

Issues before Second Irrigation Commission of Maharashtra

Although irrigation is a state subject, central directives often change the course of the state policies. Maharashtra is the only state to have undertaken an analysis of the problems of irrigation with the help of the state machinery through various committees/commissions. The paper, in the context of the appointment of the Second Irrigation Commission in the state deals with the problems of irrigation at the country level as well as in some specific states. While privatisation has been a frequently suggested solution to all ills, it is necessary first to understand the problems and prospects of privatisation initiatives notably the Krishna Valley Project in the state.

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I Introduction

Irrigation sub-sector was allocated the largest amount of resources in the overall agricultural sector, be it monetary, technological or intellectual. Number of debates have taken place ranging from the method of project identification [Gadgil 1948; Sovani and Rath 1960] to the rehabilitation of the displaced population in the Narmada river basin [Patel 1994; Ruitenbeek and Carlier 1995]. Among these, the trends in the plan expenditure and discussion on major issues in the sector (especially those on working expenses, water rates, water management, water co-operatives, cost and time overruns, measurement of the environmental and economic impact) emerged with significant importance. In the subsequent debate on many of these issues, privatisation of the management of irrigation sector, is an issue which featured only in the recent past. Traditionally, water for irrigation is considered as a common property renewable resource and the state assumed the responsibility of developing access to it. This is more so in the case of surface irrigation. It is a well known fact that the state machinery has its inadequacies in managing the surface irrigation sector. But the inadequacy of the state machinery is sometimes overplayed to drive home the point that the management of irrigation water under surface irrigation be handed over to private enterprises or a cooperative group of users. So far as the group of users managing irrigation efficiently below main canal system, we have a large number of success

stories but a good number of them also indicate that the success is more location specific than generalised (Lele and Patil, 1994; GoI, 1992). Even the successful stories among these do not deal with the problems above the distributary level. Thus the argument leads to the initial question about pinning down the problems of management of the irrigation sector with the state machinery.

Not many state governments have taken up the analyses of irrigation sector seriously as has been done in Maharashtra.¹ As irrigation is a state subject (state list number II, entry 17), the central directives (through irrigation commission, Central Water Commission, etc) help to build the policy to some extent but it is expected that the state governments, in their own interest, analyse the problems of irrigation in detail in order to make attempts to solve them. The government of Maharashtra has recently appointed a state-level irrigation commission under the chairmanship of M P Chitale. It is well known that the First Irrigation Commission in the state was appointed in 1962, immediately after the state reorganisation. Large number of changes have taken place during the last three decades in the irrigation sector and hence, the appointment of the Second Irrigation Commission is well justified. The issues before the Second Irrigation Commission of Maharashtra are not only important for the state, but also have a significant bearing on the irrigation sector in the other states.

Maharashtra is known as a state with a large share of rain-fed area, meagre proportion of area under irrigation and large

share of the available irrigation water being used mainly for high water consuming crops [GoM 1979; Rath and Mitra 1989]. Presently, the cultivated area under irrigation in the state, as per the estimates of the department of agriculture, government of Maharashtra, is above 23 lakh hectares (average of 1987-88 to 1989-90).² The irrigation needs of the state are however, much higher due to the large area coming under the drought-prone zone. Ironically, this coexists with the large quantum of impounded water being used for sugar cane [Rath and Mitra 1989]. The First Irrigation Commission of Maharashtra recommended that the policy and problems of irrigation in the state should be examined every ten to fifteen years by appointment of a special commission of inquiry [GoM 1962:194]. Thus the review of the sector was due latest by 1977. In this context the appointment of the present commission is a welcome phenomenon.

During the last three and half decades several issues have emerged and were discussed in the irrigation sector of the state. The most prominent among these are: (i) River basinwise proper assessment of water resources and its utilisation. Inter-basin transfers of water resources (at least within the state and under small catchments). (ii) Problems of scarcity areas and irrigation backlog across regions. (iii) Financial performance of the irrigation sector especially in comparison with the same in the other states. (iv) Policy towards water rates. (v) Trends in actual development expenditure on command area development as against the establishment costs. (vi) beneficiary participation in

irrigation management. (vii) Drip and sprinkler irrigation. (viii) The expected pattern of future development of irrigation in the state. It is a welcome trend that most of these issues are incorporated in the 'terms of reference' of the Second Irrigation Commission of Maharashtra. It is also not surprising that these very issues are the core problems faced by the irrigation sector in most of the states. In fact, the terms of reference are relatively wider than any of the earlier commissions or committees on the same subject. In this note, we intend to deal with some of the issues mentioned above in the specific context of Maharashtra but the analysis is likely to be very similar for any other state. In Maharashtra, trends towards privatisation are stronger than in any other state. The BJP-Shiv Sena alliance government established a state-sponsored autonomous corporation for irrigation development in the Krishna Valley. In addition to this some irrigation experts in the state seem to be strongly inclined towards privatisation. On this background, it becomes necessary to review the problems of the sector and investigate into various options.

