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GOVERNMENT OF MAHARASHTRA

DEPARTMENT OF AGRICULTURE

BOR PROJECT

IRRIGATION UTILISATION
AND
AGRICULTURAL DEVELOPMENT REPORT

IRRIGATION UTILISATION BRANCH

DEPARTMENT OF AGRICULTURE, M. S., POONA.

MAY 1965.

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FOREWORD

Bor Project is one of the major irrigation projects in the cotton growing districts of Vidarbha. Wardha district in which this project is situated enjoys annual average rainfall between 35" to 45" and is known as moderately high rainfall area with trap soils. The lands are fertile and with well distributed rainfall during monsoon season, are capable of giving fairly high yields. A few irrigation experiments that have been conducted so far with well irrigation have indicated that pre-monsoon sowing of cotton under irrigation can boost up the yield by 100 percent. Since the lands are fertile and with irrigation becoming available, cultivators can resort to double cropping as well as cultivation of perennial crops like sugarcane, banana and citrus, and two seasonal crops like chillies, turmeric etc.

Bor project will be completed during 1965 and water will become available for irrigating 12,090 acres during 1965-66 season. Full irrigation potential of 23,000 acres in the first stage will be developed in 1966-67 and of 33,000 acres in the second stage will be developed in the subsequent year. As recommended by the Irrigation Commission, the period of development of irrigation which is reckoned as 10 years from starting of irrigation should be shortened to 8 years from starting of construction work or 5 years from starting of irrigation. It is therefore, essential to take simultaneous action with construction work for development of the command area so that full utilisation of irrigation potential is achieved by 1970-71.

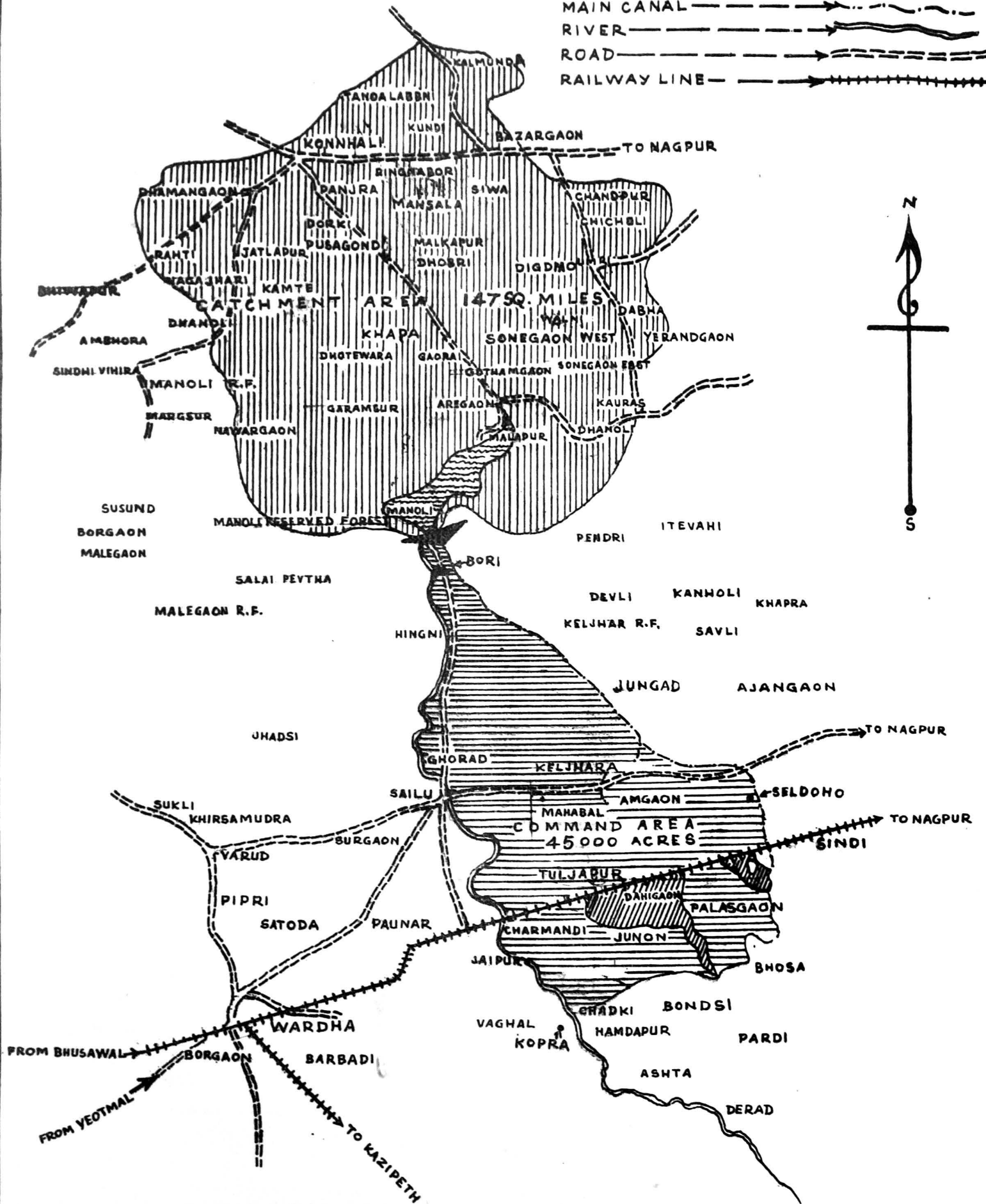
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Government have already approved a Package Programme for Bor project. Survey of the command area has already been completed. Land for establishing a Trial-cum-Demonstration farm has also been acquired and further steps for laying down irrigation experiments will be taken during 1965-66. Land development work including levelling and bunding as well as appointment of special staff under the Irrigation Units to render technical advice will also be taken up during 1965-66. Nevertheless as utilisation is dependent on several other factors such as long, medium and short term financial assistance, improved agricultural techniques etc., it is necessary to have a regular plan of action if the utilisation is to be effected within 5 years as recommended by the Maharashtra State Irrigation Commission. For such planned action a regular project report for irrigation utilisation and agricultural development is necessary and has been prepared for the Bor project. This report not only gives all information at one place but also gives existing agricultural development in the command area of the project and what needs to be done in a coordinated manner by different departments to achieve the objective of full utilisation of irrigation potential. It also gives an idea of the requirements of agricultural requisites by way of machinery, implements, seed, fertilizers, pesticides, cement etc., as well as short, medium and long term loan needs of the irrigators. It is hoped that this report will be useful to the concerned staff in executing the programme efficiently as well as watching the progress of irrigation utilisation.

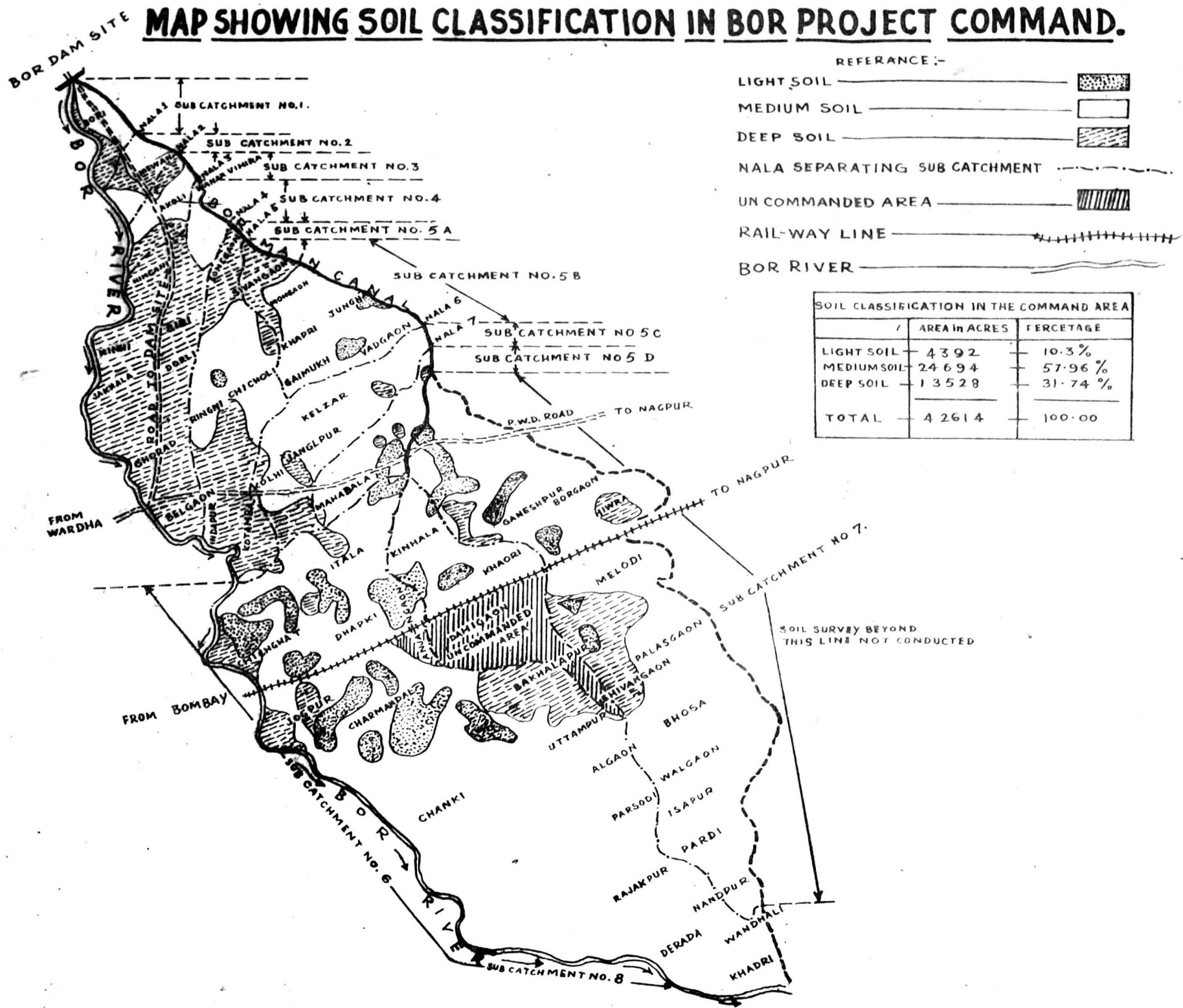
V. G. VAIDYA
Additional Director of Agriculture,
Maharashtra State, Poona 1.

MAP SHOWING THE BOR PROJECT COMMAND.

- DAM —————
- WATER SPREAD AREA —————
- CATCHMENT AREA —————
- COMMAND AREA —————
- OUT OF COMMAND AREA —————
- MAIN CANAL —————
- RIVER —————
- ROAD —————
- RAILWAY LINE —————



MAP SHOWING SOIL CLASSIFICATION IN BOR PROJECT COMMAND.



REFERENCE:-

- LIGHT SOIL
- MEDIUM SOIL
- DEEP SOIL
- NALA SEPARATING SUB CATCHMENT
- UN COMMANDED AREA
- RAIL-WAY LINE
- BOR RIVER

SOIL CLASSIFICATION IN THE COMMAND AREA		
	AREA IN ACRES	PERCENTAGE
LIGHT SOIL	4392	10.3%
MEDIUM SOIL	24694	57.96%
DEEP SOIL	13528	31.74%
TOTAL	42614	100.00

Irrigation Utilisation and Agricultural Development Report

BOR Project

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BOR PROJECT.

Salient Features.

1. Location : The dam on Bor river is located near village Bori, 9 miles north of Seloo in Wardha district of Vidarbha region of Maharashtra State.

Taluka - Wardha, District- Wardha.

Dam site - near village Bori

Longitude - $78^{\circ} - 42' 6''$

Latitude - $20^{\circ} - 57' 20''$

2. Description : It is an earthen dam 3,800' long and 119' high across the river Bor, a tributary of Painganga river of Godavari basin, in Wardha district, to impound a total storage of 4,900 MCft on final completion. A left bank canal 14 miles long and distributaries and minors 120 miles long cover 61 villages of Wardha tehsil and 14 villages of Hinganghat tehsil. The project will be carried out in two stages. The main canal will carry a discharge of 270 Cft per second in the 1st stage and 340 Cft per second in 2nd stage. The total area under command is 45,000 and 88,000 for stage I and II respectively, out of which the area proposed for irrigation is 23,000 and 33,000 for stage I and II respectively. The stage of irrigation which is now in progress will only provide for the first stage of development.

3. Catchment : 147 sq. miles (380.73 sq. km.)

4. Yield of catchment : Average- 5640 MCft (159.70 MCM.)
Maximum- 10,536 MCft (293.35 MCM)
Minimum- 414 MCft (11.72 MCM)

5. Gross command area :

Stage I - 45,000 acres (18,211 hectares)

State II- 80,000 acres (32,376 hectares)

6. Culturable area :

Stage I- 33,000 acres (13,355 hectares)

Stage II- 59,000 acres (23,878 hectares)

7. Capacity of the canal :

1 left bank canal - 340 cusecs 9.63 cu.meter/second)

8. Area proposed to be irrigated :

Stage I- 23,000 acres (9,308 hectares)

Stage II- 33,000 acres (13,355 hectares)

9. Total cost of the project :

Stage I- Rs.2.96 crores

Stage II- Rs.3.47 crores.

10. Overall cost of the scheme per acre

of irrigation of 33,000 acres - Rs.1051.57

11. Stages in which water will become available :

	Potential (acres)	Utilisation (acres)
1965-66	12,000	-
1966-67	23,000	-
1967-68	33,000	-

12. Normal rainfall in the command area :

The annual average rainfall at Wardha is 43.16" (average for 1940-1957). Monthly rainfall for the period 1940-1962 at Wardha is given in Appendix I.

	Wardha (inches)
Monsoon -	
June	6.30
July	14.49
August	9.47
September	7.35
October	1.96
Rabi- November to February	2.22
Hot weather- March to May	1.37
	<hr/>
	43.16

13. Temperature : Maximum 115° F
Minimum 55° F

14. Soils and agro-climatic zone : The command as well as the catchment area of the project lies in agro-climatic zone V-B "moderately high rainfall with trap soils". The rainfall ranges from 35" to 45" but in some years it is as high as 50" and above affecting cotton and jowar crops by creating water logged conditions. The soils are medium to heavy. Deep soils are more than 8' deep and contain clay from 35-40%. These are adjoining river Bor and its distributaries and form 28% of the total command area. Medium soils (18"-8') are predominant and occupy 58% of the command area. These generally spread out in the lower reaches of the canal but in the upper reaches extend in long strips which run parallel to the canal and are adjoining deep soils. The survey indicates that only 15% soils are light with soil cover of 0-18". Soil samples from 291 soil profiles were collected and only 12 samples indicate salt content above 0.5%. Water table in rainy season in 50% of the wells is within 10' while in the remaining wells it is below 10' indicating that the soils are well drained. Out of the water samples tested, 9 were found saline while none were alkaline.

