

**EXPERIENCE OF COMMUNITY MANAGED TUBEWELLS IN THE COMMAND
OF A SURFACE IRRIGATION PROJECT**

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A b s t r a c t

The farmers of an area situated in the tail ends of a branch canal offtaking from the lower middle reaches of the eastern main canal of Gandak Project, which was planned to provide surface irrigation to the western part of North Bihar, took an assertive initiative of rejecting the planned extension of the canal irrigation on account of its doubtful benefits and definite damages to their area and a positive action of providing themselves with groundwater irrigation. They formed a registered society, named as Vaishali Area Small Farmers Association (VASFA) in 1971 charged with the responsibility of installation, operation, maintenance and management of tubewells, the number of which grew to 36 in course of a decade since the inception of VASFA. An experience of about two decades of the functioning of VASFA and the performance of the irrigation system provided by it indicates that VASFA was eminently successful in achieving its purpose and objective. Non-expansion of VASFA's irrigation membership, the stagnation of the number of tubewells in its management and other developments in the area indicate that the experiment of VASFA in its original form and activities is not replicable for other areas, primarily due to the change in the techno-economic context. However, the basic lessons of VASFA, i.e., adoption of irrigation strategy appropriate to the agro-hydro-ecological regime of the area, farmers' control and management of irrigation and community initiative and action in the face of inaction or misaction of the government are universally relevant for development of sustainable and productive irrigation in North Bihar and other areas having similar socio-economic and agro-hydrological conditions.

INTRODUCTION

Nature has endowed North Bihar with extremely favourable resource factors for high agricultural production - fertile tracts of land capable of supporting multiple crops, congenial agroclimate providing year round growing season, ample water to satisfy all crop water requirements and sufficient manpower with skill and tradition of agriculture. Due to high and increasing population pressure on the inelastic land resources of the region and consequent encroachments in the flood plains of the rivers traversing this region as well as other interferences

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inadvertently made in its agroecological regime, the soil-water balance for productive agriculture has progressively deteriorated, resulting in decreasing agricultural productivity and production. Agriculture being the dominant economic activity of the region and the mainstay for the living of more than 80% of its people, this has led to increasing impoverishment of the teeming millions of this region, which had been the centre of prosperity in the Indian subcontinent in the past centuries.

