main occupation. Twenty per cent had agriculture as main occupation and 9.17 per cent were non workers. (Table 4.4)

Table 4.4 Distribution of workers according to main occupation, beneficiary families, Raipur district, M.P.

S. No.	Main Occupation	Males		Females		Total	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	No Occupation	10	7.87	11	9.17	21	8.50
2.	Agriculture	101	79.53	24	20.00	125	50.61
3.	Agricultural labour	1	0.79	-	-	1	0.40
4.	Artisan	3	2.36	-	-	3	1.21
5.	Service	1	0.79	-	-	1	0.40
6.	Household work	-	-	80	66.67	80	32.40
7.	Others	11	8.66	5	4.16	16	6.48
	Total Workers	127	100.00	120	100.00	247	100.00

Among subsidiary occupations agricultural labour was most important with 42.51 per cent engaged in it. Twenty seven per cent did not have any subsidiary occupation, whereas, 12.96 per cent had either agriculture or agricultural labour as a subsidiary occupation. In both males and females agricultural labour was the most important subsidiary occupation (53.54 and 30.83 per cent respectively). While 30.71 per cent of males had no subsidiary occupation, 23.33 per cent among females were without any subsidiary occupation. Among females 22.50 per cent had either agriculture or agricultural labour as subsidiary occupation (Table 4.5).

Table 4.5 Distribution of workers according to subsidiary occupation, beneficiary families, Raipur district, M.P.

S. No.	Subsidiary Occupation	Males		Females		Total	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	No Occupation	39	30.71	28	23.33	67	27.13
2.	Agriculture	4	3.15	14	11.68	18	7.29
3.	Agricultural labour	68	53.54	37	30.83	105	42.51
4.	Agriculture/ labour	5	3.94	27	22.50	32	12.96
5.	Non-Agricultural labour	2	1.57	1	0.83	3	1.21
6.	Household work	1	0.79	8	6.67	9	3.64
7.	Household work & labour	1	0.79	4	3.33	5	2.02
8.	Others	7	5.51	1	0.83	8	3.24
	Total	127	100.00	120	100.00	247	100.00

Among non beneficiary families 53.47 per cent of workers had agriculture as main occupation. About 30 per cent (29.70) had household work as main occupation. While more than 80 per cent (82.36) of the males had agriculture as main occupation 60 per cent of females had household work as main occupation and 24.00 per cent had agriculture as main occupation (Table 4.6).

Table 4.6 Distribution of workers according to main occupation, non-beneficiary families, Raipur district, M.P.

S. No.	Main Occupation	Males		Females		Total	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	No Occupation	2	3.92	3	6.00	5	4.95
2.	Agriculture	42	82.36	12	24.00	54	53.47
3.	Agricultural labour	1	1.96	-	-	1	0.99
4.	Non-Agricultural labour	-	-	3	6.00	3	2.97
5.	Service	1	1.96	-	-	1	0.99
6.	Household work	-	-	30	60.00	30	29.70
7.	Household work & labour	-	-	1	2.00	1	0.99
8.	Others	5	9.80	1	2.00	6	5.94
	Total	51	100.00	50	100.00	101.	100.00

About 30 per cent (29.70) workers had no subsidiary occupation. Non-agricultural labour was the subsidiary occupation of 26.73 per cent workers and agricultural labour was the subsidiary occupation of 23.77 per cent workers.

Among males about 30 per cent (29.41) had no subsidiary occupation. Equal percentage of male workers had non-agricultural labour as subsidiary occupation and 25.49 per cent had agricultural labour as subsidiary occupation. Among females 30 per cent had no subsidiary occupation and 24 per cent had non agricultural labour as subsidiary occupation. Agricultural labour was subsidiary occupation of 22 per cent female workers and agriculture was so of 16.00 per cent workers (Table 4.7).

Table 4.7 Distribution of workers according to subsidiary occupation, non-beneficiary families, Raipur district, M.P.

S. No.	Subsidiary Occupation	Males		Females		Total	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	No Occupation	15	29.41	15	30.00	30	29.70
2.	Agriculture	1	1.96	8	16.00	9	8.91
3.	Agricultural labour	13	25.49	11	22.00	24	23.77
4.	Agriculture/ labour	-	-	3	6.00	3	2.97
5.	Non- Agricultural labour	15	29.41	12	24.00	27	26.73
6.	Service	1	1.96	-	-	1	0.99
7.	Household work	-	-	1	2.00	1	0.99
8.	Others	6	11.77	-	-	6	5.94
	Total	51	100.00	50	100.00	101	100.00

It was noted that there was no difference between the proportions of number of workers in different main occupations between beneficiaries and non-beneficiaries.

Among subsidiary occupations agricultural labour (42.51 per cent) and agriculture/ labour (12.96 per cent) were more important on beneficiary farms than non-beneficiary farms (23.77 and 2.97 per cent respectively). On the other hand non agricultural labour was more important (26.73 per cent) on non beneficiary farms than beneficiary farms (1.21 per cent).

This was also reflected in the occupational patterns of male and female workers.

4.2.4 Land Particulars

The total owned land of the selected beneficiary farmers was 120.24 hectares. Of this 0.81 hectare was cultivable waste and 2.84 hectares were current fallow. Thus the owned cultivated area was 116.59 hectares. The rented in land was 31.57 hectares, totaling the operated area to 148.16 hectares. Of the operated area net irrigated area was 35.21 hectares or 23.76 per cent. Of the total irrigated area 79.89 per cent was irrigated by other sources, such as nala, tanks, stop dams etc. Wells irrigated 20.11 per cent. The area double cropped was 50.79 hectares bringing the gross cropped area to 198.95 hectares. Of the gross cropped area 191.48 hectares (96.25 per cent) were under NWDPRA and the remaining 7.47 hectares (3.75 per cent), under non NWDPRA.

As regards slope of the land, of the 120.24 hectares of owned land 99.80 hectares or 83.00 per cent was plain land and 20.44 hectares or 17.00 per cent land had a moderate slope.

The total owned land of non beneficiary farmers was 43.38 hectares. The cultivable wasteland and current fallow was 2.23 and 1.10 hectares respectively. This resulted in the owned cultivated land equal to 39.95 hectares. The rented in land was 5.16 hectares making the operated area to 45.11 hectares. With net irrigated area of 16.09 hectares the percentage of irrigated area came to 35.67. While 56.00 per cent of irrigated area was under the command of other sources, 44.00 per cent was irrigated by wells. As the area double cropped was 13.05 hectares the gross cropped area totalled to 58.16 hectares (Table 4.8).

Table 4.8 Land particulars of beneficiaries and non beneficiaries, Raipur district, M.P.

(Area - hectares)

Land Particulars	Beneficiaries			Non Beneficiaries		
	Area falling under NWDPRA	Area falling outside NWDPRA	Total	Area falling under NWDPRA	Area falling outside NWDPRA	Total
Owned area	113.58	6.66	120.24	40.55	2.73	43.38
a) Cultivable waste	0.81	-	0.81	2.23	-	2.23
b) Current fallow	2.84	-	2.84	0.41	0.69	1.10
Owned cultivated area	109.93	6.66	116.59	37.91	2.04	39.95
Rented in land	31.57	-	31.57	4.65	0.51	5.16
Operated area	141.50	6.66	148.16	42.56	2.55	45.11
Net irrigated area	35.21	-	35.21	16.09	-	16.09
Percentage of net irrigated area to operated area	24.88	-	23.76	37.80	-	35.67
Sources of irrigation						
a) Other sources	28.13 (79.89)*	-	28.13 (79.89)	9.01 (56.00)	-	9.01 (56.00)
b) Wells	7.08 (20.11)	-	7.08 (20.11)	7.08 (44.00)	-	7.08 (44.00)
Area double cropped	49.98	0.81	50.79	13.05	-	13.05
Gross cropped area	191.48	7.47	198.95	55.61	2.55	58.16

*Figures in brackets denote percentages.

Of the gross cropped area of 58.16 hectares 55.61 hectares (95.62 per cent) was under NWDPRA and 2.55 hectares (4.38 per cent) under non NWDPRA.

While the percentage of irrigated area to operated area was 23.76 on beneficiary farms it was 37.80 per cent or 14.04 per cent more on non-beneficiary farms.

Again, while beneficiary farms depended more on other sources (79.89 per cent), the dependence of non beneficiaries was less(56.00 per cent) on other sources and more on assured sources like wells (44.00 per cent) (Table 4.8).

4.2.5 Cropping Pattern

Raipur being located in paddy zone paddy occupied most important place in the cropping pattern on the selected farms.

On beneficiary farms it occupied about 70 per cent (70.09) of the cropped area. Besides paddy only wheat was of some importance in cereals and occupied 6.25 per cent of the gross cropped area. Pulses occupied 16.63 per cent and oilseeds, 2.65 per cent. Among pulses teora (8.46 per cent) and gram (5.73 per cent) were important. Paddy varieties could be grouped into two: improved and local. While improved varieties constituted about 30 per cent (29.79) of the gross cropped area and 42.50 per cent of the paddy area, local varieties constituted 40.30 per cent of the gross cropped area and 57.50 per cent of paddy area.

Of the total paddy area 27.38 per cent was under irrigation and the remaining 72.62 per cent was rainfed. Of the gross cropped area of 198.96 hectares 7.47 hectares or 3.75 per cent was non NWDPRA area. The non-NWDPRA area was entirely rainfed. Moreover, only paddy and teora were grown on non NWDPRA area probably because of difficulties in management of fields outside the villages of residence (Table 4.9).

In the pre project year the gross cropped area was 172.92 hectares or 24.02 hectares less than the current year. The percentage area under paddy was higher (74.58) in pre project year than the current year (70.09). The difference in percentages of area under other crops was marginal. Some difference in the percentage of area under crop groups was noted. While the percentage area under cereals came down from 85.92 to 79.55 the proportion under pulses increased from 11.97 to 16.63 (Table 4.10).

Table 4.9 Cropping pattern on beneficiary farms, Raipur district, M.P.

(Area - hectares)

Crop	NWDPRA Area			Non-NWDPRA Area			Total			
	Irrigated	Unirrigated	Total	Irrigated	Unirrigated	Total	Irrigated	Unirrigated	Total	Percentage
Paddy										
a) Improved	19.43	37.32	56.75	-	2.53	2.53	19.43	39.85	59.28	29.79
b) Local	14.16	61.90	76.06	-	4.13	4.13	14.16	66.03	80.19	40.30
Total paddy	33.59	99.22	132.81	-	6.66	6.66	33.59	105.88	139.47	70.09
Wheat	7.08	5.36	12.44	-	-	-	7.08	5.36	12.44	6.25
Wheat + Mustard	-	0.51	0.51	-	-	-	-	0.51	0.51	0.26
Kodo	-	1.01	1.01	-	-	-	-	1.01	1.01	0.51
Kodo + Til	-	1.42	1.42	-	-	-	-	1.42	1.42	0.71
Kodo + Til + Arhar	-	3.44	3.44	-	-	-	-	3.44	3.44	1.73
Total cereals	40.67	110.96	151.63	-	6.66	6.66	40.67	117.62	158.29	79.55
Gram	8.30	3.10	11.40	-	-	-	8.30	3.10	11.40	5.73
Teora	3.48	12.55	16.03	-	0.81	0.81	3.48	13.36	16.84	8.46
Pea	-	2.83	2.83	-	-	-	-	2.83	2.83	1.42
Arhar	-	2.02	2.02	-	-	-	-	2.02	2.02	1.02
Total pulses	11.78	20.50	32.28	-	0.81	0.81	11.78	21.31	33.09	16.63
Groundnut	-	0.81	0.81	-	-	-	-	0.81	0.81	0.41
Mustard	-	2.43	2.43	-	-	-	-	2.43	2.43	1.22
Linseed	-	2.02	2.02	-	-	-	-	2.02	2.02	1.02
Total oilseeds	-	5.26	5.26	-	-	-	-	5.26	5.26	2.65
Fruits & Vegetables	2.02	0.30	2.32	-	-	-	2.02	0.30	2.32	1.17
Gross cropped area	54.47	137.02	191.49	-	7.47	7.47	54.47	144.49	198.96	100.00
Percentage							27.38	72.62	100.00	

The percentage of irrigated cropped area was 24.22.

Thus in the current year the percentage area under cereals was lower (79.55) and that under pulses and oilseeds higher (16.63 and 2.65 respectively) than the pre project year (cereals 85.92, pulses 11.97 and oilseeds 1.64). Secondly the percentage of irrigated cropped area was slightly more than the pre project year (27.38 against 24.22).

Table 4.10 Cropping pattern in pre-project year, beneficiary farms, Raipur district, M.P.

Crop	Irrigated	Unirrigated	Total	Percentage
Paddy				
Improved	20.64	22.34	42.98	24.86
Local	5.47	80.52	85.99	49.73
Total paddy	26.11	102.86	128.97	74.59
Wheat	7.28	5.47	12.75	7.37
Kodo	-	6.47	6.47	3.73
Kodo + Arhar	-	0.40	0.40	0.23
Total cereals	33.39	115.20	148.59	85.92
Gram	5.67	3.39	9.06	5.24
Teora	0.81	9.61	10.42	6.03
Arhar	-	1.21	1.21	0.70
Total pulses	6.48	14.21	20.69	11.97
Groundnut	1.21	-	1.21	0.70
Linseed	-	1.62	1.62	0.94
Total oilseeds	1.21	1.62	2.83	1.64
Fruits & Vegetables	0.81	-	0.81	0.47
Gross cropped area	41.89	131.03	172.92	100.00
Percentage	24.22	75.78	100.00	

More importantly the percentage of area under improved varieties of paddy increased from 24.86 to 29.79.

On non beneficiary farms paddy contributed 70.80 per cent to the cropped area. Pulses constituted 18.36 per cent and oilseeds 3.15 per cent. Thus there was no significant difference between the cropping pattern of beneficiary and non beneficiary farms.

The area under improved varieties of paddy formed 14.17 per cent as against 29.79 per cent on beneficiary farms. However, the percentage of irrigated cropped area was 34.64 as against 27.38 on the beneficiary farms.

The gross cropped area increased from 49.67 hectares in pre project area to 57.85 hectares in the current year. The area under improved varieties of paddy slightly increased from 11.48 per cent to 14.17 per cent. The percentage of area under paddy decreased from 75.16 to 70.80 and that of cereals from 83.11 to 76.06. On the other hand the

area under pulses increased from 13.23 to 18.36 in the current year (Table 4.11 & 4.12).

Table 4.11 Cropping pattern on non beneficiaries farms, Raipur district, M. P.

(Area- hectares)

Crop	NWDPRA area			Non- NWDPRA area			Total			
	Irri-gated	Un-irri-gated	Total	Irri-gated	Non-irri-gated	Total	Irri-gated	Non-irri-gated	Total	Percen-tage
Paddy										
a) Improved	4.35	3.85	8.20	-	-	-	4.35	3.85	8.20	14.17
b) Local	10.73	20.41	31.14	-	1.62	1.62	10.73	22.03	32.16	56.63
Total paddy	15.08	24.26	39.34	-	1.62	1.62	15.08	25.88	40.96	70.80
Wheat	2.23	-	2.23	-	0.61	0.61	2.23	0.61	2.84	4.91
Kodo	-	0.20	0.20	-	-	-	-	0.20	0.20	0.35
Total cereals	17.21	24.46	41.77	-	2.23	2.23	17.31	26.69	44.00	76.06
Gram	0.51	1.21	1.72	-	-	-	0.51	1.21	1.21	2.97
Teora	0.81	7.28	8.09	-	-	-	0.81	7.28	8.09	13.99
Arhar	-	0.81	0.81	-	-	-	-	0.81	0.81	1.40
Total pulses	1.32	9.30	10.62	-	-	-	1.32	9.30	10.62	18.36
Til	-	0.20	0.20	-	-	-	-	0.20	0.20	0.35
Soybean	-	1.62	1.62	-	-	-	-	1.62	1.62	2.80
Total oilseeds	-	1.82	1.82	-	-	-	-	1.82	1.82	3.15
Vegetables	1.41	-	1.41	-	-	-	1.41	-	1.41	2.43
Total	20.04	35.58	55.62	-	2.23	2.23	20.04	37.81	57.85	100.00
Percentage							34.64	65.36	100.00	

Table 4.12 Cropping pattern, in pre-project year, non-beneficiary farms, Raipur district, M. P.

Crop	NWDPRA area- Hectares			Percentage
	Irrigated	Unirrigated	Total	
Paddy a) Improved	3.46	2.24	5.70	11.48
b) Local	10.50	21.13	31.63	63.68
Total paddy	13.96	23.37	37.33	75.16
Wheat	3.24	-	3.24	6.52
Kodo	-	0.71	0.71	1.43
Total cereals	17.20	24.08	41.28	83.11
Gram	0.20	0.40	0.60	1.21
Teora	-	3.64	3.64	7.33
Arhar	-	2.33	2.33	4.69
Total pulses	0.20	6.37	6.57	13.23
Total oilseeds(Soybean)	-	1.62	1.62	3.26
Vegetables	0.20	-	0.20	0.40
Total	17.60	32.07	49.67	100.00
Percentage	35.43	64.57	100.00	-

4.2.6 Irrigated Crops

All the important crops viz. paddy, wheat, gram and fruits and vegetables were irrigated with varying degrees.

On beneficiary farms, paddy was irrigated to the extent of 24.08 per cent. Wheat and gram were irrigated to the extent of 56.91 and 72.81 per cent respectively. Fruits and vegetables were irrigated to the extent of 87.07 per cent.

Improved varieties of paddy had higher percentage of irrigated area (32.78) than local varieties (17.66). (Table 4.13)

Table 4.13 Irrigated cropped area, beneficiary farms, current year, Raipur district, M.P.

(Area- hectares)

Crop	Cropped area	Irrigated area	Percentage of irrigated area to cropped area
Paddy a) Improved	59.28	19.43	32.78
b) Local	80.19	14.16	17.66
Total paddy	139.47	33.59	24.08
Wheat	12.44	7.08	56.91
Gram	11.40	8.30	72.81
Teora	16.84	3.48	20.67
Fruits & Vegetables	2.32	2.02	87.07

On non beneficiary farms paddy was irrigated to the extent of 36.82 per cent (12.74 per cent more than beneficiary farms). The percentages of irrigation of both improved and local paddy varieties were higher. The percentages were higher for other crops also (Table 4.14).

Table 4.14 Irrigated cropped area, non beneficiary farms, current year, Raipur district, M.P.

(Area - hectares)

Crop	Cropped area	Irrigated area	Percentage of irrigated area to cropped area
Paddy a) Improved	8.20	4.35	53.05
b) Local	32.76	10.73	32.75
Total paddy	40.96	15.08	36.82
Wheat	2.84	2.23	78.52
Gram	1.72	0.51	29.65
Teora	8.09	0.81	10.01
Fruits & Vegetables	1.41	1.41	100.00

On the beneficiary farms the percentage of irrigation of paddy increased from 20.25 in the pre project year to 24.08 in the current year. The percentages of irrigation under gram (72.81) and teora (20.67) also increased from pre project year (62.58 and 7.77 per cent respectively).

On the non beneficiary farms, however, the irrigation percentages of different crops were higher in pre project year than the current year. (Tables4.15 & 4.16)

Table 4.15 Irrigated cropped area, beneficiary farms, pre project year, Raipur district, M.P.

(Area - hectares)

Crop	Cropped area	Irrigated area	Percentage of irrigated area to cropped area
Paddy a) Improved	42.98	20.64	48.02
b) Local	85.99	5.47	6.36
Total paddy	128.97	26.11	20.25
Wheat	12.75	7.28	57.10
Gram	9.06	5.67	62.58
Teora	10.42	0.81	7.77
Fruits & Vegetables	0.81	0.81	100.00

Table 4.16 Irrigated cropped area, non-beneficiary farms, pre project year, Raipur district, M.P.

(Area - hectares)

Crop	Cropped area	Irrigated area	Percentage of irrigated area to cropped area
Paddy a) Improved	5.70	3.46	60.70
b) Local	31.63	10.50	33.19
Total paddy	37.33	13.96	37.40
Wheat	3.24	3.24	100.00
Gram	0.60	0.20	33.33
Teora	3.64	-	-
Fruits & vegetables	0.20	0.20	100.00

4.2.7 Cost of Cultivation

Cost of cultivation included following items.