15. Topography of the land : The area under command is mostly level with slight undulations. Some lands in villages viz. Dahegaon, Anjangaon, Tuljapur and Pahilanpur right in the midst of the command area are out of command. Classification of soils in the first 12,978 acres of the command with regard to percentage slope is given below :

	<u>Area</u>	<u>Percentage</u>
Flat land and upto 1% slope	7408.88	57.12
1 to 2% slope	4507.33	34.69
2 to 3% slope	858.17	6.63
Ravine lands heavily undulating and more than 3%	82.99	0.65
Land unfit for cultivation being rocky, hilly	120.53	0.91

	12977.90	100.00

16. Existing pattern of cultivation in Wardha tehsil :

	Area acres	Percentage
Rice	900	0.3
Kharif jowar	129,600	33.8
Wheat	30,900	8.0
Other cereals	140	0.0
Pulses	48,800	12.7
Cotton	154,400	40.2
Oilseeds	13,200	3.4
Fruits, vegetables and spices	5,400	1.4
Miscellaneous	460	0.2

	383,800	100.0

17. Proposed crop pattern :

	Stage I		Stage II	
	Acres	Percentage	Acres	Percentage
Other perennials	875	3.8	1000	3.1
Rice	5250	22.8	7000	21.2
Cotton	10,950	47.6	13,000	39.4
Rabi	5250	22.8	11,200	33.9
Hot weather seasonals	675	3.0	800	2.4
Follow on crops	(2500)	-	(7000)	-
	-----		-----	
	23,000	100.0	33,000	100.0

18. Agricultural Research Stations : There is a Seed Multiplication Farm at Sukli in Seloo Panchayat Samiti. There is need for a Trial-cum-Demonstration farm and one having 51.88 acres of land is being set up at Seloo.

19. Existing general agricultural development in the area :

The command area is in agro-climatic zone V-B "moderately high rainfall with trap soils". Though hardly 1.3% area receives irrigation water from wells, the soil-climate complex is such that the command area is not liable to famine. The standard of cultivation is fairly high and cultivators reap good harvest of kharif jowar, chillies and cotton, 80% of which is long staple American cotton- variety Buri L-147. Soils which receive irrigation water give excellent crops of banana, orange, vegetables, chillies and L-147 cotton sown by end of May. The main markets are at Wardha, Seloo, Sindi, Nagpur and Hinganghat. With the irrigation water becoming available from the irrigation project and proximity of markets connected by rail and road to cities like Nagpur, Wardha, Jalgaon, Bombay etc. it is likely that cultivators will develop cultivation of pre-monsoon sown L-147 cotton, wheat, banana, oranges and vegetables including chillies. The agricultural conditions being fairly stable, people are economically well placed. Density of population is 308 per sq. mile in Wardha tehsil and 197 per sq. mile in Hinganghat tehsil. Percentage of population dependent on agriculture is 58.6% in Wardha tehsil and 66.3% in Hinganghat tehsil indicating that Wardha tehsil is industrially more developed and nearly 40% population is dependent on non-agricultural pursuits. Similar data is obtainable in percentage of literacy which is 23.5 in Wardha as against 15.2 in Hinganghat tehsil. The area irrigated is 4,798 acres in Wardha tehsil and only 1,360 acres in Hinganghat tehsil which expressed in percentage area irrigated to total cultivated area is 1.3 in Wardha and 0.4 in

Hinganghat tehsil respectively. There is great scope for industrial development in view of cultivation of crops such as cotton, banana, oranges, groundnut, chillies which are amenable to processing.

20. What is envisaged after area development programme is carried out ?

Bor project will irrigate 23,000 acres in the first stage and 33,000 acres in the second stage. It will benefit 2,307 cultivators owning 12,977.90 acres of Seloo block during 1965-66. Further survey is in progress. Percentage of irrigated area to total cropped area in Wardha tehsil will go up from 1.3 to 7.3% hence the importance of the project in the agricultural economy of the area cannot be over-emphasized. Increased production of L-147 cotton will not only improve the economic condition of the cultivators but go a substantial way in improving shortage of long staple cotton in the Indian Union. There is a proposal to increase the area under sugarcane with the ultimate object of establishing a sugar factory. The project will also provide raw material for processing industries like cotton ginning, oil extraction, gul making, fruit canning and making chilly powder etc. The area is already surplus in foodgrains and additional production of wheat will partly help in improving the food deficit of Maharashtra State.

Bor Project

Chapter I.

1.1 General description and history :-

Bor project is one of the major irrigation projects in Vidarbha region. It was originally undertaken by the ex-Madhya Pradesh Government as a part of a wider programme to provide irrigation facilities and protect agriculture. The project was administratively approved by that Govt. in August 1956 at a cost of Rs.160 lakhs and was included in the Second Five-Year Plan. After the reorganisation of States, the project was transferred to Bombay Government. It was found that the project required to be recast on technical considerations especially crop planning, hydrology and final utilisation of water besides construction planning. The entire project was therefore, recast and undertaken in two stages at an estimated cost of Rs.3.47 crores.

2. The necessity of taking up the project :-

Wardha district has annual average rainfall of 38.69" per year which is normally considered adequate for kharif cropping. Vagaries of monsoon however, make it difficult to exploit fully the agricultural potential of the tract especially when the lands are fertile and can give far better yields if little help is given by way of irrigation, particularly in the latter part of September and first week of October when sometimes monsoon fails and the cultivators are worried about their standing kharif crops as well as timely sowing of rabi crops. Irrigation will serve not only as insurance against vagaries of monsoon but also enable double cropping. It was therefore, proposed to construct an

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earthen dam across the river Bor near village Bori in Wardha taluka, 9 miles north of Seloo which is 38 miles from Nagpur or 20 miles from Wardha on Nagpur-Wardha State Highway. The site of the project is approachable by an all-weather metal road from Seloo, on which State Transport buses are plying regularly from Wardha.

1.3 The river Bor : The river Bor which gives its name to the project rises in Satpura ranges near village Tanda Labbani in Nagpur district situated 1600' above MSL and flows south-west towards Wardha. The proposed dam site is located 20 miles from the source. The Manoli Nalla which is one of its major tributaries joins Bor river $1\frac{1}{2}$ mile upstream of the dam site. There is a good post-monsoon flow in this region which dwindles down to 15 cusecs in winter and 2 cusecs in summer. Bor river is a tributary of Painganga river in Godavari basin.

1.4 Site of the project ; The site of the dam is near village Bori which is 9 miles north of Seloo in Wardha taluka of Wardha district.

1.5 Catchment area : The catchment area of Bor river at dam site is 147 sq. miles, major portion of which lies in Nagpur district. The average yield of catchment is 5,640 MCft. The entire catchment is hilly and can be considered to be good one for the purposes of computing yields since the area consists mostly of rock and murum formation which are quite free draining.

1.6 The Dam : The dam consists entirely of an earthen embankment 3,800' (1158 metres) long (excluding waste weir portion) with maximum height of 119' in the gorge and width

of 825' (252 metres) at the base. Total earth work required is 86 MCft. The bed level at this point is RL 976, the proposed FSL being 1084 (2nd stage) and the top of dam RL 1095. The lake submerges an area of 3600 acres and six villages of which 3 are Abadi and 3 have only land.

1.7 The Waste weir : The waste weir 424' long will be capable of routing a maximum flood of 1.08 lakh cusecs. It will consist of an U.C.R. masonry hearting with RCC on top of Ogee shape. The storage of 3200 MCft in Stage I with a clear overfall waste weir will be increased to 4900 MCft during Stage II, by installation of 9 radial gates of size 40' x 16'. The width of waste weir is 424'. The crest of waste weir is at RL 1068 which is 44.91' above the sill level of outlet. The waste weir is located in a part of the dam line on the left flank since hard rock was expected to be met at a reasonable depth below G.L. on the flank.

1.8 The canal : Only one left bank canal takes off from the dam on the left bank at Ch. 28.5. The length of the main canal is 14 miles with discharging capacity of 340 cusecs at the head. The canal with a distribution system of 120 miles will bring under ^{gross} command an area of 45,000 acres in the first stage and 88,000 acres in the second stage. The area proposed for irrigation is 59,000 acres of mixed crop from Wardha and Hinganghat tehsils of Wardha district. Out of this, 23,000 acres will be irrigated annually during the first stage and 33,000 acres in second stage. The canal benefits 61 villages from Wardha tehsil and 14 villages from Hinganghat tehsil. The canal is lined throughout.

1.9 Progress of work : The work of the dam proper started during October 1958. The work of this project is in advanced stage of construction. Earth work on the flank is completed. Construction of waste weir, tail channel and outlet head regulator is completed. Canal earth work of all 14 miles is completed. 95% of lining is also completed. The gorge filling work is started from 1st December 1964 and 12 MCft of earth work is scheduled to be completed by April 1965. Stage II earth work of 6 MCft will be done in continuation to be completed by June 1965.

After gorge filling is completed by end of April 1965, a storage of 2000 MCft will be created sufficient to irrigate 12,000 acres of irrigable area during 1965-66. The distribution system for this area will be ready by June 1965.

1.10 No. of villages under command, area which can be irrigated in each village and No. of cultivators who will be benefitted.

In the first stage, 23,000 acres will be irrigated in 67 villages, 61 of which lie in Seloo block of Wardha tehsil and 6 in Samudrapur block of Hinganghat tehsil. In the second stage, additional area of 10,000 acres will be irrigated in 8 villages of Samudrapur block of Hinganghat tehsil. Topographical survey of all 33,000 acres in 75 villages has been undertaken. Survey of about 12,000 acres belonging to 2,307 cultivators which will receive irrigation during 1965-66 has been completed, the villagewise details of which are given in the following table.

Sr. No.	Name of village	Block	No. of cultivators benefitted	Area which will be irrigated acres
<u>Wardha tehsil</u>				
1.	Sonegaon	Seloo	63	304.90
2.	Wadgaon	"	21	96.42
3.	Mohgaon	"	28	243.65
4.	Kinhi	"	44	525.98
5.	Kelzar	"	129	1539.00
6.	Borgaon	"	53	289.43
7.	Akoli	"	53	65.59
8.	Shivangaon	"	17	113.59
9.	Bori	"	70	175.47
10.	Mungapur	"	3	15.60
11.	Chicholi	"	43	323.37
12.	Junewani	"	46	232.28
13.	Janglapur	"	94	564.07
14.	Ringni	"	84	294.92
15.	Dhondegaon	"	7	43.75
16.	Dorli Kh.	"	9	98.46
17.	Gaimukh	"	57	629.51
18.	Khadki	"	27	213.55
19.	Ganeshpur	"	9	114.63
20.	Dorli Bk.	"	158	506.67
21.	Bibi	"	32	108.03
22.	Lodhanpur	"	56	227.36
23.	Mahabala	"	44	355.21
24.	Jungad	"	16	207.25
25.	Kolhi	"	36	432.40
26.	Gangapur	"	17	253.26
27.	Kotamba	"	121	708.24
28.	Belgaon	"	205	480.81
29.	Jakhla	"	92	440.92
30.	Kolegaon	"	121	632.53
31.	Indapur	"	37	124.64
32.	Amgaon	"	82	621.61
33.	Pipra	"	24	130.01
34.	Ghorad	"	429	1780.79
			2307	12977.90
35.	Hingni	"		
36.	Mohi	"		
37.	Khapri	"		
38.	Kinhala	"		
39.	Itala	"		
40.	Danegaon	"		
41.	Anjangaon	"		
42.	Dhapki	"		
43.	Chinchghat	"		
44.	Jogapur	"		
45.	Charmandal	"		

1	2	3	4	5
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Wardha tehsil

46.	Junona	Seloo
47.	Dablapur	"
48.	Bakhalpur	"
49.	Alagaon	"
50.	Uttampur	"
51.	Bandsula	"
52.	Madka	"
53.	Chandki	"
54.	Hamdapur	"
55.	Deulgaon	"
56.	Seldoh	"
57.	Hiwra	"
58.	Belodi	"
59.	Helodi	"
60.	Tuljapur	"
61.	Palasgaon	"
62.	Pahilanpur	"

Hinganghat tehsil
(1st stage)

63.	Nandpur	Samudrapur
64.	Bhosa	"
65.	Vaygaon	"
66.	Isapur	"
67.	Pardi	"
68.	Kinra	"
69.	Palsod	"
(stage II)		
70.	Rajakpur	"
71.	Ashta	"
72.	Jejori	"
73.	Bawapur	"
74.	Derda	"
75.	Khuni	"
76.	Wandhal	"

1.11 Size of land holding in the command area :

Though holdingwise classification of cultivators is not yet completed, the number of cultivators falling in different groups in the first 34 villages covering 12,978 acres of command is as follows :

Villagewise details are given in appendix II

Sr. No.	Group of holding	No. of cultivators	Percentage
1	0 - 5 acres	1425	61.7
2	5 - 10 acres	567	24.6
3	10 - 15 acres	188	8.2
4	15 - 20 acres	77	3.3
5	above 20 acres	50	2.2
		2307	100.0

It will be observed that about 86 percent cultivators will receive irrigation benefit for less than 10 acres. There is hardly any likelihood of cultivator being affected by Ceiling Act as maximum area allowed for different types of irrigated area is given below :

	<u>acres</u>
Perennial canal irrigation	1800
Two seasonal canal irrigation	27.0
One seasonal canal irrigation	36.0
Inirrigated area	48.0

CHAPTER II.

Soil type and topography of the command area.

2.1 The command area of Bor project lies in the agro-climatic region V-B "moderately high rainfall with trap soils". The annual rainfall ranges between 35"-45" and in some years as high as 50" and above affecting cotton and jowar crops by creating water logged conditions. Major part of the precipitation is received from south-west monsoon from the end of June to mid-October. The soils of the entire command area are derived from disintegrated basalt of various shades varying from brown to black. The soils are of argelacious nature and the colour depends on the organic matter it has imbibed and the length of time it has been exposed to the air. The command area of the first stage of Bor project was surveyed and the soil classified on the basis of depth of soil cover. Light soils having a soil cover of 0"-18" and brown in colour are predominant in the lower reaches of the canal while the deep soils above 8' soil cover are situated adjoining the Bor river and its tributaries. About 58 percent soils are medium soils with 18" to 8' soil cover and exist in long strips running parallel to the canal. The soils can be described in general as under :-

1. Deep soils : These are situated adjoining the river Bor and its tributaries and form 26% of the total command area. They are black in colour and can be classified as Kali and Morand I. They are blacky in structure, fine in texture containing clay from 35% to 40%, retentive of moisture and slowly drained. They become sticky when wet and crack freely

in the dry weather and are comparatively heavy to work. They are more than 8' deep. pH is round about 8. It will be necessary to provide drains and generally perennial crops should be discouraged.

2. Medium soils : These soils mostly Morand are predominant in the command area and occupy about 58% of the area. Medium soils between 18" to 8' soil cover generally exist in long strips which run parallel to the canal in the upper reaches and are adjoining the deep soils. At lower reaches of the canal the medium soils are spread around the shallow outcrops. They are ~~black~~ to dark brown in colour, granular to blocky in structure and loam to clay loam in texture. The permeability ranges in majority cases from 0.18 to 0.6 inch per hour and is considered moderate. When irrigation is undertaken, particularly perennial irrigation, the rise of sub soil water level in the area will have to be kept under observation. The pH of the soil ranges from 7 to 7.8. The total soluble salts present is less than 0.1%. The total exchangeable capacity is above 60 m.e. per 100 gms. of soil, the predominant cation being calcium. It would be desirable to take seasonal or two seasonal crops excepting the part of the area in the lower reaches of the canal which is well drained and suitable for intensive irrigation

3. Light soils : These soils are brown in colour, have 0" to 18" soil cover and are highly drained. They form 16% of the total command area. They are predominant in the lower reaches of the canal where a number of shallow outcrops are come across. In the upper reaches of the canal the soils are

mostly medium to deep. These soils being well drained are capable of growing good crops of cotton and jowar even in years when rainfall is heavy and continuous.

