

8. Water-Supply arrangements at Bijapur and Chitradurga

The arrangements made by the Adil Shahis in the 16th and 17th centuries to supply water to their capital Bijapur were remarkable. It is possible that they continued and improved upon the Vijayanagara system in this matter and it is even possible that they employed the Vijayanagara architects after the Battle of Talikota or Rakkasatangadi. It is said :

While laying out the City of Bijapur, the planners have taken care to provide for efficient system of water distribution The architects incorporated hydraulic arrangements in all the edifices and planned and designed with great efforts arrangements to bring water into the city and nearer to the point of utilisation. Expectedly, Bijapur abounds in such hydraulic structural remains built during the Adil Shahi period, in the form of tanks, wells, towers, baths, fountains and lengths of earthen conduits¹.

Henry Cousens² has described the means adopted by the Adil Shahi architects to bring water in larger quantities from reservoirs located upon higher grounds outside the

city by force of gravitation and distributed it to the various parts of the city. Though the remains of some of the reservoirs are still existing today, their connections are either completely ruined or are out of repair. Of course, some of the pipes are still working. Begum Talab was one of the great reservoirs from which water was brought by laying earthen pipes.

The Chitradurga Palegars in the 17th and 18th centuries made a remarkable arrangement for water-supply to their capital and irrigation of the neighbourhood as follows. The rainwater that poured on the Jogimatti hills was collected in a tank called Doddannanakere, which when filled, let the water to other tanks below it called Timmannanayakanakere and Sannakere which in turn, after themselves being filled, allowed the water to two other reservoirs called Dabdaba and Vaddu by a similar process. After filling all these tanks, water used to flow to the moats round the fort-walls.

Similarly, the rain water falling on Meldurga or upper fort filled a series of reservoirs one below the other called the Gopalakrishnadevarahonda, Akkatangerahonda, Sihinirinahonda. and finally by a secret underground channel the Santhehonda. It is due to this wonderful arrangement, that the fort never in its long history suffered from water scarcity³.

Sources :

1. ("Hydraulic features of Bijapur"), P.S. Sriraman and S.G.

Samak, ASI, Bangalore Circle, Paper presented at the National Seminar on the Adilshahis held in Bangalore in Feb. 1988.

2. Cousens, H. *Bijapur and its Architectural remains*, (ASI, Imperial Series XXXVII) Bombay, 1916, p 120 - 124.
3. *Rice, I* Vol II, p 393.

9. Details of Tanks as given in Mackenzies' *Memoirs of Geographical and Statistical Survey of Mysore - 1799 - 1806.*

	<u>Tanks</u>		<u>Cuttas</u>		<u>Coontas</u>		<u>Anicuts</u>	
	Large	Small	Good	Bad	Good	Bad	Good	Bad
1	2	3	4	5	6	7	8	9
1. Pattan-Ashtagram	347						3	3
2. Mysore-Ashtagram	40		120				9	3
3. Mysore-Talakad	32	56	298				4	2
4. Hardanahally	28		159	163			2	2
5. Turkanamby	31		391	204				
6. Heggadadevanakote	42		271					3
7. Periyapatna	50		688					4
8. Bettadapur	84		164					1
9. Tayoor	27		509					2
10. Sosilla	41		376					1

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11. Yellandur	27	208		2		
12. Mailkote	133		1181			
13. Kistnarajapur	38		222			
14. Narsipur	106		931			
15. Yedathora	17		279			
16. Maddur	252					
17. Chinnapatnam	209		67			
18. Hooliyurdoorg	99		329			
19. Ramagiri	90		101			
20. Cankanahally	132		2385			
21. Mudugiri	84		142			
22. Ootradoorga	3					
23. Nagamangalam	} 31	80	269	126	3	2
24. Malavally						
25. Arkalgud						
26. Maharayandoorg						
27. Nellamangalam	80	252			3	
28. Doddabulla						
29. Nidjigul	27	152			2	
30. Manchydoorg	33	360			14	
31. Cortagery	39	147			3	
32. Chinroydoorg	35	125			6	
33. Devroydoorg	32	320			20	
34. Toomcoor	25	116			20	
35. Hagalwaady	31	123			2	

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36. Cuddaba	30	139			
37. Toorvekere	25	84			12
38. Byraudoorg	16	120			8
39. Habboor	12	110			7
40. Coonygul	8	424			12
41. Chicknaiganahally	16	42			4
42. Noogyhally	17	68			3
43. Cundykere	19	34			2
44. Banawaram	18	91			1
45. Honhally	33	432			5
46. Harnhally	28	43			1
47. Gram	21	206			9
48. Hassan	49	645			15
49. Chinraypatnam	24	335			19
50. Kickairy	21	195			5
51. Cuddor	39	59			16
52. Boodyhal	23	30			1
53. Gurdangery	31	155			2
54. Ajjampura	24	241			3
55. Sakrepatna	6	58			16
56. Turykere	32	275			38
57. Chickmagalur	72	295			12
58. Bellur	219	1111			45
59. Bangaloor	275		524	424	94
60. Maugry	62	249			34