I Irrigation Development in State

The ultimate irrigation potential of the state, as worked out by the Central Water Commission, is about 89.5 lakh hectares [CWC 1996:38].³ Out of this, 45.8 per cent of the irrigation potential is proposed to be realised through major and medium projects and the rest, 54.2 per cent has to be tapped under minor irrigation.⁴ Relative position of Maharashtra in comparison with some of the important states in India is shown in Table 1. Maharashtra ranks fifth from the top in descending order of ultimate irrigation potential. It is important to note that Punjab, Haryana, Tamil Nadu and Karnataka have only about half of the ultimate irrigation potential of Maharashtra and yet Maharashtra has a lower share of area under irrigation. This is in some way a clear reflection of the failure of efforts to tap the available potential as well as the difficult topography of the state. Three points emerge from this. Firstly, irrigation has always remained a sensitive issue in the political economy of Maharashtra as strong political groups always came from the irrigated regions of the state and hence the problems of irrigation have acquired political prominence

as well. Secondly, the potential of minor irrigation covers a larger portion of the ultimate irrigation potential hence public awareness should be directed towards this source. Similarly, problems of minor irrigation sector in the state at least at level of the discussion have not received due priority. Lastly, despite the numerous committees and commissions and volumes of work on irrigation, the state could utilise only 39.3 per cent of its ultimate irrigation potential compared with the share of potential utilised by Tamil Nadu (64.6 per cent), Rajasthan (82.7 per cent) and Gujarat (51.5 per cent). In this context and notwithstanding the controversy on potential vis-a-vis utilisation, a question arises about the intensity of efforts in tapping the potential.

Up to May 1994, 3,596 large dams were completed and 695 are under construction in the country. These include the large dams constructed from the beginning of this century (Table 2). It is unbelievable that out of these, 1,229 dams are in Maharashtra state alone. This is about 34 per cent of the total number of large dams in the country and thus Maharashtra has the distinction of having the largest number of large dams in the country. This is justified by the irrigation engineers as necessity because of the undulating terrain in the state. But this means that the state has accomplished on an average about 25 projects per year (during 1951-94). Similarly, the state has a live storage capacity of 26.20 cubic km from the completed projects, which is the highest capacity created among the states in the country (CWC 1996:17, statement No 1.8). In a comparison across the state Maharashtra has about 15.8 per cent of the total capacity of live storage of water created in the

country (including proposed), which is the second highest in the country. Thus Maharashtra does not seem to have fallen short in creating the water storage or at least the state is comfortably placed at the top rank as far as creation of the storage capacity is concerned. But in terms of achievements, the proportion of cultivated area under irrigation is less than 15 per cent of gross cropped area. Thus the situation is that, the state has the highest number of dams, high storage capacity created but still can claim only one of the bottom ranks in proportion of cultivated area under irrigation. Among the irrigation experts, a section has a strong view that this imbroglio can be sorted out by allowing privatisation of construction and management of irrigation projects. But the real question is: Can this problem be solved by privatising construction and management of irrigation sector? This needs careful consideration.

Given the present situation neither we have sufficient experience of privatised activities in irrigation management nor we can rely on the private sector knowing fully well the existing inequity in asset (land) distribution. Actually, the problem is not so much of delay or quality of construction but more seriously relates to the planning of the irrigation sector.

I River Basinwise Use of Water Resources

Even the basinwise water resource potential and the use of such water in the state raises quite a few questions. Maharashtra has five major river basins in addition to the westward flowing rivers in Konkan region. These are Krishna, Bhima,

Table 1: Statewise Ultimate Irrigation Potential and Utilisation
(Thousand Hectares)

States	Irrigation Potential ¹			Utilisation Up to 1992-93 ²		
	MMI	MI	Total	MMI	MI	Total
Andhra Pradesh	5000	6260	11260	3214	2649	5863
Bihar	6500	6847	13347	2745	4329	7074
Gujarat	3000	3103	6103	1343	1803	3145
Haryana	3000	1512	4512	1836	1479	3316
Karnataka	2500	3474	5974	1308	1406	2714
Madhya Pradesh	6000	11932	17932	1624	2372	3996
Maharashtra	4100	4852	8952	1307	2211	3518
Orissa	3600	5203	8803	1333	1116	2449
Punjab	3000	2967	5967	2570	3217	5787
Rajasthan	2750	2378	5128	1926	2317	4242
Tamil Nadu	1500	4032	5532	1458	2120	3577
Uttar Pradesh	12500	17999	30499	5897	17294	23191
West Bengal	2310	4618	6928	1614	2298	3911
India	58475	81428	139903	29216	46486	75701

Notes: MMI - Major and Medium Irrigation; MI - Minor Irrigation.

Sources: 1 CWC (1996), *Water and Related Statistics*, Central Water Commission, New Delhi, June.

2 CMIE (1994), *Basic Statistics Relating to Indian Economy: States*, Centre for Monitoring Indian Economy, Mumbai, September.

Godavari, Vainganga and Tapi. Major water availability comes from Krishna (including Bhima), Wainganga and Godavari river basins. All these basins together have about 45.2 thousand million cu m of water and the major share comes from the Wainganga and its tributaries. The Godavari basin proper (it has two sub-basins) has an availability of 403 TMC and Wainganga sub-basin has 720 TMC.

