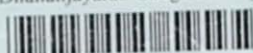


Wardha District Development Paper

IRRIGATION.

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IRRIGATION

1

WARDHA

DISTRICT DEVELOPMENT PAPER

WARDHA

District Development Paper

1

IRRIGATION

1960-61

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FOREWORD

I welcome Mr. Patankar's Study of Water resources of Wardha District for a variety of reasons. In the first instance, it brings out, through presentation of detailed data and maps in connection with a variety of problems, the great variations in conditions in regard to such fundamental problems as the availability of water for crop production even in a single district in a State. The monograph emphasises, in this manner; what should have been always known but has unfortunately been largely ignored, that intensive local studies must be undertaken and completed before plans of agricultural development can be properly formulated.

Secondly, Mr. Patankar's careful work indicates the complexity of a number of problems that have to be currently tackled in India. In this particular district, the most important as well as the most difficult problems appear to be those connected with wells. It is clear from the account of Mr. Patankar that it would be wrong to treat the problem of wells, especially of the phenomenon of abandoned wells, as if its causations and characteristics were uniform throughout the district. Physical factors, crop patterns, prices, as well as socio-economic policy all shape the contours of this problem and under different situations the possible approaches to the solution may be widely different.

Further, Mr. Patankar's study should impress forcibly on the reader the very inadequate extent of applied scientific work done so far in this country in relation to problems of agricultural production. Whether it is the problem of grass lands or of contour bunding or of Bandhara irrigation, the work, so far, appears to have been limited to isolated experiments or to limited areas of successful projects. The application of the experimental data or the limited area of experience necessarily involves, in view of the variety of conditions, considerable further work on the ground level in each case beginning with exploratory pilot projects. Remarkably little of this has been done during the last ten years.

One suspects that the surprising neglect of local studies and of local

... iv ...

experimentation during the last ten years has been the result of the manner in which our plans have been formulated, of the over-centralisation in every sphere of administration and of the natural conservatism of superior ranks in administration, even in the technical services. It is hoped that with the new experiment of decentralisation on the district level, consequent upon the formation of Zilla Parishads in Maharashtra, these obstacles will be removed to a considerable extent. However, if the Zilla Parishads take up seriously the work of planning at the district level they will require in a liberal measure assistance of studies like those of Mr. Patankar. Such studies, it is hoped, will in their turn help in discovering the special features and characteristics of local production problems and lead to the relevant experimentation and pilot projects for formulating meaningful programmes of agricultural development.

D R. Gadgil

Gokhale Institute of Politics and Economics,
12th November, 1962.
Poona 4.

PREFACE

Opportunities presented by close associations with what is now termed as 'District Planning Project Wardha', have been the mainsprings of this series of 'District Development Papers'. These papers mainly attempt a reappraisal of development policies and programmes ; and further spotlight the field of investigation and experimentation involved in initiating a process of meaningful planning in the wake of Zilla Parishads which have to be trustworthy forerunners of District Governments of tomorrow.

The present paper covers but one aspect of the studies concerning the Resource Complex of the District. Subsequent papers would discuss such aspects of development as (i) Dry farming and land development ; (ii) Grass lands and forest resources ; (iii) Animal Husbandry and Dairy Farming ; (iv) Surplus labour and trends in urbanization ; (v) Industries for Area-plans ; (vi) Public Utilities under a planned perspective ; (vii) Organisation ; and (viii) Scope of Planning. Publication of these papers would follow this first monograph.

Drafting of these papers has involved consultations with a wide range of persons who can speak on authority in their respective spheres. It is rather difficult to mention them here by their names. However, I take this opportunity to express my feelings of indebtedness, with a profound sense of gratitude to the officials in different walks of governmental activity ; but for whose willing co-operation the reappraisal would have proved a delicate task. This does not, however, mean that the opinions expressed in the following pages, in anyway, represent their views.

At different stages of compilation of this draft, I was fortunate enough, in getting frank and valuable criticism from Dr. K. G. Joshi, Principal, Government College of Agriculture, Nagpur; Engineers of Water Resources Division, Government of Maharashtra, and in particular from Shri B. R. Sardesai, Retd. Executive Engineer, Poona ; and from Shri D. A. Gadkari, Retired Director of Minor Irrigation, Maharashtra State.