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61. Colar	2611 $\frac{1}{2}$		590	94
62. Oosacotta	728 $\frac{1}{4}$	675 $\frac{1}{2}$	196	57 $\frac{1}{2}$
63. Jingamcotta	50 332		164	16
64. Sirah	36	172		
65. Mudgaree	67	107		
66. Paughur	32	35	37	
67. Moolbagul	33		32	
68. Anicull	34			88
69. Deonally	68		48	9
70. Pedda Ballapur				
71. Chinna Ballapur	243		528	24
72. Goomaigpolliam	78		153	1
73. Chitradoorga	27		407	
74. Mayaconda	23		70	
75. Holalkere	33	43		
76. Oosadurga	63	192		
77. Heerior	69		263	
78. Anujee	45			
79. Cancoopa	30	178		
80. Munacalmuru	5	1		
81. Goodicotta	4	3		
82. Tullack	15		13	
83. Dodairee	19	96		
Total	14,803 $\frac{3}{4}$	6,172 $\frac{1}{2}$	8,562	747 $\frac{1}{2}$

Though in respect of Malavally, Arkalgud and Maharayandoorga the number of irrigation works is not found in the Memoirs, it is described that in Malavally "the western part and surrounding the *casba* there were several extensive tanks which besides rearing paddy, nourished several gardens of *beetle*, *soopary*, cocoanut and plantain. It also states that there were traces of an ancient *anicut* from the Kaveri to the tank south of *casba* and near the field of battle in 1799.

Likewise, it is stated that in Arkalgood there were many tanks, those at 'Casba and Coonanoor' were very extensive. Almost every village had its tank and some two or three though of less extent and on the whole the district was well watered.

As regards Maharayandoorg, it is stated that there were few tanks in Goroor *hobly* although it abounded with paddy grown in its innumerable little valleys by periodical rains.

10. Number of Tanks in the several districts of Mysore as in 1871

	TOTAL NO. OF TANKS	NO. OF TANKS YIELDING NO REVENUE BELOW 50	NO. OF TANKS YIELDING REVENUE 50 TO 100	Number of tanks yielding revenue between										4000 TO 5000	MORE THAN 5000
				50 TO 100	100 TO 500	500 TO 1000	1000 TO 2000	2000 TO 3000	3000 TO 4000	4000 TO 5000	5000 TO 6000	6000 TO 7000	7000 TO 8000		
Nandidurg Division :															
1. Bangalore Dist.	2,227	254	862	407	630	84	31	5	2	1	1	1	1		
2. Kolar Dist.	5,282	1,427	2,028	783	886	108	33	7	7	1	1	2			
3. Tumkur Dist.	2,081	1096	285	175	359	94	39	20	6	3	4				
Ashtagram Division :															
1. Mysore Dist.	1,474	36	874	219	280	45	14	1	1	2	2				
2. Hassan Dist.	6,324	566	3,903	910	847	68	21	7	2	-	-				
Nagar Division :															
1. Shimoga Dist.	8,304	931	3,871	1,418	1,855	175	49	3	1	-	1	1			
2. Kadur Dist.	8,378	4,452	2,910	640	635	55	34	7	-	1	4				
3. Chitradurga Dist.	1,785	1,103	268	93	226	53	29	7	3	-	3	3			
	36,265	9,865	15,001	4,645	5,718	682	250	57	22	8	17				

11. Number of Tanks as existing in Mysore State in 1902 as given in the Memorandum of Sri. V. P. Madhav Rao

	Eastern Division			Western Division		
	Number	Area (Acres)	Assessment (Rs.)	Number	Area (Acres)	Assessment (Rs.)
1st class tanks with atchkat of Rs.5,000 and above	23	31,871	1,76,406	3	7,444	36,062
2nd class tanks with atchkat of Rs.1,000 to 5,000	388	1,23,464	6,55,455	95	31,894	1,53,158
3rd class tanks with atchkat of Rs.500 to 1,000	512	72,713	3,44,420	298	49,217	2,02,413
4th class tanks with atchkat of Rs.300 to 500	644	54,003	2,48,936	483	43,475	1,82,997
5th class tanks with atchkat of Rs.100 to 300	2,221	92,545	3,97,483	2,450	1,12,347	4,30,419
6th class tanks with atchkat of Rs.100 and below	4,478	55,736	1,99,069	10,437	1,30,739	4,53,987
	8,266	4,30,332	20,21,769	13,766	3,75,116	14,56,036

Note Eastern Division comprised of districts of Bangalore, Kolar, Tumkur and Chitradurga. Western Division comprised of districts of Mysore, Hassan, Shimoga and Kadur.

Status of the Tanks

Class	Condition		Area (acres)	Assessment (Rs.)
	Breached	Good		
Government tanks	6,507	20,017	7,52,916	32,44,356
Kodagi tanks	92	1,014	27,457	1,37,195
Inamti tanks	336	1,049	24,976	99,257
	<u>6,935</u>	<u>22,080</u>	<u>8,05,349</u>	<u>34,80,808</u>