Among the basins, development of the sources of irrigation has not been uniform, nor it is expected to be exactly so. However, there should not be any deliberate policy bias towards one river basin in utilising the surface water potential because this involves public investment. In the recent past, massive efforts are being made to utilise the available water from Krishna basin, similar initiatives may be taken up in the other basins. It is essential to draw a time schedule of the programme of utilising available water across major basins and sub-basins and publish it so that it is known to people well in advance. It is also necessary to work out a properly laid programme for achieving the full realisation of potential and work on it accordingly. The important point we are driving at is the possibility of lopsided development of one basin by utilising huge public resources essentially depriving the other regions (basins) of their share in public expenditure on development. In this context, we quote from the First Irrigation Commission Report which states "If such dispersal of irrigation facilities is not deliberately and properly planned in advance and the plan adhered to, lopsided development, such as the one witnessed on the existing canals, will result on the new irrigation works also" [GoM 1962:46]. If we look at the present development of the sector across regions we seem to have not heeded to the advice of the prime body. The government of Maharashtra either did not possess a carefully drawn policy of utilising the irrigation potential across its river basins or if there was any such policy then it is sure that the state government faltered in its implementation. This point becomes clear if one compares the basin-wise availability of irrigation potential and the growth rates in the development of utilisable quantum of water. Interstate water dispute tribunal on Krishna water gave its award of water distribution on May 31, 1976. Under this, Maharashtra was awarded 560 TMC of water to be used before the year 2000 and just four years before the deadline of using the water, the

government of Maharashtra established an autonomous corporation namely, Maharashtra Krishna Valley Development Corporation (MKVDC) to accomplish this task. The work before the MKVDC is to complete the projects which are at various stages of completion. The total cost of the balance work is estimated at Rs 7,100.25 crore (at 1994-95 schedule of rates) for the works to be completed by 2000-1. The schedule of rates has been revised upwards and the present cost of these works is enormously high. This means an investment of Rs 5.67 crore per day and Rs 16.79 crore per TMC of water. It must be underscored that this investment is to be accomplished only in one river basin which automatically deprives the others (regions/basins/projects) of their legitimate share (or portion of it) of public investment. Here it is essential to note that the cumulative expenditure on the irrigation sector (per unit value) over the plan periods from the beginning, has not been as high as the planned investment under MKVDC.

Apart from this the interpretation of the Bachawat award seems to be misplaced as far as utilisation of the 560 TMC water is concerned. The clause VIII (A) and VIII (B) of the report on the Krishna Water Disputes Tribunal (p 225 of further report) become relevant in this respect. The clause VIII (A) states that: "If in any water year any state is not able to use any portion of the water allocated to it during that year on account of the non-development of its projects or damage to any of its projects or does not use it for any reason whatsoever, that state will not be entitled to claim the unutilised water in any subsequent year" (p 225).

The clause clearly states no entitlement to claim (as a right) the unutilised water.

Therefore, utilisation becomes an essential component and similarly entitlement to claim as a right becomes an important point here. But immediately following clause VIII(B) seems to supersede the earlier clause and it is stated that "Failure of any state to make use of any portion of the water allocated to it during any water year shall not constitute forfeiture or abandonment of its share of water in any subsequent water year nor shall it increase the share of any other state in any subsequent water year even if such state may have used such water" (p 225).

Here it becomes clear that any state not utilising the allocated water to it shall not forfeit the claim on water allocated in subsequent year. Further in clause XIV (A) the Tribunal clearly states that "At any time after the May 31, 2000, this order may be reviewed or revised by a competent authority or Tribunal, but such review or revision shall not as far as possible disturb any utilisation that may have been undertaken by any state within the limits of the allocation made to it under the foregoing clauses" (p 238).

The above quotations bring out clearly that it was not so urgently required for the state to hurriedly plan and execute the Krishna basin projects. In other words, the present hurry in planning and execution under MKVDC brings out clearly the failure in the earlier planning process. Further, this may have far-reaching implications in terms of regional equity in investment for irrigation as far as the other basins are concerned. Given the size of investment to be raised from private sources and the required budgetary allocations, the burden on the state exchequer out of this (failure of planning) is going to be enormous during the coming years for the irrigation sector

Table 2: Statewise Distribution of Large Dams

State	Number of Dams Completed During				Under Construction	Total
	Year Not Recorded	Up to 1950	1951 to 1970	1971 to 1994*		
Andhra Pradesh	57	27	36	38	26	184
Bihar	5	1	18	37	33	94
Gujarat	6	52	136	272	71	537
Haryana	0	0	0	0	0	0
Karnataka	35	22	46	85	28	216
Madhya Pradesh	9	87	120	730	147	1093
Maharashtra	84	51	171	923	300	1529
Orissa	1	2	8	120	18	149
Punjab	0	0	1	0	1	2
Rajasthan	27	10	49	36	4	126
Tamil Nadu	13	11	34	36	13	97
Uttar Pradesh	22	29	49	45	22	145
West Bengal	0	0	2	20	5	27
India	236	293	695	2372	695	4291

* - up to May 1994.