...vi...

With great pleasure, I wish to register my sincere appreciation of co-operation received from Shri S. H. Pore and Shri S. W. Muranjan of Gokhale Institute, Poona, who bore the major brunt of field studies, all these days, in the wake of district Surveys and Planning. Exchange of notes with them has all along been an enduring experience. Indeed, I look upon them as co-authors of this Series.

And here at home, it has been an enriching experience to discuss the draft with my colleagues at the Regional Planning Institute. More particularly, I am proud to note that access to the painstaking work undertaken by Shri M. R. Deshpande on consumption of Electricity in Rural areas has made remarkable contribution to this monograph. My thoughts go back to those trainees of first batch who trampled the ploughed fields in the scorching heat of May and helped conduct the 'Condition Survey' of abandoned wells, which has so profoundly influenced the course of this study.

Regional Planning Institute,
Sewagram, (Wardha)

Pandit Patankar

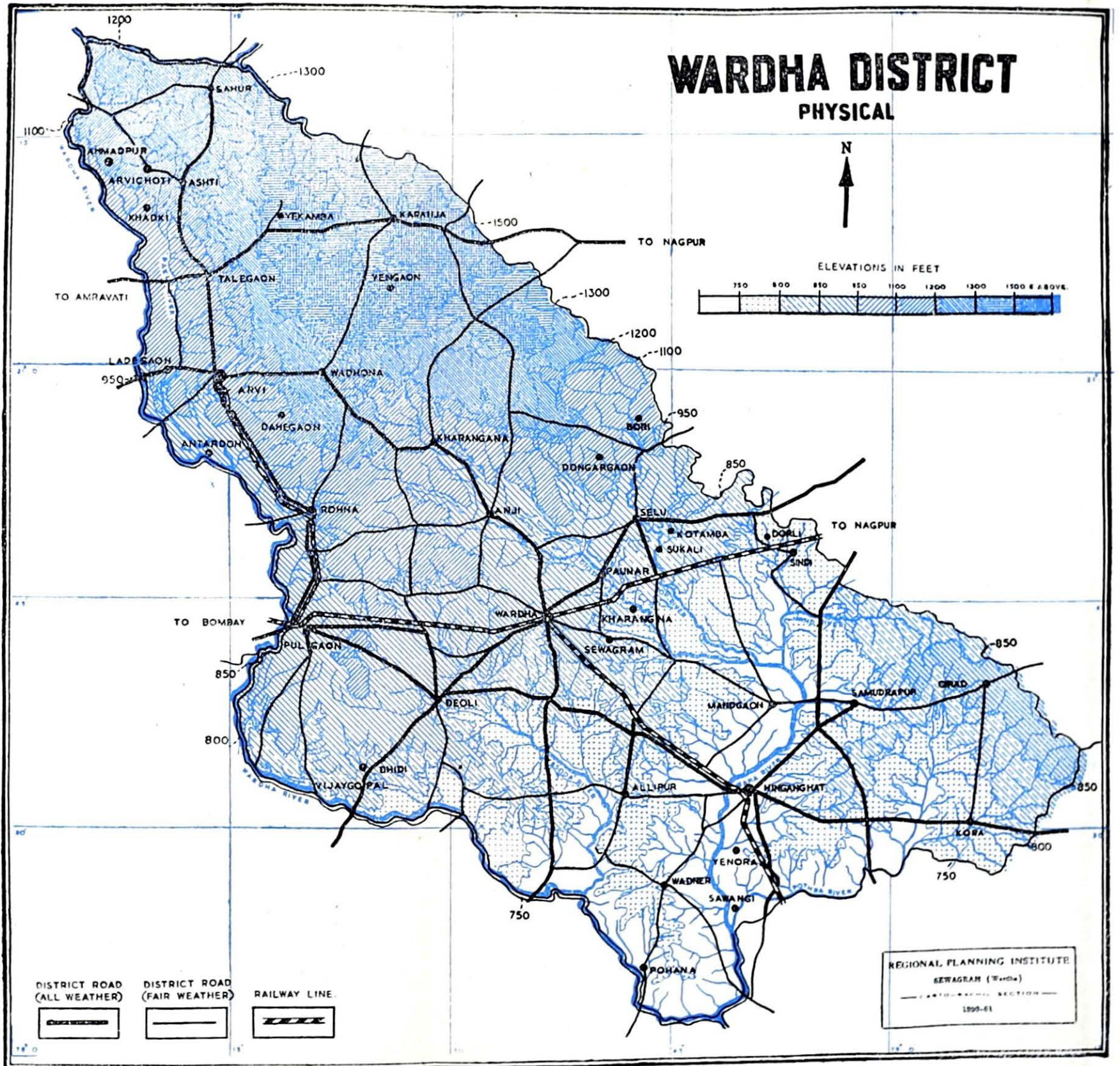
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- A District-wise use and un-use pattern of Irrigation Wells (Maharashtra State)
- B Particulars of wells *in use* in village Yengaon.
- B 2 Particulars of wells *not in use* in village Yengaon.
- C Rural Electrification—consumption of power for water lifting purposes.
- D Baglan system of Bandhara Irrigation.