12. Table showing year-wise area irrigated under channels and tanks

<u>Year</u>	<u>Area Irrigated Under</u>	
	Channels (Acres)	Tanks (Acres)
1880-81	59,784	2,33,201
1881-82	59,343	2,49,747
1882-83	59,259	2,70,841
1883-84	61,259	2,86,798
1884-85	64,925	2,87,220
1885-86	66,695	2,92,123
1886-87	72,422	3,04,756
1887-88	73,586	3,17,048
1888-89	73,842	3,20,790
1889-90	77,726	3,30,881
1890-91	78,698	3,54,282
1891-92	91,805	4,28,877
1892-93	89,803	4,74,525
1893-94	94,821	5,14,766
1894-95	99,177	4,90,950
1895-96 to 1898-1900	NA	NA
1900-01	1,06,045	4,99,815

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1901-02 to 1904-05	NA	NA
1905-06	1,06,316	5,06,860
1906-07	1,10,476	5,37,910
1907-08	1,12,053	5,22,848
1908-09	1,13,269	4,84,940
1909-10	1,17,093	5,21,242
1910-11	NA	NA
1911-12	1,18,324	5,50,320
1912-13	1,19,947	5,65,318
1913-14 to 1914-15	NA	NA
1915-16	1,15,835	5,46,845
1916-17	1,18,415	5,77,991
1917-18	1,26,600	5,77,277
1918-19	1,09,013	4,93,895
1919-20	1,16,622	5,40,644
1920-21	1,19,224	5,13,832
1921-22	1,19,032	5,22,014
1922-23	1,26,785	5,23,558
1923-24	1,36,529	4,65,544
1924-25	1,40,809	4,79,675
1925-26	1,36,197	5,17,300
1926-27	1,36,922	5,30,446
1927-28	1,37,651	5,38,886
1928-29	1,42,326	5,54,216

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1929-30	1,46,658	5,72,331
1930-31	1,65,307	5,77,364
1931-32	1,49,358	5,61,917
1932-33	1,50,601	6,02,158
1933-34	1,62,230	6,04,219
1934-35	1,64,054	5,29,127
1935-36	1,82,062	5,81,384
1936-37	1,93,002	5,75,205
1937-38	NA	NA
1938-39	1,99,649	5,70,077
1939-40	2,53,441	5,57,603
1940-41	2,16,594	5,99,414
1941-42	2,19,392	5,82,441
1942-43	2,32,270	5,84,254
1943-44	2,40,304	6,20,459
1944-45	2,45,965	6,11,660
1945-46	2,62,587	5,68,065
1946-47	2,67,540	6,19,491
1947-48	2,75,330	6,10,678
1948-49	2,69,918	5,82,206
1949-50	2,78,183	5,47,799
1950-51	2,76,377	5,38,546

13. "PHAD" System of Distribution of Water and Maintenance of Irrigation System in Maharashtra

Introduction

'PHAD' is a group of contiguous farms where the same crop is grown under irrigated conditions. 'PHAD' System is the management of irrigation by a group of beneficiaries. For over 200 years such a system of irrigation management has been practised on small irrigation works in the North-Western part of Maharashtra. Even though the farms are small and the lands are not levelled, the farmers have been managing the water allocation and equitable distribution of water, rotation of crops and maintenance of the system through community effort.

This system of water management has been practised in the Tapi basin in North Western Maharashtra on their rivers, namely Panjra, Mosam and Aram. On these rivers there are a series of Bandharas or weirs. These systems receive their run-off from the monsoon rains but have a significant post-monsoon flow which can sustain sizeable irrigation in the winter and summer seasons. These systems are managed, operated and maintained by the beneficiaries themselves through 'PHAD' system. Each system comprises of a low diversion weir across the river, small canal on the bank and distribution system for irrigation. The area

under irrigation in each weir varies from 4 to 192 ha. The maintenance is done by the beneficiaries by contributing funds for the purpose and by organising community labour from the village. The management of the maintenance funds is also done by the beneficiaries. The records show that Government only framed guidelines as to how the implementation by the beneficiaries was to be done and how accounts should be maintained.

Water Management Committee

For management of irrigation under the command of each weir, there is a committee called the Panch Committee elected by all the irrigators. The members of the Committee i.e., Panchas have to be irrigators in the PHAD. The committee appoints Irrigation Staff on an annual basis, hears complaints from irrigators and irrigation staff and also takes policy decisions regarding the allocation of water and maintenance of the system.

Water Management

The entire command area is divided into "PHADS", with the size varying from a few hectares to 50 ha depending upon topography. Only one type of crop is grown in each "PHAD". The crops to be grown in different "PHADS" is decided by an assembly of irrigators well in advance of the rainy season. The sequence of Irrigation is from head to tail. The PHAD at the top end is irrigated and the entire flow in the canal is diverted to that PHAD. Within the PHAD, the farms at the head reaches are irrigated first and then the adjacent ones and so on till tail farms are irrigated. After the rainy season, there is another

meeting of the irrigators and depending upon the rate of flow in the river and in the canal, broad guidelines are laid down as to how the water should be rationed. The water distribution is done by the irrigation staff of the PHAD. The rotational schedule is strictly followed and those infringing the rules are fined by the committee. The actual water application on the farm is also carried out by the irrigation staff. The land owners or Members of his family are not authorised to apply the water in their farms.

Maintenance

The maintenance and repairs of the weir structure is the responsibility of the Government, whereas the canal system is maintained by the irrigators themselves. The cleaning of the canal system is generally done twice a year in May and October. Immediately after the meeting in April-May, the irrigators are informed through a Public Announcement about the requirements of maintenance. Each beneficiary family is expected to provide animal and manual labour. The families which do not provide animal and manual labour have to pay in cash. The farm water courses for carrying water from the distributary to the farm are to be maintained by the individual irrigators. The responsibility of the irrigator is to maintain the channel length between the off take point and the delivery point of his farm.