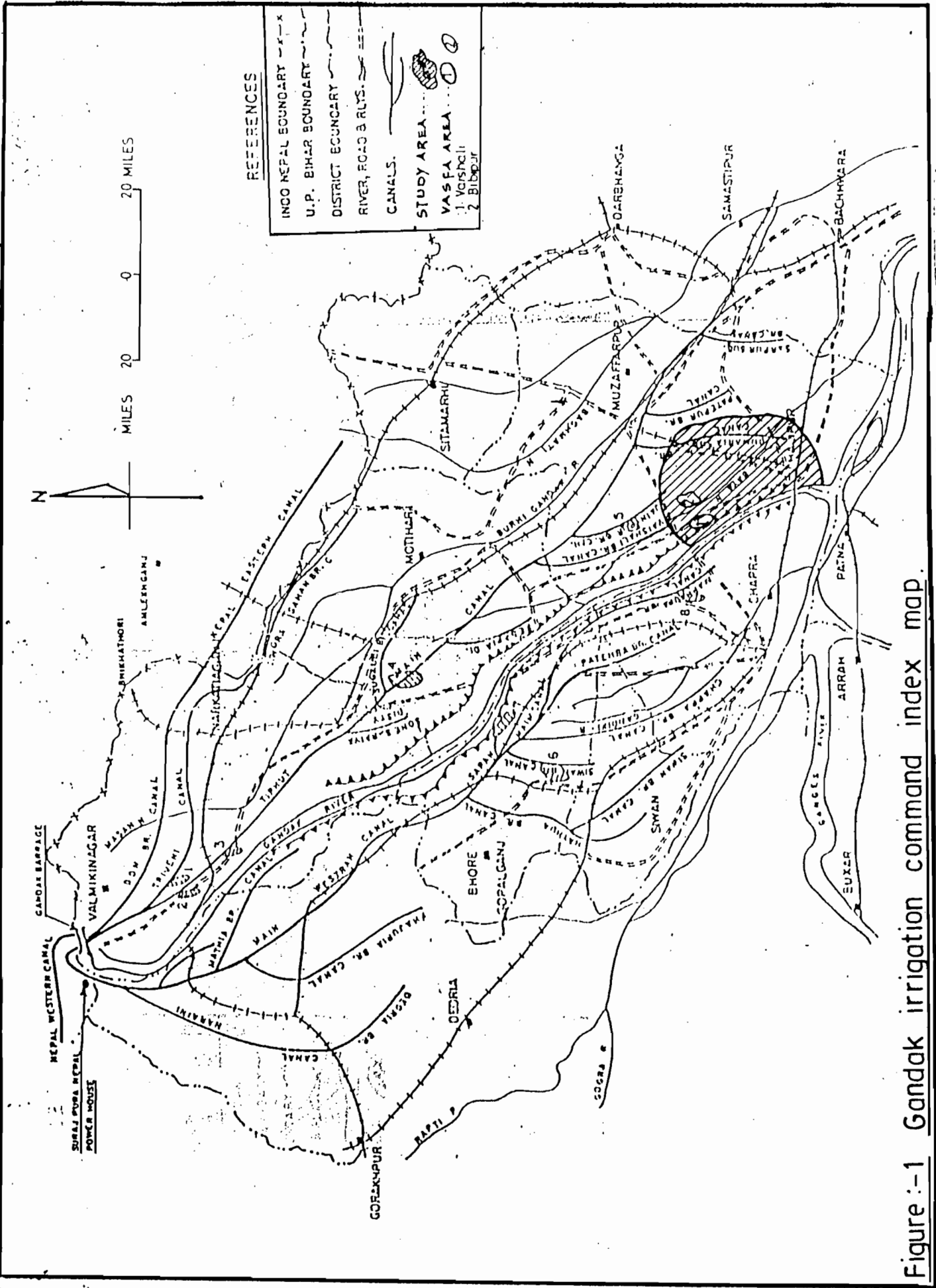
It has been widely accepted that in order to realize the high agropotential of the region, its agriculture has to be freed from the vagaries of an erratic monsoon and the soil water balance has to be effectively and sustainably restored and maintained. It was in this context that the essential role of irrigation for this humid alluvial plain was keenly perceived and two major irrigation projects, Kosi and Gandak, were implemented in the sixties and early seventies to provide irrigation to approximately 10.5 lakh ha and 13.5 lakh ha gross command areas in the eastern part and the western part, respectively, of North Bihar.

More than two decades of experience of irrigation through these two projects have clearly brought forth a disquieting feature about their performance. While these projects, which are essentially state administered surface irrigation systems, have not achieved the envisaged outcome of increased production from irrigated agriculture, they have given rise to some adverse and counter - productive features in certain parts of their command areas. However, the initiatives and actions taken by the farmers, who were exposed to the benefits of irrigation but suffered from the inadequacy, unreliability and ill effects of the state administered surface irrigation systems, have not only improved the performance of irrigated agriculture but also saved the systems from apathy and rejection by the adversely or indifferently affected intended beneficiaries. This paper deals with one such case study located in the command of the eastern Gandak canal (Fig. 1)

ORIGIN AND GROWTH OF A FARMERS' ORGANISATION

In this context, some farmers of an area situated in the tail ends of Vaishali Branch Canal, taking off at 558 Reduced Distance (RD) of Tirhut Main Canal (TMC), decided to organise themselves primarily in order to provide themselves with irrigation facilities. Several factors were at work to motivate the farmers towards this decision.

First, this area was inhabited preponderantly by small and marginal farmers who were incapable, financially and otherwise, to take individual and independent actions in this matter. Secondly, the dreadful experience of drought which occurred twice with considerable severity in the middle and late sixties in most parts of the Bihar plains, including this area, and which



REFERENCES

- INDO NEPAL BOUNDARY - - - x
- U.P. BIHAR BOUNDARY - - - .
- DISTRICT BOUNDARY - - - - -
- RIVER, ROAD & RLTS. — — — — —
- CANALS. —————
- STUDY AREA
- VASFA AREA
- 1: Varshali
- 2: Bibejur

Figure :-1 Gandak irrigation command index map.

woefully deprived them of the base of their subsistence by badly affecting agriculture, had brought forth the stark realization of the hazards of rainfed agriculture and consequently of the imperativeness of protective coverage of their sole means of livelihood by irrigation. Thirdly, programmes launched under various government sponsored or government supported schemes to help agriculture, in general, and to promote installation of tubewells for irrigation, in particular, such as under 'Freedom from Hunger Campaign', prompted the farmers to organise themselves in order to derive maximum advantage from them. And last but not the least, it was the zeal and dedication of a social organiser, Mr. K. D. Diwan, which provided inspiring leadership and acted as a catalyst in the extant situation. A registered society in the name of Vaishali Area Small Farmers Association (VASFA) was formed in 1971, the membership of which was open to small and marginal farmers of that area.