MAP No. 1



APPENDIX A

Statement showing district-wise number of irrigation wells and those not in use together with area irrigated by them in Maharashtra State (1959).

(Area figures in hundreds)

S. No.	District	Total No. of irrigation wells	Number of wells in use.	No. of wells not in use.	% of wells not in use to the total no. of wells in Col. 3	Gross Area All sources (Acres)	Irrigated wells (Acres)	% of area irrigated by wells to total area in col. 7	Average area irrigated per well (Acres)	Gross cropped area (Acres)	% of gross area irrigated by all sources to the gross cropped area	Percentage of gross area irrigated by wells to gross cropped area.
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	W. Khandesh	1,00,23	8,694	1,329	13.3	844	426	15.5	4.8	19,641	4.3	2.2
2.	Nasik	51,084	47,338	3,746	7.3	1,475	549	37.2	1.1	24,257	6.1	2.0
3.	Thana	6,654	6,239	415	6.4	114	89	78.1	1.4	7,791	1.5	1.1
4.	Bombay Suburban	476	386	90	18.9	13	13	100.0	3.3	224	5.8	5.8
5.	Kolaba	4,041	3,684	357	8.8	48	36	75.0	1.0	5,422	0.9	0.7
6.	Ratnagiri	13,480	11,798	1,682	12.5	319	129	40.4	1.1	8,848	3.6	1.5
Bombay Division Total :		85,758	78,139	7,619	11.2	2,813	1,242	57.7	2.11	66,183	3.7	2.2
7.	Ahmednagar	58,314	53,532	4,782	8.2	3,138	1,723	54.9	3.2	32,956	9.5	5.2
8.	Poona	44,085	38,733	5,352	12.1	2,405	906	37.7	2.3	26,755	9.0	3.4
9.	N. Satara	32,793	28,083	4,710	14.4	2,124	711	33.5	2.5	18,087	11.7	3.9
10.	S. Satara	32,384	27,747	4,637	14.3	1,009	728	72.2	2.6	16,241	6.2	4.5
11.	Kolhapur	10,695	9,309	1,386	13.0	763	263	34.5	2.8	10,094	7.6	2.6
12.	Sholapur	48,923	45,858	3,065	6.3	2,933	1,798	61.3	3.9	29,530	9.9	6.1
Poona Division Total :		2,27,194	203,262	23,932	10.5	12,372	6,129	49.5	3.0	1,33,663	9.2	4.5

APPENDIX A (Contd.)