Irrigation Staff

The irrigation staff normally consists of supervisors, Watermen and Watchmen. This staff is appointed by the Committee and is actively involved in distribution of water as well as maintenance operations. During irrigation all the staff work in the same "PHAD" where water is being applied. The application of water to individual farms is done by the waterman since irrigators are not permitted to apply water. The supervisors have to oversee the work of waterman and watchmen. The staff is paid either in cash or in kind or sometimes partly in cash and partly in kind. Each irrigator has to pay according to the crop grown in the PHAD. Before the irrigation staff is appointed by the Committee, the staff has to enter into an agreement with Committee in respect of their duties etc.

Defaulters

Default is generally of three kinds -

- (i) Unauthorised watering (out of turn)
- (ii) Non-maintenance of farm water-course
- (iii) Non-participation in the maintenance of canal.

In case of unauthorised watering, the matter is reported by the supervisor to the committee and a penalty is imposed in the form of a fine. Non-maintenance of farm water courses attracts the penalty of loss of turn of irrigation. Non-participation in the maintenance of canals either in the form of contribution of labour or payment is also dealt with in the same manner as unauthorised watering. Such cases are, however, very rare.

Analysis of the System

For smooth operation of the system important factors are :

- (i) Allocation and distribution of water to sub-units and farms.
- (ii) Mobilisation of human and other resources to maintain and repair the physical system.
- (iii) Resolving of disputes.

The cohesive force binding the group together is the common concern for watering the fields (collective common interest). Members realise that unless they come together all will suffer. How strong this cohesive force is in the concerned village is illustrated by the fact that despite political and local rivalries, the farmers' groups have been working harmoniously as far as water management and distribution is concerned. Though the common concern provides the motivating force, the stability to the group is imparted through rule formulation on the principle of fairness to all to gain acceptance of the participating members. Being a written record, it is known to all the farmers and hence they are conscious of their duties and responsibilities. Roles of members and panchas are clearly defined. To avoid conflicts, the task of water application was handed over to irrigation staff appointed and paid for by the beneficiaries. Divisions of command into Phads (blocks) and planning of only one crop in each Phad helps in the management of irrigation application. The water requirements for a PHAD are the same and the entire area in a PHAD can be treated uniformly for water application.

Maintenance is through community effort and the payment to irrigation staff is made in kind. The staff is allowed a specified share in the harvest. In this way the staff are also somewhat involved in the process of raising the crop. Experience of PHAD system has shown that the small size farm is not an impediment to group functioning. In the areas of PHAD system no prior land levelling seems to have been done, yet no wasteful application of water is seen.

In PHAD system, the area for irrigation is earmarked in relation to the average annual water flows rather than flows in good years. The area to be irrigated in years of plentiful flow is an extended area so that the farmers in this extended area know that they will get water once in a few years. This area is invariably at the tail end. This is a very practical and manageable arrangement. During the years when average quantity of water is not available, either cropping plan is suitably adjusted or water is rationed by extending the irrigation interval by ensuring equity among all the members.

There is an increasing awareness today of the need to involve beneficiaries in water management and distribution for more optimum utilisation of the irrigation facilities in the newly commissioned irrigation projects. Behind the advocacy of increasing association of beneficiary farmer in the management of irrigation system lies the assumption that it would reduce distribution cost and increase the effectiveness of the system with the help of knowledge of local conditions which the beneficiaries would bring to solve the problems and reduce governmental intervention which cannot always appreciate local needs and difficulties.

The success of the PHAD system shows that even though the holding sizes are small, it is possible for the beneficiary farmers to effectively come together and manage the irrigation system as a community asset.

(Ref : Water Management through farmers' organisations "PHAD" system - A case study by Shri. D.N. Kulkarni and R.K. Patil presented to the 12th Congress of the International Commission on Irrigation and Drainage).

Source :

The Appendices 13, 14 and 15 are Appendices to letter No.10-37/85-CAD dated 30th April 1987 from the Additional Secretary, Ministry of Water Resources (Govt. of India), CAD and Water Management Division, and are termed as guidelines for Farmer's Participation in Water Management.

14. A note on Mohini Water Co-operative Society in Command Area of Kakrapar Weir and Canal Project, Gujarat

(Ref: Note prepared by Surat Irrigation Circle, Surat, Govt. of Gujarat and Surat Canal Division, Surat, March, 1984).

1. Introduction

Co-operation in any walk of life helps in promoting health of society at large. Formation of water-cooperative societies within the command area of irrigation projects can bring about social reforms and therefore such cooperatives merit encouragement from all concerned.

2. The Role of Cooperatives in Irrigation

There is a large number of successful water co-operative societies running small irrigation schemes in the private sector. However the concept of water management of state owned irrigation projects through such water co-operatives is of only recent origin. Moreover, it is only need based in the context of fast flowing development in all spheres of Nation's life. The benefits of irrigation projects are too well known. Now, the time is ripe for shifting the emphasis from construction of new projects

to improve the operational efficiency of the completed ones. It is in this area that water co-operatives have an important role.