1. Human labour- The cost included expenditure on hired human labour and family labour, evaluated at the rate of permanent farm servant.

2. Bullock labour- It included payment made to hired bullocks and the bullock pair driver. The owned bullock labour was evaluated by calculating the cost of feed, fodder, medicines, etc.

3. Machinery charges included charges paid for hiring. Owned machinery charges included depreciation, repairs etc. It may be mentioned that in Madhya Pradesh no electricity charges were payable for electric motors less than 5 H.P.

4. Seed value included cost of seed purchased and owned seed valued at market rates at the time of sowing.

5. Manures were evaluated at the rates prevailing in the villages. Cost of seed treatment, fertilisers and pesticides equalled the prices paid for these.

The cost of cultivation per hectare of paddy was Rs.3,184.64. The most important item of input was human labour and constituted nearly half (48.95 per cent) of the total cost. The next important item was bullock labour and formed 17.22 per cent of the cost. Fertilisers and seed claimed nearly equal percentages of 13.02 and 12.30. The only other item worth mentioning was manures (5.59 per cent).

The cost of cultivation of improved paddy was Rs.3,383.18 and that of local paddy, Rs.3,036.50. Thus the cost of cultivation of improved paddy was Rs.346.68 higher than local paddy. The cost was higher due to higher human labour (Rs.262.54), machinery (Rs.71.28), seed (Rs.16.36) and fertilisers (Rs.26.57). The cost per hectare of bullock labour (Rs.59.88) and manures (Rs.14.38) were higher for local varieties (Table 4.17).

Table 4.17 Cost of cultivation of paddy, beneficiary farms, Raipur district, M.P.

(Cost - Rs./hectare)

Item	Improved		Local		Total	
	Cost	Percentage	Cost	Percentage	Cost	Percentage
1. Human labour						
Wage bill	944.49	27.92	542.01	17.85	713.99	22.42
Owned	764.67	22.60	904.61	29.79	844.82	26.53
Total	1,709.16	50.52	1,446.62	47.64	1,558.81	48.95
2. Bullock labour						
Wage bill	108.07	3.19	114.61	3.78	118.81	3.51
Family	406.17	12.02	459.51	15.13	436.71	13.71
Total	514.24	15.21	574.12	18.91	555.52	17.22
3. Machinery						
Hired	54.27	1.60	11.57	0.38	29.82	0.94
Owned	34.89	1.03	6.31	0.21	18.52	0.58
Total	89.16	2.63	17.88	0.59	48.34	1.52
4. Seed	401.11	11.86	384.75	12.67	391.74	12.30
5. Seed treatment	0.33	0.01	0.07	Neg.	0.18	0.01
6. Manures	170.00	5.02	184.38	6.07	178.24	5.59
7. Fertilisers	429.76	12.70	403.19	13.28	414.55	13.02
8. Pesticides	29.76	0.88	25.49	0.84	27.32	0.86
9. Diesel/Fuel charges	39.65	1.17	-	-	16.94	0.53
10. Others	-	-	-	-	-	-
Total cost	3,383.18	100.00	3,036.50	100.00	3,184.64	100.00

The cost of cultivation of wheat was Rs.3,053.94. It was about equal to local varieties of paddy (Rs.3,036.50). While the cost per hectare of local paddy was higher than wheat in the case of inputs like human labour, bullock labour and manures, it was lower in the case of machinery, seed and fertilisers. The cost of cultivation of gram was still lower (Rs.2,863.04). The cost was lower on all the inputs except seed. The cost per hectare of teora was only Rs.1,008.80. It may be mentioned that teora was a cover crop of paddy and was broadcast in standing paddy fields. Besides only human labour and bullock labour were required. Fertilisers were sparingly used and no machinery was required to be used. (Table 4.18)

Table 4.18 Cost of cultivation of wheat, gram and teora, beneficiary farms, Raipur district, M.P.

(Cost-Rs./hectare)

Item	Wheat		Gram		Teora	
	Cost	Percentage	Cost	Percentage	Cost	Percentage
1. Human labour						
Wage bill	769.70	25.20	248.02	8.66	-	-
Owned	614.54	20.12	537.93	18.79	363.01	35.98
Total	1,384.24	45.32	785.95	27.45	363.01	35.98
2. Bullock labour						
Wage bill	101.69	3.33	46.09	1.61	65.50	6.49
Family	221.06	7.24	460.93	16.10	199.26	19.75
Total	322.75	10.57	507.02	17.71	264.76	26.25
3. Machinery						
Hired	96.46	3.16	30.73	1.07	37.43	3.71
Owned	24.12	0.79	-	-	-	-
Total	120.58	3.95	30.73	1.07	37.43	3.71
4. Seed	561.90	18.40	1,096.14	38.29	285.71	28.32
5. Seed treatment	-	-	0.53	0.02	-	-
6. Manures	68.17	2.23	112.38	3.92	38.93	3.86
7. Fertilisers	595.50	19.50	296.93	10.37	18.96	1.88
8. Pesticides	0.80	0.03	33.36	1.17	-	-
9. Diesel/Fuel charges	-	-	-	-	-	-
10. Others	-	-	-	-	-	-
Total cost	3,053.94	100.00	2,863.04	100.00	1,008.80	100.00

The cost of cultivation of paddy on non beneficiary farms was Rs.3,243.17 per hectare or Rs.58.53 more than the beneficiary farms. In the case of improved paddy varieties, again, the cost of cultivation on non-beneficiary farms was higher by Rs.149.49. In the case of local varieties, however, the cost was lower on non beneficiary farms by Rs.81.82. (Table 4.19)

Table 4.19 Cost of cultivation of paddy, non beneficiary farms, Raipur district, M.P.

(Cost - Rs./hectares)

Item	Improved		Local		Total	
	Cost	Percentage	Cost	Percentage	Cost	Percentage
1. Human labour						
Wage bill	1,077.44	30.50	405.00	13.71	741.22	22.86
Owned	772.56	21.87	1,026.17	34.74	899.36	27.73
Total	1,850.00	52.37	1,431.17	48.45	1,640.58	50.59
2. Bullock labour						
Wage bill	179.88	5.09	125.24	4.24	152.56	4.71
Family	328.05	9.29	400.37	13.56	364.21	11.23
Total	507.93	14.38	525.61	17.80	516.77	15.94
3. Machinery						
Hired	30.00	0.85	27.71	0.94	28.86	0.89
Owned	40.00	1.13	25.00	0.85	32.50	1.00
Total	70.00	1.98	52.71	1.79	61.36	1.89
4. Seed	436.58	12.36	442.52	14.98	439.55	13.55
5. Seed treatment	-	-	-	-	-	-
6. Manures	-	-	-	-	-	-
7. Fertilisers	548.78	15.53	432.21	14.63	490.49	15.12
8. Pesticides	64.02	1.81	43.77	1.48	53.89	1.66
9. Diesel/Fuel charges	55.36	1.57	25.69	0.87	40.53	1.25
10. Others	-	-	-	-	-	-
Total cost	3,532.67	100.00	2,953.68	100.00	3,243.17	100.00

It was noted that the proportions of different inputs on beneficiary and non beneficiary farms were nearly equal.

The cost of cultivation of wheat on non beneficiary farms was Rs.2,986.16. The cost of gram was Rs.2,761.39 and that of teora, Rs.907.53. There was not much difference between proportions of items of inputs between beneficiary and non beneficiary farms (Table 4.20).

Table 4.20 Cost of cultivation of wheat, gram and teora, non beneficiary farms, Raipur district, M.P.

(Cost - Rs./hectare)

Item	Wheat		Gram		Teora	
	Cost	Percentage	Cost	Percentage	Cost	Percentage
1. Human labour						
Wage bill	89.58	3.00	276.14	10.00	-	-
Owned	1,166.69	39.07	478.82	17.34	309.29	34.08
Total	1,256.27	42.07	754.96	27.34	309.29	34.08
2. Bullock labour						
Wage bill	61.81	2.07	139.12	5.04	49.92	5.50
Owned	304.59	10.20	347.94	12.60	227.06	25.02
Total	366.40	12.27	487.11	17.64	276.98	30.52
3. Machinery						
Hired	119.45	4.00	13.81	0.50	36.30	4.00
Owned	59.72	2.00	41.42	1.50	-	-
Total	179.17	6.00	55.23	2.00	36.30	4.00
4. Seed	600.82	20.12	1,102.35	39.92	248.66	27.40
5. Seed treatment	-	-	-	-	-	-
6. Manures	-	-	80.08	2.90	-	-
7. Fertilisers	490.92	16.44	281.66	10.20	18.15	2.00
8. Insecticides/ Pesticides	3.00	0.10	-	-	18.15	2.00
9. Diesel/Fuel charges	-	-	-	-	-	-
10. Others	89.58	3.00	-	-	-	-
Total cost	2,986.16	100.00	2,761.39	100.00	907.53	100.00

4.2.8 Production and Profit Per Hectare

On beneficiary farms the production of main product of improved varieties of paddy was 26.69 quintals per hectare. It was 20.21 quintals per hectare for local paddy or 6.48 quintals less than improved paddy. The value of main and by products for improved paddy came to Rs.8,413.40 per hectare. The value of local paddy was Rs.6,329.66 per hectare. It was Rs.2,083.74 less than the improved paddy. With the cost per hectare of 3,383.18 and Rs.3,036.50 for improved and local paddy varieties respectively, the profit per hectare came to Rs.5,030.22 and Rs.3,293.16. Thus the profit per hectare for improved varieties was Rs.1,737.06 higher than the local varieties (Table 4.21).

The production per hectare of wheat, gram and teora was 10.68, 6.23 and 5.18 respectively. The values of main as well by products of these crops were Rs.5,245.74, Rs.6,451.72 and Rs.2,393.50 respectively. Deducting the cost of cultivation the profit per hectare for wheat, gram and teora came to Rs.2,191.80, Rs.3,588.68 and Rs.1,384.70 respectively (Table 4.22).

Table 4.21 Production, value and net profit of paddy per hectare, beneficiary farms, Raipur district, M.P.

Item		Improved	Local	Total
Production				
Main product	(quintals)	26.69	20.21	22.98
By product	(quintals)	52.85	36.29	43.36
Value				
Main product	(Rs.)	8,149.66	6,143.20	7,000.56
By product	(Rs.)	263.74	186.46	219.48
Total value	(Rs.)	8,413.40	6,329.66	7,220.04
Cost	(Rs.)	3,383.18	3,036.50	3,184.64
Net profit	(Rs.)	5,030.22	3,293.16	4,035.40

Table 4.22 Production, value and net profit of wheat, gram and teora per hectare, beneficiary farms, Raipur district, M.P.

Item		Wheat	Gram	Teora
Production				
Main product	(quintals)	10.68	6.23	5.18
By product	(quintals)	18.27	7.49	5.30
Value				
Main product	(Rs.)	4,789.79	6,277.44	2,330.00
By product	(Rs.)	455.95	174.28	63.50
Total value	(Rs.)	5,245.74	6,451.72	2,393.50
Cost	(Rs.)	3,053.94	2,863.04	1,008.80
Net profit	(Rs.)	2,191.80	3,588.68	1,384.70

On non beneficiary farms the production per hectare of improved varieties of paddy was 29.11 quintals per hectare and that of local paddy varieties, 23.65 quintals. Thus the yield of improved varieties was 5.46 quintals more than local varieties. The value of production was Rs.9287.64 for improved varieties and Rs.7,506.75 for local varieties. Thus the value was Rs.1,780.89 more for improved varieties than local varieties. Net profit after deducting the cost from output value came to Rs.5,754.97 and Rs.4,553.07 respectively. Thus the net profit from improved varieties was Rs.1,201.90 more than local varieties of paddy (Table 4.23).

In the case of wheat, gram and teora the yields were 11.16, 6.78 and 4.29 quintals per hectare. The values of products per hectare were Rs.5,213.00, Rs.6,729.00 and Rs.1,776.00 respectively. After deducting the

cost per hectare the net profit per hectare came to Rs.2,226.84 for wheat, Rs.3,268.00 for gram and Rs.1,168.47 for teora (Table 4.24).

Table 4.23 Production, value and net profit of paddy per hectare, non beneficiary farms, Raipur district, M.P.

Item		Improved	Local	Total
Production				
Main product	(quintals)	29.11	23.65	24.77
By product	(quintals)	56.51	48.65	50.25
Value				
Main product	(Rs.)	9,003.72	7,268.83	7,624.94
By product	(Rs.)	283.92	238.12	247.08
Total value	(Rs.)	9,287.64	7,506.75	7,872.02
Cost	(Rs.)	3,532.67	2,953.68	3,243.17
Net profit	(Rs.)	5,754.97	4,553.07	4,628.65

Table 4.24 Production, value and net profit of wheat, gram and teora per hectare, non beneficiary farms, Raipur district, M.P.

Item		Wheat	Gram	Teora
Production				
Main product	(quintals)	11.16	6.78	4.29
By product	(quintals)	19.28	8.00	3.00
Value				
Main product	(Rs.)	4,887.89	6,569.00	1,716.00
By product	(Rs.)	325.11	160.00	60.00
Total value	(Rs.)	5,213.00	6,729.00	1,776.00
Cost	(Rs.)	2,986.16	3,461.00	607.53
Net profit	(Rs.)	2,226.84	3,268.00	1,168.47

It was observed that the net profit per hectare of improved paddy, local paddy and wheat was more on non beneficiary farms. However, profit per hectare for gram and teora was more on beneficiary farms. One of the reasons for higher profitability on non-beneficiary farms was higher proportion of irrigation. The profit per hectare on non beneficiary farms was higher by Rs.721.75 in the case of improved paddy, by Rs.1,259.91 in local paddy and by Rs.35.04 in the case of wheat. On the other hand profit per hectare was higher on beneficiary farms by Rs.380.68 in the case of gram and Rs.216.23 in the case of teora.

4.2.9 Adoption of Improved Farming Practices

Among practices first item was adoption of improved varieties. The crops for which improved varieties used were paddy, wheat, gram and mustard. Of the improved varieties of paddy some were termed as high yielding varieties (HYV) and others were termed as improved or local high yielding varieties. H.Y. Varieties of paddy were recognised at national level, whereas, local H.Y. varieties were so at the regional or district levels (Table 4.25).

Table 4.25 Adoption of improved seed material, beneficiary farmers, Raipur district, M.P.

Paddy H.Y.V.		Paddy Local		Wheat		Gram		Mustard	
Variety	No.	Variety	No.	Variety	No.	Variety	No.	Variety	No.
IR-36	8	Ranikajal	28	147	3	Ujjain 21	8	Pusabold	1
B.D.Safari	22	Dubraj	5	Narmada-4	2	Ujjain 72	3		
B.D.200	3	Uraibuta	7	1553	1				
Kranti	17	Asamchuri	8	306	1				
Swarna	1	Safari	10	64	1				
		Luchai	1						
		Gurmatia	2						
		Shyamkali	1						
		Kalchuri	1						
		Ananda	1						
		Kalhar	1						
		Others	8						

The number of farmers was not totalled as one farmer might have adopted more than one variety.

On non beneficiary farms two high yield varieties of paddy viz. kranti and B.D.200 were grown. Among local paddy varieties safari was most important, followed by Ranikajal. In addition, 5 more local varieties were grown (Table 4.26).

Table 4.26 Adoption of improved seed material, non-beneficiary farms, Raipur district, M.P.

Paddy HYV		Paddy Local	
Variety	No.	Variety	No.
Kranti	9	Ranikajal	11
B.D. 200	1	Dubraj	4
		Uraibuta	1
		Asamchuri	1
		Safari	17
		Gurmatia	1
		Others	7

The number of farmers may not be totalled as a farmer might have adopted more than one variety.

Twelve out of 50 farmers applied some chemicals to seed before sowing. Only one farmer used iron plough for turning the soil. Further, only 3 farmers used transplanting method of sowing. Although manure was applied by all the farmers only 7 farmers used the new technique of preparing manure by Nadef method. Fertilisers of different kinds were used. These included urea, super phosphate, DAP, gromore and potash. Pesticides were used by 23 farmers.

As regards harvesting which included operations of cutting, drying and threshing farmers adopted traditional methods of cutting by hand, drying in sun and threshing under bullock feet. Storage of grains was done in traditional grain bins made of local material (Table 4.27).

Table 4.27 Adoption of improved farming practices, beneficiary farmers, Raipur district, M.P.

	Item	Adopters	Non adopters
1.	Seed treatment	12	38
2.	Improved ploughing method	1	49
3.	Improved sowing method	3	47
4.	Manure	49	1
5.	Nadef prepared	7	43
6.	Fertilisers		
	a) Urea	48	-
	b) Super phosphate	29	-
	c) DAP	14	-
	d) Gromore	10	-
	e) Potash	8	-
7.	Pesticides	23	-
8.	Harvesting		
	a) Cutting	-	50
	b) Drying	-	50
	c) Threshing	-	50
9.	Post harvest	-	50

Among non beneficiary farmers the adoption of improved farming practices was lower. None of the farmers treated the seed, used iron plough or transplanted paddy. Although manure was used by all, none used improved technique of Nadef construction. Fertilisers and pesticides were used by a limited number of farmers. As in the case of beneficiary farmers none in this category used modern methods of harvesting, threshing and winnowing. (Table 4.28)

Table 4.28 Adoption of improved farming practices, non beneficiary farmers, Raipur district, M.P.

Item	Adopters	Non-adopters
1. Seed treatment	-	25
2. Improved ploughing method	-	25
3. Improved sowing method	-	25
4. Manure	25	-
5. Nadef prepared	-	25
6. Fertilisers		
a. Urea	25	-
b. Super phosphate	7	-
c. DAP	8	-
d. Gromore	2	-
e. Potash	-	-
7. Pesticides	11	14
8. Harvesting		
a. Cutting	-	25
b. Drying	-	25
c. Threshing	-	25
9. Post harvest	-	25

Under watershed development silvicultural and horticultural saplings were distributed to beneficiaries. In all 292 saplings were distributed. Of these 120 saplings were of bamboo and the remaining 172 saplings of horticultural plants. Of the 292 saplings distributed 110 survived till the time of investigation. Thus the mortality percentage was 62.33 (Table 4.29).

Table 4.29 Distribution of saplings, beneficiary farmers, Raipur district, M.P.

S. No.	Plants	Number distributed	Number survived
1.	Guava	18	10
2.	Mango	60	11
3.	Banana	18	4
4.	Lemon	63	16
5.	Anwala	5	2
6.	Karonda	22	7
7.	Jackfruit	52	9
8.	Cashewnut	24	7
9.	Bamboo	120	40
10.	Neem	10	4
	Total	292	110

Raipur being paddy area and paddy sown in bunded fields, bunding activity took place after the harvesting of paddy and rabi crops. In summer months fields were dug and eroded bunds were reconstructed. The width and height of the bunds were increased, if necessary. The bunding activity was essential.

The selected beneficiaries had bunds of 69,316 metre length. The bunds were made of soil and of required length. These bunds helped in storing rain water significantly and thereby increased moisture retention. These also helped to reduce run off.

No vegetative bunds were constructed in the watershed.

Silyari nala watershed being plain terrain there was no need of contour cultivation.

None of the selected beneficiaries developed any pasture nor had siltation near bunds.

4.2.10 Input Supply

The inputs purchased included seed, culture and fertilisers. These were available in either cooperative society or open market. Of the 50 farmers 8 farmers got these within the villages and 20 farmers got these within a distance of 5 km. While 3 and 6 farmers had to tread to a distance of 10 to15 km., as many as 13 had to travel more than 15 km. for these. (Table 4.30)

Table 4.30 Input supply, beneficiary farmers, Raipur district, M.P.

S.No.	Distance in Km.	Frequency
1.	Within the village	8
2.	Up to 5	20
3.	6 - 10	3
4.	11 - 15	6
5.	16 & above	13
	Total	50

All the above mentioned inputs were of good quality, available timely and in enough quantity. The farmers had no problem.

Fifteen of the 25 non beneficiaries got the inputs within the villages. Four got these within 5 km. and remaining travelled more than 10 km. (Table 4.31)

Table 4.31 Input supply, non beneficiary farmers, Raipur district, M.P.

S.No.	Distance in Km.	Frequency
1.	Within the village	15
2.	Upto 5	4
3.	6 - 10	-
4.	11 - 15	2
5.	16 & above	4
	Total	25

4.2.11 Credit Facilities

Beneficiary farmers availed crop loans and term loans. Crop loans were taken for fertilisers, seed, pesticides, etc. Term loans for agriculture included pair of bullocks, buffaloes, well and pump, etc. Term loans for non agricultural purposes included bicycle repairing shop, sewing machine and cloth sale.