The dominant aim and activity of VASFA were installation, operation, maintenance and management of tubewells for providing irrigation benefits primarily to its members and secondarily to even non members. The fact that this area was imminently going to be covered by canal irrigation under the Gandak Project was no solace to the farmers of this area. Being situated in the tail ends of a branch canal offtaking from the lower middle reaches of a long main canal, the farmers knew of the uncertain benefits due to inadequacy or unreliability to which the supplies to their area will be necessarily subject, as well as of the unwelcome cost of waterlogging and loss of valuable lands which the construction and operation of canals would entail. In fact, they perceived the proposed extension of the distribution system of canal irrigation to their area as a potential threat and one of the first things they did after formation of VASFA was to petition to the Gandak project authorities to abandon the plan of extending the canal network to their area.

Taking advantage of technical assistance available under a few government sponsored schemes and of loan facilities offered by the banks, VASFA succeeded in installing 10 tubewells right in the first year in 1971 and another 16 in the following year 1972. Additional 5 tubewells were installed in 1973 and further 4 in 1975. Finally, one more tubewell was added to the VASFA managed group of tubewells in 1982, taking the total number to 36.

This group of 36 tubewells was located in 15 villages of Vaishali and Saraiya blocks in the districts of Vaishali and Muzaffarpur, respectively. These tubewells are concentrated in three clusters which may be denominated as Vaishali cluster having 16 tubewells, Bibipur cluster with 13 tubewells and Madarna cluster with 6 tubewells (Fig. 2) The tubewells are of the sizes 10 cm and 15 cm with approximately 50 m average depth of boring. They are mostly having dually powered motors, diesel as well as electricity, of capacities varying from 6.5 to 8 hp for diesel pumps and 7.5 to 10 hp for electric pumps. The command areas of these tubewells depend upon several factors and vary from 4 ha to 18 ha. A typical command of a tubewell is