3. Conventional Water Management and some of its limitations.

Water stored in irrigation reservoirs is conveyed to individual fields in the command area through an intricate network of canal system and field channels. The farmers apply for water individually and receive the same in accordance with predetermined rules and procedure which take for granted internal cooperation at least between farmers receiving irrigation water from the same outlet of the canal system. In absence of such co-operation, equitable water distribution according to the need of each farmer becomes difficult and at times the farmers located in the farthest end of the command area have to suffer as water cannot reach in time to their fields on account of quarrelling farmers of the upper reaches and not permitting smooth flow of irrigation water through their fields to the fields located in the tail end of the command. Even in the much publicised system of rotational water distribution, the tail enders suffer on account of lack of harmony and co-operation amongst all farmers. The law also cannot enforce co-operation.

3.1. One more limitation of the conventional water distribution relates to methodology of levying charges of irrigation water. Because of the very nature of things it is not possible to measure volume of water supplied to each farmer and consequently the water rates are not directly related to volume of water supplied. Therefore,

the canal authorities adopt the system of levying water rates based on crop/area and season. On account of such a system, the farmers use even more water than required by crops and thus not only waste the costly water but also spoil their valuable lands in the long run. The water co-operatives provide an answer to this menace also as in that case water can be sold to the co-operatives and water rates can be levied on the basis of volume of water measured at the supply point. The responsibility of equitable and efficient distribution of this water amongst the farmers vests in the co-operative society.

4. Mohini Water Co-operative Society (M.W.C.S) in the Command Area of Kakrapar Irrigation Project of Gujarat

Kakrapar is the largest completed irrigation project of Gujarat. Its canal system, drawing water from the weir constructed at Kakrapar village across river Tapti in South Gujarat, provides irrigation facilities to about two lakh hectares of land. The multipurpose Ukai reservoir was completed, subsequently in the year 1972 across the same river Tapti at about 32 kilometers upstream of Kakrapar Weir.

4.1 Encouraged by the State Government the Mohini Water Co-operative Society (M.W.C.S) was registered in September 1978 under State Co-operative Societies Act of 1961 and it started its work actively in March 1979 with its headquarters at village Mohini of Chorasi Taluka of Surat District. It was assigned gross command area of about five hundred hectares getting irrigation facility through four water courses and two direct outlets of 'Bhestan

Minor' of the Kakrapar Canal System. The corresponding culturable command of the area assigned to M.W.C.S. is about 475 hectares.

4.2 *Main features of Bye-laws and Objectives of M.W.C.S.-*

- (a) To promote the spirit of co-operation and self-reliance.
- (b) Water management on the basis of equity and need of the members.
- (c) Operating and maintaining the canal system outlets and field channels efficiently.
- (d) Educating the members in improvised farm management techniques.
- (e) Purchase of equipment needed for agricultural operations.
- (f) Establishing rotational water distribution system to ensure timely supply of water to each farmer.
- (g) Levy and recovery of water charges from the members in accordance with the rates fixed by the State Government.
- (h) To ensure that water is not wasted at all by any member.
- (i) To raise the working capital not exceeding Rs.50,000/- shares of Rs.50/- each.
- (j) To enroll all farmers within its area as members.
- (k) To carry out other activities for promoting the welfare of the society and its members.

4.3 *The Growth and Activities of M.W.C.S.*

In the first year of its formation i.e., in the year 1978-79 the M.W.C.S, started with 145 members and a share

capital of Rs.7,900/- only. During this year (a) the distribution net work of canals was renovated (b) additional outlets were added (c) the vulnerable reaches of even water courses were lined and (d) all preliminary procedures were set up for smooth interaction with local officers of Government for all matters. Thus the responsibility of water distribution levy and collection of water charges and operating and maintaining the canal system within the area assigned to M.W.C.S. was completely taken over from Government in the very first year of its inception. The M.W.C.S. made a net profit of Rs.17,000/- on account of its efficient management.

4.3.1 During the second year (1979-80) the membership increased to 161 from 145 and the share capital increased to Rs.9,000/-. The M.W.C.S. purchased one tractor and other equipment to assist its members in carrying out various farm management operations expeditiously and with least cost. Besides, the M.W.C.S. also collected a large portion of the past dues of Government regarding unpaid water charges from its members. A system of advance collection of water charges and in lieu thereof payment of some compensation with a view to encourage advance payment was also successfully established. Despite such concessions and capital invested on purchase of tractor and other equipments the M.W.C.S. continued to make a net profit of about Rs.3,000/- on account of increased area receiving irrigation and overall efficient management.

4.3.2 During the third year 1980-81 the M.W.C.S. membership rose to 181 and its share capital rose to Rs.10,000/-. During this year also it made a net profit of about Rs.6,000/-. The tractor purchased during previous year also earned a net profit of Rs.21,500/-. The M.W.C.S.

organised an educational tour of its members to Agriculture University at Navsari and to Mahi projects and Amul Dairy of Anand in Kaira District. The area irrigated during this year increased substantially.

4.3.3 During the subsequent year i.e., 1981-82 and 1982-83 membership increased from 181 to 203 and its share capital also rose to Rs.11,100/-. During the year 1981-82 society made net profit of Rs.10,403/- profit was also made through machinery.