While crop loans constituted 53.66 per cent, term loans for agricultural sector formed 34.89 per cent. For non-agricultural sector 11.45 per cent loans were obtained.

Among the financial institutions cooperative societies advanced 54.90 per cent loans. The Regional Rural Banks contributed 30.04 per cent of the loan amount.

It was observed that while cooperative societies and RRBs financed crop loans and term loans RRBs financed non agricultural loans also. (Table 4.32)

Table 4.32 Credit facility, beneficiary farms, Raipur district, M.P.

Purpose of loan	Source of Finance (Rs.)					Percentage
	Dena Bank	Cooperative society	Regional Rural Bank	Allahabad Bank	Total	
1. Fertiliser	400	26,715	12,500	-	39,615	27.90
2. Seed	-	215	-	-	215	0.15
3. Seed & Fertiliser	-	2,200	-	-	2,200	1.55
4. Pair of bullocks	-	5,000	5,000	-	10,000	7.05
5. She buffaloe	-	4,550	-	-	4,550	3.20
6. Fertiliser + Cash	1,000	-	5,900	-	6,900	4.86
7. Fertiliser + Pesticides + Cash	-	6,470	-	-	6,470	4.56
8. Fertiliser + Seed + Cash	-	14,800	-	-	14,800	10.42
9. Buffaloe + Seed + Fertiliser	-	15,000	-	-	15,000	10.56
10. Cultivation	-	3,000	3,000	-	6,000	4.22
11. Well & Pump	-	-	-	20,000	20,000	14.08
12. Cycle repair	-	-	5,000	-	5,000	3.52
13. Sewing machine	-	-	1,250	-	1,250	0.88
14. Cloth	-	-	10,000	-	10,000	7.05
Total	1,400	77,950	42,650	20,000	1,42,000	100.00
Percentage	0.98	54.90	30.04	14.08	100.00	

In the case of non beneficiaries crop loans and agricultural loans were provided by cooperative societies and cooperative banks. Land Development Bank advanced long term loans. Non agricultural loans were advanced by Commercial Banks. (Table 4.33)

Table 4.33 Credit facility, non beneficiary farmers, Raipur district, M.P.

S. No.	Purpose of credit	Source of Finance (Rs.)					Total amount	Percentage
		Cooperative Society	Cooperative Bank	Regional Rural Bank	Land Development Bank	Commercial Bank		
1.	Fertiliser	17,060	-	1,000	-	-	18,060	27.50
2.	Bullocks	5,600	4,000	4,500	-	-	14,100	21.48
3.	Well	-	-	-	10,000	-	10,000	15.23
4.	Pump	-	-	-	12,000	-	12,000	18.28
5.	Agriculture	11,000	-	-	-	-	11,000	16.75
6.	Cloth	-	-	-	-	500	500	0.76
	Total	33,660	4,000	5,500	22,000	500	65,660	100.00

4.2.12 Marketing of Products

Beneficiary farmers sold products like paddy, gram, teora, groundnut, arhar, wheat and vegetables. Of the total value of products sold paddy formed 82.51 per cent. Next important marketed produce was gram which formed 6.77 per cent. Value of wheat marketed formed 6.37 per cent. (Table 4.34)

Table 4.34 Marketed quantity and value of marketed crops, beneficiary farmers, Raipur district, M.P.

S. No.	Crop	Qty. (in quintals)	Value (Rs.)	Percentage
1.	Paddy	1250.50	3,83,945	82.51
2.	Gram	36.00	31,490	6.77
3.	Teora	16.50	6,638	1.43
4.	Groundnut	2.00	1,600	0.34
5.	Arhar	4.00	4,000	0.86
6.	Wheat	66.00	29,650	6.37
7.	Vegetables	-	8,000	1.72
	Total	-	4,65,323	100.00

Of the total product value of paddy 6.95 per cent was sold locally. Paddy of about equal value (7.01 per cent) was sold at places within 5 km. from the producer villages. The largest quantity or in value terms 80.48 per cent was sold in markets 11 to 20 km. away from the producer villages. (Table 4.35)

Table 4.35 Marketed quantity and value of paddy, beneficiary farmers, Raipur district, M.P.

S. No.	Distance in km.	Quantity (in quintals)	Value (Rs.)	Percentage of value
1.	Within the village	85.00	26,700	6.95
2.	Upto - 5	88.00	26,930	7.01
3.	6 - 10	72.00	21,330	5.56
4.	11 & above	1,001.50	3,08,985	80.48
	Total	1,250.50	3,83,945	100.00

On non beneficiary farms the marketed crops were paddy, gram, teora, soybean, wheat and vegetables. Like beneficiary farms the value of paddy formed 83.43 per cent of total value of products sold. Soybean formed 5.77 per cent and vegetables, 5.55 per cent (Table 4.36).

Table 4.36 Marketed quantity and value of marketed crops, non beneficiary farmers, Raipur district, M.P.

S. No.	Crop	Quantity (in quintals)	Value (Rs.)	Percentage of value
1.	Paddy	361.5	1,12,750	83.43
2.	Gram	1.5	1,500	1.11
3.	Teora	5.0	2,000	1.48
4.	Soybean	12.0	7,800	5.77
5.	Wheat	9.0	3,600	2.66
6.	Vegetables	-	7,500	5.55
	Total	389.0	1,35,150	100.00

Of the total value of marketed paddy as high as 74.07 per cent was sold at places beyond 11 km. from villages of production. The value of paddy locally sold came to 14.69 per cent and that sold at places upto 5 km. came to 8.58 per cent (Table 4.37).

Table 4.37 Marketed quantity and value of paddy, non-beneficiary farmers, Raipur district, M.P.

S. No.	Distance in km.	Quantity (in quintals)	Value (Rs.)	Percentage of value
1.	Within the village	58	19,850	14.69
2.	Upto - 5	13	11,600	8.58
3.	6 - 10	12	3,600	2.66
4.	11 & above	306	1,00,100	74.07
	Total	389	1,35,150	100.00

4.2.13 Participation in Watershed Planning, Implementation and Training

Of the 50 beneficiary farmers 13 attended the meetings held before planning of crops. Following matters were discussed.

a) Improved varieties of seed and fertilisers
b) Pesticides
c) Saplings of horticultural plants
d) Paddy seed treatment
e) Cattle development
f) Nalla bank stabilisation
g) Soybean cultural practices
h) Nadef preparation

Only 9 out of 50 beneficiaries participated in the training programmes conducted by the State Government. The programme were concerning following matters.

a) Insecticides and pesticides
b) Recommended cultural practices of diffirent crops
c) Fertilisers of different kinds
d) Sapling distribution
e) Nadef construction

As many as 35 out of 50 farmers knew the nominated Mitra Kisan of the village. They had a chance to discuss following matters with him/her

a) Improved seed
b) Nadef
c) Cultivation of gram
d) Fertilisers
e) Improved methods of cultivation
f) Cultivation of arhar on paddy bunds
g) Saplings available in nursery
h) Seed treatment and pesticides

To the question whether the staff of NWDPRA visited his household or village 42 out of 50 replied in the affirmative. They commented that the officials provided them useful information about agriculture and latest improved techniques.

Thirty farmers did attend village meetings in which problems of water management were discussed. Farmers asked questions on various aspects and the officials gave suitable replies (Table 4.38).

4.38 Participation in watershed planning, implementation and training, Raipur district, M.P.

S. No.	Question	Yes	No
1.	Did you attend any meeting while planning for your watershed?	13	37
2.	Did you participate in any training programme conducted by the state government under NWDPRA ?	9	41
3.	Do you know the nominated Mitra Kisan?	35	15
4.	Have the staff of NWDPRA visited you ?	42	8
5.	Are there any village meetings in which the problem of watershed management was discussed ?	30	20

4.2.14 Assets

Assets were categorised into three: farm assets (implements and machinery), livestock and non farm assets.

On beneficiary farms farm assets constituted 31.25 per cent of the total value of assets. Livestock constituted 62.35 per cent and non farm assets, 6.40 per cent (Table 4.39).

Table 4.39 Assets on beneficiary farms, Raipur district, M.P.

S. No.	Asset	Value (Rs.)	Percentage to total
1.	Farm assets		
	a) Iron plough	7,995	1.77
	b) Desi plough	2,860	0.63
	c) Harrow	1,035	0.23
	d) Bullock cart	28,500	6.30
	e) Buffaloe cart	9,000	1.99
	f) Winnower	2,100	0.46
	g) Leveller	675	0.15
	h) Tractor	84,000	18.58
	i) Pump	5,000	1.11
	j) Waterlift	140	0.03
	Total	1,41,305	31.25
2.	Livestock		
	a) Cow	55,360	12.25
	b) He calf	11,200	2.48
	c) She calf	5,400	1.19
	d) Bullocks	72,500	16.04
	e) Buffaloes	35,600	7.87
	f) He calf	2,800	0.62
	g) She calf	3,000	0.66
	h) He Buffaloe	96,000	21.24
	Total	2,81,860	62.35
3.	Non farm assets		
	a) Cycle	3,430	0.76
	b) Motorcycle	20,000	4.42
	c) Moped	5,500	1.22
	Total	28,930	6.40
	Grand Total	4,52,095	100.00

On non beneficiary farms farm assets formed 61.65 per cent of the total value of assets. Livestock value was 37.62 per cent and non farm assets, 0.73 per cent (Table 4.40)

Table 4.40 Assets on non beneficiary farms, Raipur district, M.P.

S. No.	Asset	Value (Rs.)	Percentage to total
1.	Farm assets		
	a) Diesel pump	13,850	5.56
	b) Plough	4,445	1.78
	c) Harrow	1,380	0.55
	d) Bullock cart	9,000	3.61
	e) Tractor	1,25,000	50.15
	Total	1,53,675	61.65
2.	Livestock		
	a) Cow	16,030	6.44
	b) Calf	12,350	4.95
	c) He buffaloes	27,050	10.85
	d) Bullocks	38,350	15.38
	Total	93,780	37.62
3.	Non farm assets		
	a) Cycle	1,830	0.73
	Grand Total	2,49,285	100.00

4.3 Beneficiaries and Non Beneficiaries of Khargon District

4.3.1 Distribution According to Benefits

Of the 50 beneficiaries half received saplings of horticultural plants. Another 5 beneficiaries received goats for rearing. Intercropping demonstrations were laid on the farms of two beneficiaries and another 2 beneficiaries got not only saplings but also got the ber trees budded. These two beneficiaries also had demonstrations of wheat and were supplied iron harrows. One beneficiary was aided to do cobblery.

One each of the remaining beneficiaries were helped by either inputs or technology or business aid (Table 4.41).

4.3.2 Population and Literacy

The population of the selected families was 337. It consisted of 104 males, 94 females and 140 children. More than 55 per cent (57.57) were illiterate meaning thereby that 42.43 per cent was the literacy percentage. Of the total population 13.65 per cent were below primary level

Table 4.41 Distribution of beneficiaries according to types of benefits received, Khargon district, M.P.

Type of benefit	No.of beneficiaries
Saplings	25
Goat rearing	5
Inter cropping demonstration	2
Saplings + Wheat demonstration + Ber budding + Iron harrow	2
Cobblery	1
Inter cropping crop demonstration + Iron harrow	1
Wheat demonstration	1
Iron smithy + harrow	1
Gold smithy	1
Fencing of Agave and Ipomoea	1
Spray pump	1
Saplings + Sprayer	1
Plough + harrow and levellor	1
Crop demonstration + Contour bunding	1
Maize demonstration + Moong	1
Sprayer	1
Saplings + Sprayer + Land development	1
Wheat HD-22 demonstration	1
Saplings + harrow + levellor	1
Saplings + Ber budding + Iron harrow + Nadef	1

and 11.28 per cent were upto primary level. The literacy percentage was higher among males (57.69) than females (30.11). It was observed that the overall literacy percentage in Raipur district was higher than Khargon district. Among males the literacy percentage was higher in Raipur district but among females it was higher in Khargon district. (Table 4.42)

Table 4.42 Educational status of family members of beneficiary families, Khargon district, M.P.

S. No.	Educational status	Males		Females		Children		Total	
		No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
1.	Illiterate	44	42.31	65	69.89	85	60.71	194	57.57
2.	Below Primary	15	14.42	2	2.15	29	20.71	46	13.65
3.	Primary (5th to 7th)	11	10.58	4	4.30	23	16.43	38	11.28
4.	Middle (8th & 9th)	14	13.46	8	8.60	2	1.43	24	7.12
5.	High School (10th & 11th)	8	7.69	5	5.38	1	0.72	14	4.15
6.	Higher Secondary (12th)	8	7.69	5	5.38	-	-	13	3.86
7.	College	4	3.85	4	4.30	-	-	8	2.37
Total population		104	100.00	93	100.00	140	100.00	337	100.00

Among non beneficiary families the total population stood at 132, much lower than the beneficiary families. The population consisted of 44 males, 33 females and 55 children. Of the total family members as high as 80.30 per cent were illiterate. Another 9.85 per cent were literate below primary level and 4.54 per cent were literate upto primary level. The literacy percentage for the group as a whole was 19.70, the lowest among beneficiaries and non beneficiaries of Raipur and Khargon districts. Among males the literacy percentage was higher (34.09) than females (6.06) (Table 4.43).

Table 4.43 Educational status of family members of non-beneficiary families, Khargon district, M.P.

S. No.	Educational status	Males		Females		Children		Total	
		No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
1.	Illiterate	29	65.91	31	93.94	46	83.64	106	80.30
2.	Below Primary	7	15.91	-	-	6	10.91	13	9.85
3.	Primary (5th to 7th)	3	6.82	-	-	3	5.45	6	4.54
4.	Middle (8th & 9th)	3	6.82	2	6.06	-	-	5	3.79
5.	High School (10th & 11th)	1	2.27	-	-	-	-	1	0.76
6.	Higher Secondary (12th)	-	-	-	-	-	-	-	-
7.	College	1	2.27	-	-	-	-	1	0.76
Total population		44	100.00	33	100.00	55	100.00	132	100.00

4.3.3 Occupational Distribution

Beneficiary families had 197 workers: 104 males and 93 females. Of the total workers 47.72 per cent had agriculture as main occupation. However, the percentage of male workers claiming this as main occupation was 70.19. Among females 22.58 per cent claimed it. Another 61.29 per cent females had "household work" as main occupation. Agricultural labour was main occupation of 9.62 per cent males. (Table 4.44)

Table 4.44 Distribution of workers according to main occupation, beneficiary families, Khargon district, M.P.

S. No.	Main occupation	Males		Females		Total	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	No occupation	-	-	2	2.15	2	1.01
2.	Agriculture	73	70.19	21	22.58	94	47.72
3.	Agricultural labour	10	9.62	-	-	10	5.08
4.	Agriculture & labour	--	-	-	-	-	-
5.	Service	3	2.88	-	-	3	1.52
6.	Household work	-	-	57	61.29	57	28.93
7.	Others	18	17.31	13	13.98	31	15.74
	Total workers	104	100.00	93	100.00	197	100.00

Of the subsidiary occupations agricultural labour was most important having 38.07 per cent workers engaged in it. Another 22.84 per cent workers had either agriculture or agricultural labour as subsidiary occupation. Fifteen per cent (15.23) workers had no subsidiary occupation. Among male workers 64.42 per cent had agricultural labour as subsidiary occupation. About fourteen per cent (14.42) had no subsidiary occupation and 13.46 per cent had non agricultural labour as subsidiary occupation. Among females 47.31 per cent had either agriculture or labour as subsidiary occupation. Two things emerged: Firstly, 15.05 per cent females had household work as subsidiary occupation and secondly none of them had non agricultural labour as subsidiary occupation. About 16 per cent had nc subsidiary occupation (Table 4.45).

Table 4.45 Distribution of workers according to subsidiary occupation, beneficiary families, Khargon district, M.P.

S. No.	Subsidiary occupation	Male		Female		Total	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	No occupation	15	14.42	15	16.13	30	15.23
2.	Agriculture	3	2.89	4	4.30	7	3.55
3.	Agricultural labour	67	64.42	8	8.60	75	38.07
4.	Agriculture labour	1	0.96	44	47.31	45	22.84
5.	Non-agricultural labour	14	13.46	-	-	14	7.11
6.	Household work	-	-	14	15.05	14	7.11
7.	Household work & labour	-	-	7	7.53	7	3.55
8.	Others	4	3.85	1	1.08	5	2.54
	Total	104	100.00	93	100.00	197	100.00

Non beneficiary families had 77 workers: 44 males and 33 females. About one third (32.47 per cent) had agriculture as main occupation and equal number had household work as main occupation. Thirteen per cent (12.98) had no occupation. Occupational distribution between males and females was quite different. While 54.55 per cent among males had agriculture and 22.73 per cent had agricultural labour as main occupation 75.76 per cent females had household work and 12.12 per cent had no occupation (Table 4.46).

Among subsidiary occupations agricultural labour was most important with 51.95 per cent workers claiming it. While 24.68 per cent had

Table 4.46 Distribution of workers according to main occupation, non-beneficiary families, Khargon district, M.P.

S. No.	Main occupation	Males		Females		Total	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	No occupation	6	13.64	4	12.12	10	12.98
2.	Agriculture	24	54.55	1	3.03	25	32.47
3.	Agricultural labour	10	22.73	1	3.03	11	14.29
4.	Non-agricultural labour	1	2.27	-	-	1	1.30
5.	Service	3	6.81	-	-	3	3.90
6.	Household work	-	-	25	75.76	25	32.47
7.	Household work & labour	-	-	2	6.06	2	2.59
8.	Others	-	-	-	-	-	-
	Total	44	100.00	33	100.00	77	100.00

no subsidiary occupation 11.69 per cent had either agriculture or agricultural labour as subsidiary occupation. The difference between males and females was that among males 56.81 per cent had agricultural labour as subsidiary occupation and 29.55 per cent had no subsidiary occupation. Among females agricultural labour was the subsidiary occupation of 45.46 per cent and agriculture/labour was subsidiary occupation of 27.27 per cent (Table 4.47).

Table 4.47 Distribution of workers according to subsidiary occupation, non-beneficiary families, Khargon district, M.P.

S. No.	Subsidiary occupation	Males		Females		Total	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	No occupation	13	29.55	6	18.18	19	24.68
2.	Agriculture	-	-	1	3.03	1	1.30
3.	Agricultural labour	25	56.81	15	45.46	40	51.95
4.	Agriculture/labour	-	-	9	27.27	9	11.69
5.	Non-agricultural labour	6	13.64	1	3.03	7	9.08
6.	Service	-	-	-	-	-	-
7.	Household work & labour	-	-	1	3.03	1	1.30
8.	Others	-	-	-	-	-	-
	Total	44	100.00	33	100.00	77	100.00

It was thus concluded that among males, agriculture and agricultural labour were main occupations and agricultural labour and non agricultural labour were subsidiary occupations. Among females household work was main occupation and agricultural labour and agriculture/labour were subsidiary occupations.

4.3.4 Land Particulars

The total owned area of beneficiary farmers was 95.98 hectares. Cultivable waste was 2.89 hectares and current fallow was 1.00 hectare. This made the owned cultivated area equal to 92.09 per cent. With 18.82 hectares of rented in land the operated area became 110.91 hectares. Of this the net irrigated area was 83.88 hectares. Thus the percentage of net irrigated area was 75.63. Three fourths of the irrigated area was commanded by wells. As the area double cropped was 51.50 hectares the gross cropped area was 162.41. Of this only 2.42 hectares were under non NWDPRA area.

The owned area of non beneficiaries was comparatively small (23.07 hectares). The operated area was 27.12 hectares. With 6.48 hectares of net irrigated area the percentage of irrigated area to operated area was only 23.89 (75.63 for beneficiary farmers). Other sources formed 62.50 per cent and wells, 37.50 per cent. The gross cropped area was 32.58 hectares. (Table 4.48)

Table 4.48 Land particulars of beneficiaries and non beneficiaries, Khargon district, M.P.