Source: CWC (1996).

alone. Therefore, at least now it is necessary to develop a clear understanding of the future scenario and draw a time schedule about utilisation of the water across river basins.

IV Investment in Irrigation and Returns

In most of the debates focusing on irrigation sector the availability of finances, sources of funds, spread of the investments, returns on investment and plough back surplus became important issues. Up to the Seventh Plan, the total investment in irrigation sector in India was to the tune of Rs 41,000 crore and out of this investment the country could achieve 55.5 million hectares of irrigated area. This does not include the irrigated area by private sources or investment in irrigation originating from private sources of funds. Maharashtra state has achieved 23.2 lakh hectares under irrigation (average of 1987 to 1990). Out of this a sizeable portion has been achieved through the public investment. We have presented the planwise expenditure on irrigation through public investment and potential of irrigation created in Maharashtra in Table 3. It can be seen from the table that investments to the tune of Rs 8,635.7 crore is already made during the last eight plans in the state. Out of this, an amount of Rs 6,135.1 crore has been utilised towards major and medium irrigation (MMI) works, whereas, an amount of Rs 2,500.7 crore has been used for developing minor irrigation (MI). Even if attempts are made to add the estimated investment from private sources to this investment from public sources in the minor irrigation sector, the investment in minor irrigation is most unlikely to fall in the vicinity of the investment in MMI. It is argued that such comparison is not warranted [Dhawan 1989]. But from the policy perspective, we feel that, it is necessary to underscore a point that the minor irrigation sector, which offers higher potential for development of irrigation in the state, needs to be strengthened in terms of incentives/schemes. This has been argued and demonstrated by the experiments under Pani Panchayat [Salunke and Rasal 1996]. Such policy would certainly pave a way for steady growth of the sector. It is therefore necessary to induce such investment in minor irrigation schemes.

It is well known that the financial performance of the irrigation sector is

extremely poor. The performance at country level as well as at the state level has no major differences. This was pointed out by the Second Irrigation Commission (1972). Recently, Vaidyanathan Committee [GoI 1992] has unequivocally shown that at the country level large amounts of the cost incurred on irrigation remains unrecovered. It can be seen from Table 4 that the unrecovered cost is 3.15 times the gross revenue realised during 1977-78 and it has reached to an alarming proposition of 8.27 times the gross revenue in about a decade.

We have incorporated financial performance of irrigation and multipurpose river valley projects for selected states in Table 5. It is a matter of common knowledge that the sector is not able to recover even up to 10 per cent of the working expenses and an average yearly working expenditure of Rs.2,000 crore remains unrecovered at the country level [GoI 1992]. The situation is not very different in Maharashtra. We have been able to recover only about 3 to 6 per cent of the working expenses in the state. What is really disturbing is the time trend in the rate of recovery (i.e, proportion of working expenses recovered). During the last decade, almost every major state has shown a deterioration in the rate of recovery with the exceptions of Andhra Pradesh and Tamil Nadu. It is quite alarming that in the case of Maharashtra the per cent of recovery is declining at a very fast rate. It can be seen from Table 6 that the recovery rate has been declining very sharply in the state as well as in the country. It was 166 per cent during the year 1974-75 in the state and slid down sharply in the immediate two years. What is surprising is the drop in the recovery rate in the year 1987-88 to 5.9 per cent from 43 per cent in the previous year. This is mainly due to the

sharp increase in the working expenses during 1987-88.

Another important aspect of the comparison of the working expenses with the gross receipts is the conceptual mismatch between the two. Researchers have been using the gap between the two (working expenses and gross receipts) to highlight the point of poor recovery but at times (or more often) the argument is stretched ahead to recommend substantial increase in water rates to bridge the gap. But it should be noted here that gross receipts represent the actual receipts on account of supply of water. In fact in almost all the states a large share of water rates/penalties etc, claimed or demanded from the farmers, is not actually paid (Table 7). Thus the proportion of unrecovered water rates is very high in some of the states. Therefore the gross receipts represent only a share of what was expected as receipts from the farmers. In fact the expected receipt should be much higher than the actual receipts and some times there may not be any gap between the expected receipts and working expenses to justify the increase in water rates on this account. This has not been analysed so far. The state level data on demand for water rates and actual receipts need to be analysed.⁵

Table 4: Estimates of Unrecovered Costs on Major, Medium and Multipurpose Irrigation Projects - India
(*Rs in million*)

Particulars	1977-78	1986-87
Working expenses	1272	4927
Interest on capital average borrowing of cost	2155	8506
Depreciation @ 1 per cent	600	2023
Total expenses	4027	15456
Gross revenue	969	1667
Unrecovered cost (4-5)	-3058	-13789

Note: Estimates cover 14 major state of Indian Union.
Source: GoI (1992).

Table 3: Planwise Details of Expenditure and Potential Created in MMI and MI

Plan	Expenditure (Rs Crore)		Potential Created (Thousand Hectares)	
	MMI	MI*	MMI	MI
First Plan	-	-	21	-
Second Plan	52.7	4.0**	47	242
Third Plan	63.1	74.9	129	-
Annual Plan	58.0	90.8	119	173
Fourth Plan	166.3	156.4	266	100
Fifth Plan	361.2	157.7	286	180
Annual Plan	292.8	87.7	112	47
Sixth Plan	1187.2	384.9	458	365
Seventh Plan	1561.9	932.0	264	397
Eight Plan	2391.5	612.2++	444+	-
Total	6135.1	2500.6	2146	1504

* - State plus institutional; ** - Institutional alone; +- Target; ++ - State alone.
Figures are rounded off to the nearest integer.