2.2 There are a number of well defined Nallas and the drainage capacity of the area in general is satisfactory. The soil samples from 291 profiles have been collected and only 12 samples indicate the existence of salts over 0.5%. The ranges of analytical data of different constituents in deep and medium soils are as under :

pH	7.55 to 8.45
Total soluble salts	0.29 to 0.44
Exchangeable Ca	30 to 50 me/ 100 gm.
Exchangeable Mg	3 to 10 me/ 100 gm.
Exchangeable K	0.1 to 0.6 me/ 100 gm.
Organic carbon	0.33 to 0.4 %
Total N	0.042 to 0.052%
Available P205	10.0 to 15.0 lb. per acre
Available K2O	200 to 3000 lb/ acre
Calcium carbonate	3 to 4%

About 300 soil samples from Selo block which covers considerable portion of the command area were analysed. The soil test summary is given below gives a fair idea about the fertility level of the soils.

<u>Value</u>	<u>Unit for various classes</u>		<u>percentage of samples</u>
pH	Below 6	Acidic	-
	6-8	Neutral	88
	above 8	Alkaline	12
Electrical conductivity	upto 1	Normal	100
Organic carbon %	Low	below 0.5%	61
	Medium	0.5 to 0.75%	33
	High	above 0.75%	6

contd.

Available P205 (lb/ acre)	Low	Below 20	70
	Medium	20 to 50	25
	High	above 50	5
Available K20 (lb/acre)	Low	Below 200	-
	Medium	200 - 400	56
	High	above 400	44

The above analysis indicates that the soils in this area are normal as far as their total soluble salts, pH and permeability are concerned and use of organic manures would further improve them.

2.3 273 wells have been observed in the command area and the fluctuations of water levels in different seasons have also been noted down by the Soil Survey Division, Nagpur. This will help in introducing specific intensity of irrigation in command.

The water level in 152 wells out of 273 wells is within 10' in rainy season and out of these 104 wells exist in medium soils. In the remaining 121 wells the water table is below 10' in rainy season. Out of the 273 water samples collected from wells in the command some 9 samples are found to be saline while none of the samples is found to be alkaline. There is therefore, no harm at all if the soils are irrigated by river water.

2.4 Distribution of soils in the command area is given below. A total area of 23,000 acres was surveyed by the Soil Survey Sub Division, Nagpur of the Irrigation & Power Department. The officer i/c classified light soils as having a soil cover of 0"-18", medium soils 18"-8' and deep soils more than 8'

	Stage I		Stage II	
	Area	%	Area	%
Light soils	3680	16	4392	10.3
Medium soils	13340	58	24694	57.96
Deep soils	5980	26	13528	31.74
	23,000	100	42614	100.0

2.5 Topography : The command area of 23,000 acres is being surveyed by the Land Utilisation Survey staff of the Agriculture Department and topographical survey of about 12000 acres for which water will be available during 1965-66 is completed. The classification of lands with regard to percentage slope is given in the following table. Villagewise details are given in Appendix VIII.

	<u>Area</u>	<u>Percentage</u>
1. Flat lands and upto 1% slope	7408.88	57.12
2. 1 to 2% slope	4507.33	34.69
3. 2 to 3% slope	858.17	6.63
4. More than 3% slope, ravine and cut up lands	82.99	0.65
5. Rocky, hilly lands, unfit for irrigation	120.53	0.91
	<u>12,977.90</u>	<u>100.0</u>

The cost of survey for categorisation of land according to percentage slope is Rs.0.50 per acre.

CHAPTER III

Crop Pattern.

3.1 The existing crop pattern in relation to soil and rainfall condition ⁱⁿ Wardha tehsil is as under :

<u>Crop</u>	<u>acres</u>
Rice	900
Wheat	30,900
Kharif jowar	129,600
Other cereals	140
Gram	2,500
Mug	15,700
Tur	26,300
Other pulses	4,290
Sugarcane	80
Chillies & other condiments	2,600
Fruits including banana, oranges	1,400
Vegetables including onion	1,400
Cotton	154,400
Groundnut	3,100
Linseed	9,500
Other oilseeds	610
Fodder crops and miscellaneous	380

Total cropped area	383,800

An analysis of the existing crop pattern indicates that 34% area is under kharif jowar and 40% area is under long staple cotton. 88.4% of the area is under kharif crops and only 11.6% area is under rabi crops. Hardly 0.7% area is under chillies. Vegetables and fruits do not account for even 0.75%, not because these cannot be grown but because irrigation facilities are not available.

3.2 Existing sources of irrigation in Wardha tehsil :

	<u>acres</u>
Govt. canals	-
Private canals	-
Wells	4,750
Other sources - 1 tube well	40

No. of built wells	1,980
No. of kacha wells	444
Wells not in use	3,677

Percentage of irrigated area to total cropped area 1.3

3.3 Irrigated crops :

	<u>acres</u>
Gram	20
Rice	30
Wheat	340
Kh. jowar, bajri, maize	30
Sugarcane	80
Chillies	1790
Other foodgrains	2540
Total foodcrops	4830
Cotton	110
Other crops	120
Total cropped area	5060

(Source : Maharashtra Krishi Darshan.
Figures are for 1957-58.)

3.4 The existing cropping in the villages of the command area under Bor project is given in Appendix IV. This agrees closely with the district crop pattern. It will also be observed that there are certain villages in which orchards and vegetables are grown on a large scale, e.g. Bori, Hingni, Khapri, Jungad, Gharad, Amgaon, Khadki, Danegaon. These indicate the possibility of increasing the area under these crops considerably when canal water becomes available.

3.5 The following crop pattern has been sanctioned in the project report of Bor project :

	<u>Stage I</u> (acres)	<u>Stage II</u> (acres)
Other perennials	875	1000
Rice	5250	7000
Cotton	10,950	12,000
Rabi	5250	11,200
Hot weather seasonals	675	800
Follow on crops	-	(7000)
	-----	-----
	23,000	33,000

The Irrigation Department expects to give water for 12,000 acres only during 1965-66 season and for the full area of 23,000 acres from June 1966 onwards. Further the command area has been divided into eight sub catchments. The distribution of crops under the first six sub catchments is shown below :

Sub-catchment	Crops				
	Other perennials	Rice	Cotton	Rabi	Hot weather
1	-	-	-	-	239
2	-	-	-	-	275
3	-	-	-	-	286
4	-	3950	-	-	-
5-A	-	2550	-	-	-
5-B	1000	200	-	-	-
5-C	-	300	1150	825	-
5-D	-	-	655	320	-
6	-	-	200	140	-
	-----	-----	-----	-----	-----
	1000	7000	2005	1285	800

Grand total :- 12,090

3.6 Comments :- The basis on which the sub-catchments have been formed and the acreage for different crops proposed is rather arbitrary and not quite clear. While hot weather seasonals are restricted to first three sub-catchments near the dam site, other perennials including

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sugarcane and banana are restricted only to sub-catchment 5-B which has medium soil. Rice is proposed mainly in sub-catchments 4 and 5-A which have predominantly heavy soils. No other crop is proposed for these sub-catchments. Cotton and rabi are mainly allotted to sub-catchments 5-C, 5-D and 6, which have predominantly medium and light soils and no heavy soils which are suitable for rabi.

It may be said at the outset that cotton forms 40% of the cropped area while jowar forms 34%. Since cotton is a cash crop and jowar is food and fodder crop, the cultivation of these crops will not be given up by the cultivators and they will be continued to be grown in every village even after irrigation is provided. It may be possible that area under them may be adjusted slightly in view of other lucrative crops. It is therefore, necessary to give irrigation for cotton in all sub-catchments. This irrigation will be required from 15th May for which there will be great demand. There will not be any demand for irrigation to kharif jowar. Area under kharif groundnut is also very limited and there will not be much demand for irrigation to that crop also. Hybrid maize can be grown and will give good returns in both kharif and hot weather seasons. It may not grow satisfactorily during winter season because of severe winter. Hybrid maize may replace kharif jowar to a certain extent and cultivators may take protective irrigation for hybrid maize as it will be grown under heavy manurial doses. Hybrid jowar when introduced has good future in this area and will replace ordinary jowar

grown without irrigation. It may also need protective irrigation.

Rice is not a crop of this region but will be grown in the low-lying heavy areas along the Bor river as it can stand water logged conditions. The undulating lands will have to be converted into bunded fields in the first 5 sub-catchments. Hence rice may be allowed in all the 5 sub-catchments. A follow on crop of gram and linseed may also be taken to the extent of 1500 and 2000 acres respectively.

It may be observed that 1790 acres of chillies are irrigated out of a total area of 2400 acres under chillies. Chillies are planted sometime in July and harvested by end of December. This is a two seasonal crop but no provision has been made for it in the crop pattern. 500 acres may therefore, be allotted for chillies out of the area allotted for kharif (rice) and rabi seasonals.

As regards other perennials, these may be restricted to medium and light soil areas along the main canal. Which crops are included under 'other perennials' is not quite clear. There is great demand for sugarcane in this area and the Zilla Parishad is contemplating to set up a co-operative sugar factory in Wardha district in the near future. Irrigation may therefore, be provided for 600 acres under cane. Bananas grow luxuriently and Selo bananas are famous in the tract. The whole of Nagpur and Wardha region is famous for Nagpur oranges and as such 150 acres and 125 acres will have to be allotted for banana and orange respectively making up the total area under 'other perennials' to 875 acres.

Irrigated wheat may also be concentrated in sub-catchments 2, 4 & 5 which have predominantly heavy soils in the areas adjoining bunded fields of paddy. Wherever irrigated wheat is grown, a monsoon crop of mug or udid and groundnut may also be encouraged as a double crop. Sann and mug green manuring can also be followed in order to maintain fertility of the soil.

From agro-climatic point of view it has been made clear that cultivators will not go in for irrigation of kharif crops unless there is serious failure of monsoon in the second fortnight of September. Such a contingency may arise once in 10 years. If therefore, irrigators are to be encouraged for taking monsoon irrigation as insurance, the rates will have to be so fixed as to make it an attractive proposition. The main demand for irrigation is for cotton and that too for pre-monsoon irrigation because experiments have shown that pre-monsoon irrigation increases the yield by almost 100%.

Next in order will be the demand for other cash crops particularly chillies and heavy perennials like sugarcane and banana and light perennials like oranges which grow successfully in this area. The Irrigation Department may have to keep this factor into consideration while allocating water for crops in different seasons.

The revised crop pattern showing area under different crops is given below :

<u>Crop</u>	<u>area</u>
Other perennials :	
Sugarcane	600
Oranges	125
Bananas	150
Kharif seasonal :	
Rice	3750
Hybrid maize	1000
Two seasonals :	
Chillies	300
Cotton	10950
Rabi seasonals :	
Wheat	4750
Hot weather seasonals :	
Vegetables & fodder	225
Hybrid maize	225
Hot weather groundnut	225

	22500
Follow on crops :	
Gram	(1500)
Linseed	(1000)

N.B. : Chillies is shown under two seasonals and not under both kharif and rabi; hence the area is reduced from 1000 to 500 acres.

CHAPTER IV

Agricultural Research.

4.1 Irrigation is a method of soil moisture control in practice. In Maharashtra, irrigation is needed in both dry as well as assured rainfall areas. Crop production requires more assured irrigation-water supply with greater frequency in the arid and semi arid regions, while it is more of a protective nature except in summer season in higher rainfall areas where the nature of rainfall distribution has to be watched for careful irrigation. In the transition zone, the conditions change somewhat sharply from high to low rainfall in a fairly narrow belt. Each area needs proper study for its irrigational needs. Maharashtra State has nine well defined agro-climatic zones and it is proposed to establish 22 Trial-cum-Demonstration farms in the whole State to meet the experimental needs. The command area of Bor project lies in agro-climatic zone V-B 'moderately high rainfall with trap soils' and a Trial-cum-Demonstration farm is being established at Seloo in Wardha taluka of Wardha district. The total area of the farm is 51.88 acres, all of which is irrigable by canal. The land has been acquired. The staff working on the farm is one Agricultural Officer, one Agril. Supervisor, two Agril. Assistants, one Junior clerk, one Peon and one Watchman. The annual budget of the farm is about Rs.50,000 besides non-recurring expenditure of Rs.56,840/- for acquisition of land and Rs.2,68,000 for buildings and equipment etc. The details of the financial estimates of such a Trial-cum-Demonstration farm are given in Appendix VI.

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4.2 In low rainfall areas margin of profits between dry and irrigated farming is very large and in his enthusiasm, over-irrigation by a farmer will spell early ruin of the soils which are poorly permeable, high in pH (alkaline) with moderate to moderately high salt contents and fairly dangerous exchangeable sodium and magnesium contents. In higher rainfall areas it is more of elimination of probable drought hazards in farming with soil management practices carefully followed for higher soil productivity. Disposal of any surplus rainfall, probable drainage correction, salt leaching, seasonal water needs of crops and irrigation frequency, cost of land levelling for proper irrigation etc. have all to be considered as per climatic and soil conditions of the area.

4.3 The following experiments will be conducted at the farm :-

1. field experiments on irrigation cum manurial requirements of field crops,
2. study of critical periods of crop growth with respect to moisture,
3. study of the effect of soil, climatic and biological factors in fixing the schedule of crop irrigation,
4. trials of improved agricultural practices of irrigated crops including newly introduced crops. Different rotations of crops will be tried.
5. scientific management of irrigated soils with reference to drainage, run-off and disposal of water,
6. study of the effects of various agronomic practices on soil properties,
7. study of the economics of irrigated farming in comparison to unirrigated farming.

The field crops studied will be sugarcane, jowar, wheat, long staple cotton, groundnut, chillies, vegetables and orchard crops. Fodder crops and grasses will be grown and

green manuring will be followed as a regular practice.

In order that cultivators appreciate the benefits of irrigated farming and prepare their minds to take canal water when it becomes available, it is proposed to purchase eight oil engines for each Trial-cum-Demonstration farm. These will be given on loan to progressive cultivators who have well irrigation or a perennial stream adjoining, in the area served by the T.C.D. farm. The cultivator will incur expenditure for running the oil engine and grow crops under the guidance of the staff of the T.C.D. farm. Besides serving as demonstration, these sub centres will also provide data on cost of cultivation irrigation water requirement and frequency of irrigation of different crops which will be supplementary to that collected at the T.C.D. farm.

4.4 Results of research :Data on additional yields of different crops obtained under irrigation are not available for this agro-climatic zone. However, some advanced cultivators who are growing irrigated crops under well irrigation say that the yield of L-147 cotton can easily be doubled by pre-monsoon sowing by 15th May. The yield of irrigated wheat can also be as high as 15 md. per acre. If plenty of water is available, triple cropping i.e. mug followed by wheat followed by hot weather groundnut can be attempted with fair amount of success. The maximum demand for irrigation water will however, be for pre-monsoon sowing of L-147 cotton and the same has been provided for in the proposed crop pattern.

Necessary data on cost of cultivation of different crops under irrigated and unirrigated conditions is not available. Moreover, cost of cultivation of different crops under irrigated and unirrigated conditions in one agro-climatic zone will not necessarily be the same as in other agro-climatic zone. Such studies will now be taken up on T.C.D. farms so as to give an accurate idea of the additional gain to a cultivator by following irrigated farming.

Chapter V

Water rates, and concessions given to irrigators
by Irrigation Department.