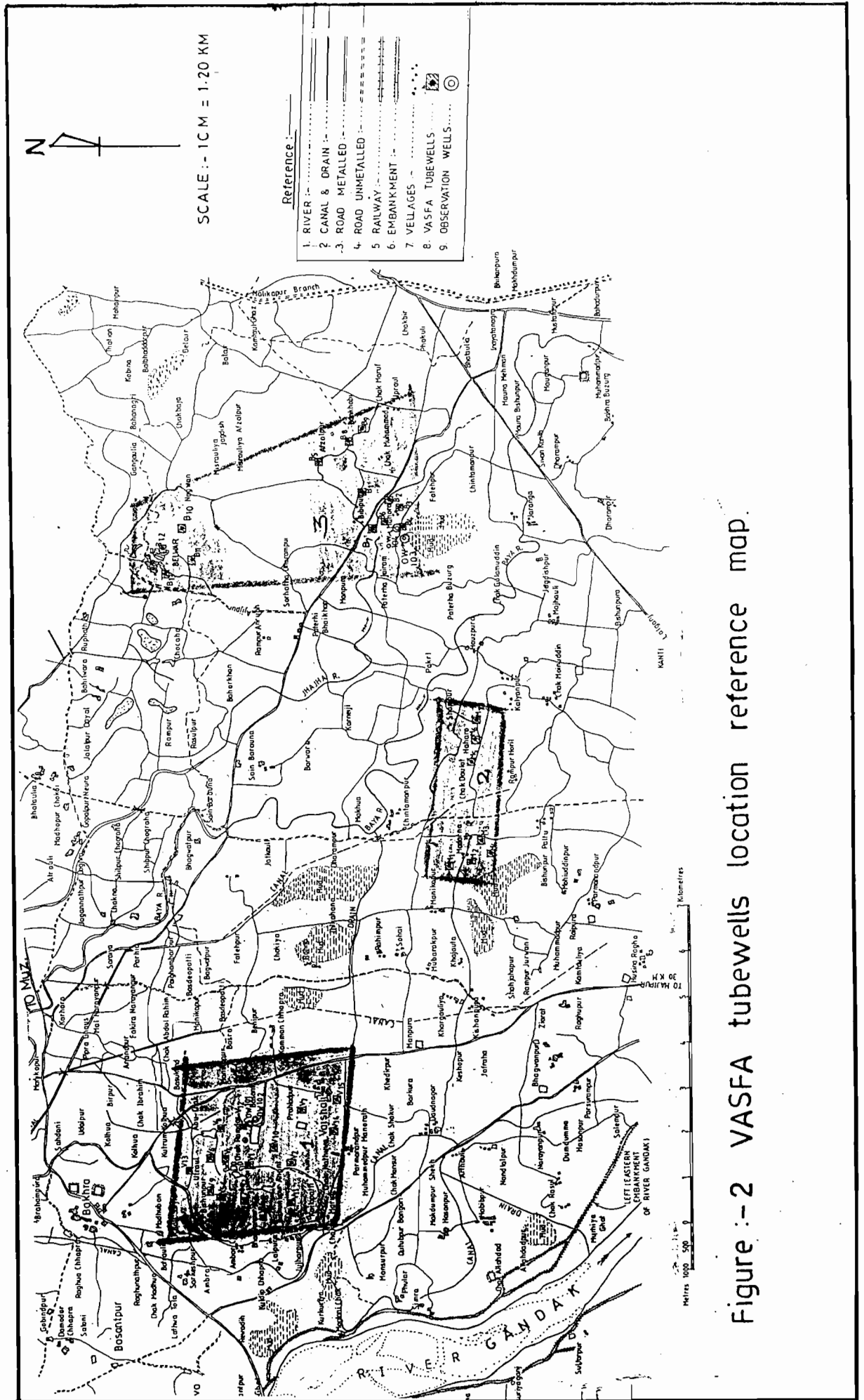
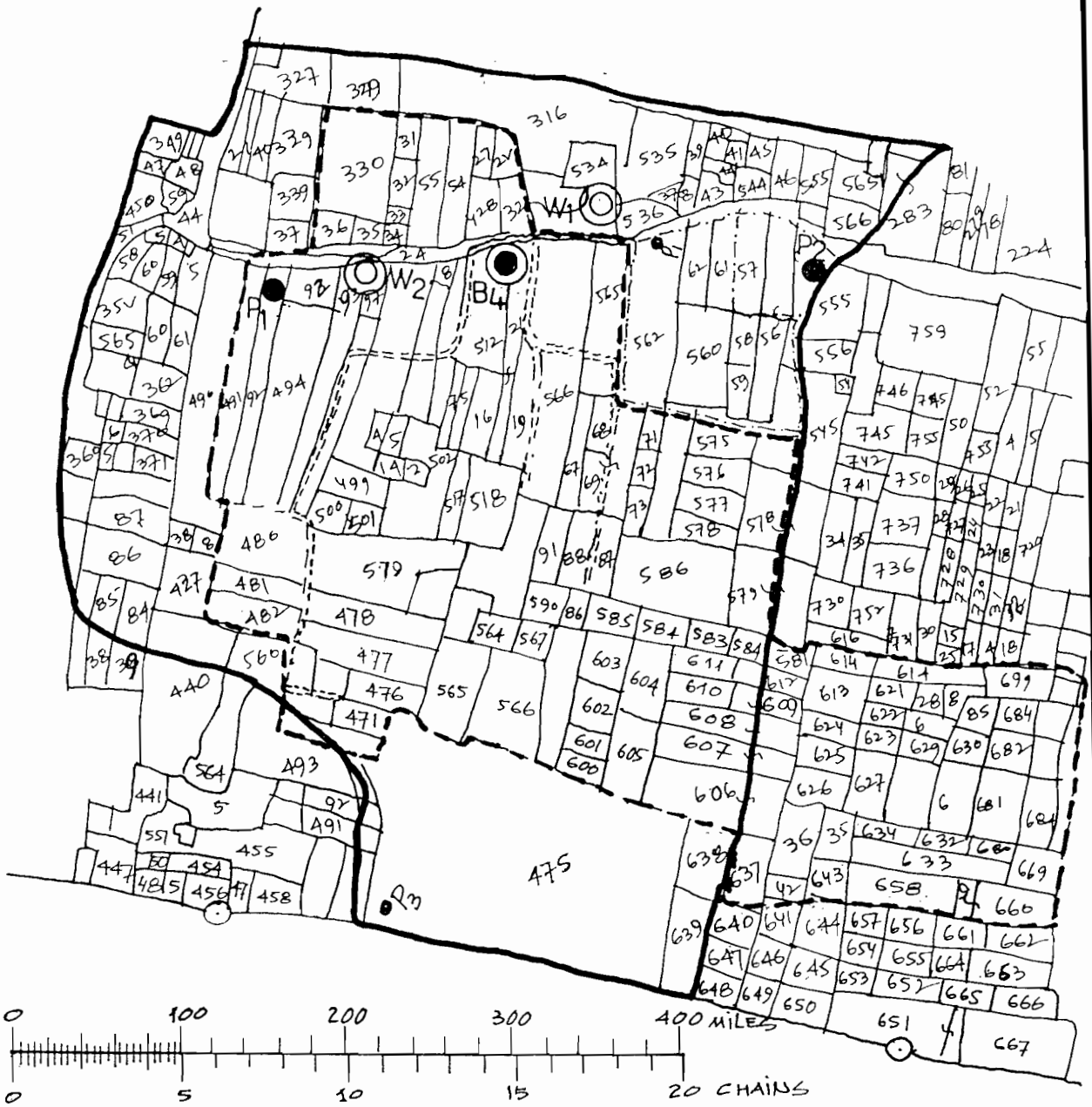