S. No.	District	Total no. of irrigation wells.	No. of wells in use	No. of wells not in use.	% of wells not in use to the total no. of wells in Col. 3	Gross area All sources (acres)	Irrigated wells (acres)	% of area irrigated by wells to total area in Col. 7.	Average area irrigated per well (Acres)	Gross cropped area (acres)	% of gross area irrigated by all sources to the gross cropped area	% of gross area irrigated by wells to gross cropped area
1	2	3	4	5	6	7	8	9	10	11	12	13
13.	E. Khandesh	46,174	34,689	11,485	24.9	887	605	68.2	1.8	20,963	4.2	2.9
14.	Aurangabad	29,501	26,009	3,492	11.8	1,190		77.3	3.5	32,098	3.7	2.9
15.	Parbhani	13,292	10,547	2,745	20.7	435	422	97.0	4.0	24,152	1.8	1.7
16.	Bhir	26,944	25,146	1,798	6.7	855	533	62.3	2.2	20,433	4.2	2.6
17.	Osmanabad	17,588	14,714	2,874	16.3	997	778	78.0	5.3	26,829	3.7	2.9
18.	Nanded	4,120	2,880	1,240	30.1	171	152	88.9	5.3	19,800	0.9	0.8
Aurangabad Division Total :		1,37,619	1,13,985	23,634	17.2	4,535	3,410	75.2	2.9	1,44,275	3.1	2.4
19.	Buldhana	19,110	12,693	6,417	33.6	168	165	98.2	1.3	16,947	1.0	1.0
20.	Akola	15,197	2,872	12,325*	81.1	71	67	94.4	2.4	18,918	0.4	0.4
21.	Amravati	13,927	10,109	3,818	27.4	131	127	96.9	1.3	16,703	0.8	0.8
22.	Yeotmal	6,410	3,588	2,822	44.0	61	51	83.6	1.4	18,069	0.3	0.3
23.	Wardha	16,097	5,725	10,372	64.4	106	102	96.2	1.8	9,898	1.1	1.0
24.	Nagpur	34,490	18,746	15,744	45.6	594	313	52.7	1.7	13,167	4.5	2.4
25.	Chanda	9,085	6,399	2,686	29.6	2,125	27	1.3	0.4	13,499	15.7	0.2
26.	Bhandara	11,127	8,410	2,717	24.4	3,098	64	2.1	0.8	12,465	24.9	0.5
Nagpur Division Total :		1,25,443	68,542	56,901	45.4	6,354	916	14.4	1.3	1,19,666	5.3	0.8
State Total :		9,62,764	463,928	1,12,086	21.07	26,074	11,697	49.2	2.57	4,63,787	5.3	2.47

*Figures to be verified. Source : Report of the Technical Committee on Wells Scheme, Government of Bombay 1959.

APPENDIX B

Particulars of wells in use in village Yengaon (Karanja Revenue Circle)

Serial No. as shown on Map	Particulars of construction						Area Under Irrigation			Water lifting device	Remarks
	Construction	Total depth of the well	Diameter	Water Column	Year of construction	If Taccavi was secured	Seasonal	Perennial	Total		
1	2	3	4	5	6	7	8	9	10	11	12
1.	B	12	7	4	1957	No.	Nil	0.75	0.75	M	
2.	B	21	10	3	1930		0.50	Nil	0.50	M	
3.	A	21	11	5	Old	Rs. 400- for repairs	0.50	3.00	3.50	M	
4.	B	24	10	9	Old	No.	...	...	...	M	
5.	B	26	8	13	1922	...	3.0	2.0	5.0	M	
6.	A	21	8	10	Old	...	3.0	...	3.0	M	
7.	B	21	10	13	1932	...	...	1.0	1.0	M	
8.	A	17	22	8	1932	...	8.30	...	8.30	Oil Engine	Rs. 1500 own ex- penditure
9.	A	11	12	5	1957	...	2.50	2.0	4.50	Oil Engine	—do—
10.	B	20	11	9	1958	...	0.50	1.0	1.50	M	
11.	B	21	11	12	1961	...	1.15	0.50	1.65	M	
12.	B	13	10	7	1957	...	...	2.50	2.50	M	
13.	B	12	10	5	Old	...	...	0.20	0.20	M	
14.	B	11	7	5	Old	...	1.0	...	1.00	M	
15.	B	17	8	4	Old	...	1.50	2.00	3.50	Oil Engine	
16.	B	17	8	4	1912	...	...	1.0	1.0	M	
17.	A	22	15	4	1961	Yes	3.00	4.00	7.00	Oil Engine	

A—Pucca construction; B—Kaccha construction; M—Water lift provided by Mhote.