(Area- hectares)

Land particulars	Beneficiaries			Non beneficiaries		
	Area falling under NWDPRA	Area falling outside NWDPRA	Total	Area falling under NWDPRA	Area falling outside NWDPRA	Total
Owned area	94.77	1.21	95.98	23.07	-	23.07
a) Cultivable waste	2.89	-	2.89	-	-	-
b) Current fallow	1.00	-	1.00	-	-	-
Owned cultivated area	90.88	1.21	92.09	23.07	-	23.07
Rented in land	18.82	-	18.82	4.05	-	4.05
Operated area	109.70	1.21	110.91	27.12	-	27.12
Net irrigated area	82.67	1.21	83.88	6.48	-	6.48
Percentage of net irrigated area to operated area	75.36	100.00	75.63	23.89	-	23.89
Sources of irrigation						
a) Other sources	22.60 (27.34)	-	22.60 (26.94)	4.05 (62.50)	-	4.05 (62.50)
b) Wells	60.07 (72.66)	1.21 (100.00)	61.28 (73.06)	2.43 (37.50)	-	2.43 (37.50)
Area double cropped	50.29	1.21	51.50	5.06	-	5.06
Gross cropped area	159.99	2.42	162.41	32.58	-	32.58

Figures in brackets denote percentages.

4.3.5 Cropping Pattern

Khargon being located in cotton-jowar zone these were important crops of the district, besides wheat. Jowar contributed slightly less than 20 per cent (19.59 per cent) to the gross cropped area and cotton contributed slightly more than 20 per cent (21.91 per cent). Wheat was an emerging crop of the district and during the reference year constituted 29.04 per cent of the gross cropped area. Besides these crops groundnut was important having 6.78 per cent area under it. On non NWDPRA area only jowar and wheat were grown. Of the gross cropped area of 162.39 hectares 134.97 hectares or 83.11 per cent were irrigated. As in Raipur district non NWDPRA area was entirely unirrigated (Table 4.49).

In the pre project year the gross cropped area was 142.43 hectares or 19.96 hectares less than the current year. Although the area increased in current year the proportion of area under different crops remained about equal. In the current year some area was allotted to H.Y.V. of groundnut. In the preproject year the percentage of irrigated area was 73.73 as against 83.11 per cent in the current year (Table 4.50).

Table 4.50 Cropping pattern in pre-project year, beneficiary farms, Khargon district, M.P.

(Area in hect.)

Crop	Area			
	Irrigated	Unirrigated	Total	Percentage
Paddy	0.81	-	0.81	0.57
Jowar HYV	5.28	1.82	7.10	4.98
Local	7.55	1.62	9.17	6.44
Jowar + Urd + Moong	3.75	7.28	11.03	7.75
Total Jowar	16.58	10.72	27.30	19.17
Bajra	-	0.81	0.81	0.57
Maize	6.48	2.83	9.31	6.54
Maize + Jowar + Moong	2.42	3.00	5.42	3.80
Total Maize	8.90	5.83	14.73	10.34
Wheat HYV	39.78	1.21	40.99	28.78
Total Cereals	66.07	18.57	84.64	59.43
Gram	6.17	0.40	6.57	4.61
Urd	1.52	0.81	2.33	1.64
Moong	1.82	1.41	3.23	2.27
Arhar	0.81	3.84	4.65	3.26
Total pulses	10.32	6.46	16.78	11.78
Soybean	-	0.81	0.81	0.57
Groundnut local	3.84	6.96	10.80	7.58
Cotton HYV	24.78	4.62	29.40	20.64
Total Cropped Area	105.01	37.42	142.43	100.00
Percentage	73.73	26.27	100.00	

Table 4.49 Cropping pattern on beneficiary farms, Khargon district, M.P.

(Area-hectares)

Crop	NWDPRA Area			Non-NWDPRA AREA			Total			Percentage
	Irrigated	Unirrigated	Total	Irrigated	Unirrigated	Total	Irrigated	Unirrigated	Total	
Paddy	0.81	0.40	1.21	--	--	--	0.81	0.40	1.21	0.75
Jowar HYV	5.31	1.41	6.72	--	--	--	5.31	1.41	6.72	4.14
Jowar	9.11	0.81	9.92	--	--	--	9.11	0.81	9.92	6.11
Jowar+Maize+Urd+Moong	3.64	10.33	13.97	1.21	--	1.21	4.85	10.30	15.18	9.34
Total Jowar	18.06	12.55	30.61	1.21	--	1.21	19.27	12.55	31.82	19.59
Bajra	0.40	1.62	2.02	--	--	--	0.40	1.62	2.02	1.24
Maize	7.08	--	7.08	--	--	--	7.08	--	7.08	4.36
Maize+Jowar+Moong	6.64	1.21	7.85	--	--	--	6.64	1.21	7.85	4.83
Total Maize	13.72	1.21	14.93	--	--	--	13.72	1.21	14.93	9.19
Wheat HYV	45.94	--	45.94	1.21	--	1.21	47.15	--	47.15	29.04
Total Cereals	78.93	15.78	94.71	2.42	--	2.42	81.35	15.78	97.13	59.81
Gram	6.78	0.40	7.18	--	--	--	6.78	0.40	7.18	4.42
Urad	0.40	--	0.40	--	--	--	0.40	--	0.40	0.25
Moong	3.04	2.60	5.64	--	--	--	3.04	2.60	5.64	3.47
Arhar	3.64	1.82	5.46	--	--	--	3.64	1.82	5.46	3.36
Total Pulses	13.86	4.82	18.68	--	--	--	13.86	4.82	18.68	11.50
Soybean	0.81	0.81	1.62	--	--	--	0.81	0.81	1.62	1.00
Groundnut HYV	3.64	0.38	4.02	--	--	--	3.64	0.38	4.02	2.48
Groundnut	2.63	2.73	5.36	--	--	--	2.63	2.73	5.36	3.30
Total Groundnut	6.27	3.11	9.38	--	--	--	6.27	3.11	9.38	5.78
Total Oil Seeds	7.08	3.92	11.00	--	--	--	7.08	3.92	11.00	6.78
Cotton HYV	31.36	1.18	32.54	--	--	--	31.36	1.18	32.54	20.04
Cotton HYV+Maize	1.32	1.72	3.04	--	--	--	1.32	1.72	3.04	1.87
Total Cotton	32.68	2.90	35.58	--	--	--	32.68	2.90	35.58	21.91
Gross Cropped Area	132.55	27.42	159.97	2.42	--	2.42	134.97	27.42	162.39	100.00
Percentage							83.11	16.89	100.00	

On non beneficiary farms the proportion of jowar was higher(34.81) than beneficiary farms (19.59). The proportions of maize (4.33) and wheat (16.78) were lower than the beneficiary farms(9.19 and 29.04 respectively). While the proportion of pulses (3.69) was lower than the beneficiary farms (11.50) the proportion of groundnut was higher (13.36) on non beneficiary farms than beneficiary farms (5.78 per cent). The irrigated cropped area on non beneficiary farms was 35.39 per cent as compared to 83.11 per cent on beneficiary farms (Table 4.51).

Table 4.51 Cropping pattern on non-beneficiary farms, Khargon district, M.P.

(Area- hectares)

Crop	NWDPRA Area			
	Irrigated	Unirrigated	Total	Percentage
Paddy	-	0.20	0.20	0.61
Jowar HYV	1.62	-	1.62	4.98
Local	0.40	0.61	1.01	3.10
Jowar + Maize + Moong	1.92	6.78	8.70	26.73
Total Jowar	3.94	7.39	11.33	34.81
Bajra	-	0.40	0.40	1.23
Maize	0.40	-	0.40	1.23
Maize + Moong + Groundnut	-	1.01	1.01	3.10
Total Maize	0.40	1.01	1.41	4.33
Wheat HYV	3.44	-	3.44	10.57
Local	-	0.40	0.40	1.23
Wheat HYV + Gram	1.62	-	1.62	4.98
Total Wheat	5.06	0.40	5.46	16.78
Total Cereals	9.40	9.40	18.80	57.76
Urd	-	0.40	0.40	1.23
Moong	0.40	0.40	0.80	2.46
Total Pulses	0.40	0.80	1.20	3.69
Soybean	-	0.81	0.81	2.49
Groundnut HYV	-	1.21	1.21	3.72
Local	-	2.33	2.33	7.16
Groundnut + Arhar	-	0.81	0.81	2.48
Total Groundnut	-	4.35	4.35	13.36
Total Oilseeds	-	5.16	5.16	15.85
Cotton HYV	0.40	2.23	2.63	8.08
Cotton HYV + Maize	1.32	3.44	4.76	14.62
Total Cotton	1.72	5.67	7.39	22.70
Gross cropped area	11.52	21.03	32.55	100.00
Percentage	35.39	64.61	100.00	

In pre project year the cropping pattern was about equal to that of current year except the fact that in pre project year urd, soybean and high yielding varieties of groundnut were not grown (Table 4.52).

Table 4.52 Cropping pattern in pre-project year, non beneficiary farms, Khargone district, M.P.

(Area- hectares)

Crop	Area			
	Irrigated	Unirrigated	Total	Percentage
Paddy	-	0.20	0.20	0.72
Jowar HYV	1.62	0.20	1.82	6.52
Local	1.52	0.40	1.92	6.88
Jowar + Maize + Moong	0.81	4.55	5.36	19.21
Total Jowar	3.95	5.15	9.10	32.61
Maize	0.40	-	0.40	1.43
Maize + Moong	-	0.40	0.40	1.43
Total Maize	0.40	0.40	0.80	2.86
Wheat HYV	3.44	-	3.44	12.33
Local	-	0.40	0.40	1.43
Wheat HYV+ Gram	-	0.81	0.81	2.90
Total Wheat	3.44	1.21	4.65	16.66
Total Cereals	7.79	6.96	14.75	52.85
Moong	0.81	1.01	1.82	6.52
Groundnut	-	4.15	4.15	14.87
Groundnut + Maize	-	0.61	0.61	2.19
Total Groundnut	-	4.76	4.76	17.06
Cotton HYV	0.71	3.24	3.95	14.15
Cotton HYV + Maize	0.61	2.02	2.63	9.42
Total Cotton	1.32	5.26	6.58	23.57
Gross cropped area	9.92	17.99	27.91	100.00
Percentage	35.54	64.46	100.00	

4.3.6 Irrigated Crops

On beneficiary farms the irrigated crops in the current year were jowar, maize, wheat, gram, moong, arhar, groundnut and cotton. Wheat area was entirely irrigated. Gram was irrigated to the extent of 94.43 per cent. Maize and cotton were irrigated to the extent of about 91 per cent each (Table 4.53).

Against this the irrigated crops on non beneficiary farms were smaller in number and the extent of irrigation was lower than the beneficiary farms (Table 4.54).

Table 4.53 Irrigated cropped area, beneficiary farms, current year, Khargon district, M.P.

(Area- hectares)

Crop	Cropped area	Irrigated area	Percentage of irrigated area to cropped area
Jowar	31.82	19.27	60.56
Maize	14.93	13.72	91.90
Wheat	47.15	47.15	100.00
Gram	7.18	6.78	94.43
Moong	5.64	3.04	53.90
Arhar	5.46	3.64	66.67
Groundnut	9.38	6.27	66.84
Cotton	35.58	32.68	91.85

Table 4.54 Irrigated cropped area, non-beneficiary farms, current year, Khargon district, M.P.

(Area- hectares)

Crop	Cropped area	Irrigated area	Percentage of irrigated area to cropped area
Jowar	11.33	3.94	34.77
Maize	1.41	0.40	28.37
Wheat	5.46	5.06	92.67
Moong	0.80	0.40	50.00
Cotton	7.39	1.72	23.27

On beneficiary farms, in the pre project year the irrigated crops were same but the proportion of irrigated area was lower in the case of maize, wheat, gram, arhar, groundnut and cotton (Table 4.55).

Table 4.55 Irrigated cropped area, beneficiary farms, pre project year, Khargon district, M.P.

(Area- hectares)

Crop	Cropped area	Irrigated area	Percentage of irrigated area to cropped area
Jowar	27.30	16.58	60.73
Maize	14.73	8.90	60.42
Wheat	40.99	39.78	97.05
Gram	6.57	6.17	93.91
Moong	3.23	1.82	56.35
Arhar	4.65	0.81	17.42
Groundnut	10.80	3.84	35.56
Cotton	29.40	24.78	84.29

In the case of non beneficiary farms in pre project year the percentage of irrigated area for jowar and maize was more than current year. But for wheat, moong and cotton it was more in the current year than pre project year (Table 4.56).

Table 4.56 Irrigated cropped area, nor beneficiary farms, pre-project year, Khargone district, M.P.

(Area- hectares)

Crop	Cropped area	Irrigated area	Percentage of irrigated area to cropped area
Jowar	9.10	3.95	43.41
Maize	0.81	0.40	49.38
Wheat	4.65	3.44	73.98
Moong	1.82	0.81	44.51
Groundnut	4.76	-	-
Cotton	6.58	1.32	20.06

4.3.7 Cost of Cultivation

The crops for which cost of cultivation was calculated were jowar, groundnut, maize, wheat and cotton. Jowar and groundnut had both high yielding and local varieties. Therefore, the cost was calculated for the two kinds of varieties separately.

On beneficiary farms the cost of cultivation of jowar was Rs.2,083.95 per hectare. It was Rs.2,331.66 for high yielding varieties and Rs.2,014.27 for local varieties. Thus the cost was Rs.317.39 more for high yielding varieties. Human labour was the most important item and accounted for between 44 to 46 per cent. Bullock labour was the second important item and accounted for between 23 to 25 per cent. Fertilisers accounted between 15 to 16 per cent.

In the case of groundnut the most important item was seed and constituted about half of the total cost (49.50 per cent for overall crop, 52.49 per cent for high yielding varieties and 47.15 per cent for local varieties). Human labour constituted about 23 per cent and bullock labour, around 11 per cent. The total cost per hectare was Rs.5,631.34 for high yielding varieties and Rs.5,381.16 for local varieties (Table 4.57).

The cost per hectare of maize, wheat and cotton was Rs.2,674.54, Rs.3,405.05 and Rs.5,234.91 respectively.

In the case of maize human labour was the most important input and accounted for 40.87 per cent of the cost. Bullock labour accounted for 26.72 per cent and fertilisers, 19.08 per cent. In the cost of

Table 4.57 Cost of cultivation of jowar and groundnut, beneficiary farms, Khargon district, M. P.

(Cost - Rs./hectare)

Item	Jowar						Groundnut					
	HYV		Local		Total		HYV		Local		Total	
	Cost	Per cent	Cost	Per cent	Cost	Per cent	Cost	Per cent	Cost	Per cent	Cost	Per cent
1. Human Labour												
Wage bill	389.28	16.69	300.13	14.90	319.70	15.34	422.88	7.51	447.76	8.32	437.10	7.97
Owned	651.61	27.95	642.95	31.92	644.85	30.94	824.63	14.64	800.37	14.87	810.77	14.77
Total	1040.89	44.64	943.08	46.82	964.55	46.28	1247.51	22.15	1248.07	23.19	1247.87	22.74
2. Bullock Labour												
Wage bill	93.75	4.02	79.53	3.95	82.65	3.97	34.82	0.62	91.42	1.70	67.17	1.22
Family	453.87	19.47	443.70	22.03	445.93	21.40	547.26	9.72	550.38	10.23	549.04	10.00
Total	547.62	23.49	523.23	25.98	528.58	25.37	582.08	10.34	641.80	11.93	616.21	11.22
3. Machinery												
Hired	7.44	0.32	--	--	1.63	0.08	--	--	--	--	--	--
Owned	29.02	1.24	11.93	0.59	15.68	0.75	78.36	1.39	67.16	1.25	71.96	1.31
Total	36.46	1.56	11.93	0.59	17.31	0.83	78.36	1.39	67.16	1.25	71.96	1.31
4. Seed	151.85	6.51	102.47	5.08	113.29	5.43	2955.23	52.49	2537.31	47.15	2716.42	49.50
5. Seed treatment	6.25	0.27	1.17	0.06	2.29	0.11	--	--	--	--	--	--
6. Manures	93.00	3.99	73.67	3.66	77.92	3.74	149.25	2.65	146.46	2.72	147.65	2.69
7. Fertiliser	375.13	16.08	315.19	15.65	328.36	15.76	603.98	10.72	717.91	13.34	669.08	12.19
8. Pesticides	34.46	1.48	23.02	1.14	25.55	1.22	2.49	0.04	--	--	1.07	0.02
9. Irrigation charges	7.44	0.32	--	--	1.63	0.08	--	--	--	--	--	--
10. Electric charges	23.68	1.02	20.51	1.02	21.20	1.02	12.44	0.22	22.39	0.42	18.12	0.33
11. Diesel/Fuel charges	14.88	0.64	--	--	3.27	0.16	--	--	--	--	--	--
12. Others	--	--	--	--	--	--	--	--	--	--	--	--
Total Cost	2,331.66	100.00	2,014.27	100.00	2,083.95	100.00	5,631.34	100.00	5,381.16	100.00	5,488.38	100.00

cultivation of wheat human labour (27.47 per cent) and fertilisers (22.31 per cent) were two important inputs. Bullock labour (18.33 per cent) and seed (17.66 per cent) were other important items. Cotton had different type of input structure. While human labour(32.45 per cent) was most important, seed (22.47 per cent) took the second place and fertilisers (19.23 per cent) took the third place (Table 4.58).

Table 4.58 Cost of cultivation of maize, wheat & cotton, beneficiary farms, Khargon district, M.P.

(Figures-Rs./hectare)

Item	Maize		Wheat		Cotton	
	Cost	Percentage	Cost	Percentage	Cost	Percentage
1. Human Labours						
Wage bill	494.31	18.48	459.19	13.49	907.39	17.33
Owned	598.79	22.39	465.93	13.68	791.74	15.12
Total	1,093.10	40.87	925.03	27.47	1,699.13	32.45
2. Bullock labour						
Wage bill	98.46	3.68	112.75	3.31	108.21	2.07
Family	616.21	23.04	511.54	15.02	497.47	9.50
Total	714.67	26.72	624.29	18.33	605.68	11.57
3. Machinery						
Hired	-	-	185.79	5.46	16.86	0.33
Owned	43.20	1.62	92.40	2.71	108.35	2.08
Total	43.20	1.62	278.19	8.17	125.21	2.41
4. Seed	138.51	5.18	601.48	17.66	1,176.48	22.47
5. Seed treatment	0.40	0.01	2.70	0.08	39.40	0.75
6. Manure	146.35	5.47	73.36	2.16	210.51	4.02
7. Fertiliser	510.18	19.08	759.58	22.31	1,006.94	19.23
8. Pesticides	-	-	24.64	0.72	161.47	3.08
9. Irrigation charges	1.34	0.05	13.60	0.40	2.81	0.05
10. Electric charges	26.79	1.00	67.81	1.99	190.42	3.64
11. Diesel/Fuel charges	-	-	34.28	1.01	16.86	0.33
12. Others	-	-	-	-	-	-
Total cost	2,674.54	100.00	3,405.05	100.00	5,234.91	100.00

On non beneficiary farms the cost per hectare of jowar was 2,008.16: Rs.2,248.36 for high yielding varieties and Rs.1,959.84 for local varieties. The cost was lower than beneficiary farms. As in the case of beneficiary farms human labour formed the largest (49.22)per cent followed by bullock labour (28.93 per cent). The cost of groundnut was Rs.5,035.86. It was Rs.5,078.51

for high yielding varieties and Rs.5,019.43 for local varieties. The cost was lower than that on beneficiary farms. Seed formed the largest item of input as in the case of beneficiary farms (56.98 per cent for groundnut as a whole, 58.59 per cent for high yielding varieties and 56.34 per cent for local varieties). Human labour (23.78 per cent) and bullock labour(13.01 per cent) were other important inputs in that order (Table 4.59).

On non beneficiary farms the cost per hectare of wheat and cotton was Rs.3,232.60 and Rs.4,737.89 respectively. It was lower than the beneficiary farms by Rs.172.45 and Rs.497.02 respectively. In wheat human labour and fertilisers were important, whereas, in cotton human labour and seed were important in that order. This was true with both beneficiary and non beneficiary farms (Table 4.60).

Table 4.60 Cost of cultivation of wheat and gram, non-beneficiary farms, Khargon district, M.P.