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Water rates for various crops grown under canal in Vidarbha region are as follows. These rates are taken from I. & P. D. Resolution No. BCL-1057-4881-I(4) dated 17th April, 1963.

Crop	Water rate per acre per crop under an Irriga- tion Agreement Section 37(1) (a) of C.P. Irrigation Act. 1931	Water rate per acre per crop for water supplied on demand Section 27(1) (b) of C.P. Irriga- -tion Act. 1931.
	Rs.	Rs.
Rice	8	16
Wheat	3	6
Kharif seasonal	-	6
Rabi Seasonal	-	6
Hot weather seasonal	-	10
Garden crops and vegetables.	-	15
Sugarcane	-	45
Pan, Plantations and Mulberry	-	45
Any other fruit.	-	30

(Irrigation cess and betterment levy will be charged to irrigators)

- - -

5.2 Government have so far taken various measures in order to accelerate development of irrigation. Following are some facilities offered by Government.

1) It was found that some of the agriculturists were reluctant to avail of the irrigation facilities because they were required to construct considerable lengths of field channels to take water from the Government outlet to their own fields. To eliminate this difficulty, Government has vide Government Circular P.W.D.No.BIA-1258-T dated 18th May, 1958 fixed lower criteria for the designs of water course commands and also fixed the responsibility of Government and the irrigators for the construction of the channels. The irrigators are now required to construct water courses not more than $\frac{1}{2}$ to 1 mile in length for taking water from the Government outlet to their respective fields. These water courses have a capacity of 1 to $1\frac{1}{2}$ cusecs and will be capable of irrigating blocks of 100 to 150 acres.

2) Government has issued orders vide Government Circular, C & R.B.D. No.IRR-1063-B, dated 23rd January, 1963 directing that the work of excavation of water courses should be handled on the basis of local campaign which should be authorised, guided and supervised by the Zilla Parishad through the agency of the Block Development Officer who should be able to stir and organise the local people in this regard with the help of the influential leaders. The Block Development Officers are to be supplied with all the necessary technical help. As a permanent

measure, Government also contemplates to enact legislation making it obligatory on the part of the beneficiaries to construct water courses and if they fail, empowering Government to construct them at their cost. The draft of the bill is under active and immediate consideration of Government.

3) Government has directed vide I.& P.D.No.WTR-1563-I (4) dated 12th December, 1963 that (a) water should be supplied free of charge for green manuring crop during monsoon season on all irrigation works in the State without any restrictions, as generally water is available in this season, (b) during hot weather season, green manuring crops should be charged a concessional rate of Rs.2 per acre on all irrigation works throughout the State without any restrictions regarding the extent of the holding, subject to the condition that water is available after meeting all prior commitments, (c) in respect of areas in Western Maharashtra no irrigation cess should be charged on green manuring crops, and (d) the above concessions will be granted only if the green manuring crop is ploughed and used for manuring purposes.

4) In order to induce the agriculturists to go in for irrigation and realise for themselves its advantages over dry farming water supply from newly completed irrigation schemes is allowed at concessional rates. The concessions are as under :

Food and fodder crops:

1st year	no water rates
2nd year	1/2 the normal rate
3rd year	2/3 the normal rate
4th year	full rate.
Other crops	Half the normal rates for 1st year and full rates thereafter.

5) In spite of various measures taken by Government for development of irrigation schemes it is seen that kharif irrigation and rabi irrigation in certain parts of the State is not developing as anticipated. This results in non utilisation of water during the seasons it is available. In order to encourage irrigators to use the available water in kharif and rabi seasons, Government is pleased to allow the following concessions in water rates on major, medium and minor irrigation works until further orders :

- 1) Kharif crops other than cotton and groundnut in Western Maharashtra, Marathwada and districts of Buldhana, Akola, Amravati, Yeotmal, and Wardha from Vidarbha region. Concessional rate
- 2) Rabi crops other than cotton and groundnut in the districts of Chanda, Bhandara and Nagpur in Vidarbha region. 1/3 of the normal rate

Sugarcane and other perennial crops will not be eligible for the above concession.

5.3 Progress of irrigation utilisation is given below :

Irrigation water has not been made available during 1964-65; it is however, proposed to make available irrigation water during 1965-66 for an area of 12,000 acres. Full irrigation potential of 23,000 acres would be developed in 1966-67.

5.4 Cultivators in the command area of the project do appreciate the importance of irrigation and the change that it will bring about in their pattern of cultivation and the standard of living as a whole. While they are keen to make use of irrigation water, certain difficulties are bound to be experienced as in the case of other irrigation projects. These are mentioned below :

1) Field channels crossing village roads :-

Some field channels which are required to be constructed by cultivators for taking irrigation water, cross the village roads. In a number of cases they are frequently damaged by road traffic. As a matter of fact cross-drainage work should be undertaken at such places to overcome the difficulty. However, there is no provision with the Irrigation Department for such works and at the same time individual cultivators are not ready to incur expenditure on this account. It is therefore, necessary that such cross drainage construction work is included as one of the items under land development and carried out by the land development staff in the first instance and the cost recovered from the beneficiary cultivators in due course.

2) The alignment of field channels should be shown to every cultivator. In many cases the alignment of field channels given by the Irrigation Department is not known to owners of fields and hence they do not construct field channels. This difficulty should be brought to the notice of officials of Irrigation Department and they should be requested to depute their surveyor in such areas to show the alignment of channels to individual cultivators concerned.

3) Some cultivators do not allow others to dig water channels through their fields. This may be because they are either interested in some other vocation than irrigated farming or actually have very small area under irrigation command. The other cultivators down stream are thus handicapped from getting canal water for irrigation. This difficulty should be removed early by enacting suitable legislation which Government is contemplating. It may however, be necessary to set up village irrigation committees which might settle this problem on spot.

4) There is great demand for not only land utilisation survey but also establishing irrigation units for undertaking extension work. The Land Utilisation Survey unit ~~will be completed~~ the survey of Bor project and Government has already issued orders for making available one or two charges from the neighbouring soil conservation sub divisions to undertake levelling work. Proposals have also been submitted to Government for sanctioning two Irrigation units from 1965-66 season and Government sanction is awaited.

5) There is great need for technical information on water requirement of crops, economics of irrigated farming etc. It is proposed to locate a Trial Cum Demonstration farm for this purpose at Seloo Land has been acquired by private negotiations and it will start functioning from 1965-66 onwards.

CHAPTER VI.

Supplies and credit needs of cultivators.

6.1 Credit needs of cultivators whose lands are likely to be benefitted by the project can be classified under three heads : (1) funds for land development, (2) funds for purchase of bullocks, and (3) funds for seasonal agricultural operations. Requirements under each of these heads are indicated below :

1. Land development :- Lands have to be reclaimed and made fit for wet cultivation. The survey of the first 12,978 acres of the command area indicates that the problem is not so acute in respect of Bor project. About 57.12% of the command area is flat and will not need any levelling. Another 34.69% area has a slope of 1 to 2% and these will also not need much levelling. Hardly 6.63% area have a slope of 2 to 3% and will require levelling. Another 0.65% area has deep gullies and will require to be levelled by bulldozers. Out of the total area of 23000 acres, only about 220 acres or 0.91% are unfit for cultivation being rocky and hilly and will have to be put under pasture grasses and forest trees. The soils are mostly clay loam, the soil cover ranging from 18" to 8' while those on the banks of Bor river are predominantly black and more than 8' deep. Government in Irrigation and Power Department will construct the branch canal and distributaries while main water channel and field channels will have to be constructed by the agriculturists at their own cost. It would also be necessary to dig

drains in heavy soil areas for draining salts and surplus water. Wherever lands are undulating, part of the earth on the higher regions has to be removed and put on the lower regions. This work can be carried out by mechanical equipment like bulldozers, graders or with manual labour. The Land Utilisation Section of the Agriculture Department has already surveyed more than half the command area and classified the fields to be reclaimed. Two charges of the soil conservation sub division Wardha have now been asked to carry out distributorywise 1' contour survey of the command area and undertake the work of levelling and construction of small bunds, main water channels, field channels and drains.

6.2 In case of lands with a slope of 1 to .2%, it is not necessary to level the lands but provide suitable drains so that no water logging will be caused in heavy soils and surplus salts will be drained out. For a distributory with a discharge of 1 to $1\frac{1}{2}$ cusecs, it would be necessary to construct the main water channel, the size of which will be $1\frac{1}{2}$ ' deep and 1' broad at the bottom and 4" wide at the top. If there are any sudden falls, suitable drops will also have to be provided. Field channels of the size 1' deep, 1' broad at the bottom and 3'-6" wide at the top taking water from the main canal will be constructed by cultivators as required. Suitable drains of the size 2' deep and $1\frac{1}{2}$ ' wide at the bottom and 5'-6" at the top will also have to be provided at an interval of every 200'.

The rate for removing black cotton soil is Rs.15 per 1000 Cft in Wardha district. In the case of water channels and drains the soil has to be dug and put on the sides which will form small bund. In case of levelling an extra charge of Re.1 per 1000 Cft for every additional lead of 10 yards will be given. The rate in that case will work out to Rs.16 per 1000 Cft. The cost figures for different percentage slopes as well as for digging main water channel, field channels and drains are worked out and given in Appendix VI.

The cost of initial manuring like green manuring and application of Farm Yard Manure to levelled fields to bring them to proper structure is estimated at Rs.50 per acre. As regards supply of bullocks, it is not desirable to allocate the cost of bullocks pre-rata per acre. Assuming the cost of a pair of bullocks at Rs.1000/- the same will be useful for cultivation of 10 acres and the provision per acre of wet land will be Rs.100/-.

6.4 The estimated cost of land development including cost of digging main water channels, field channels and drains, and levelling lands with different slopes in Bor project is as follows :

	Rs.
1. Main water channels and drains in land upto 2% slope = 21,116 x 45	9,50,220
2. Lands with 2 to 3% slope : 1,525 x 250 =	3,81,000
3. Lands with more than 3% slope 150 x 210 =	31,500
----- 22,791 acres	----- 13,62,720

Initial manuring @ Rs.50/- on 22,791 acres	=	11,39,550
Total long term loan provision	=	25,02,270
Assuming that only 50% cultiva- -tors will avail of the loan, the requirement of long term loan	=	12,51,135
Provision for medium term loan for bullocks : 700 pairs @ Rs.1000/-	=	7,00,000
Implements etc.	=	2,00,000
		----- 9,00,000

6.5 Provision of supplies viz. seeds,
fertilizers and pesticides :-

Statement showing requirement of seed and fertilizers is appended (Appendix VII). The requirements of fertilizers are calculated at the rate of 20 N and 20 P₂O₅ for cotton, paddy maize and wheat; and 10 N. and 20 P₂O₅ for groundnut. It will be necessary for the co-operative societies to stock 2200 quintals of different kinds of seeds and 2834 tons of nitrogenous and 1279 tons of phosphatic fertilizers, and make them available to cultivators. It may however be noted that only half the quantities of seed and fertilizers would be required during 1965-66 and hence only 50% of the quantities mentioned above should be stocked at various centres by the co-operative agency.

6.6 As regards production of improved seeds, a statement of programme of seed production is attached (Appendix VIII). It will be observed that in Bor project area there is one Taluka Seed Farm at Sukali in Seloo Block of Wardha

Tahsil. The Vegetable Development Scheme is also being worked at this farm. Besides, it is proposed to establish a Trial-cum-Demonstration farm at Seloo in the command area. It will also produce some foundation seed of wheat, jowar, cotton, groundnut, fruits and vegetables and chillies. It may be mentioned here that the Taluka Seed farm is mainly for multiplication of cereal and pulse crops and cotton and groundnut are grown only as rotational crops. There is no independent Seed Farm for cotton and groundnut. The requirement of vegetables and pulses will be met fully but multiplication of wheat seed will have to be extended and the requirement of wheat, paddy, cotton and groundnut will be met only partially to the extent of 50% and remaining quantities will have to be obtained from other Seed Farms.

6.7 As regards sugarcane, it may be possible to supply foundation seed from the Trial-cum-Demonstration Farm, Seloo. Cotton and groundnut seed will be supplied under the Coordinated Cotton Extension Scheme and Oilseed Extension Scheme. Seed of good quality vegetables and Hybrid maize will be raised at the Trial-cum-Demonstration Farm, Seloo and Taluka Seed Farm ~~Sukhal~~ and some requirement will also be obtained from outside. Similarly demand for horticultural plants will be met through reliable nurserymen and from Government gardens and nurseries. As regards supply of sann hemp and Dhaincha seed for green manuring, same would be arranged by the Parishad Agricultural Development Officer at 25% subsidised cost under Green Manuring Scheme.

6.8 Short term loan requirements from co-operative banks :-

Details of short term loan requirements from cooperative banks are given in Appendix IX. The total amount of loan required is about Rs.51.15 lakh excluding fruit crops. It may however, be noted that requirement for 1965-66 will not exceed Rs.12 lakh as there will be some who may not be eligible and others who may not like to avail of crop loans. The loan for Sann seed has not been provided and the same will be supplied at subsidised cost of 25% under the Green Manuring Scheme which is already in operation in the State. As regards fruit crops, Government vide Government Resolution, Agriculture and Food Department No.HRT/1763/A dated 19th June 1963, and No.HRT-1764/A dated 6th February, 1964 has provided the amount of loan under "Q-Loans and Advances - Scheme in Third Five Year Plan - Advance to cultivators -(I)-Loans under Horticultural Development Scheme ". Fruit crops may be grown as an alternative to sugarcane and they will mostly be banana and oranges.

6.9 Appendix VII gives the total fertilizer requirement for all crops. Appendix IX gives loan requirement in kind for fertilizers amounting to Rs.14,24,900/- for all crops excluding fruit crops. It is expected that loan for fertilizer for fruit crops mentioned above will be included in the horticultural loans provided under the Horticultural Development Scheme. The sanctioning authorities viz. Mamlatdar, Assistant or Deputy Collectors and Collectors will see that a part of the horticultural

loan is given in the form of fertilizers through the cooperative organisations.

The total amount required for purchase of seed amounts to Rs.1,67,950. The cooperative societies should purchase the seed required from the registered seed growers and make them available to cultivators in kind. They should avail of the facilities provided under the Seed Multiplication and Distribution Scheme of Agriculture Department.

6.10 As regards plant protection work, the pesticide requirements will be ascertained from the cultivators who apply for loans and the cooperative societies in the area. They will be requested to buy and stock these. The cost of insecticides will be Rs.3,00,000/- out of the total requirement of Rs.8,25,850 earmarked for plant protection measures. It may be suggested that about 1/5th area is likely to be affected by some pests or diseases for which preventive measures will have to be taken. The remaining area will however, need prophylactic measures at comparatively less cost. The amount involved in actual purchase of insecticides and fungicides may however, not exceed Rs.1,50,000/- at one time. 25% subsidy is now given on all pesticides. Since this area will be worked intensively on a campaign basis, 50% subsidy will become available on all insecticides and pesticides used in this area for combating diseases and pests from the plant protection scheme of the Agriculture Department.

6.11 The Agriculture Department has strengthened its plant protection section and expanded the plant protection scheme. It is now possible to supply dusting and spraying equipment on hire to the needy farmers. With the object of making the farmers independent in respect of plant protection appliances, the Department is also selling the equipment at 50% subsidised cost. No separate provision for plant protection appliances has been made under the proto-type package programme since more provisions have been made to meet the likely demand on account of expanded activities under the Plant Protection Scheme.