APPENDIX B (Continued)

Serial No. as shown on Map	Particulars of construction					Area under Irrigation				Remarks	
	Construction	Total depth of the well	Diameter	Water Column	Year of construction	If Taccavi was secured	Seasonal	Perennial	Total		Water lifting device
1	2	3	4	5	6	7	8	9	10	11	12
18.	A	20	9	10	1932	No.	1.00	2.50	3.50	M	
19.	A	24	21	7	Old	...	1.30	5.35	6.65	M	
20.	A	20	12	7	Old	...	1.0	2.00	3.0	M	
21.	B	22	7	5	Old	...	1.55	...	1.55	M	
22.	A	25	7	9	Old	...	0.75	1.00	1.75	M	
23.	A	15	14	2	Old	...	0.50	1.00	1.50	M	
24.	A	17	9	8	Old	...	...	1.00	1.00	M	
25.	A	24	12	7	1932	...	4.0	4.00	8.0	M	
26.	B	9	10	2	1932	...	...	1.50	1.50	M	
27.	A	21	13	6	1912	Rs. 800 for repairs	1.0	...	1.0	M	
28.	A	16	14	5	1947	...	1.30	6.00	7.30	Oil Engine	
29.	B	11	7	3	1931	...	...	1.00	1.00	M	
30.	A	13	11	3	1931	...	...	1.00	1.00	M	
31.	B	14	9	4	1931	No.	...	0.30	0.30	M	
32.	B	14	7	5	1931	...	0.30	...	0.30	M	
33.	A	18	11	3	1931	...	0.20	4.00	4.20	Oil Engine	
34	B	12	14	2	1959	...	...	0.30	0.30	M	
35.	B	27	11	4	Old	...	...	1.00	1.00	M	
36.	B	23	11	4	Old	...	...	1.00	1.00	M	
							37.85	52.90	90.75	Total Mhotes ... 30 Oil Engines...6	

A — Pucca Construction.

B — Kaccha construction

M—Water lift provided by Mhote.

APPENDIX B-2

**Particulars of wells not in use in the village Yengaon
(Karanja Revenue Circle)**

<i>S. No.</i>	<i>Particulars of construction</i>				<i>Year of construction</i>	<i>Present condition of the well</i>	<i>If Taccavi was secured</i>	<i>Main reason for its abandonment</i>
	<i>Construction</i>	<i>Total depth of the well (in feet)</i>	<i>Diameter (in feet)</i>	<i>Water column (in feet)</i>				
1	2	3	4	5	6	7	8	9
37.	B	...	...	...	Old	Totally ruined	Not available	In total ruins
38.	B	...	...	...	Work in progress	...	...	... ..
39.	B	...	...	...	Old	Totally ruined	Not available	In total ruins
40.	B	—	—	—	Old	—	—	In total ruins
41.	A	19	9	9	Prior to 1945	Construction intact	...	Hard rock : water not struck
42.	B	14	9	3	Prior to 1930	Slightly Damaged	...	Inadequate supply of water; used for drinking water for cattle.
43.	A	16	17	Nil	Prior to 1930	Damaged	...	Hard rock struck. Digging left half way.
44.	A	10	16	4	Prior to 1945	Collapsed	Taccavi of Rs. 1,000/- secured.	Hard rock. Inadequate supply of water.
45.	B	11	12	5	Prior to 1945	Damaged	...	Hard rock. Inadequate supply of water.
46.	B	12	10	3	Prior to 1930	Damaged	...	Hard rock — inadequate water

A—Pucca Construction

B—Kaccha construction

... 54 ...