During the year 1982-83 M.W.C.S. made a net profit of Rs.7,331/- and a net profit of Rs.364/- through machinery. So the M.W.C.S has made tremendous all round impact and its name and fame have spread not only in the entire State but also in the entire irrigation sector of the country at large.

Water was supplied by Government to M.W.C.S. in bulk and charged on volumetric basis at the rate of 25 paise per ten thousand litres.

The rate was revised vide Government letter No.UTR/1083/6/p dt.1.4.83 from Rs.0.25 to Rs.0.30 per ten thousand litres from June 1984.

The M.W.C.S. charged its members the prevailing water rates fixed by Government from time to time on crop/area season basis.

4.3.4 It is pertinent to note that prior to formation of M.W.C.S. the sum total of area receiving irrigation in all seasons in its command was only 450 hectares, which

increased by 100 per cent during the last four years 1979-80 to 1982-83. This is a very great achievement itself as the value of additional agricultural produce which directly helps in increasing nation's income, is very large compared to a small managerial support and subsidy in water rates received by the M.W.C.S. from the State Government. As against these subsidies the State Government saved the recurring expenditure on operation maintenance and repairs of the canal system covering the area assigned to M.W.C.S.

The M.W.C.S. had requested to increase the area by adding the Bhestan Minor which has a C.C.A. of 44.20 hectares covering a village Deladva and Mohini. As per the request of M.W.C.S. the area of Bhestan Minor was added in command of M.W.C.S. area. The charge handed over to M.W.C.S. on 16.2.83 and accordingly water is being supplied through the water course also from hot season 1983-84 and charges are also recovered from society accordingly.

4.3.5 The State Government provided for the first three years one manager, one mistry and two clerks for M.W.C.S. and also agreed to reimburse the net loss if any during the first three years. Besides, a uniform water rate of 30 paise per 10,000 litres was charged to the M.W.C.S. for all crops whereas the State Government permitted M.W.C.S. to charge its members such different water rates as were decided by State Government from time to time for different crops on the basis of area irrigated. Since M.W.C.S. had a large proportion of cash crops like sugarcane and summer groundnut for which the water rates on area basis are relatively high, it could earn some profit in water rates. The efficient and wasteless use of water are also

major contributory factors for the success story of M.W.C.S.

The Government of Gujarat has revised the water rates for irrigation purpose vide Government letter No.WTR/1083/6/p dt.1.4.83 to Rs.0.25 to 0.30 per 10,000 litres of water consumed with effect from June 1984.

5. Conclusion

Water co-operative societies have promising future in the command ares of irrigation projects of all kinds. It offers ideal solution of the rather complex problem of distribution of irrigation water on the basis of equity. It also makes easy introduction of the discipline of rotational water distribution and also of irrigation water in bulk on volumetric basis. Water co-operatives should be encouraged to grow very fast and in great number with a view to optimise the benefits of irrigation projects and there by raise the overall status of social life from good to better and best in days to come.

15. Brief note on the working of the Sinchai Panchayats in Tawa Project (M.P.)

(Ref: Note on Sinchai Panchayats enclosed to D.D. NO.IRR/11/86/6535 dt. 12.6.86 from Smt. Shashi Jain, Commissioner and Ex-Officio Secretary, Tawa Project, M.P.)

Under the Madhya Pradesh Irrigation Act applicable for all irrigation works spread over entire Madhya Pradesh there is a provision for constitution of the Sinchai Panchayats. Each Panchayat is formed for about 400 ha (1000 acres) of irrigated area covering around 3-4 villages.

In the Tawa Project Command Area these Panchayats have been fully constituted in 2 out of 5 irrigation divisions, their number being 124. In another 2 divisions elections have been held for 79 Panchayats and they would be constituted as soon as the approval of the Collector is received. In the 5th Division, construction work is in progress and very little irrigation potential has been created so far. For these limited areas the Sinchai Panchayats will be formed this year.

The electorate for election to the Panchas of the Sinchai Panchayat comprises of all the beneficiary farmers in the area. Ordinarily there are 5-7 members in these Panchayats, three members being elected for the first 100 beneficiaries and an additional one for every 100 beneficiaries. Such election is subject to the approval of the Collector,

who also has the power to nominate a member or dismiss any member or dissolve any Panchayat for reasons to be recorded in writing. The members of the Panchayat elect a Sarpanch from amongst themselves.

The term of a Sinchai Panchayats is 3 years subject to the election of the new Panchayat, the Collector having the right to extend this term for another period of 3 years.

The Sinchai Panchayats are entrusted with the responsibility of orderly management and distribution of irrigation water. Successful operation of the water discipline through Warabandi and Osarabandi is also a major responsibility entrusted to the Irrigation Panchayats. They are required to assist the Irrigation Department in arranging for construction of water courses and in recording and checking of irrigation measurement and settling land and water disputes. The essential repairs for the water courses are also to be carried out by them. Moreover one of the important responsibilities of the Sinchai Panchayats is to collect irrigation revenue and to remit it to the Treasury without delay, and in any case within 14 days of the collection. The Panchayat is also required to assist in detecting and preventing encroachments on canal roads and to report any wilful damage caused to irrigation works.