CHAPTER VII

Agricultural Extension and Concessions given to cultivators by the Agriculture Department.

7.1 Organisation :

Although the various activities under the integrated programme envisaged, are the normal duties of the Block agency, there is clearly a need for strengthening the present Block organisation, if the objective of speedy utilisation of irrigation potential created is to be achieved within the next two or three years, and if the work is to be taken on a campaign basis. The emphasis in the present programme is on carrying conviction to the cultivators about the cropping programme suggested, as well as in making necessary financial and other arrangements for the purpose. This points to the need for strengthening the agricultural machinery and the co-operative organisation within the Block. For this purpose the pattern of the Irrigation Unit sanctioned recently by Government on such other projects appears to be suitable. It is suggested that for every block of 10,000 to 15,000 acres, there should be an Irrigation Unit sanctioned under an Agricultural Extension Officer working with the Block agency and supported by a staff of an Agril. Assistant for every 1000 to 1500 acres.

Two such units will be established to cover the potential area of 33,000 acres in the second stage in over 6 villages from Seloo block of Wardha Tehsil and 14 villages of Samudrapur block of Hinganghat Tehsil. During 1965.66, however, only one Irrigation

will be

Unit will be working over an area of 12,090 acres in 33 villages of Seloo Block of Wardha Tehsil. 10 Agricultural Assistants will be given to Seloo block and their work will be supervised by one Agricultural Officer with headquarters at Seloo. This staff will work under the Block Development Officer, Seloo who will be responsible for successful implementation of the programme in his area. He will also be given administrative assistance of one Agril. Officer as Asstt. Block Development Officer and one Senior Clerk. The staff of the Irrigation Units will be withdrawn after 3 years when most of the area will have been covered and the work will then be left to the normal block agency and this staff moved to some other project.

7.2 There is no need to appoint a Campaign Officer at the district level while at the block level the Block Development Officer will be responsible for successful implementation of the programme. At the district level, the Zilla Parishad through the Chief Executive Officer will be in overall charge of the programme. For successful implementation of the programme, effective coordination is required between the co-operative sector, the local sector, and the State sector agencies and for this purpose a Project Co-ordination committee may be constituted with the following members.

President, Zilla Parishad, Wardha	Chairman.
Chief Executive Officer, Z.P., Wardha	Member.
Executive Engineer, Irrigation Divn.	"
Dy. Registrar, Coop. Societies	"
Co.op and Industries Officer, Z.P.	"
Chairman, Central Co-op. Bank	"
Chairman, Taluka Sale Purchase Union	"
Wardha	"
Chairman, District Land Mortgage Bank	"
Wardha	"
Chairman, Agril. Sub Committee, Z.P.	"
Parishad Agril. Development Officer, Z.P.	Member-Secretary

The Chairman may also invite other officials and non-officials who may be of help in implementation of the programme as invitees. The committee will consider the reasons for non-utilisation of irrigation and make specific recommendations which may be given effect to by the various agencies and also bring about coordination between various sectors.

7.3 The following technical programme will be carried out by the field staff:-

- 1) Introduction of new crops and demonstration of suitable crop pattern.
- 2) Demonstration of the method of land preparation, proper lay out of irrigation channels. If cultivators need iron ploughs, seed drill etc., Agriculture deptt. will supply the same under the scheme for distribution of improved implements at subsidised rates.
- 3) Technical advice on growing of various crops, green manures, vegetables and fruit crops. The Agriculture department gives 25% subsidy on the sale of green manure seeds. Loans at concessional rate of interest are given for growing fruit crops and improved seeds and quality grafts are supplied from Govt. nurseries.
- 4) Use of improved seeds, organic manures, fertilizers for increased production and maintenance of soil fertility and providing short term loans required for the same. Subsidies and other concessions are given by the Agriculture department for these items. and the cultivators may be acquainted of the same so they may avail of them.
- 5) Demonstration on the use of improved agricultural practices and intensive cultivation methods.

- 6) Demonstrations on plant protection measures and under taking plant protection campaigns wherever necessary. Govt. gives 50% subsidy on the sale of hand operated plant protection appliances and 25% subsidy on pesticides. The latter subsidy is increased to 50% if used in the campaign.
- 7) Starting atleast one Agril. Demonstration Centre on the field of a progressive cultivator in each village where he will follow the improved practices side by side with his normal practice. Govt. guarantees to meet the loss if any, the cultivator may incur due to following improved practices at the advice of the Agriculture Department.
- 8) Laying out half-a-dozen Free Fertilizer Demonstration plots in each village under command. Govt. of India bears all the cost of these demonstrations.
- 9) Conduct village, taluka, district and State level crop competitions under which lucrative prizes are given to winners by the Agriculture Department.
- 10) Education programme :- In order to familiarise the irrigators with the technique of irrigated farming, Shibirs will be organised in some villages under command. These Shibirs will be of 2-3 days duration when talks of experienced officers and progressive cultivators will be organised and small exhibition arranged for the benefit of new irrigators. The boarding and lodging arrangements of these who attend the Shibirs will be made by the Extension staff and cost borne by Government.
- 11) Publicity : Posters, folders, leaflets etc. will be published by the Agricultural Information Unit of the Agriculture Department ~~xxxx~~ and also by the concerned ~~xx~~ Zilla Parishads. These will be distributed freely among the farmers.

7.4 Government in Agriculture Department have so far taken various measures in order to increase food production.

Following are some facilities offered by Govt. which will be applicable to cultivators under Bor project command :-

1. Seeds :- In order to encourage the practice of green manuring, Govt. has sanctioned a scheme to supply sann hemp and Dhaincha Seed at 25 percent subsidised cost.

2. Fertilizers :- Cultivators use mainly popular nitrogenous fertilizers but do not use phosphatic and potassic fertilizers in sufficient quantities. It is well known that fertilizer

mixtures ensure balanced fertilisation. With a view to stepping up the consumption of phosphatic fertilizers and fertilizer mixtures, Govt. has sanctioned subsidy at the rate of Rs. 20/- per ton.

3. Land development:- Land development including levelling and bunding is a costly process. This work is undertaken by the soil conservation sub divisions and bulldozer units in the fields of cultivators in the command area. Govt. provides long term loans for this purpose to cultivators and bears the establishment cost which is equivalent to 25% of the total cost, as subsidy.

4. Improved agricultural implements:- Govt. grants subsidy under the scheme for propagation of improved agricultural implements at a uniform rate of 25% of the cost of mechanical seeder subject to a maximum limit of Rs.30, and at uniform rate of 12½% of the cost of new heavy iron plough or medium iron plough subject to a maximum cost of Rs.15 and Rs. 10 respectively.

5. Town compost:- Many a times there is limited demand locally for town compost produced by the urban centres. If the compost is transported to farther places where there is demand for it, the transport cost becomes prohibitive. Hence, with a view to lifting the accumulated stocks of town compost, Govt. has sanctioned a subsidy for transport of town compost beyond 5 miles of the compost preparing centre, at the rate of Rs.1 per ton of compost.

6. Development of fruit production:- Under the scheme for Development of fruit production, the loans will be granted for planting new orchards at the rate of Rs. 300 per acre. The loan will ~~be~~ ~~off~~ carry an interest of 4.75% per annum. The recovery

of loan will be effected in 10 equal instalments commencing from 6th year from the date of issue of loans and no interest will be charged in the first 5 years.

7. Vegetable development scheme:-The scheme provides necessary technical guidance and service to vegetable growers. For the purpose of bringing additional area under vegetable cultivation, following assistance is given under the scheme.

(i) Provision is made for purchase of seed of certain vegetables from abroad at the cost of Rs. 1 lakh per year. 40 nurseries - 25 on Taluka Seed Farms and 15 on private lands will be established. If possible, arrangements will be made with private farmers to raise seedlings of vegetables under the guidance of technical staff. Seedlings raised at these nurseries will be supplied at concessional rates.

(ii) Straight fertilizers will be supplied at a subsidy of 25% on the cost of fertilizers.

(iii) Short term loans will be advanced to needy vegetable growers at the rate of Rs. 300 per acre for crops such as potato, tomato, green peas etc.,

(iv) In order to facilitate quick transport and marketing of perishable crops like vegetables it is proposed to grant loans to co-operatives or vegetable growers societies for purchase of trucks and given them a subsidy of 25% on the purchase price instead of subsidising the actual transport.

8. Plant Protection:

(i) The plant protection appliances recommended by the Agriculture department will be purchased by the Zilla Parishad from the concerned manufacturing firms and are to be sold to cultivators and their organisations at 50% subsidised rates.

(ii) Insecticides and fungicides will be made available from the shops of the agents of the plant protection firms at 25% subsidised rate.

(iii) Insecticides and fungicides used in the plant protection campaigns will be charged at 50% cost. The remaining 50% cost will be borne by Govt. as subsidy.

9. Free distribution of departmental publications

CHAPTER VIII

Co-operative Storage & Marketing.

8.1 Existing position :- The area under command of Bor project is spread over ⁱⁿ 2 Panchayat Samitis - Seloo and Samudrapur. There are at present 14 Seva Sahakari Societies and 2 large size cooperative societies serving 75 villages under the command of Bor project. Appendix X gives information about their working, financial structure, membership etc. Out of the 17 societies, 6 are in 'B' class and 10 are in 'C' audit class. Only 1 society is not audited. The financial position of 6 societies is sound while in case of remaining 11 societies it is necessary to strengthen them immediately. The amount of overdues is 21%.

8.2 There is not a single cooperative marketing society under the command of Bor project, but as per the policy of the department, one society is to be registered in each development block and accordingly there are 2 marketing societies registered and functioning. Out of these 2 societies, one is at Sindi in Seloo block. It has opened a branch at Seloo recently. It will be possible to undertake cooperative marketing activity in the villages under command area of Seloo block through this branch. Another marketing society is registered at Samudrapur which serves the needs of cultivator of the villages under command in the Samudrapur block.

8.3 One cotton ginning cooperative society is registered during 1964-65 at Seloo and has taken up cotton pool business. This society can concentrate on cooperative marketing and processing of cotton, which is an important cash crop in the command area.

Difficulties of cooperative marketing
in the command area :-

8.4 The first difficulty ^{at least in the command area of Bor} is the absence of a sense of Proj^w loyalty on the part of cultivators to bring their produce to be marketed through a cooperative marketing society or credit society. Though the number of primary cooperative societies in the command area is fairly large, the percentage of agricultural produce that is offered for sale through these cooperative seva societies is almost negligible. The societies' share hardly exceeds 1% of the total marketable surplus that comes to the market. Different reasons are offered for the unwillingness of cultivators to bring their surplus produce to be marketed through a cooperative marketing society. In the command area of Bor project, absence of godowns at convenient centres is one of the chief reasons. In some cases the reason given is the inability of the Taluka Purchase and Sale Union to go in for outright purchase. Generally cultivators are not inclined to offer their produce for sale on a commission basis and are not satisfied with the advance that is given to them against the produce offered. An average cultivator prefers to sell his produce at the earliest opportunity and to collect the entire price and is not interested in waiting or in making several trips to the marketing society to collect his entire sale price. In some cases these trips also prove expensive thereby nullifying the effect of the little advantage gained in price. It is observed that private merchants many times go into a village and collect, load and transport available agricultural surplus from the village to marketing centre. The commission agents also provide gunny bags and ostensibly charge only a

nominal commission. The cultivator is made to feel that he is not being charged for these services though in fact he has to pay for them in the shape of lower price.

8.5 Whereas finance or credit extended by a cooperative society takes care only of the production needs of a cultivator, a cultivator has many other problems, personal and domestic for which finance is required. As cooperative societies are not in a position to advance finance for such purposes which may include domestic or family reasons and which needs are met by a private merchant or middleman, a cultivator develops relations with and is tempted to approach the latter for disposal of his available surplus.

8.6 The third difficulty is the inadequate facilities for communication from villages in the command area to the marketing centres. In course of time with the full utilisation of irrigation potential made available under Bor project, the volume of agricultural marketable surplus coming from the command area will increase considerably. The estimated marketable surplus is shown in Appendix XI.

8.7 The present facilities of roads and communications linking the villages to each other and with the various marketing centres are reported to be quite inadequate and unsatisfactory. The absence of adequate road facilities is felt much more keenly because of the further absence of convenient arrangements for transport of agricultural produce from the village to the marketing centre. The representatives of primary societies as well as of marketing societies feel that it is difficult to obtain trucks for transporting agricultural produce when needed. At present

no primary societies or Purchase and Sale Unions in the command area possess their own transport facilities.

8.8 The fifth difficulty is about the inadequacy of godown facilities for storing agricultural surplus in some important villages as well as at the headquarters of the Purchase and Sale Unions. At present there are two small size godowns at Hingni and Seloo which are not sufficient for storage of agricultural produce and therefore more small size godowns belonging to seva societies under the command area of the project require to be sanctioned and constructed for storage of agricultural produce. These societies have been sanctioned loans and subsidies for construction of godowns during the year 1963-64 as shown below :-

Name of the society	Size	Block	Cost	
			Loan	Subsidy
1. Large Size Multi-Purpose Society, Hingni	Small	Seloo	7,500	2,500
2. -do- Seloo	Small	Seloo	7,500	2,500

8.9 What is being done and proposed to do :-

It is understood that some more societies have been selected for providing godowns and sanctioning required finance. A small size godown is estimated to cost Rs.10,000 and a medium size godown Rs.20,000. But since these estimates are sufficiently old and the cost of construction has increased much, a small size and a medium size godown is now estimated at Rs.12,000 and Rs.24,000 respectively. The societies being poor financially, the cost will have to be given by way of loan and subsidy at 75 : 25. The size and

cost of large, medium and small size godowns is given below:-

Type of godown	Size of godown						Cost Rs.
	According to old pattern			According to revised pattern			
	L.	B.	Ht.	L.	B.	Ht.	
Small	40 x	12 x	15	40 x	20 x	12	12,000
Medium	50 x	40 x	18	50 x	35 x	14	24,000
Large	100 x	40 x	18	100 x	40 x	14	48,000

8.10 As regards additional finance, Wardha Central Bank will provide required agricultural finance which is estimated at Rs.51.15 lakh. No difficulty of finance to the societies in the area is expected.

8.11 The real problem of cooperative marketing in the command area is identical to the problem in the other areas in the State, viz. the reluctance of cultivators to use the cooperative machinery for marketing of their produce, and the failure of cooperative marketing societies to make their presence felt in the sphere of marketing in competition to private traders and/or middlemen. A solution to the problem in the command area by itself has become difficult because the area coming under the project is not a compact homogenous tract but the area forms part of different administrative jurisdictions. . . The problem of cooperative marketing may be met in two stages. The first stage is securing of the available marketable surplus from member-cultivators at the village level through cooperative Seva Societies and its storage and transport to a taluka Sale and Purchase Union. The second stage is an efficient and expeditious marketing of agricultural surplus by a taluka

...

Sale and Purchase Union either on a commission basis or as an outright sale through the agency of the Vidarbha Cooperative Marketing Society, Nagpur. Unless an effective machinery is created to tackle the problem at the two stages, it will not be possible for the cooperative sector to make an impact on the marketing of agricultural produce.