APPENDIX B-2 (continued)

S. No.	Particulars of construction				Year of construction	Present condition of the well	If Taccavi was secured	Main reason for its abandonment
	Construction	Total depth of the well in feet	Diameter in feet	Water column in feet				
1	2	3	4	5	6	7	8	9
47.	B	13	10	2	Prior to 1945	Damaged	—	Hard rock — inadequate water
48.	B	23	7	7	Prior to 1945	Good	...	Murum layers : inadequate water
49.	B	11	10	1	Prior to 1945	Good	...	Hard rock — left incomplete
50.	B	8	12	Nil	Prior to 1945	Collapsed	...	Inadequate water. Hard rock. Left incomplete. Water not struck.
51.	B	15	19	1.5	Prior to 1945	„	...	Hard rock — left incomplete.
52.	A	17	9	Nil	Prior to 1945	„	...	Hard rock-left incomplete ; water not struck.
53.	B	...	...	...	Not available	In total ruins	...	...
54.	B	17	9	2	Prior to 1945	Heavily silted	...	Murum layers—cultivator unable to repair for want of finances.
55.	B	17	9	Nil	Prior to 1945	Damaged.	...	Hard rock struck—left incomplete
56.	B	...	...	...	Not available	In total ruins	...	...
57.	B	22	12	5	Prior to 1945	Damaged	...	Murum layers—inadequate supply of water.
58.	B	20	10	0.5	Not available	Collapsed	...	Requires major repairs.
59.	B	17	9	Nil	Prior to 1945	Damaged	...	Hard rock encountered. Water not struck
60.	B	...	...	...	...	In total ruins	...	On the bank of Nallah.
61.	B	...	...	...	...	In total ruins	...	Damaged on account of flooding of Nallah.
62.	B	...	...	...	...	In total ruins	...	Damaged on account of flooding of Nallah.

A — Pucca construction.

B — Kaccha construction.

APPENDIX C

Statement showing extent of consumption of Electricity for lifting water from wells in Wardha (1960—61) recorded as in the month of July 1961.

Serial No.	Name of the village.	Revenue Inspector's circle	Total no. of consumers.	Number of consumers consuming power more than the minimum prescribed			
				for yearly total	Percent. Even for summer season	Percent	Percent
1	2	3	4	5	6	7	8
1.	Sewagram	Sindi	17	13	76	11	64
2.	Kharangana	„	17	2	11	4	23
3.	Chitoda	„	5	4	80	4	80
4.	Salod	Wardha	38	14	36	18	47
5.	Inzapur	Wardha	7	4	57	2	28
6.	Selu Kate	Sindi	1	...	...	...	...
7.	Barbadi	„	15	5	33	7	46
8.	Borgaon	Selu	12	4	33	5	41
9.	Warud	Selu	13	10	77	11	84
10.	Selsura	Deoli	6	...	...	...	...
11.	Nalwadi	Wardha	16	3	18	4	25
12.	Isapur	Deoli	5	3	60	1	20
13.	Wadadh	Deoli	10	3	38	2	25
14.	Chichala	Sindi	5	1	20	3	60
15.	Dattapur	Sindi	4	2	50	3	75
16.	Mahakal	Selu	2	1	50	2	100
17.	Pipri	Wardha	5	1	20	...	...
18.	Khapri	Deoli	10	2	20	2	20
19.	Seldo	Selu	4	...	...	...	...
20.	Digras	Sindi	3	1	33	...	...
21.	Deoli	Deoli	54	10	18	8	14
22.	Saongi	Deoli	10	2	20	3	30
23.	Satoda	Selu	11	6	54	5	45
24.	Sindi	Sindi	18	5	28	6	33
25.	Bela	Selu	6	...	...	...	...
26.	Sawangi	Wardha	1	1	100	1	100
27.	Asola	Pulgaon	1	1	100	1	100
28.	Arvi	Arvi	43	20	46	20	46
29.	Dautpur	Arvi	7	1	14	1	14
30.	Pachegaon	Rohana	7	1	14	2	28

APPENDIX C (Continued)