For effective discharge of their duties Sinchai Panchayats are empowered to impose fines up to Rs.50/- for specified offences such as obstruction caused to the free flow of water in the irrigation canals, diversion or wastage of water, damage caused to any permanent points like gauges and measuring devices, grazing of cattle on the canal banks etc. Besides, as an incentive for collection of irrigation dues a commission is paid to the Panchayats at the rate

of Rs.30/- per 1000/- for first Rs.1000/- collected and Rs.20/- per thousand for collection of additional amounts. This commission is required to be distributed in proportion of 2:1 between the Sarpanch and such of the Panchayat members, who have assisted in the collection of dues.

An administrative commission of 9 paise per acre of the irrigation area is also given to the Sinchai Panchayats for meeting their administrative expenditure of stationery etc. The Panchayat can itself use the penalty amount for important maintenance of canals etc.

It is proposed to make the Sinchai Panchayats powerful and in fact involve them in the areas of their responsibility as per the provisions of the Irrigation Act. In order to make them effective in the discharge of their responsibilities it has been decided to entrust them with the entire responsibility for distribution of water below outlet level in the Warabandi area, to begin with. For the year 1986-87 a programme for introduction of Warabandi in 60 thousand ha is being taken up as against 7,500 ha last year. In order to enable the Panchayats to understand the importance and procedural requirements for introduction and implementation of Warabandi a programme of training is being chalked out which would involve the training of all the Panchas of the Sinchai Panchayats alongwith the field staff of irrigation and Agriculture Departments.

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GLOSSARY

- Agrahāra* A village held by Brahmin scholars on a favourable tenure.
- Amaldār, Amildār* A collector in charge of a taluk.
- Amāni* Lands or other sources of revenue held under the direct management of Government officers.
- Amātya* A Minister.
- Āṇicutṭ, Āṇecutṭ, Āṇe* A masonry or brick dam across a river or a stream for the purpose of raising the water and distributing it by side channels to the land on each side.
- Atchkaṭṭ, Āyacuṭṭ* Extent of land capable of being irrigated from an irrigation work.
- Āyagār* Village officials consisting of 12 persons viz., *Gauḍa, Shānbōg, Pañchāṅgi, Talvār, Tōṭi, Nīrgaṇṭi, Agasa, Nāyinda, Kumbāra, Lohār, Badagi and Agasāle.*
- Baṇḍi, Bhaṇḍie* A cart or conveyance.
- Bārabalūti* Same as *Āyagār.*
- Bijavari* Area of land calculated according to the quantity of seed required for sowing in it.
- Bittuvatta* Grant of land below the tank for constructing and maintaining it.
- Chatra* A resting place for travellers.
- Chauthāi* A fourth part.
- Cuttai* See *Katte*

- Cōḍi, Cōḍy* The weir of a tank or a reservoir, waste - weir.
- Caṇḍuga, Caṇḍi* Land measure. See *Khaṇḍuga*.
- Daṣavanda* Land granted to a person for repairing or building a tank, same as *Bittuvaṭṭa* and *Kaṭṭukodige*.
- Dastabund* Same as above.
- Dāna* A gift, Charity.
- Dāmāshāyi, Dāmāsi* A proportionate share.
- Devādāya* Lands endowed rent-free for temples.
- Dewān* Minister.
- Durg, Droog* A hill-fort.
- Ēri* Bund of a tank in Kannada and a tank in Tamil.
- Gadyāṇa* Half a sovereign.
- Gauḍa, Gāuṇḍa* Headman of a village; Head of the village police; Same as *Paṭēl*.
- Hagēvu* A subterranean granary.
- Haḷḷa* A water-course, a river bed.
- Haṇa* Money; a *faṇam*; a small coin of either gold or silver.
- Hiṅgāru* The later rains, from October to January; the North-East Monsoon.
- Hōbli* The subdivision of a *tāluk*.
- Hoḷe* A stream; a river.
- Honnu* A gold coin.
- Inām* A gift, reward, a grant of land or money by Government as a reward for services rendered.

- Ināmti, Ināmati* Free of tax or rent.
- Ināmdār* The holder of a rent-free grant.
- Jāgir* Rent-free lands granted for services rendered to Government.
- Jamābandi* The annual settlement made under the ryotwari system.
- Jōdi* Grant of land or village on light assessment varying according to circumstances.
- Jōdidār* A ryot holding as *Inām*, lands or villages on reduced assessment.
- Kachēri, Cutchēri* An office, Court.
- Kālave, Kāluve* An irrigation channel.
- Jōyisa* An astrologer.
- Kaṇḍi, Khaṇḍuga* Land measure; 10,000 square yards of wet and garden land and 64000 square yards of dry land; Grain measure; 4 bushels, 12.8 pints.
- Karṇam* Village accountant; same as *Shānbōg*.
- Kasbā* - The chief town of a district or a division.
- Katṭe* An anicut or dam across a river or stream, a pond.
- Katṭu kālve* Feeder channel to a tank.
- Katṭu kōḍige* Same as *bittuvaṭṭa* and *dasavanda*.
- Kaul* An agreement or contract.
- Kere* A tank.
- Koḍgi, Koḍagi* A gift.