Sources: Compiled from CWC (1996) and GoI (1992).

Vaidyanathan Committee [GoI 1992] and Gulati et al (1994) suggested various measures to improve the financial performance of the sector which include: (i) improvement in design and appraisal; (ii) restructuring of the management; (iii) building up incentive structure; (iv) increasing and restructuring irrigation fees; (v) pricing on volumetric basis; and (vi) participation of beneficiaries in management. Recently it is suggested by Rath (1997) that the water distribution below the main canal system be handed over to the group of irrigators. The water rates should be fixed at the opportunity cost of water and revised every year by applying price index. It is favoured that the irrigation department should not specify the water rates and these should be left to the users bodies. This seems to be more feasible solution but the working details of this have to be analysed keeping in view the ground realities about the irrigation department.

In some quarters of policy makers it is strongly felt that the burden of irrigation investment on the public sources needs to be reduced and private sources of investment should be explored. We have discussed earlier the example of Maharashtra Krishna Valley Development Corporation (MKVDC). The corporation established under the Maharashtra Act XV of 1996, announced a public issue of bonds aggregating Rs 250 crore at an interest rate of 17.5 per cent per annum for tapping the private resources. The public issue had an overwhelming response. This has shown at least notionally a way through which capital can be raised for tapping private sources in order to overcome the financial bottlenecks.

The picture is however, not as rosy as it is made out to be through the private sector investment. The corporation or private autonomous organisation managing irrigation, like MKVDC, is not private in full sense of the term as the composition of the corporation has eight members in the ex-officio capacity and other seven members are nominees (members of the legislative assembly/council). In other words, now in the case of gross failures, the irrigators have neither the government to put the blame on nor any permanent private body. Further, the corporation is established by the government of Maharashtra with a committed budgetary support. The promised returns on investment is also very high. This means either the corporation nets (net of expenses of the

corporation) the profits above 17.5 per cent (the promised rate of return to investors) on its fixed investment in irrigation to pay dividends to the investors or the state government undertakes to pay it out of the states' own budgetary resources. In any case the experience of the returns from investment in irrigation is not very encouraging to promise 17.5 per cent returns to the investors. Further, the identity of the investors who have pledged their funds with MKVDC needs to be established clearly. Our guess is that a large amount of funds came from other semi-government bodies. This, if analysed, adds a new dimension to the 'privatisation' drive. Gulati et al (1994) also had suggested water bonds in the background of the poor recovery thereby either asking the investors (with full knowledge) to invest in a losing proposition or by compelling the state exchequer to contribute towards the non-performance of the irrigation bureaucracy as done earlier.

V Water Pricing Policy

One of the major points of discussion right from the time of the First Irrigation Commission [GoI 1962], is the policy towards water rates. Water rates have been quite low in most states and have not been periodically revised. Among the sugges-

tions on water rates given by the Second Irrigation Commission [GoI 1972] the major ones are: (i) the water rate (i) should relate to benefits rather than to cost, (ii) should relate to crop and season, (iii) should consider the cropping needs of the state, (iv) should be fixed between 6 to 12 per cent of the gross income and (v) should be revised after every five years. In Maharashtra, the recommendations of the irrigation commission are broadly adhered

Table 6: Percentage of Recovery of Working Expenses through Gross Receipts in Irrigation and Multipurpose River Projects: Maharashtra and India

Year	Maharashtra	India
1974-75	166.02	64.16
1975-76	134.38	91.09
1976-77	98.76	92.86
1977-78	97.21	76.23
1978-79	79.80	69.64
1979-80	93.49	71.67
1980-81	93.82	45.79
1981-82	94.14	45.30
1982-83	78.72	49.25
1983-84	61.05	60.27
1984-85	47.30	38.83
1985-86	48.86	45.97
1986-87	43.26	34.05
1987-88	5.90	9.90
1988-89	5.21	7.80
1989-90	6.30	9.30
1990-91	4.00	9.00
1991-92	4.00	8.00

Note: The data beyond 1991-92 were not available at the time of preparing this paper.

Source: CWC (1996).

Table 5: Financial Performance of Irrigation and Multipurpose River Valley Projects for Selected States (Rs Crore)

States/Period	Capital Outlay	Gross Receipts (GR)	Working Expenses (WE)	Recovery Percentage (GR/WE x 100)
Andhra Pradesh				
Late 1980s	281.45	20.30	403.25	5.03
Early 1990s	265.45	31.30	376.20	8.32
Haryana				
Late 1980s	38.00	14.55	105.00	13.86
Early 1990s	57.50	16.55	126.80	13.05
Maharashtra				
Late 1980s	449.10	23.15	399.35	5.80
Early 1990s	475.25	19.80	546.20	3.63
Punjab				
Late 1980s	86.70	17.00	71.75	23.69
Early 1990s	118.90	14.65	91.40	16.03
Tamil Nadu				
Late 1980s	37.30	1.45	72.45	2.00
Early 1990s	45.95	2.20	84.80	2.59
Uttar Pradesh				
Late 1980s	282.30	33.50	327.50	10.23
Early 1990s	224.30	35.90	427.90	8.45
India				
Late 1980s	2486.00	187.00	2175.90	8.59
Early 1990s	2770.65	219.00	2567.45	8.53

Notes: Late 1980s - Average of 1988-89 and 1989-90.