8.12 The cooperative department may appoint special staff of 2 Cooperative Officers and 2 Supervisors for Seloo and Samudrapur blocks for a period of 3 years in the first instance to chase the Seva Societies in the matter of collection of marketable surplus. This unit will be a sort of tail twister and will constantly move in the villages in the command area and must see that every village level Seva Society collects agricultural surplus atleast to the extent of the credit advanced through such societies. The Unit should be under the control of the Joint Registrar Marketing, but for administrative purposes may be under the control of the District Deputy Registrar of Cooperative Societies.

8.13 The practice of recovery of loan in kind should be introduced immediately. A modest beginning has been made by introducing the cotton pool at Seloo. Cultivators bring their produce which is rouged and a certificate issued to the effect. An advance to the extent of 75% of the current market price is paid to them by the society as part price. The cotton is then ginned separately and sold by auction. The remaining price is paid as soon as the sale is effected. If however, he is a member of Seva Society and has taken crop loan, the amount is deducted from the balance that is to be paid to him. This practice should also be extended to other crops, particularly jowar and wheat for which monopoly purchase has been introduced by Government.

8.14 The question of revitalisation of the societies in this area should be taken up with priority by the Cooperative Department for these blocks and efforts made to ensure maximum share contribution both private and Government, for all the Primaries to enable them to function more effectively. The proposal of two societies - Kelzar and Mahabala has been sent to the Divisional Joint Registrar of Cooperative Societies, Nagpur for sanction. What is more important is to improve the financial structure of the societies. In this case it is recommended that the grant of Govt. share capital on a matching basis should not be insisted upon.

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CHAPTER IX.

Communications and Agro-Industrial Development.

9.1 The following existing communications pass through the command area of Bor project :-

i) National Highway :- There is no National highway in the command area.

ii) State Highway :- The State highway from Nagpur to Wardha enters the command area at Seldoh and leaves at Seloo.

iii) District roads :- There is no major district road except the one running from Seloo to Bori, the dam site (about 9 miles).

iv) Village roads : There are a number of village roads which are more or less cart tracts :

1. Hingani- Kelzar
2. Kelzar- Mandapur via Ashta, Darad & Chadaki
3. Kelzar- Sindi
4. Sindi- Waghel via Chadaki
5. Seloo- Bondsul
6. Sindi- Pardi

From the communications point of view the command area is rather undeveloped.

9.2 Railway :- Bombay-Nagpur line of Central Railway runs through the command area from Paunar to Sindi.

9.3 The District Central Co-op. Bank is located at Wardha with a branch at Sindi. The Dist. Co-op. Land Mortgage Bank is located at Wardha with a branch at Sindi. There are also branches of the State Bank of India.

9.4 Cotton will be grown under irrigation in the command area on 10,950 acres and the average production

will increase from 7.5 to 15 Md. per acre and add about 5000 bales. There is a cotton ginning and pressing factory at Wardha. There is no co-operative ginning and pressing factory in the command area. One co-operative cotton ginning society has been registered at Seloo in the command area. One more co-operative ginning and pressing factory will be necessary in the command area. Sugarcane, oranges, bananas and chillies will also be grown on a large scale and it would be necessary to undertake detailed survey for agro-industrial development in the command area.

CHAPTER X.

Financial benefits to cultivators, and
repayment of loans etc.

	<u>Rs.</u>
1. Long term loan requirement	12,51,135
2. Medium term loan requirement	9,00,000
3. Short term loan requirement	51,14,500
4. Expenditure by Agriculture Department -	
a) Irrigation Unit (1)	35,000 (for a period of one year)
b) Trial-cum-Demonstration Farm, Seloo	5,61,900 (over a period of five years)
c) Subsidies will be borne under individual schemes.	
5. Expenditure by Cooperative Department on staff etc.	1,00,000
6. <u>Financial benefit to cultivators :-</u>	

The existing crop pattern in the command area of Bor project gives a total net surplus of Rs.22,85,000 as shown in Appendix XII, i.e. an average of Rs.76 per acre. With the switching over to irrigated farming and introduction of cash crops like sugarcane, fruits and vegetables etc. the total net surplus is expected to increase to Rs.64,93,000 as shown in Appendix XIII, i.e. an average of Rs.217 per acre.

There are 2,307 cultivators in the command area of 12,978 acres. Out of these, 1,425 or 61.7% cultivators own land between 0-5 acres and 567 or 24.6% cultivators own land between 5-10 acres. If both these groups are considered together, it will be seen that 1,992 or 86.3% cultivators have irrigated land between 0-10 acres or an average of 5 acres. 315 or 13.5% cultivators have an average irrigated holding of about 15 acres. The need for financial help as well as the capacity to pay back loan of both these categories of

cultivators i.e. small and big holders will be different and is discussed below :

a) Small holders : The average net income of a small holder of 5 acres will increase from Rs.380 to Rs.1,085 after he switches over to irrigated farming completely. Since he is not employed all the year round, he will find more employment for himself and his family with the introduction of irrigated farming. Same may be the case in respect of bullock power and it may not be necessary for him to go in for an additional pair. It is likely that he may be a defaulter to the extent of about Rs.200/-. In order that he becomes eligible for further loan for irrigated farming, it might be necessary to convert all his debt to medium term loan payable in three to four instalments. He may be required to buy improved implements to the extent of Rs.200/-. As regards land development, he may be able to carry out his own levelling work or atleast earn that much or even more from working on somebody else's fields. He may however, have to incur land development loan to the extent of Rs.200/-. The living cost of a farmer family of 5 members may be about Rs.1,100/- as shown below :

Item	Approximate cost	
	Rs. from	Rs. to
1. Food- 16 gr. cereals & pulses per head per day- 1825 lb. per year @ Rs.16 to Rs.18 per Md.	365	416
2. Other needs, oil, spices, salt, gul etc. @ Rs.15 to Rs.20 p.m.	180	240
3. Cloth- 12 yards per head per year i.e. 50 yards @ Rs.1.50 to Rs.2.00 per yard	90	120

4. Miscellaneous- utencils, bedding, repairs to hut, medical help etc. @ Rs.15 to Rs.20 p.m.	180	240
5. Lighting @ Rs.3 to Rs.5 p.m.	36	60
6. Average cost on ceremonies, holidays, entertainments etc.	100	150
Total	951	1226
Average per year : Rs.1088/- say, Rs.1100/-		

The subsistence farming he is carrying out on his holding without irrigation does not give him enough surplus for a reasonable living. Then there are scarcity and near-scarcity conditions occurring once in 10 years when he has to work outside for a living. Irrigated farming gives him a hope of a reasonable surplus after a period of 8 to 9 years when he is free from debts and has acquired efficiency. The first three to four years will be spent in paying off his overdues which have been converted into medium term loan. He will further be taking medium term loan for improved implements. It would, therefore, not be possible for him to pay any instalment of long term loan excepting only interest charges. During 3rd, 4th, 5th and 6th year he will have to pay medium term loan instalment and interest on long term loan. From 4th year upto 9th year he will have to pay long term loan instalments. It is actually from the 10th year that he will be in a position to make net profit of Rs.1,085/- which may suffice for a reasonable living.

b) Big holder :- The net income of a big holder of 15 acres under irrigation will increase from Rs.1,140 to Rs.3,255/.. Under irrigated conditions he will have full employment spread more or less all the year round and not only at certain periods of the year as is the case in unirrigated

farming. It may be necessary for him to go in for a pair of bullocks costing about Rs.1000/- to supplement his bullock power. Since he used to make a net income even under unirrigated conditions sufficient to meet his reasonable cost of living for himself and his family, he is not likely to be a defaulter. He will however, have to take a medium term loan for the purchase of improved implements worth Rs.800 and a long term loan for land development to the extent of Rs.1000/-. He may be able to pay the medium term loan in four instalments and long term loan with interest in 9 equal instalments beginning from the 3rd year. From the 10th year he will have a net surplus of Rs.3,255/- for a reasonably good standard of living.

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Further line of action :-

The foregoing chapters give all the information at one place. They also give an idea of the existing agricultural development under the command area of Bor project and what needs to be done in a co-ordinated manner by different departments to achieve the objective of full utilisation of irrigation potential. The estimated overall requirements of agricultural requisites by way of machinery, implements, seeds, fertilizers, pesticides, cement etc. as well as short, medium and long term loans have been given, which will be useful for submitting schemes to Government for sanction. It will now be necessary to break down this information villagewise as well as cultivatorwise. The area that will be irrigated by each cultivator in the command will be fixed by Irrigation Department. Besides, the survey numbers which will receive perennial irrigation will also be settled by that Department. That information is not yet available. It will be obtained for every cultivator under each distributary to determine accurately the quantum of levelling and bunding work to be done for each cultivator and the amount of short, medium and long term loans as well as agricultural supplies required by him. Though the estimated cost of levelling lands having different slopes has been mentioned in the report, the extent of lands having different slopes possessed by each cultivator will have to be ascertained and his loan requirement worked out. Similarly though the general crop pattern is given in the report, crop pattern for each cultivator will differ according to the type of soil, location

of fields with reference to distributary and availability of water, and finally the marketing facilities. Such type of cultivatorwise detailed information will form the second part of the report and will be taken up in cooperation with the Irrigation and Power Department and Cooperative Department. The Agricultural Assistants in the Irrigation Units will prepare Farm Production Plans for each individual cultivator indicating therein the various in-puts in the form of money and materials as well as the production that will result therefrom.

Appendix I.

Statement showing monthly and annual rainfall table of Maharashtra State for the years
1940 to 1962. Station : Wardha.

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual	
1940	Nil	0.77	Nil	0.62	0.87	14.42	21.45	6.81	2.90	4.83	0.87	0.71	54.25	inches
1941	0.03	1.76	1.19	0.12	Nil	3.83	22.86	6.43	5.84	Nil	Nil	Nil	41.46	"
1942	0.04	3.41	Nil	0.44	0.05	7.65	20.31	16.42	4.58	0.03	Nil	0.90	53.83	"
1943	4.65	0.06	Nil	0.11	0.71	5.29	9.97	3.03	12.56	3.02	Nil	Nil	39.40	"
1944	0.19	2.28	2.83	0.06	Nil	2.37	16.92	13.88	18.32	3.51	0.08	Nil	60.44	"
1945	0.36	Nil	Nil	0.05	0.35	4.95	14.59	9.10	7.22	0.81	Nil	Nil	37.43	"
1946	Nil	0.73	Nil	0.69	0.28	7.83	14.81	4.93	5.18	1.65	4.07	0.37	40.54	"
1947	2.08	0.46	0.70	0.11	0.20	7.27	17.38	9.77	4.41	0.33	Nil	0.44	43.15	"
1948	2.06	0.47	0.23	0.13	..	4.05	17.11	8.63	8.39	0.28	7.37	..	49.72	"
1949	Nil	0.22	Nil	0.02	1.12	9.42	15.92	7.60	12.78	4.89	Nil	Nil	51.97	"
1950	Nil	1.37	0.13	0.07	0.18	1.71	13.75	9.49	1.28	0.82	Nil	0.23	29.03	"
1951	0.05	Nil	1.64	0.61	Nil	2.63	14.18	11.74	5.08	3.24	Nil	Nil	39.17	"
1952	Nil	0.38	0.10	0.05	0.17	3.77	5.18	8.69	4.40	2.00	Nil	Nil	24.74	"
1953	Nil	Nil	Nil	0.24	0.18	4.21	10.42	17.97	11.43	0.99	Nil	Nil	45.44	"
1954	Nil	Nil	Nil	Nil	Nil	4.68	22.01	7.85	10.68	0.12	Nil	Nil	45.34	"
1955	1.30	Nil	Nil	0.34	0.40	11.38	10.42	10.51	7.13	6.26	Nil	Nil	47.74	"
1956	Nil	Nil	Nil	Nil	3.44	11.06	6.82	2.30	4.62	1.84	1.67	0.20	31.95	"

contd....

Appendix I (contd.)

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual	
1957	0.03	Nil	2.11	3.00	0.87	6.97	6.85	15.43	5.48	0.58	Nil	Nil	41.32	inche
1958	4.3	Nil	13.7	13.5	9.1	90.5	242.3	352.7	252.5	74.5	43.9	Nil	1103.0	m.m.
1959	25.9	Nil	Nil	17.0	1.3	231.0	239.0	89.0	302.0	28.4	0.2	Nil	933.8	m.m.
1960	55.2	Nil	49.6	5.2	77.7	102.8	407.8	128.6	118.2	59.2	Nil	0.98	1003.1	m.m.
1961	Nil	Nil	Nil	Nil	7.4	196.4	331.8	422.8	284.8	96.2	Nil	2.0	1341.4	m.m.
1962	16.0	2.0	30.8	21.2	14.0	36.0	389.8	204.2	209.4	4.6	32.0	100.0	1060.0	m.m.

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Appendix II

Statement showing the size of land holding in the first and second stages covering 12978 acres of the command area of Bor Project, Dist. Wardha

Name of village	0 to 5 acres	5-10 acres	10-15 acres	15-20 acres	More than 20 acres	Total No of cultivators Benefitted	
Sonegaon	43	15	3	-	2	63	
Wadgaon	9	7	1	-	4	21	
Mahagaon	12	9	-	3	4	28	
Kinhi	20	10	8	4	2	44	
Kelzar	60	40	17	7	5	129	
Borgaon	9	11	8	5	-	33	
Akoli	45	4	3	1	-	53	
Shivangaon	7	8	1	1	-	17	
Bori	42	19	4	5	-	70	
0 Mungapur	2	1	-	-	-	3	
1 Chicholi	17	13	8	1	4	43	
2 Junewani	28	12	6	-	-	46	
3 Janglapur	49	34	4	3	4	94	
4 Ringni	63	14	7	-	-	84	
5 Dhondegaon	2	4	1	-	-	7	
6 Dorli	1	4	2	2	-	9	Pipra distri butary.
7 Gaimukh	14	19	12	6	6	57	
8 Khadaki	8	9	8	1	1	27	
9 Ganeshpur	-	5	1	1	2	9	
0 Dorli	129	24	3	2	-	158	Gharad and Kotamba distributary
1 Bibi	19	9	2	1	1	32	
2 Lodapur	38	13	3	1	1	56	
3 Mahabala	12	21	7	2	2	44	
4 Jungad	8	2	2	2	2	16	
5 Kolhi	14	10	4	4	4	36	
6 Gangapur	4	4	4	2	3	17	
7 Kotamba	87	25	8	1	-	121	
8 Belgaon	176	22	5	2	-	205	
9 Jakhala	60	22	6	4	-	92	
0 Kolegaon	72	34	8	5	2	121	
1 Indapur	30	5	2	-	-	37	
2 Amgaon	32	31	14	4	1	82	
3 Pipra	13	8	2	1	-	24	
4 Gharad	300	99	24	6	-	429	
Total	1425	567	188	77	50	2307	

Statement showing villagewise classification of land coming under the Bor Project, Dist. Wardha.