- Koḍagidār* A holder of a land under a tank, free of or on nominal assessment for having built, repaired or restored it.
- Kōḍi, Cōḍi* The weir of a tank or reservoir; waste-weir.
- Kola* A reservoir with stone steps down to water's edge.
- Kolaga* One-twentieth of a *Khanduga*.
- Kuṅṭa* A land-measure.
- Kuṅṭe* A pond.
- Kūpa* A well.
- Mahājana* Scholar-citizens of an *agrahara* village.
- Maidān* Plain country as distinguished from a hill region or *malnāḍ*.
- Malnāḍ* Hill region.
- Māmledār, Amildār* A collector.
- Maṅḍal* A subdivision of a zilla or district as defined in the Act.
- Maṅegār* An agent, an accountant, an overseer.
- Mānya* Exempt from taxes.
- Marāmat* Mending or repairing, commonly used for the department of public works.
- Maṭha, Muṭṭ* A school-house, seat of a religious head.
- Mēstri, Maistry* A subordinate employed for supervising a work, an overseer.
- Mattar* A land-measure, roughly equivalent of four to five acres.

- Mirāsi* An allowance or perquisite, sometimes paid in money and sometimes in kind, generally applied to grains etc., given to village officials by the *ryots*.
- Mutchalike, Mutchalika* A deed of agreement.
- Mungāru* The early rains, from June to September, the south-west monsoon.
- Mutsaddi, Mutsuddy,* An agent, an accountant.
- Muzrāri* A department for the control of temple funds, and other religious property.
- Nāḍu* A group of villages.
- Nāḍagāudike* Headship of a *nāḍu* or a group of villages.
- Neergaṅṅi, Nirgaṅṅi* Regulator or distributor of water to irrigated lands.
- Nibhanda* Fixed or immovable property and also a fixed allowance.
- Nirugandāya* Water cess.
- Pagōda* A gold coin.
- Paṇa, Haṇa* Gold coin equal to 5.28 grains.
- Panchāyat* A village committee of five or more persons.
- Pāṭel* Headman of a village, same as *Gauḍa*.
- Paṭnashetṭi* A title given to the principal men of towns next to *Shetṭis*; a *Shetṭi* being in some respects similar to a Mayor and *Paṭnashetti* to an Alderman.
- Patta* A deed of lease given to the cultivator specifying the conditions of lease and details of land leased.
- Pattana, Patna* A town.

- Pēshkar* A revenue officer next in rank to *Amildār*.
- Punya* Good lot or fortune or merit.
- Reddi* A Telugu designation for the headman of a village.
- Rāgi* Finger millet.
- Ryot* A cultivator, a farmer.
- Rāziname* A deed of consent.
- Saluge, Salage* A measure of capacity, a *khaṇḍuga*, 160 seers.
- Sanad* A grant, a document conveying to an individual emoluments, titles, etc, under the seal of the ruling authority.
- Sante* A fair, a market place.
- Sarkār* Government.
- Sarvamānya* Land granted on entirely free tenure.
- Seer* Grain measure, a weight.
- Sēnabōva* Village accountant.
- Sētu, Sētuve* A bridge or dam.
- Shānbhōg, Shānbōg* Village accountant, same as Senabova.
- Shēkdār* Revenue officer in charge of a *hobli* or subdivision of a taluk.
- Shikimdār* Sub-cultivator.
- Shirastedār, Sheristedār* Head of a revenue or judicial office.
- Shivāi Jame* Miscellaneous receipts credited to Government.

Shreya, Shraya Rent commencing at a low rate and increasing gradually year by year till the maximum is attained.

Supāri, Soopāri Arecanut.

Sowdie Same as *Neerganti*.

Talāri, Talāra, Talavāra Village watchman, whose duty is to give information to officers and to guide travellers.

Tāluk A division of a district under the management of an *Amildar*.

Tōṭi A deputy of *Talari*, who is employed to watch crops from the growing crop to the granary.

Tūbu The sluice of a tank or reservoir.

Umbali A village or plot of land free of rent.

Vaḍḍa, Voḍḍar A tank digger; a worker in stone or earth.

Varāha A gold coin, a *pagoda*.

Waḍḍar Same as *Voddar*.

Yēta A lever for raising water from a well; a well from which water is raised by such an instrument.

Zilla Parishad District Assembly.

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“To my knowledge there was so far no treatise on the subject of ‘History of Irrigation Tanks’. The reason was simple: it needed painstaking research into history and insightful study to draw lessons. Both have been accomplished in ample measure by the authors. Tanks are a creation of the people, by the people and for the people. It is therefore necessary to have the book translated into Kannada”.

— **A.V. SHANKARA RAO**

Former Chief Engineer
Water Resources, Karnataka.

“This survey presents an in-depth account of the history of tank irrigation from the earliest times, and would serve as an invaluable guide for planning the future. Though the survey is of Karnataka, the facts brought out are applicable to the other states of south India in an equal degree, and as such its utility is far greater than what appears at first sight”.

— **Dr. S.V. DESIKACHAR**

Former Director of State Archives,
Karnataka.

"The book is a good blend of history and engineering. A very important finding of the authors is that the maintenance of tanks and canals by the Government is impossible. They offer suggestions on beneficiary maintenance schemes and the State Government should seriously consider these".

— **Prof. RAMA PRASAD**

Indian Institute of Science,
Bangalore