Early 1990s - Average of 1990-91 and 1991-92.

* - Working expenses are inclusive of interest on capital at the end of year.

Source: CWC (1986).

to and the water rates are revised with the required frequency. At present the state has the highest range of water rates prevailing in the country. But compliance is quite poor in all the states including Maharashtra. Statewise working expenses of the multipurpose river valley projects, gross receipts per hectare and prevailing water rates are presented in Table 8. The table show clearly that the per hectare working expenses in Maharashtra are more than five times of the average per hectare working expenses at the country level. It may also be noted that the gross receipts per hectare are also higher in the state – the recovery ratio (gross receipts/working expenses) works out to be only 3.66 per cent.

From a comparative statement of gross receipts per hectare as against the gross productivity per hectare given by the Vaidyanathan Committee on Pricing of Irrigation Water [GoI 1992], it becomes clear that state governments have been able to tap only about 0.1 per cent (West Bengal and Tamil Nadu) to 2.9 per cent (Uttar Pradesh) of the gross value of productivity (Table 9). The situation in Maharashtra tallies with the average of all states. In Maharashtra, the per hectare gross receipts come to about 1.9 per cent of the gross value of production from one hectare of irrigated area, which is certainly low and does not fully adhere to the recommendations of the Second Irrigation Commission. If we compare the difference between the gross value of production under irrigated and unirrigated conditions the picture does not change substantially. In Maharashtra, the gross receipts per hectare form only 2.4 per cent of the incremental gross value of production due to irrigation. Thus it becomes clear from the above discussion that either the receipts have to be enhanced or the expenses should be reduced in order to improve the viability of the sector.

An important aspect crops up here from the perspective of understanding the total production process of the farmers. Water rates are always compared with the gross value of productivity to express the percentage of returns to investment. The very purpose of comparing the gross value of productivity with the water rates is to get an idea of how much of the gross income should be accounted for the returns on investment. But as the production process involves investment on other cash resources as well as capital cost, it will not only be erroneous to compare the water rates with

gross productivity but it will also be misleading. This will amount to belittling the importance of other factors of production as well as creating an impression that a very small fraction, of the gross benefits generated, is ploughed back as surplus. Therefore, it is very essential to compare the water rates with the net value of productivity (net of cost-A or paid out cost excluding irrigation). Such comparison can only clearly identify the quantum of surplus amenable for ploughing back as returns to investment.

While deliberating on the issue of water rates the First Irrigation Commission of Maharashtra had given a broad outline of policy. But as we have seen above, the water rates in Maharashtra are quite high when compared with those of other states and therefore, it will not be totally erroneous, if we assume that the compliance towards payment of water rates is lower because these are high when compared with the other states.⁶ In this context it will

not be out of place here if we quote from the minute of dissent by G K Chitale in the report of the Deccan Canals Financial Improvement Committee of 1932. It was stated that “The information that we have obtained from Hyderabad, Mysore and Bikaner states, confirms our views that the present pitch of the water rates on the Deccan Canals is too high as compared with those in force in these states. Even after making allowances for the cost of construction, it is still apparent that in Mysore and in Hyderabad where the canals run through soils similar to ours, there is no reason, especially in these days of competition, as to why we should insist up on a water rate which does not bear a fair proportion to the net profits” [GoB 1932:40]. The views of G K Chitale need absolutely no alteration after 65 years even under today’s circumstances. Hence, instead of working only on the water rates side (revenue side) vigorously, it is obligatory to consider with equal rigour the ex-

Table 7: Demand Raised, Actual Collection and Accumulated Arrears of Irrigation Charges in Respect of MMI Sector in Selected States: TE 1990-91

(Rs in Lakh)

States (1)	Demand Raised (2)	Actual Collection (3)	Arrears (Cumulative) (4)	3/2 x 100 (5)
Bihar	1022	463	3593	45.30
Gujarat	1099	719	3347	65.42
Haryana	1155	1389	1151	120.26
Madhya Pradesh@	2450	1475	6859	60.20
Maharashtra	1901	1341	7325	70.54
Orissa	934	417	na	44.65
Punjab	992	1150	na	115.93
Tamil Nadu@	337	-	-	-
Uttar Pradesh@	6179	5703	na	92.29
West Bengal@	234	80	na	34.19

Notes: na - not available; @ - relates to TE 1989-90.

Source: GoI (1992).