Serial No.	Name of the village	Revenue Inspector's circle	Total no. of consumers.	Number of consumers consuming power more than the minimum prescribed			
				for yearly total	Percent,	Even for summer season	Percent
1	2	3	4	5	6	7	8
31.	Pipri	Rohana	7	1	14	2	28
32.	Maneri	Arvi	7	...	...	...	...
33.	Varadh	Arvi	13	3	20	2	13
34.	Jalgaon	Arvi	35	22	62	18	51
35.	Borgaon	Arvi	7	3	43	...	...
36.	Belora	Arvi	7	3	43	1	14
37.	Borgaon (Hatla)	Arvi	3	...	...	...	...
38.	Talegaon	Arvi	39	18	46	23	59
39.	Nachangaon	Pulgaon	39	24	61	25	64
40.	Rohana	Rohana	22	11	50	11	50
41.	Virul	Rohana	25	4	16	3	12
42.	Sorta	Rohana	1	1	100	1	100
43.	Pulgaon	Pulgaon	5	4	80	3	60
44.	Selu	Selu	38	25	66	28	73
45.	Kini	Selu	11	7	63	8	72
46.	Juwadi	Selu	5	4	80	4	80
47.	Ghorad	Selu	11	6	54	5	45
48.	Lehki	Selu	52	33	63	46	88
49.	Surgaon	Selu	18	7	39	10	55
50.	Hingni	Selu	33	16	59	20	60
51.	Wadgaon	Selu	49	28	57	38	77
52.	Moi	Selu	15	5	33	8	53
53.	Zadsi	Selu	37	17	46	18	48
54.	Pimpalkhuta	Kharangana	5	3	60	3	60
55.	Borikokate	Selu	8	3	37	4	50
56.	Salai Peth	Selu	7	3	43	3	43
57.	Hinganghat	Hinganghat	11	4	36	4	36

APPENDIX C (*Continued*)

List of villages approved for electrification.

- | | |
|-----------------------------|-------------------------------|
| 1. Kutki - Wardha. | 12. Sakra - Hinganghat. |
| 2. Talodi - Wardha. | 13. Ashta - Wardha. |
| 3. Tuljapur - Wardha. | 14. Hamdapur - Wardha. |
| 4. Waghala - Wardha. | 15. Nandora - Wardha. |
| 5. Jaipur - Wardha. | 16. Mandaogad - Wardha |
| 6. Chanki - Wardha. | 17. Shirpur - Wardha. |
| 7. Kopra - Wardha. | 18. Karanji (Bhoge) - Wardha. |
| 8. Takli - Wardha. | 19. Nagapur - Wardha. |
| 9. Karanji (Kazi) - Wardha. | 20. Dhanora - Wardha. |
| 10. Madni - Wardha. | 21. Dodki - Wardha. |
| 11. Hivra - Hinganghat. | 22. Morangana - Arvi. |

Supplementary list of village electrified till 30th Oct. '62.

- | | |
|--------------------------------|-----------------------------------|
| 1. Paunar - Wardha. | 26. Talegaon - Arvi. |
| 2. Salod (Hirapur) - Wardha. | 27. Panwadi - Arvi. |
| 3. Wadadh - Wardha. | 28. Rasulabad - Arvi. |
| 4. Kamthi - Wardha. | 29. Bhisnoor - Arvi. |
| 5. Hivra - Wardha. | 30. Kajali - Arvi. |
| 6. Umri - Wardha. | 31. Dhawoli Bahadurpur.-Arvi. |
| 7. Ratnapur - Wardha. | 32. Wagholi - Hinganghat. |
| 8. Bhidi - Wardha. | 33. Dabha - Hinganghat. |
| 9. Muradgaon - Wardha. | 34. Ganeshpur - Hinganghat. |
| 10. Nandora - Wardha. | 35. Nagzari - Arvi. |
| 11. Dhanoli - Wardha. | 36. Dhavadi - Arvi. |
| 12. Inzala - Wardha. | 37. Madni - Arvi. |
| 13. Vijaygopal - Wardha. | 38. Behadi - Arvi. |
| 14. Waigaon (Nipani) - Wardha. | 39. Karanja - Arvi. |
| 15. Kurzadi - Wardha. | 40. Sondi - Wardha. |
| 16. Jamtha - Wardha. | 41. Salai Kala - Wardha. |
| 17. Sonegaon (Abaji) - Wardha. | 42. Palasgaon - Wardha. |
| 18. Nagzari - Wardha. | 43. Palasgaon near Bhidi-Wardha . |
| 19. Agargaon - Wardha. | 44. Kholapur - Wardha. |
| 20. Loni - Wardha. | 45. Yeli Keli - Wardha. |
| 21. Ashti - Arvi. | 46. Sukli - Wardha. |
| 22. Rahati - Arvi. | 47. Anji - Wardha. |
| 23. Ashta - Arvi. | 48. Paunar - Wardha. |
| 24. Jam - Arvi. | 49. Kharangana - Arvi. |
| 25. Peth Ahmadpur - Arvi. | 50. Dahegaon Gondi - Arvi. |