Figure :- 2 VASFA tubewells location reference map.



REF. VILL. SURVEY MAP, THANA NO. 217.





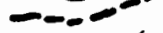


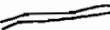
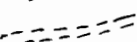
REFERENCE :-	
PLOT BOUNDARY.....	
ORIGINAL CCA.....	
PRIVATE TUBEWELL...	
OBSERVATION WELL...	
EXISTING CCA.....	
CCA OF PRIVATE TW.	
VASFA TUBEWELL.....	
PUCCA CHANNEL...	
CUTCHA CHANEL.....	

Figure :-3 A typical VASFA tubewell command area map.

illustrated in Fig. 3. An aggregate of 317 ha is under command of these 36 tubewells, benefitting about 780 VASFA members. The relevant details of these tubewells are given in Table 1.

Table 1. VASFA tubewells and its salient features.

Sl. No.	T.W No.	Village & (Block) *	Instal- lation Year	Construc- tion cost		Size (cm)	Comm -and Area (ha)	Capacity of Motor (H.P.)	
				(Rs.)	(US\$)			Diesel	Elect.
1	V1	Chakramdas (V)	1971	16987	680	15	9.80	10.0	10.0
2	V2	Chakramdas (V)	1971	26049	1042	15	16.52	8.0	10.0
3	V3	Bania (S)	1972	15659	626	10	10.00	-	7.5
4	V4	Bania (S)	1972	23701	948	15	10.05	6.5	10.0
5	V5	Bania (S)	1972	15482	619	10	7.33	6.5	-
6	V6	Bania (S)	1971	30496	1220	15	12.60	6.0	10.0
7	V7	Prahladpur (V)	1971	27677	1170	10	5.38	6.5	-
8	V8	Bania (S)	1972	21340	854	10	6.26	6.5	7.5
9	V9	Bania (S)	1972	11786	471	10	8.05	-	7.5
10	V10	Chakramdas (V)	1972	13719	549	10	11.82	-	7.5
11	V11	Lalpura (S)	1972	20120	805	10	10.10	8.0	7.5
12	V12	Chakramdas (V)	1972	8343	334	10	5.88	6.5	-
13	V13	Ufraul (S)	1972	6790	272	10	8.40	6.5	7.5
14	V14	Vaishali (V)	1972	4753	190	10	7.63	-	-
15	V15	Vaishali (V)	1972	24719	989	10	8.15	-	7.5
16	V16	Lalpura (S)	1982	7660	306	10	2.60	5.0	-
17	M1	Madarna (V)	1971	15456	618	15	13.10	-	10.0
18	M2	Madarna (V)	1971	14475	579	15	6.17	6.5	-
19	M3	Madarna (V)	1973	19160	766	10	6.87	6.5	-
20	M4	Madarna (V)	1973	17132	685	10	5.04	6.5	-
21	M5	Haharo (V)	1973	12905	516	10	8.18	6.5	-
22	M6	Haharo (V)	1973	17457	698	15	12.84	6.5	7.5
23	M7	Haharo (V)	1973	15755	630	10	3.89	6.5	7.5
24	B1	Bibipur (V)	1971	10299	412	10	6.91	6.5	7.5
25	B2	Bibipur (V)	1971	17623	705	15	13.48	-	10.0
26	B3	Bibipur (V)	1971	15879	635	10	7.92	-	7.5
27	B4	Manora (V)	1971	18840	754	15	8.83	8.0	10.0
28	B5	Afjalpur (V)	1972	16333	653	10	8.91	6.5	7.5
29	B6	Manora (V)	1972	12395	496	10	17.20	-	7.5
30	B7	Manpura (V)	1972	13454	538	10	7.39	6.5	7.5
31	B8	Bibipur (V)	1972	11370	455	10	7.52	8.0	7.5
32	B9	Bankhobi (V)	1972	17469	699	10	11.72	8.0	7.5
33	B10	Belwar (V)	1975	17044	682	10	12.06	-	7.5
34	B11	Belwar (V)	1975	17131	685	15	17.86	-	7.5
35	B12	Belwar (V)	1975	12162	487	10	6.91	6.5	7.5
36	B13	Belwar (V)	1975	11517	461	10	4.86	-	7.5