Table 8: Working Expenses and Gross Receipts Per Hectare of Potential Utilised of Irrigation and Multipurpose River Valley Projects and Range of Water Rates, 1991-92

(Rs/ha)

States	Working Expenses*	Gross Receipts	Range of Water Rates	Year of Water Rate Revised Last
Andhra Pradesh	1377	48	99-222	1986
Bihar	na	na	30-158	1983
Gujarat	3605	231	25-830	1981
Haryana	792	88	17-99	1975
Jammu and Kashmir	529	15	6-289	1976
Karnataka	1639	252	37-556	1985
Kerala	596	46	37-99	1974
Madhya Pradesh	748	182	15-297	1990
Maharashtra	5627	206	100-1750	1994 [§]
Orissa	189	40	6-185	1981
Punjab	412	65	14-81	1974
Rajasthan	852	99	20-143	1982
Tamil Nadu	579	15	6-65	1962
Uttar Pradesh	808	64	7-237	1983
West Bengal	514	16	74-593	1977
India	1032	82	-	-

* - inclusive of interest on capital.

Sources: CWC (1996); § - Irrigation Department, Government of Maharashtra, Pune.

penditure side also to understand the increasing trends in expenditure and ways and means to cut down unwarranted expenditure. Rath's (1997) alternative suggestions mentioned above can help in better compliance because it will be irrigators body who will collect the water charges and the revision is also inbuilt. This alone will help ushering in financial efficiency in the sector.

On the expenditure side, it is essential to work out various components of the total expenditure on irrigation management. First of all, the data on these aspects are not easily available nor published regularly. It is pertinent to observe the time trends in: (i) capital cost vis-a-vis index of construction cost, (ii) cost of repairs and maintenance, (iii) cost of establishment and manpower, (iv) expenditure on development work, (v) cost of other overheads by components. The shares of expenditure on direction and administration on one hand, as against the same on repairs and maintenance on the other are given in the publication of Central Water Commission [CWC 1994]. It is interesting to note from this that the proportion of working expenses on direction and administration which was about 34 per cent of the total expenses in 1974-75 has gone up to 43 per cent in 1986-87 (Table 10). It should be noted that the share of expenditure on 'repairs and maintenance' in the total working expenses is reducing in most of the states. In Maharashtra, the share of expenditure on repairs and maintenance was 43 per cent of the total working expenses and it has gone down up to 37 per cent by 1986-87. We do not have the latest data on this, but possibly the trend has not been reversed in the recent past. In this context, some of the observations of the Deccan Canals Financial Improvement Committee of 1932 again become relevant even today. We quote from the minutes of dissent of G K Chitale. He stated that "In our opinion the establishment charges and ordinary repairs have been much heavier than they should have been and we strongly recommend that they should bear a proportion of not more than a fixed percentage of the gross assessed income on each canal. This will give the irrigation department fair discretion in economical management of the Deccan Canals" [GoB 1932:38]. We do not feel necessary to add any comment to this observation. The Second Irrigation Commission can attempt a closer analysis of this by taking

the trends in the various components of expenditure.

VI Drip Irrigation

In the sub-surface water regime the problem of over-exploitation of the water has been highlighted by many researchers [Dhawan 1995; Narayanamoorthy 1996a; Vaidyanathan 1996]. Given the constraints on water availability, the multi-faceted impact of the over-exploitation, it becomes imperative to work on the efficiency side of irrigation. In other words, this means reducing the per unit cost of exploitation of water on the one hand and increasing the per unit incremental income from water on the other. One way of reducing the inefficiency in groundwater use is to increase the resource literacy (information base about a particular resource, especially the use rates, pricing, cost of substitutes and replenishment). The other way of dealing with this is the introduction of water saving technologies like sprinkler irrigation, drip irrigation, mulching, organic treatments, etc. Among these drip irrigation has a wider acceptance and is widely practised in Maharashtra [INCID 1994; Narayanamoorthy 1996].

During the Eighth Five-Year Plan the government of India allocated an amount of Rs 250 crore towards promotion of drip irrigation in the country. According to a recent estimate the area under drip irrigation in the country is about 246 thousand hectares and Maharashtra alone contributes about 122 thousand hectares in it. Area under drip irrigation increased from

about 15 hundred hectares in 1985-86 to about 246 thousand hectares in 1997-98 in the country [AFC 1998]. In Maharashtra, this has increased from 236 hectares in 1986-87 to about 122 thousand hectares in 1997-98. This stands as a testimony of the exemplary results obtained under drip irrigation in the state.

Drip irrigation helps in avoiding the losses of water during conveyance and distribution. Available results in this regard show that water saving under drip irrigation ranges from 40 to 80 per cent compared to flood irrigation [INCID 1994]. Apart from this, drip method brings in substantial improvement in the crop productivity. Among the various crops, all wide spaced and perennial crops like grapes, banana, coconut, mango, pomegranate, citrus, sapota and other horticultural crops as well as vegetables, have proved to be the most suitable crops for drip irrigation. However, it can be used efficiently even in the narrow spaced crops, though the life of the drip set reduces slightly under these conditions.