S. No.	Name of village	Area surveyed C.C.A.	Flat land 0-1%	Medium undulating 1 to 2%	Heavily undulating 2 to 3%	Ravine or cut up land more than 3%	Rocky land unfit for irrigation	Remarks
1	Sonegaon	304.90	9.03	278.61	17.26	-	-	
2	Wadgaon	96.42	17.33	79.09	-	-	-	
3	Mohagaon	243.65	194.70	34.83	14.12	-	6.23	
4	Kinhi	525.98	199.02	310.85	9.82	-	-	
5	Kelzar	1532.00	990.32	391.02	103.04	-	54.62	
6	Borgaon	289.43	224.18	65.25	-	-	-	
7	Akoli	65.59	28.47	30.45	5.25	1.42	-	
8	Shivangaon	119.59	17.75	90.35	11.49	-	-	
9	Bori	175.47	-	169.47	3.00	3.00	-	
10	Mungapur	15.60	-	15.60	-	-	-	
11	Chicholi	323.37	99.88	213.05	10.00	-	0.44	
12	Junewani	232.28	27.85	384.98	19.45	-	-	
13	Janglapur	564.07	555.30	8.77	-	-	-	
14	Ringni	294.92	234.72	57.57	2.45	-	0.18	
15	Dhondagaon	47.75	35.36	14.39	-	-	-	
16	Dorli	98.46	98.46	-	-	-	-	Under Pipra distributary.
17	Gaimukh	627.51	570.83	58.68	-	-	-	
18	Khadali	213.55	173.85	15.00	24.70	-	-	
19	Ganeshpur	114.63	106.63	8.00	-	-	-	
20	Dorli	506.67	205.32	296.31	-	5.04	-	Under Gharad & Kotamba distri- butary.

Appendix III contd.

S. No.	Name of village	Area surveyed	Flat land 0-1%	Medium undulating 1 to 2%	Heavily undulating 2 to 3%	Ravine or cut up land more than 3%	Rocky land unfit for irrigation	Remarks
21	Bibi	130.03	110.31	51.26	10.88	-	7.60	
22	Lodhapur	327.36	107.88	66.84	52.49	0.15	-	
23	Mahabala	355.21	241.19	95.56	16.16	2.30	-	
24	Jungad	207.25	57.36	148.39	1.50	-	-	
25	Kolh	432.40	94.66	182.30	52.44	3.00	-	
26	Gangapur	253.26	73.34	114.59	46.34	18.99	-	
27	Kotarba	708.24	380.23	185.98	101.85	28.49	11.69	
28	Belgaon	400.81	411.37	53.01	-	-	16.43	
29	Jakhla	440.92	307.18	94.12	37.29	3.00	0.33	
30	Kolegaon	532.53	526.63	86.81	16.41	0.70	1.98	
31	Inolapur	124.64	100.19	24.45	-	-	-	
32	Amgaon	621.61	393.27	295.16	31.88	-	1.30	
33	Pipra	130.01	102.56	27.45	-	-	-	
34	Gharad	1780.79	838.74	859.14	46.32	16.90	19.69	
Total		12377.50	7408.88	4507.33	858.17	82.99	120.53	
(percent)			57.12	34.69	6.63	0.65	0.91	

Statement showing the existing cropping pattern in the villages under the command area of Bor Project

Name of village	Area U/ Kharif crops				Area U/Rabi crops			Area U/orchard & vegetable crops				
	Paddy	Cotton	Jowar	Tur	Wheat	L.S. cotton	Gram	Banana	Orange	Chilly	Veg.	Sugar cane
1	2	3	4	5	6	7	8	9	10	11	12	13
1 Sonagaon	-	181.03	144.99	30.17	-	-	4.71	-	-	1.35	1.00	-
2 Wadgaon	6.39	537.24	456.57	38.21	16.36	9.66	5.59	-	1.51	8.89	7.88	-
3 Mohagaon	0.21	143.31	205.74	23.05	-	-	0.75	-	-	-	-	-
4 Kinh	3.09	159.79	277.55	21.55	10.14	-	0.75	0.04	4.75	2.97	6.15	3.00
5 Kalzar	28.22	1286.74	1092.12	9.73	162.02	43.33	23.74	1.00	4.18	12.36	7.73	-
6 Borgaon	-	117.39	152.81	24.02	82.00	26.00	0.62	-	-	-	0.26	-
7 Akoli	-	81.44	181.78	15.36	8.28	-	1.44	7.37	2.00	4.71	0.50	-
8 Shivangaon	0.50	260.23	268.37	43.37	1.00	-	-	13.61	1.50	1.00	0.75	-
9 Bori	3.97	383.00	313.00	49.00	5.59	-	1.98	30.00	3.50	3.49	2.00	-
10 Mangapur	-	244.66	113.23	40.78	-	-	-	-	-	-	0.17	-
11 Chicholi	-	161.88	191.49	25.50	9.46	5.39	0.25	-	1.60	4.32	1.19	-
12 Junawani	0.75	341.92	238.81	52.00	0.40	-	2.45	3.38	-	-	0.50	-
13 Janglapur	-	303.08	316.62	24.00	56.76	15.77	1.32	-	-	0.16	0.47	-
14 Ringani	-	127.92	127.48	21.32	15.65	1.00	1.00	-	-	1.50	2.90	-
15 Dhonegaon	0.73	77.15	64.32	9.00	13.40	0.05	0.65	-	6.69	8.00	1.16	-
16 Dorli	-	189.84	280.09	32.96	25.00	5.00	1.00	-	-	1.00	6.00	-
17 Gaimukh	1.76	247.84	253.49	32.07	5.13	-	0.75	-	0.50	3.34	1.00	-
18 Khadaki	4.75	354.09	348.55	27.16	38.45	27.80	-	3.00	13.03	11.51	2.30	-
19 Gajreshpur	-	225.52	317.59	48.52	12.50	1.57	0.55	-	-	-	-	-
20 Dorli	see under (16) above											

contd...

1	2	3	4	5	6	7	8	9	10	11	12	13
21 Bibi	0.19	233.00	265.94	41.00	-	-	0.75	-	-	2.40	0.50	0.50
22 Lodapur												
23 Mahabala	7.05	228.97	258.34	25.04	94.86	13.07	1.77	-	0.60	4.69	5.40	
24 Junrad	0.28	181.48	191.00	29.00	6.54	0.94	0.50	-	9.58	11.09	2.53	1.00
25 Kolhi	-	119.23	226.63	20.00	7.61	31.39	0.32	-	-	-	0.06	
26 Gangapur	-	82.87	92.76	6.12	59.76	12.26	1.36	-	-	0.16	0.06	
27 Kotamba	2.00	455.35	693.54	20.94	48.57	24.03	11.27	-	-	0.55	0.16	
28 Belgao	-	160.30	186.28	25.32	25.97	1.00	3.00	4.50	-	2.50	3.00	
29 Jakhala	-	188.17	207.16	26.80	3.19	-	0.50	5.00	9.00	2.50	0.50	0.50
30 Kolegaon	-	234.04	258.67	40.67	42.00	41.71	3.49	-	-	0.45	1.07	
31 Indapur	-	79.85	64.56	13.95	3.00	15.00	16.00	3.50	-	1.00	-	
32 Amgaon	-	299.54	246.85	19.75	23.84	26.08	1.00	-	10.02	8.82	3.22	
33 Pipra	0.70	271.10	304.30	58.80	93.70	14.50	3.20	-	-	1.95	13.28	1.00
34 Gharad	-	740.97	673.75	121.83	90.00	30.00	2.00	13.00	2.00	12.30	5.00	1.00
35 Hingani	7.61	390.13	375.11	64.09	25.45	-	9.35	42.60	27.59	12.02	16.15	3.00
36 Mohi	1.20	125.49	113.31	20.91	6.60	-	-	0.81	10.00	2.34	1.93	2.00
37 Khepari	0.50	154.50	203.00	25.80	1.80	-	-	10.70	2.30	11.10	6.00	
38 Kinhala	0.16	277.53	439.46	21.00	14.52	2.27	1.94	-	4.51	3.16	1.47	
39 Itala	5.00	526.81	411.03	41.00	73.00	16.61	7.79	-	2.10	1.79	1.78	
40 Dahegaon (Gcse)	0.85	945.59	548.57	45.00	154.50	68.00	35.26	-	4.80	10.00	10.50	2.00
41 Anjangaon	1.28	276.19	277.78	30.37	59.99	-	18.39	-	-	2.77	3.00	
42 Dhapaki	3.07	230.00	215.19	20.13	28.16	-	20.06	-	-	0.66	3.50	0.66

contd....

Appendix IV contd..

	2	3	4	5	6	7	8	9	10	11	12	13	
43 Chinchagnat	2.26	236.70	235.48	19.46	4.20	2.00	5.00	-	-	-	-	-	Grapes 0.50
44 Jogapur	0.60	330.39	217.60	55.06	-	-	-	1.00	-	-	-	-	
45 Charmandla	0.50	918.04	858.12	97.03	182.16	-	14.93	-	-	6.98	9.00	0.50	
46 Junona	2.32	554.75	286.89	56.44	114.80	-	16.27	-	-	11.18	7.00	1.00	
47 Dabapur	-	154.12	91.14	15.98	92.81	-	1.00	-	2.75	1.06	1.50	-	
48 Pakhalapur	2.50	73.10	85.44	8.00	74.14	-	2.10	-	-	-	-	-	
49 Alagan	-	230.90	79.83	26.68	132.88	43.80	8.72	-	-	5.63	9.00	-	
50 Uttampur	-	104.70	146.09	14.60	174.87	23.92	2.15	-	-	0.25	1.00	-	
51 Borikula	-	119.40	174.45	13.30	228.76	-	11.65	-	-	0.59	2.00	-	
52 Madaka	-	86.02	96.76	-	7.77	-	0.25	-	-	-	-	-	
53 Chauki	4.79	714.35	790.05	119.00	409.23	72.18	12.00	-	-	-	-	-	
54 Haniadapur	-	1033.78	278.10	113.10	1082.15	337.50	16.14	-	-	2.75	7.30	-	
55 Deulgan													
56 Deidoh	20.54	788.41	625.88	60.37	74.86	4.42	0.90	-	6.52	12.00	3.31	-	
57 Hiwara	-	280.97	345.66	46.75	29.28	32.34	3.62	-	-	3.25	0.78	1.00	
58 Belodi	1.93	97.39	130.21	18.30	14.51	0.35	0.52	-	-	1.57	6.48	-	
59 Helodi	-	374.19	62.73	312.75	182.02	29.00	0.22	-	-	2.47	0.45	-	
60 Poljarur	-	471.12	339.07	48.10	238.53	42.32	10.00	-	1.65	14.65	5.50	0.50	
61 Palangaon	0.50	795.55	139.75	876.51	678.64	528.13	16.25	-	-	2.30	11.34	1.00	
62 Bahilanpur	0.50	135.26	120.55	31.55	176.53	36.86	2.83	-	-	-	-	-	

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Appendix V.

showing the expenditure required for a Trial-cum-Demonstration Farm.

Designation & pay scale	(No.)	1966-67	1967-68	1968-69	1969-70	1970-71	Total for 5 years
Agronomist in M.A.S. Class II, (Rs.250-270-15-200-23-15-450-20-490-23-25-715)	1	3000	3000	3000	3000	3000	15000
Agricultural Officer (Rs.270-15-375)	1	3240	3420	3600	3780	3960	18000
Agricultural Assistant (Rs.100-3-130-4-170)	3	3600	3708	3816	3924	4032	19080
Senior Clerk (Rs.145-8-185)	1	1740	1836	1932	2028	2124	9660
Junior clerk (Rs.100-3-130-4-170)	2	2400	2472	2544	2616	2688	12720
Peon (Rs.65-1-75)	2	1560	1584	1608	1632	1656	8040
Watchman (Rs.65-1-75)	2	1580	1584	1608	1632	1656	8040
Bullockman (Rs.65-1-75)	3	2340	2376	2412	2448	2484	12060
Mukadam (Rs.75-2-95-2-105)	2	1800	1848	1896	1944	1992	9480
Total for pay of Officer & Estt.		21240	21828	22416	23004	23592	112,080
Dearness allowance		3420	3600	3600	3600	3600	17820
Travelling allowance		3800	3800	3800	3800	3800	19000
Total allowances		7220	7400	7400	7400	7400	36820
Contingencies :							
Recurring :							
Office Exp. & Misc.		1000	1000	1000	1000	1000	5000
Cultivation charges		12000	12000	12000	12000	12000	60000
Maintenance of Livestock Deadstock, Petty constructions etc.		6000	6000	6000	6000	6000	30000
		19000	19000	19000	19000	19000	95000
Non-recurring :							
Purchase of land		50000	-	-	-	-	50000
Land development		5000	-	-	-	-	5000
Laboratory equipment		25000	-	-	-	-	25000
Bullock pairs (5)		7500	-	-	-	-	7500
Fencing of farm		15000	-	-	-	-	15000
Buildings for office and residence		180,000	-	-	-	-	180,000

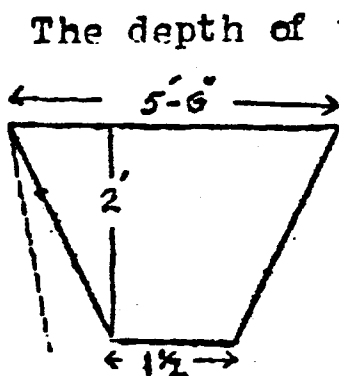
Appendix VI.

Cost of levelling and drainage work under Bor Project.

4) Drainage :-

The trapezoidal type open drains are proposed at a distance of 200' apart. These drains will be connected to natural drains in the area to drain out excess water and to avoid water logging and salt accumulation.

The earth excavated will be deposited on both sides of the channel.



The depth of the drain, in general, is kept at 2' taking into consideration the root zone of 12" to 18". This 660' drain will be for 3 acres. Therefore the total earth work per acre will be $\frac{7 \times 220}{3} = 1540$ Cft.

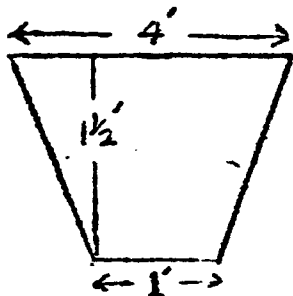
The cost of 1540 Cft earth work at Rs.16/ 1000 Cft will be $\frac{1540 \times 16}{1000} = \text{Rs.24.64}$

Add 10% extra for rise in cost and other incidentals.

Therefore cost per acre = 24.64 + 2.46 = 27.10, say Rs.27.50

B) Main water channel :

The total length of field channels in the command area of 23,666 acres is 240 Kms. or 150 miles i.e. 792,000 running feet. Therefore the length of field channel per acre will be 36 ft. or say 40 ft.

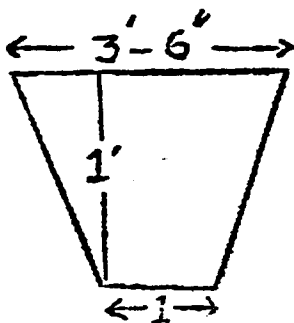


The cross sectional area of main water channel is $\frac{5}{2} \times \frac{3}{2} = 3.75$ Sq.ft.

Therefore total earth work per acre will be $3.75 \times 40 = 150.0$ Cft. and cost of earth work @ Rs.15/- per 1000 Cft will be $\frac{150 \times 15}{1000} = 2.25$, say Rs.2.50

C) Field channels :-

Field channels will have to be provided for each 10 guntha plot. Cross sectional area of the field channel = 2.25 Sq.ft. and length = 108.9. Therefore the quantity of earth work for 10 gt.plot = $108.9 \times 2.25 = 245$ Cft. Therefore, total cost of earth work for one acre = $\frac{4 \times 245 \times 15}{1000} = 14.70$



say, Rs.15/- per acre

Thus the cost of drainage + main water channel + field channel = 27.50 + 2.50 + 15 = Rs.45/-

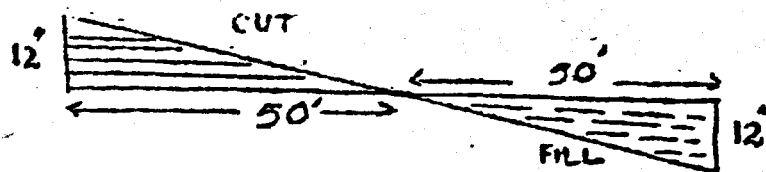
D) Land levelling :- (for lands with 2 to 3% slope)

10 guntha plot = 10890 Sq. ft.

width of strip for 10 gt. plot = 100 ft.