(Cost - Rs./hectare)

S. No.	Item	Wheat		Cotton	
		Cost	Percentage	Cost	Percentage
1.	Human labour				
	Wage bill	439.56	13.60	243.57	5.14
	Owned	469.78	14.53	1,345.74	28.40
	Total	909.34	28.13	1,589.31	33.54
2.	Bullock labour				
	Wage bill	-	-	94.72	2.00
	Family	576.92	17.85	541.27	11.42
	Total	576.92	17.85	635.99	13.42
3.	Machinery				
	Hired	109.89	3.40	81.19	1.71
	Owned	49.45	1.53	16.24	0.34
	Total	159.34	4.93	97.43	2.06
4.	Seed	697.80	21.59	1,506.77	31.80
5.	Seed treatment	-	-	5.68	0.12
6.	Manures	32.05	0.99	151.56	3.20
7.	Fertilisers	778.39	24.08	622.60	13.14
8.	Pesticides	20.15	0.62	70.37	1.49
9.	Diesel/Fuel charges	-	-	-	-
10.	Others	58.61	1.81	58.19	1.23
	Total cost	3,232.60	100.00	4,737.89	100.00

4.3.8 Production and Profit Per Hectare

On beneficiary farms the value of output (main as well as by products) for jowar as a whole was Rs.3,715.78 per hectare. After deducting the cost per hectare of Rs.2,083.95 the profit came to Rs.1,631.83 per

Table 4.59 Cost of cultivation of jowar and groundnut, non beneficiary farms, Khargon district, M.P.

(Cost- Rs./hectare)

Item	Jowar						Groundnut					
	HYV		Local		Total		HYV		Local		Total	
	Cost	Per cent	Cost	Per cent	Cost	Per cent	Cost	Per cent	Cost	Per cent	Cost	Per cen
1. Human Labour												
Wage bill	215.35	9.45	280.12	14.29	270.87	13.49	--	--	159.24	3.17	114.94	2.28
Owned	833.33	36.57	698.25	35.63	717.56	35.73	1,115.70	21.97	1,070.06	21.32	1,082.76	21.50
Total	1,048.68	46.02	978.37	49.92	988.43	49.22	1,115.70	21.97	1,229.30	24.49	1,197.70	23.78
2. Bullock Labour												
Wage bill	55.35	2.43	28.84	1.47	32.56	1.63	-	-	222.93	4.44	160.92	3.20
Family	593.83	26.06	540.68	27.59	548.28	27.30	619.83	12.20	445.86	8.88	494.25	9.81
Total	648.18	28.49	569.52	29.06	580.98	28.93	619.83	12.20	668.79	13.32	655.17	13.01
3. Machinery												
Hired	--	--	--	--	--	--	--	--	--	--	--	--
Owned	55.55	2.44	--	--	7.94	0.39	--	--	--	--	--	--
Total	55.55	2.44	--	--	7.94	0.39	--	--	--	--	--	--
4. Seed	137.04	6.01	105.26	5.37	109.52	5.46	2,973.21	58.59	2,828.03	56.34	2,868.97	56.98
5. Seed tretment	5.15	0.22	--	--	5.15	0.26	--	--	--	--	--	--
6. Manures	95.00	4.17	84.45	4.31	85.97	4.28	152.89	3.01	54.14	1.08	81.61	1.62
7. Fertiliser	267.11	11.72	202.16	10.32	211.03	10.51	214.88	4.23	239.17	4.76	232.41	4.61
8. Pesticides	21.16	0.93	--	--	1.87	0.09	--	--	--	--	--	--
9. Diesel/Fuel charges	--	--	--	--	--	--	--	--	--	--	--	--
10. Others	--	--	20.08	1.02	17.21	0.86	--	--	--	--	--	--
Total cost	2,248.86	100.00	1,959.84	100.00	2,008.16	100.00	5,078.51	100.00	5,019.43	100.00	5,035.86	100.00

hectare. The profit per hectare for high yielding and local varieties came to Rs.1,658.67 and Rs.1,624.28 respectively. The profit was Rs.34.39 per hectare more for high yielding varieties than local varieties.

For groundnut the profit per hectare was Rs.5,201.39 for the crop as a whole and Rs.5,766.67 for high yielding varieties and Rs.4,777.43 for local varieties. It was thus seen the profit per hectare was higher for high yielding varieties by Rs.989.24 than local varieties (Table 4.61).

Table 4.61 Production value, cost and net profit of jowar and groundnut per hectare, beneficiary farms, Khargon district, M.P.

Item	Jowar			Groundnut		
	HYV	Local	Total	HYV	Local	Total
Main product(qtls)	14.14	7.51	8.97	6.22	5.60	5.86
By product(qtls)	45.98	16.58	23.03	13.68	16.79	15.46
Value						
Main product (Rs.)	3,534.23	2,387.61	3,419.80	11,305.97	10,074.63	10,602.35
By product (Rs.)	456.10	250.94	295.98	92.04	83.96	87.42
Total value (Rs.)	3,990.33	3,638.55	3,715.78	11,398.01	10,158.59	10,689.77
Cost (Rs.)	2,331.66	2,014.27	2,083.95	5,631.34	5,381.16	5,488.38
Net profit (Rs.)	1,658.67	1,624.28	1,631.83	5,766.67	4,777.43	5,201.39

The value of main and by products of maize together was Rs.5,187.20 per hectare. Deducting the cost of Rs.2,674.55 per hectare the net profit per hectare came to Rs.2,512.65. The net profit per hectare for wheat was Rs.4,212.62 and that for cotton, Rs.12,848.29 (Table 4.62).

Table 4.62 Production value, cost and net profit of maize, wheat and cotton per hectare, beneficiary farms, Khargon district, M.P.

Item	Maize	Wheat	Cotton
Main product (quintals)	10.00	16.24	12.61
By product (quintals)	15.94	16.26	-
Value			
Main product (Rs.)	5,073.67	7,311.17	18,083.19
By product (Rs.)	113.53	406.50	-
Total value (Rs.)	5,187.20	7,717.67	18,083.19
Cost (Rs.)	2,674.55	3,505.05	5,234.90
Net profit (Rs.)	2,512.65	4,212.62	12,848.29

The value of main and by products for jowar was Rs.2,730.80 per hectare. After deducting the cost per hectare of Rs.2008.16 the profit per hectare came to Rs.722.64 per hectare. The profit per hectare for high yielding varieties was Rs.923.98 and that for local varieties was Rs.697.22. Thus the profit per hectare for high yielding varieties was Rs.226.76 more than the local varieties.

For groundnut the value of main and by products totalled to Rs.11,163.68 per hectare. The profit was Rs.6,127.82. It was Rs.6,921.49 for high yielding varieties and Rs.5,821.97 for local varieties. Thus the profit per hectare of high yielding was Rs.1,099.52 more than the local varieties (Table 4.63).

Table 4.63 Production value cost and net profit of jowar and groundnut per hectare, non-beneficiary farms, Khargon district, M.P.

Item	Jowar			Groundnut		
	H.Y.V.	Local	Total	H.Y.V.	Local	Total
Main product(qtls)	8.64	8.45	8.47	6.61	6.05	6.21
By product(qtls)	7.41	32.34	28.77	19.83	13.38	15.17
Value						
Main product (Rs.)	3,098.77	2,288.88	2,404.68	11,900.83	10,748.41	11,068.97
By product (Rs.)	74.07	368.18	326.13	99.17	92.99	94.71
Total value (Rs.)	3,172.84	2,657.06	2,730.80	12,000.00	10,841.40	11,163.68
Cost (Rs.)	2,248.86	1,959.84	2,008.16	5,078.51	5,019.43	5,035.86
Net profit (Rs.)	923.98	697.22	722.64	6,921.49	5,821.97	6,127.82

On non beneficiary farms the value of production per hectare of wheat was Rs.6,062.27. The cost per hectare was Rs.3,232.60. Therefore, the profit per hectare came to Rs.2,829.67. For cotton the value of production was Rs.10,649.53. The cost per hectare being Rs.4,737.89 the profit per hectare came to Rs.5,911.64 (Table 4.64).

Table 4.64 Production value cost and net profit of wheat and cotton hectare, non beneficiary farms, Khargon district, M.P.

Item	Wheat H.Y.V.	Cotton H.Y.V.
Main product (quintals)	12.27	9.20
By product (quintals)	13.55	-
Value		
Main product (Rs.)	5,723.44	10,649.53
By product (Rs.)	338.83	-
Total value (Rs.)	6,062.27	10,649.53
Cost (Rs.)	3,232.60	4,737.89
Net profit (Rs.)	2,829.67	5,911.64

4.3.9 Adoption of Improved Farming Practices

The crops for which high yielding varieties were sown were cotton, groundnut, soybean, jowar and wheat. For paddy, maize and gram only local varieties were used. Cotton had 5 high yielding varieties. Groundnut had 3, soybean had 1 and jowar and wheat had 3 each (Table 4.65).

Table 4.65 Adoption of improved seed material, beneficiary farmers, Khargon district, M.P.

S. No.	Crop/Variety	No.of farmers	S. No.	Crop/Variety	No.of farmers
1.	Cotton		4.	Paddy	
	a) H.Y.V.	10		Local	3
	i) Hybrid	10	5.	Jowar	
	ii) J K-1	23		a) H.Y.V.	
	iii) Khandwa-2	2		i) Sankar	9
	iv) Vijay	1		ii) J-51	1
	v) Kakdi	2		iii) CSH-5	1
2.	Groundnut			b) Local	1
	a) H.Y.V.		6.	Maize	
	1) H.B.	1		Local	2
	2) Ganga-5	1	7.	Wheat	
	3) Jagannath	1		a) H.Y.V.	
	b) Local	8		i) Lok-1	30
3	Soybean			ii) WH -147	7
	a) H.Y.V.			iii) HD -2274	1
	1) JS-72-44	2	8.	Gram	
				Local	7

Non beneficiary farmers also grew 5 varieties of cotton. They grew only one variety of soybean and 3 varieties of wheat (Table 4.66).

Table 4.66 Adoption of improved seed material, non-beneficiary farmers, Khargon district, M.P.

S. No.	Crop/Variety	No.of farmers	S. No.	Crop/Variety	No.of farmers
1.	Cotton		5.	Jowar	
	a) H.Y.V.			a) H.Y.V.	
	i) Hybrid	1		i) Sankar	2
	ii) J.K. - 1	2		ii) Local	12
	iii) Khandwa-2	2	6.	Maize	
	iv) Kakdi	1		Local	3
	v) Vikram	1	7.	Wheat	
2.	Groundnut			a) H.Y.V.	
	Local	5		i) WH-147	2
3.	Soybean			ii) Lok- 1	1
	a) H.Y.V.			b) Local	2
	J S 72-44	1	8.	Moong	
4.	Paddy			Local	2
	Local	1	9.	Urd	
				Local	1
			10.	Bajra	
				Local	1

Seed treatment was given by 33 out of the selected 45 beneficiary farmers and all the farmers used improved sowing method and manure. Of the fertilisers, urea & super phosphate were more common and were used by majority of the beneficiary farmers. However, for harvesting, drying and threshing mainly traditional methods were used. Storage was also done in traditional ways (Table 4.67).

Table 4.67 Adoption of improved farming practices, beneficiary farmers, Khargon district, M.P.

S. No.	Item	Adopters	Non-Adopters	S. No.	Item	Adopters	Non-Adopters
1.	Seed treatment	33	12				
2.	Improved ploughing method	2	43	7.	Pesticides	22	23
3.	Line sowing method	45	-	8.	Harvesting		
4.	Manure	45	-		a) Cutting	-	45
5.	Nadef prepared	-	45		b) Drying	-	45
6.	Fertilisers				c) Threshing	11	34
	a) Urea	38	7	9.	Post harvest	-	45
	b) Superphosphate	24	21				
	c) DAP	29	16				
	d) Potash	4	41				
	e) IFFCO	2	43				

Among non beneficiaries the adoption of improved farming practices was lower. Only 4 non beneficiary farmers out of 17 did seed treatment. Farm yard manure and urea were used by a large majority of farmers but DAP and pesticides were used by only one third of non beneficiaries. Improved methods of harvesting and post harvest were not followed by any non beneficiary (Table 4.68).

Table 4.68 Adoption of improved farming practices, non beneficiary farmers, Khargon district, M.P.

S. No.	Item	Adopters	Non-Adopters	S. No.	Item	Adopters	Non-Adopters
1.	Seed treatment	4	13				
2.	Improved ploughing method	-	17	7.	Pesticides	5	12
3.	Improved sowing method	-	17	8.	Harvesting		
4.	Manure	13	4		a) Cutting	-	17
5.	Nadef prepared	-	-		b) Drying	-	17
6.	Fertilisers				c) Threshing	-	17
	a) Urea	13	4	9.	Post harvest	-	17
	b) Superphosphare	7	10				
	c) DAP	4	13				
	d) Potash	-	-				

A total number of 1,517 saplings were distributed among beneficiaries. Of these 748 survived by the time of investigation. Thus the rate of survival was about half (49.38 per cent) (Table 4.69).

Table 4.69 Distribution of saplings, beneficiary farmers, Khargon district, M.P.

S. No.	Saplings	Number distributed	Number survived
1.	Mango	12	4
2.	Lemon	327	148
3.	Guava	346	194
4.	Pomegranate	15	3
5.	Custard apple	200	93
6.	Amla	160	101
7.	Jack fruit	20	7
8.	Neem	15	6
9.	Bamboo	365	185
10.	Gulmohar	15	2
11.	Acacia	42	5
	Total	1,517	748

Khargone district being low rainfall area bunding was not an important activity. The bunds were low in height and served the limited purpose of water conservation and checking of run off.

4.3.10 Input Supply

Of the 36 respondents 12 got the supplies of inputs within the villages. An equal number got these at a distance of 5 km. Another 9 had to travel a distance upto 10 km. and the remaining got these only after travelling a distance above 16 km. (Table 4.70).

Table 4.70 Input supply of beneficiary farmers, Khargon district, M.P.

S. No.	Distance in Km.	Frequency
1.	Within the village	12
2.	Upto 5 Km.	12
3.	6 to 10 Km.	9
4.	11 to 15 Km.	-
5.	16 and above	3
	Total	36

Of the 17 non beneficiaries 5 got the inputs within the village and another 4 got these within a distance of 5 km. Five non beneficiaries had to travel a distance between 6 to 10 km. and the remaining went beyond 16 km. to procure the inputs (Table 4.71).

Table 4.71 Input supply, non-beneficiary farmers, Khargon district, M. P.

S.No.	Distance in km.	Frequency
1.	With in the village	5
2.	Upto 5	4
3.	6 - 10	5
4.	11 - 15	-
5.	16 & above	3
	Total	17

4.3.11 Credit Facilities

On beneficiary farms crop loans predominated and formed 46.71 per cent of total loan amount taken. Medium term loans formed 36.11 per cent and long term loans, 13.52 per cent. Among the sources of finance, cooperative societies accounted for a title more than 3/4 of total loan amount(76.56). Land Development Bank accounted for 15.78 per cent (Table 4.72).

Table 4.72 Credit facilities, beneficiary farms, Khargon district, M.P.

S. No.	Purpose of loan	Source of Finance: District Cooperative Central Bank	Cooperative Society	Land Development Bank	Regional Rural Bank	Trader	Total	Percentage
1.	Cash	1,500	-	-	-	-	1,500	0.85
2.	Seed	-	1,390	-	-	-	1,390	0.78
3.	Fertilisers	-	15,525	-	9,100	-	24,625	13.87
4.	Electric pump	-	-	28,000	-	-	28,000	15.78
5.	Well	-	24,000	-	-	-	24,000	13.52
6.	A pair of bullocks	-	2,500	-	-	-	2,500	1.41
7.	Fertilisers + Seed	-	33,843	-	-	-	33,843	19.07
8.	Cash + Fertilisers	-	9,200	-	-	3,000	12,200	6.87
9.	Electric pump + Fertilisers	-	6,500	-	-	-	6,500	3.66
10.	Kirana + Cash	-	6,500	-	-	-	6,500	3.66
11.	Fertilisers + Seed + Pesticides	-	9,360	-	-	-	9,360	5.27
12.	Cash + Bullock pair + Fertilisers	-	2,000	-	-	-	2,000	1.13
13.	Kirana + Fertilisers + Seed	-	5,590	-	-	-	5,590	3.15
14.	Bullock cart + Fertilisers + Seed	-	8,194	-	-	-	8,194	4.62
15.	Well + Fertilisers + Seed	-	11,285	-	-	-	11,285	6.36
	Total	1,500	1,35,887	28,000	9,100	3,000	1,77,487	100.00
	Percentage	0.84	76.56	15.78	5.13	1.69	100.00	

On non beneficiary farms the financing agencies were only two: Cooperative Society and Land Development Bank. While former accounted for 29.84 per cent of the loan amount, the latter accounted for 70.16 per cent. Loans from cooperative society were crop loans and those from Land Development Bank, long term loans for well and pump (Table 4.73).

Table 4.73 Credit facility, non beneficiary farmers, Khargon district, M.P.

S. No.	Purpose of Loan	Source of finance: Cooperative Society	Land Development Bank	Total	Percentage
1.	Fertilisers	2,520.00	-	2,520.00	12.63
2.	Seed & Fertilisers	3,433.00	-	3,433.00	17.21
3.	Well & Pump	-	14,000.00	14,000.00	70.16
	Total	5,953.00	14,000.00	19,953.00	100.00
	Percentage	29.84	70.16	100.00	

4.3.12 Marketing of Products

Beneficiary farmers marketed cotton, jowar, maize, arhar, moong, groundnut, soybean, wheat and gram. In value term the most important crop was cotton and formed 68.27 per cent of the value of marketed products. The value of wheat marketed was 16.52 per cent (Table 4.74).

Table 4.74 Marketed quantity and value of marketed crops, beneficiary farmers, Khargon district, M.P.

S. No.	Crop	Quantity (quintals)	Value (Rs.)	Percentage
1.	Cotton	383.00	5,56,650.00	68.27
2.	Jowar	35.00	10,150.00	1.25
3.	Maize	13.00	4,100.00	0.50
4.	Arhar	5.00	7,400.00	0.91
5.	Moong	18.50	24,150.00	2.96
6.	Groundnut	16.00	27,500.00	3.37
7.	Soybean	21.00	16,260.00	2.00
8.	Wheat	318.00	1,34,725.00	16.52
9.	Gram	31.50	34,400.00	4.22
	Total	-	8,15,335.00	100.00

The value of marketed crops on non beneficiary farms was Rs.1,18,650.00. Of the total value nearly half (49.64 per cent) was that of cotton. Another 1/4 (25.83 per cent) of the total value was that of groundnut. Wheat value was 11.00 per cent (Table 4.75).

Table 4.75 Marketed quantity and value of marketed crops, non beneficiary farmers, Khargone district, M.P.

S. No.	Crop	Quantity (quintals)	Value (Rs.)	Percentage
1.	Cotton	41.50	58,900.00	49.64
2.	Groundnut	21.50	30,650.00	25.83
3.	Wheat	29.00	13,050.00	11.00
4.	Jowar	17.00	4,250.00	3.58
5.	Moong	5.50	9,500.00	8.01
6.	Maize	2.00	500.00	0.42
7.	Soybean	2.00	1,800.00	1.52
	Total	118.50	1,18,650.00	100.00

It revealed that cotton was the most important crop from marketing point of view on both beneficiary and non-beneficiary farms. The location of market place in relation to place of residence showed that only one fourth (23.21 per cent) of cotton was sold within the villages. Another 11.82 per cent was sold at places located at a distance upto 5 km. As high as 62.27 per cent worth of cotton was sold at places beyond 10 km. (Table 4.76).

Table 4.76 Marketed quantity and value of cotton, beneficiary farmers, Khargon district, M.P.

S. No.	Distance in km.	Quantity (quintals)	Value (Rs.)	Percentage
1.	Within the village	83.00	1,29,200.00	23.21
2.	Upto - 5	46.00	65,800.00	11.82
3.	6 - 10	10.00	15,000.00	2.70
4.	11 & above	244.00	3,46,650.00	62.27
	Total	383.00	5,56,650.00	100.00

In the case of non-beneficiary farmers also 65.20 per cent of the marketed product was sold at a distance 11 km. or more. The value of marketed produce sold within 5 km. was 29.71 per cent. Only 5.09 per cent worth cotton was sold within the village (Table 4.77).

Table 4.77 Marketed quantity and value of cotton, non beneficiary farmers, Khargon district, M.P.