* (S) for Saraiya block in district Muzaffarpur & (V) for Vaishali block in district Vaishali.

ORGANISATION OF IRRIGATION THROUGH COMMUNITY TUBEWELLS

Irrigation through the group of 36 tubewells is managed through a 3-tier structure, as indicated below, under the overall stewardship of VASFA.

- i) Tubewell Committee. VASFA members under the command of each tubewell, numbering generally 20 to 25, constitute the Tubewell Committee and elect an honorary Dalpati (Group Leader) who heads the Committee and who is an ex-officio member of the executive committee of VASFA. He is assisted by an honorary manager/secretary who maintains all accounts and records. An operator for the tubewell is appointed by the Committee, who is paid on the basis of the running hours of the tubewell. The Committee is responsible for fixing the cropping pattern to be followed in a particular crop season, for deciding the priority in distribution of water which is generally on first come first served basis, for the fixation of the water rates to be charged from the beneficiaries and for collection of charges which is done in advance.
- ii) Zonal Committee. Each of the three clusters of tubewells constitutes a zone which elects an honorary zonal head, called Pradhan, who is an ex-officio vice-chairman of VASFA. The zonal committee helps the member farmers in the zone to get, apart from water, other agricultural inputs such as seeds, fertilizers and pesticides. It is also responsible for settling disputes that may crop up among the farmers in the zone.
- iii) Apex Body. An apex body for the management of all 36 tubewells is constituted by all Dalpatis and a few nominated members representing the bank, a cultural organisation called Vaishali Sangh and related agencies. This body elects a chairman who, in consultation with the Dalpatis, nominate a secretary. The posts of chairman and secretary are honorary. Apart from co-ordinating the activities of the three zones, this body is responsible for planning and execution of new tubewell projects, procuring other agricultural inputs, liaisoning with the concerned government departments and other agencies, running the central workshop for repair and maintenance of tubewells, arranging technical assistance from outside as well as training and employment of the members or dependents of the members.

The water rates are fixed on the basis of operation, maintenance and repair costs of the tubewell including remuneration paid to the operator as well as depreciation cost for repayment of loans. They vary from tubewell to tubewell as well as from time to time. The beneficiaries are charged on the basis of hours of operation of the tubewell to irrigate their respective plots. Charges are to be paid in advance based on the allotments of running hours. During 1991 Kharif, the water rates charged were Rs. 15 (\$ 0.6) and Rs. 20 (\$ 0.8) per running hour of the diesel pump for members and non-members, respectively. For electric pumps, the corresponding charges are less.