Length of strip for 10 gt. plot = 108.9 ft.

Area of cut and fill



Area of cut = $50 \times 1 \times \frac{1}{2} = 25$ Cft.

Quantity for 10 guntha plot = $25 \times 108.9 = 2723$ Cft.

Bunds : Size - 12" x 9"

Length of boundary bunds (only 2 bunds are taken into account for each plot since the area levelled would be contiguous)

$(100 + 108.9) \times 1 \times \frac{3}{4} = 156.7$ Cft.

Therefore quantity for 10 guntha plot with bunds on either side = $2723 + 157 = 2880$ Cft.

Therefore cost per acre @ Rs.16/- per 1000 Cft

= $\frac{4 \times 2880 \times 16}{1000} = 184.32$; say, Rs.185/-

Add 10% extra for rise in cost and other incidentals

= $185 + 18.5 = 203.5$; say, Rs.205/-

Therefore total cost on land development including levelling bunding, drainage and main water channel and field channel

= $205 + 15 + 27.50 + 2.50$

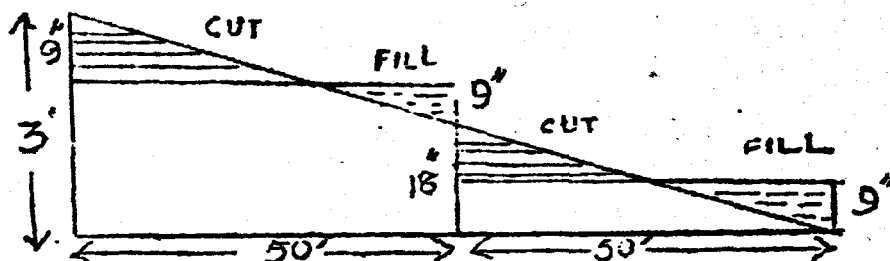
= Rs.250/-

E) Land levelling : (for lands over 3% slope, ravine and cut up lands)

width of strip . 50 ft.

Length of strip - 108.9 ft.

Area of cut and fill



Quantity for a 5 guntha plot with bunds on both sides

= $25' \times \frac{9}{12} \times \frac{1}{2} = 9.38$ Cft.

= $9.38 \times 108.9 = 1021$ Cft.

Bunds : Size 12" x 9"

$(50 + 108.9) \times 1 \times \frac{3}{4} = 119$ Cft.

Therefore quantity for one acre

= $8 \times (1021 + 119) = 8 \times 1140 = 9120$

Therefore cost per acre @ Rs.15/- per 1000 Cft

= $\frac{9120 \times 15}{1000} = 145.9$; say, Rs.150/- per acre

Add 10% extra for rise in cost and other incidentals -

= $150 + 15 =$ Rs.165/-

Therefore the total cost per acre including levelling, drainage, main water channel and field channel

= $165 + 45$

= Rs.210/-

Appendix VII

Statement showing requirements of seeds and fertilizers.

Crop	Area	Seeds Quintals	Fertilizers	
			Amm. Sulphate Tons	Super phosphate Tons
1 Sugarcane	600	-	408	30
2 Oranges	125	-	63	25
3 Banana	150	-	153	29
4 Rice	3750	375	375	187
5 Cotton Long Staple	10950	329	1095	548
6 Wheat	4750	855	475	237
7 Maize (Hybrid)	1225	221	122	61
8 Hot weather Gr.nut	225	90	9	17
9 Hot weather fodder and vegetables	225	-	45	45
10 Linseed on paddy (1000)	(1000)	30	40	75
11 Gram (on paddy) (1500)	(1500)	300	-	-
12 Chillies	500	-	50	25
	22,500	2200	2834	1279

Appendix VIII

Programme of seed production.

Name of the Taluka Seed Farm : Sakali.

Item	Jowar	Wheat	Cotton	Vege tables	Misc. other pulses	Total
1 Area	8.00	19.00	20.00	3.00	3.00	53.00
2 Estimated foundation seed in B.Mds	64	152	40	-	18	-
3 Estimated registered seed 50% procurement B.Mds.	1600	760	400	-	90	-
4 Estimated area covered by registered growers	16000	1520	4000	-	180	-

Appendix IX

Statement showing the amount of cooperative credit necessary for various crops.

Crop	Area acres	Fertilizers Rs.	Seed Rs.	Plant protection Rs.	Cost for cultivation Rs.	Total Rs.
1 Sugarcane	600	3,60,000	-	12,000	2,28,000	6,00,000
2 Oranges	125	The loans for these areas can be given from the Horticultural Dev. scheme				
3 Banala	150	-do-		-do-		
4 Rice	3,750	1,27,500	30,000	30,000	1,87,500	3,75,000
5 Cotton, Long stanla	10,950	5,69,400	32,850	7,11,750	19,71,000	32,85,000
6 Rabi wheat	4,750	2,47,000	57,000	38,000	1,33,000	4,75,000
7 Maize (Hybrid)	1,225	63,700	14,700	9,800	34,300	1,22,500
8 Hot weather groundnut	225	3,600	8,100	1,800	4,500	18,000
9 Hot weather fodder & Veg.	225	11,700	6,300	4,500	22,500	45,000
10 Linseed	1,000	16,000	5,000	8,000	20,000	49,000
12 Gram	1,500	-	-	-	45,000	45,000
12 Chillies	500	26,000	14,000	10,000	50,000	1,00,000
Total	22,500	14,24,900	1,67,950	8,25,850	26,95,800	51,14,500

Appendix A

Statement showing details of Seva Societies covering the villages under Bor project scheme in Wardha tehsil of Wardha district.

S. No.	Name of Society	Name of village	Membership	Share Capital		Reserve & other funds	Deposits	Borrowings	Other liabilities	Total liabilities	Loaning programme during 1964			Audit classification	
				Owned	Govt.						Advanced 63-64	Recoveries	Outstandings		Over dues
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Large size Cooperative Society, Hingni R.No.7	Bori Junewani Hingni Akoli Sonegaon Shivangaon Mohi Kinhi Gangapuri Klapri Monagaon	31	7500	29954	11836	7163	84099	2518	143070	111030	92059	76974	28392	Not audited
2	-do- Seloo, R.No.427	Dorli Chincholi Kunghi Gharai Monlapur Belgach Takharda Libi	2	7500	53805	12851	9311	125558	21462	290497	154640	127996	125558	30132	B
3	Kotamba Seva Sahakari Cooperative Society, R.No.172	Kotamba	87	-	6572	1191	1537	13258	-	22558	14700	20652	11159	800	C

contd...

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4.	Wadgaon Seva Sahakari Cooperative Society Ltd. R.No.657	Wadgaon Gaimukh Jungadh	48 8 28	-	8200	589	-	32725	-	41514	38140	30768	32725	1580	C
5.	Mahabala Seva Co-op. Society Ltd. R.No.510	Mahabala Gangapur Janglapur Itala	115 - 7 5	-	9635	347	1002	28014	23380	62378	32560	30650	28014	6194	C
6.	Kelzar Seva Sahakari Socy.Ltd. R.No.510	Kelzar Pinhala	114 2	-	9760	929	342	37510	-	48541	36260	26709	37510	7160	B
7.	Amgaon Seva Cooperative Socy.Ltd. R.No.652	Amgaon Phadki Dronagaon	38 38 8	-	1610	218	-	62	-	1890	400	5705	62	-	C
8.	Seldoh Service Co-op. Socy.Ltd. R.no.421	Seldoh Dorli Borgaon	74 - 12	-	10040	928	2175	38208	1500	47851	36290	47973	33208	10490	C
9.	Sindi Jarge Size Co-op. Seva Socy. R.No.273	Hivara Bini Ganeshpur Khapri Belodi Helodi Tuljapur	- 3 - 15 - 39 13	7500	48550	10425	1658	157093	2980	228206	175847	121739	157093	-	B

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
10.	Alegaon Seva Co-op. Socy. Ltd. R.No.651	Alegaon	30	-	1940	30	18	11306	--	13888	13530	9897	11306	1674	C
12.	Bhapki Seva Co-op. Socy. Ltd. R.No.237	Bhapki	23	-	405	78	260	2480	-	3223	-	1354	2480	108	C
12.	Dahegaon Service Co-op. Socy. Rahianpur R.No.525	Shivangaon	8	-	14310	583	1801	42726	2209	61796	48750	51503	42726	14166	C
13.	Bhosa Service Co-op. Socy. Ltd. R.No.525	Bhosa	127	-	7555	922	1324	14205	80	23986	23368	18026	14205	3471	B
14.	Usra Service Co-op. Socy. Ltd. R.No.37	Wargaon	94	-	8505	1723	2275	28375	285	39103	24429	25036	26375	6629	B
15.	Isapur Service Co-op. Socy. Ltd. R.No.137	Isapur	47	-	2175	1130	1407	8959	3	437722	3004	2483	8998	7317	C
16.	Nandpur Service Co-op. Socy. Ltd. R.No.232	Nandpur	35	-	2785	349	187	613	6466	-	19401	8018	8548	6466	B
17	Palasgaon Seva Sahakari Socy. Ltd. R.No.20	Palasgaon	25	-	3140	3177	218	2180	94	8839	150	3887	2180	2180	C

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Appendix XI

Statement showing estimates of agricultural production in the Bor Project.
(The irrigable area 22,500 acres.)

Season	Crops	Area to be irrigated (Potential)	Yield per acre	Total estimated production	Marketable surplus (tons)
Kharif	Rice	3750	20 Md.	75000 Md.	832.5
	Cotton	10950	15 "	164,250 "	6077.2
	Sugarcane	600	35 tons	21000 tons	16800.0
	Oranges	125	20 Qtl.	2500 Qtl.	200.0
	Bananas	150	30 tons	4500 tons	3600.0
	Chillies	500	20 Md.	10000 Md.	296.0
	Hybrid maize	1000	25 Md.	25000 Md.	277.5
Rabi	Wheat	4750	10 Md.	47500 "	527.2
	Gram (on paddy)	(1500)	7 "	10500 "	116.5
	Linseed "	(1000)	4 "	4000 "	118.4
Hot weather	Veget. & fodder	225	100 "	22500 "	666.0
	Hybrid maize	225	25 "	5625 "	62.8
	Hot weather groundnut	225	25 "	5625 "	166.5
		22500			

Note :- Marketable surplus is estimated at 30% of the production in case of foodgrains and 80% in case of oilseeds, fruits, vegetables. As far as cotton is concerned, all production is marketable.

Statement showing the value of agricultural produce under existing crop pattern and its material expenses.

Crop	Area	Yield/ acre lb.	Price in Rs/Qtl.	Value in Lakh Rs.	Seed		Manure		Total seed & Manure Lakh Rs.
					Rate Rs/acre	Amount Lakh Rs	Rate Rs/acre	Amount Lakh Rs	
1. Rice	70	528	46.0	0.08	8.35	0.01	20.0	-	0.01
2. Kh. Sower	10115	464	37.50	8.75	1.49	0.15	10.0	1.01	1.16
3. Wheat	2436	375	55.0	2.27	10.0	0.24	10.0	0.24	0.48
4. Other cereals	12	301	40.0	0.0	2.00	0.0	10.0	-	0.0
5. Pulses	5810	1055	48.0	8.71	4.00	0.15	10.0	0.38	0.53
6. Cotton	12072	56 (lint)	130.0	11.41	2.73	0.33	30.0	3.62	3.95
7. Oilseeds	1030	231	62.0	0.67	10.00	0.10	10.0	0.10	0.20
8. Fruits & Veg	420	100	600.0	2.52	-- Rs.100 per acre			0.42	0.42
9. Mi		(Md)	(per acre)						
9. Miscella- neous	35	217	50.0	0.02	4.00	0.0	10.0	-	0.0
	30,000								
Total value of farm produce				34.43	Total				6.75
Deduct 10% for F.V.P.				- 3.40	Add fodder expenses at 10% of F.V.P.				+ 1.71
				30.99					8.46
Add for fodder on items 1,2, 3 & 4 @ 30%				+ 3.33	Add for implement charges @ 3% of F.V.P.				+ 0.51
				34.32					8.97
Add for dung receipt of F.V.P. @ 3%				+ 0.92	Add labour charges @ 20% of F.V.P.				+ 3.42
				35.24					12.39
Deduct material expenses				- 12.39					
Net value of produce				22.85					
Therefore, value of produce = Rs.76.2/acre.									

Appendix XIII

Statement showing value of agricultural produce after introduction of irrigation, and material expenses.

Crop	Area acres	Yield/ acre	Price in Rs/lb.	Value in Lakh Rs	Seed		Manure		Total seed & manure Lakh Rs
					Rate Rs/acre	Amount Lakh Rs	Rate Rs/acre	Amount Lakh Rs	
1. Sugarcane	600	35 tons	60/ton	12.60	180.0	1.08	600	3.60	4.68
2. Orange	125	20 Qtl.	100/Qt1	2.50	.. Rs. 500 per acre ..				0.62
3. Bananas	150	30/tons	40/ton	1.80	150.0	0.22	600	0.90	1.12
4. Rice	3750	20 Md.	46/Qt1	12.77	8.35	0.31	60	2.25	2.56
5. Hy. maize	1225	25 "	55/Qt1	6.27	10.0	0.12	40	0.40	0.61
6. Chillies	500	20 "	88/Md	8.80	1.00	0.01	200	1.00	1.01
7. Cotton	10950	15 Md.	130/Qt1	79.00	2.73	0.29	120	13.14	13.43
8. Wheat	750	10 "	55/Qt1	9.67	10.00	0.47	40	1.90	2.37
9. Vegetables & fodder	225	100 "	10/Md	2.25	16.80	0.04	25	0.06	0.10
10. Hot weather groundnut	225	25 "	61/Qt1	1.27	16.80	0.04	25	0.06	0.10
11. Gram (on paddy)	(1500)	7 "	45/Qt1	1.75	8.18	0.12	15	0.23	0.35
12. Linseed (on paddy)	(1000)	4 "	100/Qt1	1.48	10.00	0.10	10	0.10	0.23
13. Jowar (un- irrigated)	7500	7 "	37.50/Qt1	7.28	1.50	0.11	40	3.00	3.11
	<u>30000</u>			<u>147.40</u>					<u>30.29</u>
			Deduct 10% of F.H. price	- 14.74			Add fodder expenses @ 10% of F.H.P.		+ 13.26
				<u>132.66</u>					<u>43.55</u>
			Add for fodder @ 25% on items 4,5,8 & 13	+ 8.98			Add implement charges @ 3% of F.H.P.		+ 3.98
				<u>141.64</u>					<u>47.53</u>
			Add for dung receipts @ 3% of F.H.P.	+ 3.98			Add labour charges @ 25% of F.H.P.		+ 33.16
				<u>145.62</u>					<u>80.69</u>
			Deduct for material expenses	- 80.69			Total material exp.		80.69
			Net value of produce	<u>64.93</u>					

Therefore value of production Rs:216.50/acre.