S. No.	Distance in km.	Quantity (quintals)	Value (Rs.)	Percentage
1.	Within the village	2.00	3,000.00	5.09
2.	Up to 5	13.50	17,500.00	29.71
3.	6 - 10	-	-	-
4.	11 & above	26.00	38,400.00	65.20
	Total	41.50	58,900.00	100.00

4.3.13 Participation in Watershed Planning, Implementation and Training

Of the total beneficiaries 10 attended the meetings held before planning of crops. The matters discussed were:

a) Improved and Recommended methods of cultivation

b) Growing of horticultural plants

c) Irrigation methods and irrigation timings

d) Contour cultivation

As many as 34 beneficiaries participated in training programmes. The training programme agenda contained subjects such as:

a) Use of bladed harrow, spray pump iron plough etc.

b) Improved cultural practices of different crops

c) Demonstration of construction of Nadef and operation of leveller

Thirty five beneficiaries knew the village mitra kisans.

They discussed with mitra kisans matters related to-

a) Contour cultivation

b) Recommended cultural practices

A large number of 41 beneficiaries told that staff of NWDPRA officials visited their villages and told them about improved methods of cultivation like line sowing by suitable seed drill. However, a limited number (20) of beneficiaries attended the meetings convened to discuss the problems of watershed management. They told that in these meetings problems of soil conservation, pesticides use were discussed besides general problems of cultural practices (Table 4.78).

Table 4.78 Participation in watershed planning, implementation and training, Khargon district, M.P.

S.No.	Item	Yes	No
1.	Did you attend any meeting while planning for your watershed?	10	35
2.	Did you participate in any training programme conducted by the state government under NWDPRA?	34	11
3.	Did you know the nominated Mitra Kisan?	31	14
4.	Have the staff of NWDPRA visited you?	41	4
5.	Was there any village meeting in which the problem of watershed management was discussed ?	20	25

4.3.14 Assets

Assets were categorised into three: farm assets, livestock and non farm assets.

On beneficiary farms, farm assets constituted 29.75 per cent and livestock, 57.88 per cent. The non farm assets constituted 12.37 per cent (Table 4.79).

Table 4.79 Assets on beneficiary farms, Khargon district, M.P.

S.No.	Asset	Value (Rs.)	Percentage to total
1.	Farm Assets		
a)	Iron plough	700	0.09
b)	Desi plough	9,830	1.30
c)	Harrow	9,855	1.30
d)	Seed drill	9,230	1.22
e)	Leveller	5,455	0.72
f)	Pump EP/DP	1,44,300	19.09
g)	Bullock cart	45,500	6.02
	Total	2,24,870	29.74
2.	Livestock		
a)	Cow	69,450	9.18
b)	He calf	8,810	1.16
c)	She calf	8,705	1.15
d)	Bullocks	1,98,800	26.30
e)	She Buffaloe	1,17,000	15.47
f)	He calf	6,500	0.86
g)	She calf	5,700	0.75
h)	Hen	850	0.11
i)	Goat	22,070	2.92
	Total	4,37,885	57.90
3.	Non farm assets		
a)	Cycle	6,900	0.91
b)	Motor cycle	55,000	7.28
c)	Radio	3,040	0.40
d)	Television	20,200	2.67
e)	Fan	1,150	0.15
g)	Sewing machine	2,600	0.34
h)	Phone	3,000	0.40
i)	Watch	1,600	0.21
	Total	93,490	12.36
	Grand Total	7,56,245	100.00

On non-beneficiary farms the proportion of farm assets was lower (24.38) as compared to beneficiary farms (31.25). The proportion of livestock was much higher (75.02) than that on beneficiary farms (62.35). Non beneficiary farmers had practically no non farm assets (Table 4.80).

Table 4.80 Assets on non-beneficiary farms, Khargon district, M.P.

S.No.	Asset	Value (Rs.)	Percentage to total
1.	Farm assets		
a)	Iron plough	1,820	1.29
b)	Desi plough	1,415	1.00
c)	Harrow (Bakhar)	3,360	2.37
d)	Leveller	1,675	1.18
e)	Seed drill	3,460	2.44
f)	Bullock cart	10,800	7.63
g)	Pump	12,000	8.47
	Total	34,530	24.38
2.	Livestock		
a)	Cow	13,650	9.64
b)	He calf	2,000	1.41
c)	She calf	2,820	1.99
d)	Bullocks	55,600	39.26
e)	Buffaloes	25,700	18.15
f)	He calf	800	0.57
g)	She calf	800	0.57
h)	Goat	2,410	1.70
i)	Goat calf	2,200	1.55
j)	Poultry	250	0.18
	Total	1,06,230	75.02
3.	Non farm assets		
a)	Bicycle	850	0.60
	Grand Total	1,41,610	100.00

From the foregoing description it was noted that there was no significant difference between beneficiary farms and non beneficiary farms as far as agricultural production, cost and net profit per hectare for different crops. For example, in Raipur district the net

profit per hectare for paddy was more on non beneficiary farms than beneficiary farms. In the case of wheat also the net profit per hectare on non beneficiary farms was slightly more. In the case of gram and teora net profit per hectare was more on beneficiary farms. This might be because of higher percentage of irrigation on non beneficiary farms.

In Khargone district the profit per hectare of jowar was higher on beneficiary farms but the profit per hectare for groundnut was higher on non beneficiary farms. In the case of wheat and cotton the profit per hectare was more on beneficiary farms.

It may be stated that profit per hectare of important crops had nothing to do with NWDPRA programme because the benefits received by beneficiaries had very little to do with the productivity, cost and, therefore, the profit per hectare of these crops.

In Raipur district 17 beneficiaries got saplings of horticultural crops and another 9 got saplings and help to construct Nadef compost tanks. Another 6 beneficiaries got help to construct Nadef tanks. Khargon district beneficiaries were termed so because 25 got saplings and 5 got help for goat rearing.

To sum up-

There was not much difference between the profitability per hectare of beneficiary and non beneficiary farms and even if there was any difference it had nothing to do with the NWDPRA implementation. This was because of the fact that the NWDPRA activities were only marginal or peripheral.

Secondly the impact of inputs supplied could be assessed only after few more years. The impact of saplings supplied and construction of Nadef compost pit could be felt only after 5 to 6 years.

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CHAPTER V

IMPACT OF SELECTED WATERSHEDS

5.1 Methodology

Impact of a project can be assessed by two methods

a) Comparison of pre programme and post programme situations
b) Comparison of beneficiaries and non beneficiaries

In this study second method was used. A sample of 100 beneficiaries were selected and their performance was compared with 50 non beneficiaries. For studying some aspects pre and post project situations were compared. Beneficiaries were those who got benefit in the form of inputs or material. Non beneficiaries were those who did not get any benefit.

5.2 Limitations

The study had two limitations as regards measurement of impact. Firstly, the terms "beneficiaries" and "non beneficiaries" had a limited meaning and secondly the study was conducted in 1994-95 (October,1994) for the NWDPRA works completed in 1993-94. Thus not enough period was allowed to assess the impact of works. This may be elaborated.

In Raipur district out of 50 beneficiaries 17 beneficiaries got saplings of horticultural plants and another 9 got saplings and help to construct Nadef compost tanks. While another 6 beneficiaries got help for construction of Nadef tanks 5 got saplings and weedicides.

In Khargon district as many as 25 beneficiaries got saplings and 5 got help for goat rearing. Two beneficiaries each had demonstrations of intercropping on their fields and two others got saplings and wheat demonstrations.

It was thus observed that majority of the beneficiaries got such benefits which could be termed as marginal or peripheral. One can not expect significant difference in economy of beneficiary and non beneficiary farmers. This was supported by the data.

The benefits given were such which would require at least 6 years to show their impact. It was too early to assess the impact of benefits in 1994-95 for those given in 1993-94.

In Silyarinala watershed the target of expenditure for the 5 year period from 1990-91 to 1994-95 was Rs.50.864 lakhs. Against this the expenditure till 1993-94 was Rs.14.855 lakhs or only 29.21 per cent.

Moreover, the expenditure was not uniformly spread in the reference years. Of the total expenditure incurred during the period 1990-91 to 1993-94 Rs.8.574 or 57.72 per cent was incurred in 1993-94.

In Chanderinala watershed the target of expenditure for 5 year period 1990-91 to 1994-95 was Rs.45.770 lakhs. Against this the expenditure incurred was Rs.10.109 lakhs or 22.09 per cent of the planned expenditure. Again, of this expenditure Rs.5.657 lakhs (55.96 per cent) was incurred in 1993-94 and another Rs.4.202 lakhs (41.57 per cent) in 1992-93.

Two things were clear. Firstly the expenditure incurred was very small against the planned expenditure and secondly whatever expenditure was incurred it was during the last year or in recent past. With low percentage of expenditure one cannot expect impact to a considerable extent. Secondly with the survey work conducted in October, 1994 for the works undertaken in 1993-94 it is thought to be too early to draw any conclusion.

As mentioned earlier the works were of 4 types

a) Works called Preliminary Activities
b) Agricultural Land Development Works
c) Non Agricultural Land Development Works
d) Drainage Line Treatment Works
e) Livestock Management Works

The impact was therefore studied by works.

5.3 Impact of Preliminary Activities

Preliminary activities included survey projectisation, nursery establishment, dryland Chetna Kendra, training of mitra kisans and research. All these were training and extension activities. A fairly good nursery was established at village Lawar in Raipur district. This catered to the need of saplings. It had a good impact. In Khargon district NWDPRA did not develop a nursery of its own but services of State Govt. nursery located near Segaon were taken. In Raipur district Dryland Chetna Kendra was established in the nursery. It had a big hall and all facilities for training, lectures, etc. The impact was good. In Khargon district the Kendra was established at village Keli. It had many visual aids. In both the districts training of Mitra Kisans was done in Chetna Kendras. The Mitra Kisans were benefitted by the training received and farmers were aware of the training of Mitra Kisans. However, nothing was done in the field of research in Khargon and very little was done in Raipur. We suggest that the funds under this head be transferred to Agricultural University farms in those regions (Table 5.1).

Table 5.1 Financial targets and achievements under preliminary activities, selected watersheds, M. P.

(Unit - Rs. lakhs)

S. No.	Activity	Raipur district		Khargon district		Total	
		Target for 1990-91 to 1994-95	Total achievement till 1993-94	Target for 1990-91 to 1994-95	Total achievement till 1993-94	Target for 1990-91 to 1994-95	Total achievement till 1993-94
1.	Survey projectisation	2.800	1.592 (56.86)	3.000	1.235 (41.17)	5.800	2.827 (48.74)
2.	Nursery establishment	1.500	0.908 (60.53)	1.500	-	3.000	0.908 (30.27)
3.	Dryland chetana kendra	-	0.756 (-)	2.190	0.746 (34.06)	2.190	1.502 (68.58)
4.	Training of mitra kisans	10.734	1.039 (9.68)	2.000	0.156 (7.80)	12.734	1.195 (9.38)
5.	Salary of guard	3.220	0.784 (24.35)	-	-	3.220	0.784 (24.35)
6.	Research	1.600	0.041 (2.56)	7.000	-	8.600	0.041 (0.05)
7.	Innovative research	2.680	-	-	-	2.680	-
	Total	22.534	5.120 (22.72)	15.690	2.137 (13.62)	38.224	7.257 (18.98)

5.4 Impact of Agricultural Land Development measures

These included conservation measures like vegetative filter stripes, hedges, hedges with earthen support, repairs of old structures and contour cultivation.

These measures were taken on lands and slopes leading to cultivated land. These helped in checking reel erosion. However, these being temporary structures the impact was felt for a year. We suggest to construct semi permanent structures and provision of funds be made for repairs and renovation of the structures. The use of ipomea should be avoided and suitable alternative be found. No work was done on contour cultivation in both the watersheds. Further, no work was done on controur dead furrow, contour cultivation and contour vegetative hedges in Raipur district. Under gully control measures live checks, earthen checks, vegetative checks and loose bolder checks were constructed. These measures had a definite impact on checking soil and water erosion and was visible from siltation occuring due to these.

Crop demonstrations have a certain impact. Double cropping and inter cropping check erosion and make use of available moisture. However, single crop demonstrations have limited impact. In agro forestry bamboo saplings were distributed and under dryland horticulture saplings of horticultural crops were distributed. The impact was very limited due to high mortality percentage. These programmes should be taken up with more training and after care. In the prevailing system of grazing of cattle the programmes have limited scope. Compost making was known to farmers. However, system of construction of Nadef compost tanks was of recent origin. The effects have been encouraging but impact on productivity would be felt only after 2-3 years.

Under homestead garden, again, distribution of saplings was taken up. In this case mortality percentage was low but impact could be known only after 4-5 years. Help given under household production systems had very little to do with agriculture and the impact was very low. (Table 5.2)

5.5 Impact of Non Agricultural Land Development

Under these, works likes live fencing, vegetative hedges, gully control and loose bolder checks were to be constructed. Nothing was done under gully control and very insignificant work was done on loose bolder checks. In live fencing and vegetative hedges with furrow the work done was scattered to make any impact. Under production system planting of grasses, hedges, bushes and planting on nala banks was to be done. Afforestation was also expected to be done. However nothing was done and therefore no impact could be seen (Table 5.3).

Table 5.3 Financial targets and achievements under non agricultural land development, selected watersheds, M.P.

(Unit- Rs.lakhs)

S. No.	Activity	Raipur district		Khargon district		Total	
		Target for 1990-91 to 1994-95	Total achievement till 1993-94	Target for 1990-91 to 1994-95	Total achievement till 1993-94	Target for 1990-91 to 1994-95	Total achievement till 1993-94
1.	Conservation measures						
a.	Live fencing	0.500	0.074 (14.80)	0.300	0.075 (25.00)	0.800	0.149 (18.62)
b.	Vegetative hedges with furrows	1.600	0.339 (21.19)	2.000	0.758 (37.90)	3.600	1.097 (30.47)
c.	Gully control	0.950	-	-	-	0.950	-
d.	Loose bolder checks	-	0.196	-	-	-	0.196
2.	Production systems						
a.	Over seeding of grasses	0.800	0.425 (53.12)	1.030	-	1.830	0.425 (23.22)
b.	Planting of hedges	0.400	-	-	-	0.400	-
c.	Planting of bushes	-	-	0.500	-	0.500	-
d.	Plantation on the nala banks	0.375	-	-	-	0.375	-
e.	Afforestation	-	-	0.225	-	0.225	-
	Total	4.625	1.034 (22.36)	4.055	0.833 (20.54)	8.680	1.867 (21.51)

Table 5.2 Financial targets and achievements under agricultural Land development, selected watersheds, M. P.

(Unit- Rs. lakhs)

S. No.	Activity	Raipur district		Khargon district		Total	
		Target upto 1994-95	Achievement till 1993-94	Target upto 1994-95	Achievement till 1993-94	Target upto 1994-95	Achievement till 1993-94
1.	Conservation measures						
a.	Vegetative filter stripes	1.050	-	0.300	0.071 (23.67)	1.350	0.071 (5.26)
b.	Contour vegetavive hedges	2.400	0.536 (22.33)	4.800	0.707 (14.73)	7.200	1.243 (17.26)
c.	Contour vegetative hedges with earthen support	0.080	-	1.500	0.577 (38.47)	1.580	0.577 (36.52)
d.	Repairs of old structures	0.500	0.368 (73.60)	0.150	0.075 (50.00)	0.650	0.443 (68.15)
e.	Contour dead furrow	-	-	0.250	0.087 (34.80)	0.250	0.087 (34.80)
f.	Contour cultivation	-	-	-	-	-	-
2.	Gully control						
a.	Live checks			0.050	0.040 (80.00)	0.050	0.040 (80.00)
b.	Earthen checks	0.500	-	0.040	0.014 (35.00)	0.040	0.014 (35.00)
c.	Vegetative checks			0.200	0.119 (59.50)	0.200	0.119 (59.50)
d.	Loose bolder checks			-	-	-	-
3.	Crop demonstrations						
a.	Single crop	1.575	2.318 (147.17)			1.575	2.318 (147.17)
b.	Double crop	0.480	0.054 (11.25)	6.820	2.106 (30.88)	0.480	0.054 (11.25)
c.	Inter cropping	1.950	0.367 (18.82)			1.950	0.367 (18.82)
4.	Agro forestry	0.375	0.045 (12.00)	0.600	0.066 (11.00)	0.975	0.111 (11.38)
5.	Dryland horticulture	1.500	0.183 (12.00)	1.200	0.192 (16.00)	2.700	0.375 (13.89)
6.	Organic farming system						
a.	Compost Preparation	-	-	0.910	0.250 (27.47)	0.910	0.250 (27.47)
b.	Nadef compost	0.800	0.375 (46.88)	-	-	0.800	0.375 (46.88)
c.	Bio fertilisers	-	-	-	0.050	-	0.050
d.	Micro fertiliser	-	-	-	-	-	-
7.	Homestead garden	0.600	0.140 (23.33)	0.400	0.187 (46.75)	1.000	0.327 (32.70)
8.	Household production systems						
a.	Agriculture based			3.000	0.137 (4.57)	3.000	0.137 (4.57)
b.	Animal husbandry based	1.000	-	-	0.590	-	0.590
c.	Service sector			-	0.190	-	0.190
	Total	12.810	4.386 (34.24)	20.220	5.458 (26.99)	33.030	9.844 (29.80)

5.6 Impact of Drainage Line Treatment

This was the item under watershed management on which maximum funds were spent. Incidentally this was the item which showed significant impact. Under nala bank stabilisation works were done to check erosion by way of plantation on banks. The impact was good.

However, alternative to ipomea has to be found. Under upper, middle and lower reaches treatment live checks, bush wood checks and loose bolder checks were constructed not only across nalas but also on smaller nalas and gullies joining the main nalas. It had two fold effect. Firstly these helped in reducing the speed of water gushing into nalas and secondly siltation took place checking soil erosion. Check dams in series have helped to check erosion and siltation in the main nala or sunken or dug out ponds. However these helped only those farmers whose fields were close to the nala or sunken ponds. Farmers with fields located at a distance could not get benefit. Moreover the impact was not felt all the year round.

Sunken ponds in upper reaches and small dug out ponds in middle reaches made two impacts: The water so stored was used by cattle and at places it was used for irrigation. At a few places around ponds vegetable cultivation was initiated and fishery was started. The water table in wells around ponds had increased.

However it may be emphasised that these structures need regular maintenance and repairs. We were told that there was no provision for these. In the absence of maintenance and repairs the structures got destroyed. It is recommended that provision for maintenance and repairs be made.

It will not be out of place to mention that the entire programme needs awakening among villagers for their participation. Without the active participation of people the programme would achieve only limited success. Another important point is that the impact would be felt only when large and continuous investment would be done. Sporadic investment would not yield results. Moreover the results will be felt only after a lapse of 5-6 years.

In Silyari nala watershed a causeway had 4 hume pipes for free flow of water under it. During post monsoon season, of the four pipes two were blocked to allow the water to stagnate and spread in the adjoining fields for flooding. When the water requirement was met the blocked hume pipes were unblocked so that water flowed freely and water level in the adjoining fields was reduced. This had helped a large number of farmers in the catchment area. This type of works should be encouraged.

No works were done on farmers fields and, therefore, there was no direct impact.

Advisory work like growing of arhar and castor on bunds in Silyari nala watershed of Raipur district had good impact (Table 5.4).

Table 5.4 Financial targets and achievements under drainage line treatment, selected watershed, M.P. (Unit- Rs. lakhs)

S. No.	Activity	Raipur district		Khargon district		Total	
		Target for 1990-91 to 1994-95	Total achievement till 1993-94	Target for 1990-91 to 1994-95	Total achievement till 1993-94	Target for 1990-91 to 1994-95	Total achievement till 1993-94
1.	Nala bank stabilisation	0.500	0.093 (18.60)	0.200	0.079 (39.50)	0.700	0.172 (24.57)
2.	Upper reaches treatment						
a.	Live check dams	0.20	0.036 (180.00)	0.020	-	0.040	0.036 (90.00)
b.	Brush Wood check dams	0.075	0.097 (129.33)	0.869	0.028 (46.67)	0.135	0.125 (92.59)
c.	Loose bolder	0.050	0.345 (690.00)	0.300	0.143 (47.67)	0.350	0.488 (139.43)
d.	Sunken pond	0.375	0.197 (52.53)	0.150	0.103 (68.67)	0.525	0.300 (57.14)
3.	Middle reaches treatment						
a.	Earthen bunds with vegetative	0.500	-	0.400	0.185 (46.25)	0.900	0.185 (20.56)
b.	Loose bolder structures	1.000	0.998 (88.80)	0.800	0.286 (35.75)	1.800	1.284 (71.33)
c.	Small dugout Ponds	0.750	0.634 (84.53)	0.250	0.117 (46.80)	1.000	0.751 (75.10)
4.	Lower reaches treatment						
a.	Run off management system	2.000	1.903 (95.15)	-	-	2.000	1.903 (95.15)
b.	Sunken ponds	-	-	1.000	0.740 (74.00)	1.000	0.740 (74.00)
	Total	5.270	4.303 (81.65)	3.180	1.681 (52.86)	8.450	5.984 (70.82)

5.7 Impact of Livestock Management Works

This was the programme which attracted least attention. Less than 1 per cent of budgeted amount was spent. There was no impact of the programme (Table 5.5).