PERFORMANCE OF THE FARMER MANAGED IRRIGATION SYSTEM

Provision of irrigation through co-operatively owned and managed tubewells was a venture both in co-operative action as well as in rejection of what was perceived as an imposition of an inappropriate and counter - productive irrigation system. Based on the experience of about two decades, the performance of this venture can be analysed in search of lessons to be learnt from a farmer - managed irrigation system. Such an analysis should be done on the basis of both agricultural performance as well as organisational performance.

Agricultural Performance

The agricultural performance of this farmer-managed irrigation system can be best appraised with reference to that of the state-administered and managed irrigation system prevailing in nearby areas having similar agrological, hydrological and other relevant conditions. The VASFA irrigation system differs from the nearby irrigation system in the following two significant ways

- i) While the VASFA irrigation system is based on exclusive use of groundwater, the nearby system dominantly uses surface water distributed through canals, and
- ii) In operation, each tubewell commanding a maximum area of 18 ha is independent of other tubewells in the VASFA system and hence is more responsive to the needs and requirements of the beneficiaries as it is more amenable to their control and management. The canal water supplies to the nearby counterpart areas are hydraulically subject to the supplies as well as demands in other areas of the expansive command of thousands of ha. Also, the irrigation system providing irrigation to these areas is administered by a hierarchical bureaucracy more bound by inflexible rules and manuals than by the demands of individual farmers.

These differences in the two irrigation systems may explain, substantially if not wholly, the following comparative performances.

- i) The cropping pattern practised in the VASFA area is more diversified than that in the canal command areas. While in the latter, mostly cereal crops and sugarcane are grown, non-cereal crops like vegetables and bananas as well as non-food crops like tobacco are cultivated, apart from principal cereal and perennial crops, in the former.
- ii) As shown by the farm productivity and input information obtained for a few VASFA areas and a few nearby canal irrigated areas in Laloo Chapra command for Kharif 1991, the productivity in grain output is about 1.5 times in the VASFA area while the inputs in terms of fertiliser applied

and manpower employed per ha are 2 times and 3 times, respectively, higher in the latter than in the former (Tables 2 & 3)

Table 2. Sample farm productivity of VASFA area under tubewell irrigation for kharif 1991.

Tube-wells No.	Nos. of plot	Total Area (ha)	Irrigation (Hours)	Inputs per ha		Outputs per ha	
				Fertilizer (Kg)	Labour (Manday)	Grain (Q.)	Fodder (Q.)
V2	3	0.691	13	70	78	28.20	13.90
V6	8	1.189	11	55	77	21.95	11.02
V11	3	0.335	42	84	128	22.40	12.40
V12	3	1.630	17	58	89	20.90	10.12
B4	17	1.709	17	74	80	27.00	14.00
B7	11	1.140	00	65	89	20.48	10.50
B11	6	0.450	17	56	78	22.20	12.11

Table 3. Sample farm productivity of Laloo Chapra command for kharif 1991.

Out-let No.	Nos. of plot	Total Area (ha)	Irrigation Provided (mm)		Inputs per ha		Outputs per ha	
			Nos.	Depth	Fertilizer (Kg)*	Labour (Manday)	Grain (Q.)	Fodder (Q.)
OL1	10	0.344	5/6	125	157+610	218	16.13	19.20
OL3	6	0.708	2	125	541+212	216	11.79	14.20
OL5	7	0.668	3	125	85+150	177	18.00	21.03
OR6	17	1.488	3	100	38+548	216	17.44	20.57

* Quantity of Urea + Manure

iii) The long term hydrological sustainability of tubewell irrigation is unambiguous. Running at an average of 4 hours per day, the tubewells in the VASFA area have served to maintain the water table within 0.5 m of rise or fall over the years. The same is not likely to be true in the canal command areas.

Organisational Performance

The experience of organisational performance of the VASFA venture for the last 2 decades is interesting but mixed. There was very rapid expansion of tubewell installations under VASFA ownership and management for the first four years after it was set up, when the number rose to 35. A lone tubewell was added to the group in 1982 after a lapse of 7 years, taking the number to 36, where it has remained stagnant since then. Considering the fact that there has always been a scope and need for coverage of more and more areas under tubewell irrigation, non-expansion of VASFA membership for the purpose is somewhat intriguing. On a