APPENDIX D

BAGLAN SYSTEM OF BANDHARA IRRIGATION.

(The following Note is prepared by extracting relevant portions from Beale's Report (Part I) and from the Report of Mr. Visvesvaraya Committee of 1938).

“The North Deccan districts differ from the other parts of the Presidency by their extensive system of bandharas or masonry weirs with channels taking off on one or both banks. The flow in the rivers and channels is principally during the monsoon and rabi seasons, but a small hot season supply is sometimes obtained. This is an ancient form of irrigation. The system of cultivation under bandharas has reached perfection in what is called the “Baglan”—a tract including the Burai, the west Panjhra valley, the Mosum and the whole Girna valley west of Malegaon.

In this part the thal or area commanded by a bandhara and its channel, is usually divided into four nearly equal parts or ‘phads,’ the whole of which is annually brought under irrigation. Each phad is subdivided into an equal number of shares or fields according to the number of owners. In any one year, the whole of one phad is devoted to rice, another to sugarcane, the third to wheat, gram, peas etc., and the fourth to bajri or kharif jowar etc. All cultivators in a given phad are bound to grow the same crop so as to equate their water requirements. Further, they are not allowed to change the rotation of crop pattern fixed by the villagers in advance. In the next year the same crops are grown but on different phads, viz., in the following order :— (1) sugarcane, (2) wheat, (3) bajri, (4) rice and in the next two years the crops move round in the same rotation until in the fifth year they regain their original ‘position. This rotation continues without interruption, the only periods of fallow being the interval between the crops. Manure is put on before the rice crop, and again, by those who can afford, for the sugarcane. This system is termed as quadrennial rotation. In triennial the bajri is omitted ; in quinquennial rotation, two sorts of rice are grown, superior Kamod and ordinary.

Under *pacca bandharas*, which are not controlled exclusively by the irrigation department, a consolidated land and water assessment was fixed on the area irrigated under the *bandharas* at the time of the survey. The repairs to the *bandharas* are done by the Government from the revenue of the consolidated assessment.

This system of distribution of irrigation water was advocated by some witnesses for adoption before the Bombay Irrigation Inquiry Committee, 1938. Speaking of the *phad* system in a Technical Paper (No. 16, issued in 1929) Mr. C. C. Inglis, I. S. E., Superintending Engineer, Irrigation Development and Research Circle, Poona, has explained why its introduction on major irrigation canals is not practicable. He writes :—

“ ... It was not proposed to divide the blocks into *phads* because it was realised that such a drastic distribution of holdings would be impossible ; but it was anticipated that exchanges of land could be arranged between those with land outside the selected blocks who wanted to grow cane in the blocks and those with lands inside the blocks who did not want to grow cane.

“ The cane areas were not concentrated into large blocks and practically the only alteration that took place was that cane areas were standardised by demarcation, but they remained scattered widely over large areas wherever there was a demand for them.

“ The advantages which occurred from the introduction of blocks were, however, very great ; because when the areas were standardised it was possible for the canal staff to distribute water much more economically ; and the cultivators, having an assurance of water for a period of years, found it worth while to carry out improvements to their land. ”

The technical difficulties mentioned above do not seem to be insurmountable and serious attempts should be made to find out how this *Baglan* system of irrigation can be introduced. This system should be tried as an experiment on all new schemes since introduction of co-operative farming is Government policy to-day.