Table 5.5 Financial targets and achievements under livestock management, selected watersheds, M.P.

(Unit- Rs. lakhs)

S. No.	Activity	Raipur district		Khargon district		Total	
		Target for 1990-91 to 1994-95	Total achievement till 1993-94	Target for 1990-91 to 1994-95	Total achievement till 1993-94	Target for 1990-91 to 1994-95	Total achievement till 1993-94
1.	Castration of non useful bulls	0.250	-	-	-	0.250	-
2.	Measures to check livestock population	0.375	0.012 (3.20)	-	-	0.375	0.012
3.	Fodder production on farmers' fields	5.000	-	-	-	5.000	-
	Total	5.625	0.012 (0.21)	2.625	-	8.250	0.012 (0.14)

CHAPTER VI

SUMMARY AND CONCLUSIONS

6.1.1 Watershed is a geo-hydrological unit or a piece of land that drains at a common point. It comprises of arable land, non arable land and natural drainage lines in rainfed areas.

6.1.2 Watershed management focuses on conservation, use and improvement of land, water and other resources on a sustainable basis. It aims at slowing down or even reversing the run off and sedimentation of water resources. Its objective is to stop progressive removal of vegetative cover on non arable lands. It seeks to control flooding from seasonal streams. The watershed development project was an integrated project involving close coordination of departments of agriculture, horticulture, forestry, veterinary and fishery. National Watershed Development Project for Rainfed Areas (NWDPRA) was structured during VIII plan (1992-97).

6.1.3 The objectives of the project are :

(i) Conservation, upgradation and utilisation of natural endowments like land, water, plant, animal and human resources in a harmonious and integrated manner.

(ii) Generation of massive employment during the project period and regular employment after the project completion for enhancing the employment opportunities in the backward rainfed areas to ensure livelihood security particularly for under previleged sections of the rural population like small and marginal farmers, landless labourers, tribals, etc.

(iii) Improvement of production environment and restoration of ecological balance through scientific management of land and rain water.

(iv) Reduction of inequalities between irrigated and rainfed areas. This will reduce large scale migration from rural areas to the cities.

(v) In addition to food, fuel and fodder the project would endeavour to enhance cash flow to the rainfed farmers and landless agricultural labourers through increased casual employment, marketable surplus of agricultural and dairy produce, growing of cash crops like vegetables, coriander, cumin, medicinal plants, etc. in suitable areas.

Thus, the ultimate objective of this project is to develop the natural resource-base, sustain its productivity, improve the standard of living of millions of poor farmers and landless labourers and endeavour for restoration of ecological balance.

6.1.4 The sectors of watershed development were : arable or cultivated land, non arable land and natural drainage lines. For a household the sub components would be food, fodder, fuel and household production system.

6.1.5 Impact of NWDPRA was studied by all the ten Agro-Economic Research Centres in one state each.

6.1.6 The specific objectives were :

(i) To examine the present status of the available technology and the extent of its adoption by farmers

(ii) To identify the factors responsible for productivity changes

(iii) To locate the constraints in the project implementation in terms of infrastructure, technology and other factors

(iv) To evaluate the impact of vegetative measures, soil and water conservation structures and other components as suggested in the 1992 guidelines of NWDPRA

(v) To suggest strategies for removal of the constraints faced in NWDPRA.

6.1.7 In M.P. two districts viz. Raipur and Khargon were selected. These belonged to two agro-climatic regions. In each district one watershed was selected. In Raipur district Silyarinala watershed was selected and in Khargon district Chanderinala watershed was selected. In each watershed fifty beneficiaries and twenty five non beneficiaries were selected. Thus the total sample comprised 100 beneficiaries and 50 non beneficiaries.

6.1.8 The analysis pertained to the data for the year 1993-94. The field work was completed by 10th October 1994. Simple tabulation technique was adopted.

6.2.1 Raipur district was situated in the south eastern part of the state. The area of the district was 21,274 sq.km. River Mahanadi flowed through the district from south west to north east. The area to the west of Mahanadi including the selected watershed was thickly populated and closely cultivated. The area on the east was hilly. The climate was in general warm and humid. The district received an average rainfall of 1,375 mm. While the southern and south eastern parts of the district received copious rains the western tract which included selected watershed suffered from scarcity of rainfall.

6.2.2 The average size of holdings was 1.784 hectares. Marginal size holdings predominated. Of the total geographical area 60 per cent was net area sown. The district had only 11 per cent area under forest. Paddy occupied 73 per cent of the cropped area. Lathyrus occupied 17 per

cent. Of the gross cropped area 34.82 per cent was irrigated. Paddy was irrigated to the extent of 45.28 per cent and wheat, 41.33 per cent. The chief sources of irrigation were government canals and commanded as high as 81.94 per cent of the irrigated cropped area. Tanks commanded 7.25 per cent.

6.2.3 There were three methods of paddy cultivation: broadcasting, transplanting and lahi (sowing after germination). Broadcasting was the commonest method. The system of double cropping practised in the district was known as utera. The seed of spring crop was scattered in the slush of paddy fields while paddy crop was still standing. The utera crops commonly grown were gram, linseed, teora, urad and batra.

6.2.4 Khargon district was located in the south west corner of Madhya Pradesh. It was encased between Vindhyas on the north and Satpuras in the south, with Narmada flowing in between. The geographical area of the district was 13,458 sq.km. Khargon district included most varied tracts; wild forest clad hills, rich alluvial plains and long stretchs of barren plain and low rocky hills. Average rainfall of the district was 747.4 mm. Thus the district was a low rainfall area.

6.2.5 The average size of holdings was 3.701 hectares, nearly double that of Raipur district. The soils were of 5 types a) Black cotton soil b) Yellow soil c) Grey soil d) Loamy soil e) Stony soil. Land use pattern of Khargon district was similar to Raipur district. Net area sown was 64.92 per cent. Forest occupied 9.60 per cent of the area. Cotton occupied 26.30 per cent of the cropped area and jowar, 25.57 per cent. Groundnut, wheat and maize occupied 7.18, 6.92 and 6.40 per cent area respectively. Irrigated cropped area was 23.16 per cent. Cotton was irrigated to the extent of 41.06 per cent. Wheat was nearly fully irrigated (99.61 per cent) Gram was irrigated to the extent of 75.69 per cent. Wells were most important sources of irrigation commanding 63.85 per cent of the irrigated area. Other sources like nalas, stop dams, etc. commanded 24.32 per cent.

6.3.1 In Raipur district Silyarinala watershed of Simga block of Baloda Bazar tehsil was selected. In Khargon district Chanderinala watershed of Segaon development block of Segaon tehsil was selected.

6.3.2 Silyarinala watershed of Raipur district was situated at a distance of 60 km. from district headquarter and 16 km. north of Simga. It came under Mahanadi basin. The watershed had 8 villages and the slope was from south to north. Silyarinala joined the Sheonath river.

6.3.3 The four sectors involved in watershed development were agriculture, horticulture, forest and veterinary. The annual rainfall of the watershed was more than 1,000 km. The groundwater availability was poor and there was no waterlogging problem. The irrigated area was only 5.82 per cent of the arable land. Marginal and small size holdings predominated. Paddy occupied 67.17 per cent of the gross cropped area. Kodo (10.59 per cent) and teora (9.68 per cent) were other important crops. While paddy was irrigated to the extent 7.6 per cent, wheat was irrigated to the extent of 16.66 per cent. The productivity of both kharif and rabi crops was lower than the district and block averages.

6.3.4 For the entire plan period of 1990-91 to 1994-95 the target amount to be spent was Rs.50.864 lakhs. Of this the amount spent in the first four years was Rs.14.855 lakhs or 29.21 per cent. This clearly indicated that very little work was done. Of the various activities the percentage of amount of expenditure to target amount to be spent was highest (81.65)for "drainage line treatment" and lowest (0.21) for"livestock management". It is true that in the year 1993-94 (the last year for which data was available) the expenditure shot up suddenly but even so the scope for programme implementation was quite large.

The subactivities for which the percentage of expenditure to target was more than 50 were-

a) Nursery establishment (60.53)
b) Survey projectisation (56.86)
c) Single crop demonstrations(147.17)
d) Repairs of old structures (73.68)
e) Over seeding of grasses (53.13)
f) Loose bolder checks with vegetative support (690.00)
g) Live check dams (180.00)
h) Bushwood check dams (129.33)
i) Run off management system- sunken ponds (95.15)
j) Small dug out ponds (84.53)

6.3.5 Chanderinala watershed came under sub basin of Borat river of the Narmada basin. The watershed had 5 villages. The average rainfall was 579.7 mm. The area irrigated was 10.14 per cent. The water holding capacity was very low. Due to insufficient rains and low irrigation kharif crops dominated. The soils were medium to dark black. In the hills region these were yellow and shallow. Thirty five per cent land had slope between 4 to 8 per cent and 44.12 per cent land had slope of 8 per cent and more. Scheduled tribes population constituted 72.75 per cent and others, 26.85 per cent. The socio economic condition of population was not good.

6.3.6 The kharif crops grown were cotton, groundnut, jowar and bajra. Rabi crops were wheat, gram and jowar.

6.3.7 The estimated expenditure for five year period was Rs.45.770 lakhs. Against this the expenditure was Rs.10.109 lakhs or 22.09 per cent, indicating much remained to be done. As in Raipur district the percentage of expenditure to allotment was highest (52.86) for activity "drainage line treatment." The percentage for agricultural land development and production systems was 29.14. Soil conservation measures and gully control used 23.18 per cent of the allotment. Non agricultural land development claimed 20.54 per cent and preliminary activities, 13.62 per cent. No expenditure was incurred on livestock development. In the following activities the percentage of expenditure to target was more than 40.

a) Survey projectisation (41.17)
b) Live checks (80.00)
c) Vegetative checks (59.50)
d) Repairs of old structures (50.00)
e) Homestead garden (46.75)
f) Agricultural based production systems(45.67)

On following sub activities of the main activity "drainage line treatment" the percentage of expenditure to budget was more than 40.

a) Sunken ponds on the lower reaches (74.00)
b) Small ponds on upper reaches (68.67)
c) Bushwood checks (46.67)
d) Bolder checks with vegetative support (47.67)
e) Earthen bund with vegetation (46.25)
f) Small dug ponds on middle reaches (46.80)

6.3.8 It was observed that-

a) Maximum percentage of expenditure to allotment was incurred on item "drainage line treatment".

b) Minimum percentage of expenditure to allotment was incurred for item "livestock management".

c) Most of the expenditure incurred was during the last two years viz. 1992-93 and 1993-94 and very little or no expenditure was incurred during the first two years of 1990-91 and 1991-92.

6.4.1 Beneficiaries were those who got some material input such as seed or saplings, technical help in the form of crop demonstrations, loan and subsidy for the construction of compost tanks, equipments and help in starting non agricultural occupations. Non beneficiaries were those who remained out of the activities of NWDPRA.

Among selected 50 beneficiaries of Silyarinala watershed 17(34.00 per cent) received saplings of different horticultural crops. Nine beneficiaries were helped by providing saplings and construction of Nadef compost tanks. Six beneficiaries (12.00 per cent) got help for construction of Nadef and 5 (10.00 per cent) got saplings and weedicides.

6.4.2 Literacy percentage among beneficiaries was higher (48.53) than non beneficiaries (43.14). It was also observed that literacy percentages of males and females of beneficiary families were higher than those of non beneficiary families. In both categories literacy percentage among males was higher than females. There was no difference between the proportions of number of workers in different main occupations between beneficiaries and non beneficiaries. Among subsidiary occupations agricultural labour (42.51 per cent) and agriculture/labour (12.96 per cent) were more important on beneficiary farms than non-beneficiary farms (23.77 and 2.97 per cent respectively). On the other hand non agricultural labour was more important (26.73 per cent) on non beneficiary farms than beneficiary farms (1.21 per cent). This was also reflected in the occupational patterns of male and female workers.

6.4.3 The average operated area of beneficiaries was 2.96 hectares and non beneficiaries, 1.80 hectares. While the percentage of irrigated area to operated area was 23.76 on beneficiary farms it was 37.80 or 14.04 per cent more on non-beneficiary farms. While beneficiary farms depended more on other sources (79.89 per cent), the dependence of non beneficiaries was less (56.00 per cent) on other sources and more on assured sources like wells (44.00 per cent).

On beneficiary farms the difference in percentages of area under crops between current year and pre project year was marginal. Some difference in the percentage of area under crop groups was noted. While the percentage area under cereals came down the proportion under pulses increased. The percentage of irrigated cropped area was slightly more in current year (27.38) than the pre project year (24.22). The percentage of area under improved varieties of paddy increased. There was no significant difference between the cropping pattern of beneficiary and non beneficiary farms. On non beneficiary farms the area under improved varieties of paddy slightly increased in current year. The percentage of area under paddy and cereals decreased and that of pulses increased. Improved varieties of paddy had higher percentage of irrigated area than local varieties. On non beneficiary farms percentages of irrigation of both improved and local varieties were higher than beneficiary farms. The percentages were higher for other crops also.

On beneficiary farms the percentage of irrigation of paddy was higher in the current year. On non beneficiary farms the percentage was higher in pre project year.

6.4.4 The cost of cultivation of paddy on beneficiary farms was Rs.3,184.64 per hectare. It was Rs.3,383.18 for improved varieties and Rs.3,036.50 for local varieties. On non beneficiary farms the cost of cultivation of paddy was Rs.3,243.17. It was Rs.3,532.67 for improved varieties and Rs.2,953.68 for local varieties. It was noted that the proportions of different inputs on beneficiary and non beneficiary farms were nearly equal. The cost of cultivation of wheat, gram and teora was Rs.3,053.94, Rs.2,863.04 and Rs.1,008.80 respectively on beneficiary farms.

On non beneficiary farms the cost of wheat, gram and teora was Rs.2,986.16, Rs.2,761.39 and Rs.907.53 respectively. There was not much difference between proportions of items of inputs between beneficiary and non beneficiary farms. Net profit per hectare of improved paddy, local paddy and wheat was more on non beneficiary farms. However, profit per hectare for gram and teora was more on beneficiary farms. One of the reasons for higher profitability on non beneficiary farms was higher proportion of irrigation (Table 6.1).

6.4.5 Beneficiary farmers adopted high yielding paddy varieties of B.D. Safari, Kranti and IR 36. Local varieties adopted were Ranikajal, Safari, Assamchuri, etc. Wheat varieties adopted included 147, Narmada 4, etc. Gram varieties were Ujjain 21 and Ujjain 72 and mustard variety adopted was Pusabold. On non beneficiary farms two high yielding paddy varieties viz. Kranti and B.D.200 and two local varieties viz. Rani kajal and safari were grown. Twelve out of 50 farmers applied some chemicals to seed before sowing. Manure was applied by all the farmers but only 7 used the modern method of compost preparation in Nadef tanks. Fertilisers were used by a large number of farmers. Pesticides were used by 23 farmers. Among non beneficiaries the adoption of improved practices was lower. In all 292 saplings were distributed to beneficiaries. Of these only 110 survived, indicating the mortality percentage to be 62.33. No vegetative bunds were constructed by any beneficiary. No contour cultivation was practised. No farmer developed any pasture and none had siltation near bund.

6.4.6 All the inputs were of good quality, available timely and in enough quantity. Inputs were available within a distance of 5 km.

Table 6.1 Characteristics of beneficiaries and non beneficiaries, Silyarinala watershed, Raipur district, M.P.

S. No.	Particulars	Beneficiaries	Non beneficiaries
1.	Total Population	373	153
2.	Literacy Percentage		
	Males	77.17	64.71
	Females	25.83	24.00
	All	48.53	43.14
3.	Main Occupation (Percentage)		
	Males		
	a) Agriculture	79.53	82.36
	b) Non workers	7.87	3.92
	c) Others	8.66	9.80
	Females		
	a) Household work	66.67	60.00
	b) Agriculture	20.00	24.00
	c) Non workers	9.17	6.00
	Total		
	a) Agriculture	50.61	53.47
	b) Household work	32.40	29.70
	c) Non workers	8.50	4.95
4.	Subsidiary Occupation		
	Males		
	a) Agricultural labour	53.54	25.49
	b) No subsidiary occupation	30.71	29.41
	c) Non agricultural labour	-	29.41
	Females		
	a) Agricultural labour	30.83	22.00
	b) No subsidiary occupation	23.33	30.00
	c) Agriculture/ agricultural labour	22.50	6.00
	d) Non agricultural labour	-	24.00
	Total		
	a) Agricultural labour	42.51	23.77
	b) Agriculture/ agricultural labour	12.96	2.97
	c) No subsidiary occupation	27.13	29.70
	d) Non-agricultural labour	1.21	26.73

Contd...2/-

Table 6.1 continued ...

S. No.	Particulars	Beneficiaries	Non beneficiaries
5.	Land Particulars		
	Operated area (hectares)	148.16	45.11
	Percentage of irrigated area	23.76	35.67
	Percentage by other sources	79.89	56.00
	Percentage by wells	20.11	44.00
	Gross cropped area(hectares)	198.95	58.16

		Beneficiaries		Non beneficiaries	
		Current	Pre project	Current	Pre project
6.	Cropping Pattern (Percentage)				
	Paddy	70.09	74.58	70.80	75.16
	Improved	42.50	33.33	20.01	15.27
	Local	57.50	66.67	79.99	84.73
	Wheat	6.25	7.37	4.91	6.52
	Total cereals	79.55	85.92	76.06	83.11
	Teora	8.46	6.03	13.99	7.33
	Gram	5.73	5.24	2.97	1.21
	Total pulses	16.63	11.97	18.36	13.23
	Oilseeds	2.65	1.64	3.15	3.26
7.	Irrigated Crops (Percentage)				
	Paddy	24.08	20.25	36.82	37.40
	Improved	32.78	48.02	53.05	60.70
	Local	17.66	6.36	32.75	33.19
	Wheat	56.91	57.10	78.52	100.00
	Gram	72.81	62.58	29.65	33.33
	Teora	20.67	7.77	10.01	-
	Fruits & Vegetables	87.07	100.00	100.00	100.00

		Beneficiaries	Non beneficiaries
8.	Cost of Cultivation (Rs./hectare)		
	Paddy	3,184.64	3,243.17
	Improved	3,383.18	3,532.67
	Local	3,036.50	2,953.68
	Wheat	3,053.94	2,986.16
	Gram	2,863.04	2,761.39
	Teora	1,008.80	907.53

Contd...3/-

S. No.	Particulars	Beneficiaries	Non beneficiaries
9.	Production, Output, Cost and Profit per hectare		
	Production (Quintals/hectare)		
	Paddy	22.98	24.77
	Improved	26.69	29.11
	Local	20.21	23.65
	Value of output per hectare(Rs.)		
	Paddy	7,220.04	7,872.02
	Improved	8,413.40	9,287.64
	Local	6,329.66	7,506.75
	Cost per hectare (Rs.)		
	Paddy	3,184.64	3,243.17
	Improved	3,383.18	3,532.67
	Local	3,036.50	2,953.68
	Net profit per hectare (Rs.)		
	Paddy	4,035.40	4,628.65
	Improved	5,030.22	5,754.94
	Local	3,293.16	4,553.07
	Wheat		
	Production per hectare(Quintals)	10.68	11.16
	Value of output per hectare(Rs.)	5,245.74	5,213.00
	Cost per hectare (Rs.)	3,053.94	2,986.16
	Net profit per hectare (Rs.)	2,191.80	2,226.84
	Gram		
	Production per hectare(Quintals)	6.23	6.78
	Value of output per hectare (Rs.)	6,451.72	6,729.00
	Cost per hectare (Rs.)	2,863.04	3,461.00
	Net profit per hectare (Rs.)	3,588.68	3,268.00
	Teora		
	Production per hectare(Quintals)	5.18	4.29
	Value of output per hectare(Rs.)	2,393.50	1,776.00
	Cost per hectare (Rs.)	1,008.80	607.53
	Net profit per hectare (Rs.)	1,384.70	1,168.47

For some inputs farmers had to travel more than 15 km. Fifteen of the 25 non beneficiaries got the inputs within the villages. Four got these within 5 km. and the remaining travelled more than 10 km. Crop loans constituted 53.66 per cent and agricultural term loans, 34.89 per cent. Among the financial institutions cooperative societies advanced 54.90 per cent. The Regional Rural Banks contributed 30.04 per cent of the loan amount. In the case of non beneficiaries crop loans and agricultural loans were provided by cooperative societies and cooperative banks. Land Development Bank advanced long term loans. Non agricultural loans were advanced by Commercial Banks.