closer examination of working of the VASFA managed tubewells, certain facts have come to light, which may explain this. One is the emergence of conflicts among the members of a Tubewell Committee over certain operational aspects, such as inter se priority in watering. Where the leadership provided by Dalpati is not effective or where management of the day to day working of the tubewells is not efficient, such conflicts are more liable to emerge and to remain unresolved. In such a situation, discontentment grows among the adversely affected members. Secondly, the government's scheme to provide incentives and subsidies for installation of private tubewells to individual farmers have encouraged many farmers to go for their own shallow tubewells to meet their irrigation requirements, particularly in view of the fact that in the prevailing geohydrological situation, adequate discharge of good quality groundwater is assured even at low lifts. These two factors have combined to promote installation of increasing number of private tubewells, both within as well as without the erstwhile commands of VASFA tubewells. Added to this is the emerging phenomenon of water markets which provide a viable alternative to meet the irrigation requirements in this area. This has resulted in the decline of original commands of several VASFA tubewells as well as in the stagnation of VASFA membership for the purpose, which presently stands at 782.

VASFA seems to have realized that its role of promoter and facilitator of providing community - managed groundwater irrigation in the face of the proposed extension of state administered canal irrigation system to the area is essentially achieved and is not poignantly relevant today. However, VASFA as a farmers' association has considerable role to play in protecting and promoting farmers' interests in other spheres of agriculture. Consequent to this realization, VASFA has also opened its membership, called Action Group as distinct from Irrigation Group, to those farmers who are not interested in getting benefits from VASFA - managed irrigation but would like to get assistance in other areas such as obtaining loans, seeds, fertilisers, etc. On this score, the membership of VASFA is increasing and is now 886.

SOCIO-ECONOMIC IMPACT

No bench mark socio-economic survey of the area is available to facilitate assessment of socio-economic impact of VASFA irrigation and related activities for the last two decades. However, a recent socio-economic survey conducted in this area reveals certain socio-economic features characterising it which help understand the performance, the successes as well as the failures of VASFA irrigation. An overwhelming population of this area, 94%, engages in agriculture as their sole means of livelihood while the remaining 6% constitutes mainly agricultural labourers. In this regard, this area is distinctly different from other nearby areas where 12% to 40% of the people are engaged in other economic activities such as small businesses,

government service, and other professions. Also, caste composition of this area indicates that almost 97% of the population is constituted by upper caste and backward caste people whereas only 3% are scheduled caste people as distinct from about 10% in other nearby areas. Also, this area is inhabited preponderantly by small and marginal farmers. About 50% of the farmers of this area own land upto 1 ha and another 48% own land more than 1 ha but less than 4 ha. A negligible 1.5% farmers, as against 10% in other nearby areas, own land more than 4 ha.

These distinctive socio-economic features of this area explain the origin and relative success of the VASFA experiment in farmer -managed irrigation system. On analysing the performance of each tubewell in the system, it is found that the few tubewells which have bigger land holding farmers in their commands are more prone to disputes due to dominance of these farmers at the expense of smaller and marginal farmers. Otherwise, uniformity in degree of dependence on agriculture, in land holding pattern and in caste composition have ensured identity of interests among the members and consequent success in performance of most of the tubewells in the VASFA system. This uniformity is reflected also in the income level of the farmers. While about 60% of the farmers in this area earn annually upto Rs. 5000 (\$ 200) from agriculture, the annual agricultural income of the remaining 40% is within the range of Rs. 5000 (\$ 200) to Rs. 10,000 (\$ 400). About 86% of the farmers earn income from other sources upto a maximum of Rs. 5000 (\$ 200) annually. Thus, there is virtually complete absence of high income group people in this area.

Although this area is marked by a lack of general or even isolated affluence, it has been learnt through personal interviews that the socio-economic condition of this area has undergone remarkably positive transformation during these two decades. There is visible and palpable improvement in the agricultural performance of this area compared to its pre VASFA status. Out migration of labour from this area has been almost completely arrested. On one point the farmers are emphatically unanimous - they will never like the canal system to be extended to their area.

OUTLOOK AND EPILOGUE

What can we say about the nature, performance and outcome of the VASFA experiment in conclusion and about the feasibility as well as the desirability of its replication for other areas?

Based on the analysis presented, it can be said that VASFA essentially represented a community action, inspired by a dedicated leadership, to fulfill an apparent and demanding need to provide irrigation in order to free the agriculture, the only source of subsistence in an area inhabited preponderantly by small and marginal farmers, from helpless dependence on the

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