Of the total value of products sold by beneficiaries paddy formed 82.51 per cent. The percentage formed by gram was 6.77 and that by wheat, 6.37. The largest quantity or in value terms 80.48 per cent was sold in markets 11 to 20 km.away. On non beneficiary farms the value of paddy formed 83.43 per cent of the total value of products sold. Of the total value of marketed paddy 74.07 per cent was sold at places beyond 11 km. The value of paddy sold locally was 14.69 per cent.

6.4.7 Of the 50 beneficiary farmers 13 attended the meetings held before planning of the crops. Only 9 out of 50 beneficiaries participated in the training programmes. As many as 35 of the 50 farmers knew the nominated Mitra Kisans of the villages. Forty two of the 50 beneficiaries said that the officials of NWDPRA visited their villages and provided useful information about improved techniques of agriculture. Assets were categorised into three : farm assets, livestock and non farm assets. On beneficiary farms farm assets constituted 31.25 per cent of the total value of assets. Livestock constituted 62.35 per cent and non farm assets, 6.40 per cent. On non beneficiary farms farm assets formed 61.65 per cent of the total value of assets. Livestock value was 37.62 per cent and non farm assets, 0.73 per cent.

6.4.8 In Chanderinala watershed of the 50 selected beneficiaries half received saplings of horticultural plants. Another 5 received goats for rearing. Others were either helped by inputs or technology. The population of the selected beneficiary families was 337. The literacy percentage among beneficiary families was 42.43. The literacy percentage was higher among males (57.69) than females (30.11). It was observed that the overall literacy percentage in Raipur district was higher than Khargon district. Among males the literacy percentage was higher in Raipur district but among females it was higher in Khargon district. The population of selected non beneficiary families was 132. The literacy percentage was 19.70. It was higher (34.09)for

males than females (6.06). The literacy percentage for the group as a whole was 19.70, the lowest among beneficiaries and non beneficiaries of Raipur and Khargon districts.

6.4.9 Of the total workers of beneficiary families 47.72 per cent had agriculture as main occupation. Among males the percentage was 70.19 and among females, 22.58 per cent. Another 61.29 per cent females had "household work" as main occupation. Agricultural labour was main occupation of 9.62 per cent males. Of the subsidiary occupations agricultural labour was having 38.07 per cent workers engaged in it. Another 22.84 per cent workers had either agriculture or agricultural labour as subsidiary occupation. Among males 64.42 per cent had agricultural labour as subsidiary occupation and 13.46 per cent had non agricultural labour as subsidiary occupation. Among females 47.31 per cent had either agriculture or labour as subsidiary occupation. Two things emerged: Firstly, 15.05 per cent females had household work as subsidiary occupation and secondly none of them had non agricultural labour as subsidiary occupation.

6.4.10 Among non beneficiary families 32.47 per cent had agriculture as main occupation and an equal number had household work as main occupation. Occupational distribution between males and females was quite different. While 54.55 per cent among males had agriculture and 22.73 per cent had agricultural labour as main occupation 75.76 per cent females had household work as main occupation. Among subsidiary occupations agricultural labour was most important with 51.95 per cent workers claiming it. Another 11.69 per cent had either agriculture or agricultural labour as subsidiary occupation. The difference between males and females was that among males 56.81 per cent had agricultural labour as subsidiary occupation and among females it was so with 45.46 per cent. It was thus concluded that among males, agriculture and agricultural labour were main occupations and agricultural labour and non agricultural labour were subsidiary occupations. Among females household work was main occupation and agricultural labour and agriculture/labour were subsidiary occupations.

6.4.11 The operated area of beneficiary farms was 110.91 hectares. Of this 75.63 per cent was irrigated. Three fourths of irrigated area was commanded by wells. The gross cropped area was 162.41 hectares. The operated area of non beneficiaries was 27.12 hectares. The percentage of irrigated area was 23.89. Other sources formed 62.50 per cent and wells, 37.50 per cent. The gross cropped area was 32.58 hectares.

6.4.12 On beneficiary farms in the current year jowar contributed 19.59 per cent to the gross cropped area and cotton, 21.91 per cent. Wheat contributed 29.04 per cent and groundnut, 6.78 per cent. Of the gross cropped area 83.11 per cent was irrigated. In the pre project year the proportion of area under different crops was about equal.

On non beneficiary farms the proportion of jowar was higher (34.81) than beneficiary farms (19.59). The proportions of maize (4.33) and wheat (16.78) were lower than the beneficiary farms(9.19 and 29.04 respectively). While the proportion of pulses (3.69) was lower than the beneficiary farms (11.50) the proportion of groundnut was higher (13.36) on non beneficiary farms than beneficiary farms (5.78 per cent). The irrigated cropped area on non beneficiary farms was 35.39 per cent as compared to 83.11 per cent on beneficiary farms.

In the pre project year cropping pattern was about equal to that of the current year. On beneficiary farms the irrigated crop were jowar, maize, wheat, gram, moong, arhar, groundnut and cotton. Against this the irrigated crops on non beneficiary farms were smaller in number and the extent of irrigation was lower than the beneficiary farms. On beneficiary farms in the pre project year the irrigated crops were same but the proportion of irrigated area was lower in the case of maize, wheat, gram arhar, groundnut and cotton. In the case of non beneficiary farms in pre project year the percentage of irrigated area for jowar and maize was more than current year. But for wheat, moong and cotton it was more in the current year than pre project year.

6.4.13 On beneficiary farms the cost of cultivation of jowar was Rs.2,083.95 per hectare. It was Rs.2,331.66 for high yielding varieties and Rs.2,014.27 for local varieties. The total cost per hectare of groundnut was Rs.5,631.34 for high yielding varieties and Rs.5,381.16 for local varieties. The cost per hectare of maize, wheat, and cotton was Rs.2,674.54, Rs.3,405.05 and Rs.5,234.91 respectively. On non beneficiy farms the cost per hectare of jowar was 2,008.16: Rs.2,248.36 for high yielding varieties and Rs.1,959.84 for local varieties. The cost was lower than beneficiary farms. The cost of groundnut was Rs.5,035.86. It was Rs.5,078.51 for high yielding varieties and Rs.5,019.43 for local varieties. The cost was lower than that on beneficiary farms. On non beneficiary farms the cost per hectare of wheat and cotton was Rs.3,232.60 and Rs.4,737.89 respectively. It was lower than the beneficiary farms by Rs.172.45 and Rs.497.02 respectively.

On beneficiary farms the value of output for jowar was Rs.3,715.78 per hectare. The profit came to Rs.1,631.83. The profit per hectare for high yielding and local varieties was Rs.1,658.67 and Rs.1,624.28 respectively. For groundnut the profit per hectare was Rs.5,201.39 for the crop as a whole and Rs.5,766.67 for high yielding varieties and Rs.4,777.43 for local varieties. In the case of maize value of product was Rs.5,187.20 per hectare. The net profit per hectare came to Rs.2,512.65. The net profit per hectare for wheat was Rs.4,212.62 and that for cotton, Rs.12,848.29. On non beneficiary farms the value of product of jowar was Rs.2,730.80 per hectare. The profit per hectare was Rs.722.64. For high yielding varieties the profit per hectare was Rs.923.98 and that for local varieties was Rs.697.22. For groundnut the profit per hectare was Rs.6,127.82 for the crop as a whole. It was Rs.6,921.49 for high yielding varieties and Rs.5,821.97 for local varieties. The profit per hectare of wheat was Rs.2,829.67. For cotton the profit per hectare came to Rs.5,911.64 (Table 6.2).

6.4.14 Beneficiary farmers adopted 5 high yielding varieties of cotton, 3 high yielding varieties of groundnut, 1 of soybean and 3 each of jowar and wheat. Non beneficiaries also adopted 5 varieties of cotton, 1 of soybean and 3 varieties of wheat. Seed treatment was given by 33 out of 45 beneficiaries and all the farmers used improved line sowing method and used manure. Majority of the beneficiary farmers used fertilisers like urea and superphosphate. Among non beneficiaries the adoption of improved farming practices was lower. A total number 1,517 saplings were distributed among beneficiaries. The rate of survival was about half (49.38 per cent). Of the 36 respondent beneficiaries 12 got input supplies within the villages. An equal number got these within a distance of 5 km. Another 9 had to travel a distance between 5 to 10 km. Of the 17 non beneficiaries 5 got the inputs within the villages and another 4 got these within a distance of 5 km. Five non beneficiaries had to travel a distance between 6 to 10 km.

6.4.15 On beneficiary farms crop loans predominated and formed 46.71 per cent of total loan amount taken. Medium term loans formed 36.11 per cent and long term loans, 13.52 per cent. Among the sources of finance, cooperative societies accounted for a title more than 3/4 of total loan amount (76.56). Land Development Bank accounted for 15.78 per cent. On non beneficiary farms the financing agencies were only two : Cooperative Society and Land Development Bank. While former accounted for 29.84 per cent of the loan amount, the latter accounted for 70.16 per cent. Loans from Cooperative Society

Table 6.2 Characteristics of beneficiaries and non beneficiaries, Chanderinala watershed, Khargon district, M.P.

S. No.	Particulars	Beneficiaries	Non beneficiaries
1.	Total Population	337	132
2.	Literacy Percentage		
	Males	57.69	34.09
	Females	30.11	6.06
	All	42.43	19.70
3.	Main Occupation (Percentage)		
	Males		
	a) Agriculture	70.19	54.55
	b) Agricultural labour	9.62	22.73
	Females		
	a) Agriculture	22.58	-
	b) Household Work	61.29	75.76
	Total		
	a) Agriculture	47.72	32.47
	b) Household Work	28.93	32.47
4.	Subsidiary Occupation (Percentage)		
	Males		
	a) Agricultural labour	64.42	56.81
	b) Non agricultural labour	13.46	13.64
	Females		
	a) Agriculture/labour	47.31	27.27
	b) Household work	15.05	3.03
	c) Agricultural labour	8.60	45.46
	Total		
	a) Agricultural labour	38.07	51.95
	b) Agriculture/labour	22.84	11.69
	c) Non agricultural labour	7.11	9.08
	d) Household work	7.11	1.30
5.	Land Particulars		
	Operated area (hectares)	110.91	27.12
	Percentage of irrigated area	75.63	23.89
	Percentage by other sources	26.94	62.50
	Percentage by wells	73.06	37.50
	Gross cropped area (hectares)	162.41	32.58

Contd...2/-

S. No.	Particulars	Beneficiaries		Non beneficiaries	
		Current	Pre project	Current	Pre project
6.	Cropping Pattern(Percentage)				
	Jowar	19.59	19.17	34.81	32.61
	Wheat HYV	29.04	28.78	16.78	12.33
	Groundnut	5.78	7.58	13.36	17.06
	Cotton HYV	21.91	20.64	22.70	23.57
7.	Irrigated Crops (Percentage)				
	Jowar	60.56	60.73	34.77	43.41
	Maize	91.90	60.42	28.37	49.38
	Wheat	100.00	97.05	92.67	73.98
	Gram	94.43	93.91	-	-
	Moong	53.90	56.35	-	44.51
	Arhar	66.67	17.42	-	-
	Groundnut	66.84	35.56	-	-
	Cotton	91.85	84.29	23.27	20.06

8.	Cost of Cultivation (Rs./hectares)	Beneficiaries	Non beneficiaries
	Jowar HYV	2,331.66	2,248.36
	Local	2,014.27	1,959.84
	Total Jowar	2,083.95	2,008.16
	Groundnut HYV	5,631.34	5,078.51
	Local	5,381.16	5,019.43
	Total Groundnut	5,488.38	5,035.86
	Maize	2,674.54	-
	Wheat	3,405.05	3,232.60
	Cotton	5,234.91	4,737.89
9.	Production, Output, Cost and Profit per hectare		
	Production (Quintals)		
	Jowar HYV	14.14	8.64
	Local	7.51	8.45
	Total Jowar	8.97	8.47
	Value of output per hectare (Rs.)		
	Jowar HYV	3,990.33	3,172.84
	Local	3,638.55	2,657.06
	Total Jowar	3,715.78	2,730.80
	Cost per hectare (Rs.)		
	Jowar HYV	2,331.66	2,248.86
	Local	2,014.27	1,959.84
	Total Jowar	2,083.95	2,008.16

Contd...3/-

S. No.	Particulars	Beneficiaries	Non beneficiaries
	Net Profit (Rs./hectare)		
	Jowar HYV	1,658.67	923.98
	Local	1,624.28	697.22
	Total Jowar	1,631.83	722.64
	Groundnut		
	Production (quintals per hectare)		
	HYV	6.22	6.61
	Local	5.60	6.05
	Total	5.86	6.21
	Output (Rs./hectare)		
	HYV	11,398.01	12,000.00
	Local	10,158.59	10,841.40
	Total	10,689.77	11,163.68
	Cost (Rs./hectare)		
	HYV	5,631.34	5,078.51
	Local	5,381.16	5,019.43
	Total	5,488.38	5,035.86
	Profit (Rs./hectare)		
	HYV	5,766.67	6,921.49
	Local	4,777.43	5,821.97
	Total	5,201.39	6,127.82
	Maize		
	Production (quintals/hectare)	10.00	-
	Output (Rs. per hectare)	5,187.20	-
	Cost (Rs. per hectare)	2,674.54	-
	Profit (Rs. per hectare)	2,512.66	-
	Wheat		
	Production (quintals/hectare)	16.24	12.27
	Output (Rs. per hectare)	7,717.67	6,062.27
	Cost (Rs. per hectare)	3,505.05	3,232.60
	Profit (Rs. per hectare)	4,212.62	2,829.67
	Cotton		
	Production (quintals/hectare)	12.61	9.20
	Output (Rs. per hectare)	18,083.19	10,649.53
	Cost (Rs. per hectare)	5,234.91	4,737.89
	Profit (Rs. per hectare)	12,848.28	5,911.64

were crop loans and those from Land Development Bank, term loans for well and pump. In value terms the most important crop was cotton and formed 68.27 per cent of the value of marketed products. The value of wheat marketed was 16.52 per cent. On non beneficiary farms of the total value nearly half (49.64 per cent) was of cotton. Another 1/4 (25.83 per cent) of the total value was that of groundnut. Wheat value was 11.00 per cent. It revealed that cotton was the most important crop from marketing point of view on both beneficiary and non-beneficiary farms. The location of market place in relation to place of residence showed that only one fourth (23.21 per cent) of cotton was sold within the villages. Another 11.82 per cent was sold at places located at a distance upto 5 km. As high as 62.27 per cent worth of cotton was sold at places beyond 10 km. In the case of non beneficiary farmers also 65.20 per cent of the marketed product was sold at a distance 11 km. or more. The value of marketed produce sold within 5 km. was 29.71 per cent. Only 5.09 per cent worth cotton was sold within the village.

6.4.16 Of the total beneficiaries 10 attended the meetings held before planning of crops. As many as 34 beneficiaries participated in training programmes. A large number of 41 beneficiaries told that staff of NWDPRA officials visited their villages and told them about improved methods of cultivation like line sowing by suitable seed drill. On beneficiary farms, farm assets constituted 29.75 per cent and livestock, 57.88 per cent. The non farm assets constituted 12.37 per cent. On non beneficiary farms the proportion of farm assets was lower (24.38) as compared to beneficiary farms (31.25). The proportion of livestock was much higher (75.02) than that on beneficiary farms (62.35). Non beneficiary farmers had practically no non farm assets.

6.4.17 There was not much difference between the profitability per hectare of beneficiary and non beneficiary farms and even if there was any difference it had nothing to do with the NWDPRA implementation. This was because of the fact that the NWDPRA activities were only marginal or peripheral.

Secondly the impact of inputs supplied could be assessed only after few more years. The impact of saplings supplied and construction of Nadef compost pit could be felt only after 5 to 6 years.

6.5.1 For the assessment of impact comparison method was used. Performance of 100 beneficiaries and 50 non beneficiaries was compared. For some aspects pre and post project situations were compared. The terms "beneficiaries" and "non beneficiaries" had a limited meaning. The second limitation was that study was conducted in 1994-95 for the works completed in 1993-94. Thus the period lapsed was short. The amount spent in Silyari nala watershed was 29.21 per cent of the targetted amount and in Chanderinala watershed it was 22.09 per cent. The expenditure incurred was not unformly spread during the reference period. In Silyari nala watershed 57.72 per cent of expenditure was incurred in the last year of the reference period. In Chanderinala watershed the expenditure incurred during the last 2 years was 97.53 per cent. It was observed that majority of the beneficiaries got such benefits which could be termed as marginal or peripheral. One can not expect significant difference in economy of beneficiary and non beneficiary farmers. This was supported by the data. The benefits given were such which would require at least 6 years to show their impact.

6.5.2 Preliminary activities included training and extension activities. A nursery and Chetna Kendra established at village Lawar in Raipur district had a good impact. In Khargon district Chetna Kendra was established by NWDPRA and the state government nursery was used. Both had good impact.

6.5.3 Agricultural and development measures included soil conservation measures. These helped in checking reel erosion. It is suggested that semi permanent structures be constructed and provision for repairs and renovation be made. The use of ipomea be avoided. Under gully control measures live checks, earthen checks, vegetative checks and loose bolder checks were constructed. These measures had a definite impact on checking soil and water erosion and was visible from siltation occuring due to these. Demonstrations of double cropping and inter cropping had good impact. In agro forestry bamboo saplings were distributed and under dryland horticulture, saplings of horticultural crops were distributed. The impact was very limited due to high mortality percentage. These programmes should be taken up with more training and after care. In the prevailing system of grazing of cattle the programmes have limited scope. The method of compost preparation by constructing Nadef tanks was appreciated. However, impact could be measured only after 3-4 years. In the case of planting

of saplings of horticulture and agro forestry the mortality was high and the impact of surviving plants could be known after 4-5 years.

6.5.4 The works under non agricultural land development were insignificant in number and scattered to make any impact. Under planting of grasses planting on nala banks and afforestation very little was done to create an impact.

6.5.5 Maximum percentage of funds were spent on "Drainage Line Treatment". Incidentally this was the item which showed significant impact. Under upper, middle and lower reaches treatment live checks, bush wood checks and loose bolder checks were constructed not only across nalas but also on smaller nalas and gullies joining the main nalas. It had two fold effect. Firstly these helped in reducing the speed of water gushing into nalas and secondly siltation took place checking soil erosion. Check dams in series have helped to check erosion and siltation in the main nala or sunken or dug out ponds.

Sunken ponds in upper reaches and small dug out ponds in middle reaches made two impacts: The water so stored was used by cattle and at places it was used for irrigation. At a few places around ponds vegetable cultivation was initiated and fishery was started. The water table in wells around ponds had increased.

However it may be emphasised that these structures need regular maintenance and repairs. We were told that there was no provision for these. In the absence of maintenance and repairs the structures got destroyed. It is recommended that provision for maintenance and repairs be made.

It will not be out of place to mention that the entire programme needs awakening among villagers for their participation. Without the active participation of people the programme would achieve only limited success. Another important point is that the impact would be felt only when large and continuous investment would be done. Sporadic investment would not yield results. Moreover the results will be felt only after a lapse of 5-6 years.

6.5.6 No works were done on farmers fields and, therefore, there was no direct impact. Advisory work like growing of arhar and castor on bunds in Silyari nala watershed of Raipur district had good impact. Livestock management programme attracted least attention. Less than 1 per cent of budgeted amount was spent. There was no impact of the programme.