Studies have shown that drip irrigation even helped in reducing the cost of cultivation by reducing the losses in inputs like fertilisers, labour, tilling and weeding (inter cultivation) when compared with the conventional methods. Since fertilisers are supplied along with water (fertigation), the wastage of fertilisers through leaching and evaporation is much less. As a result efficiency of fertilisers increases significantly. We have presented in Table 11, a summary of the results of the impact of drip irrigation in Maharashtra. It can be observed from the table that though drip

Table 9: Gross Receipts from Irrigation Projects Relative to Productivity of Irrigation

States	Gross Receipt Per ha of GIA	Value of Production Per ha of Irrigated Area (Rs)	(1) As Per Cent of (2)	Difference between I and UI Productivity (Rs)	(1) As Per Cent of (4)
	(1)	(2)	(3)	(4)	(5)
Andhra Pradesh	27	6689	0.4	4407	0.6
Bihar	33	2993	1.1	714	4.6
Gujarat	139	6353	2.2	3639	3.8
Haryana	70	4462	1.6	3169	2.2
Karnataka	58	6825	0.8	4528	1.3
Madhy Pradesh	90	3391	2.6	1735	5.2
Maharashtra	140	7415	1.9	5812	2.4
Orissa	66	3958	1.7	1770	3.7
Punjab	53	5997	0.9	3370	1.6
Rajasthan	93	3426	2.7	2405	3.9
Tamil Nadu	9	6689	0.1	4364	0.2
Uttar Pradesh	111	3875	2.9	1555	7.1
West Bengal	7	5634	0.1	2457	0.3

Notes: I - irrigated; UI - unirrigated.

Gross receipts from CWC (1990) relates to averages for 1984-85 to 1986-87.

GIA by major and medium projects based on Planning Commission estimates of utilisation (1986-87).

Source: GoI (1992).

irrigation has only a slight edge in terms of advantages in cost of cultivation, the real impact is seen in productivity. The results of water as well as energy saving show a substantial gain [Narayanamoorthy 1996b, 1997].

VII Conclusions

A large number of debates, intellectual inputs and financial investment mark the specificity of irrigation sector. It is essential to understand the problems of irrigation sector from the standpoint of each state as irrigation is a state subject and the policies are state specific. The government of Maharashtra has the distinction appointing a statutory irrigation commission, a second time, to investigate the problems of the sector and advise the state government on important issues. This is more important in the background of the present discussion of privatisation in the irrigation sector. This paper concentrated on the analyses of the issues confronting the irrigation sector in the state. However, the focus of our analysis is much wider and also extends to issues pertaining to the other states also. We have listed below some of the most important observations for the deliberations of the irrigation commission.

It is essential to prepare a basinwise detailed plan for utilising the irrigation potential in the next decade for each of the state separately. The major constituents of such plan may be: (i) fresh estimates of available surface water at 75 per cent or 50 per cent dependability in each of the basins and sub-basins, (ii) plans of utilisation of such water through different schemes and details of such schemes (major, medium and minor), (iii) financial estimates of the investment for such schemes at 1997-98 prices and sources of such finance, (iv) time schedule for such utilisation (which should be published). (v) plans of inter-basin and intra-basin transfer of water. Some of these plans need to be discussed by a tribunal appointed by the central government under the constitutional provision under Article 262 of Constitution of India.

Autonomous river development boards on the lines of MKVDC but more democratic in nature (with farmers representatives) for each of the basins may be constituted. This will serve the purpose of preparing plans for water utilisation, mobilisation of resources and effective

implementation of the schemes. But these should be made more democratically accountable and must have full representation of irrigators. Over the years, the budgetary support to such corporation must reduce steadily, in real terms, to make them self-supporting and economically viable. Once the plans are prepared the execution of such plans should be under the control of a body constituted for such purpose.

It would be required that a plan for utilisation of groundwater in different regions of each of the state be prepared and made available. In this respect five components become important viz, (i) additional schemes of financial assistance/incentives for utilisation of groundwater potential; (ii) promotion of conjunctive use of water in canal irrigated areas; (iii) institutional arrangements for groundwater sharing in the scarcity region; (iv) legal framework keeping in view water users rights; and (v) specific schemes for increasing the capability of recharge zones.

It is essential to categorise different irrigation schemes/projects in the country according to their level of sickness. Here the sickness of a scheme/project can be defined in terms of time overrun, cost overrun, planning bottlenecks, financial performance and level of completion of different development parameters. The projects can be grouped into three audit categories namely, A, B and C, where audit grades refer to the performance of the scheme/project. Identification of problems and remedial solutions can be planned after such categorisation.

Drought-prone areas in Maharashtra have remained relatively neglected in terms of public investment per unit of area/household. It would be worthwhile to review the regionwise investment in irrigation in the core drought-prone region of the state. These areas constitute a sizeable proportion of the net cropped area and support the food economy of the state. It would be worthwhile to think of establishing a

Table 10: Relative Share of Administration and Maintenance Expenses in Working Expenses in Irrigation Projects, 1974-89

State	Direction and Administration				Repair and Maintenance			
	1974-75	1980-81	1984-85	1986-87	1974-75	1980-81	1984-85	1986-87
Andhra Pradesh	21	59	33	59	66	71	62	63
Bihar	52	55	69	70	40	41	31	30
Gujarat	24	25	40	45	53	48	44	38
Haryana	22	24	20	27	na	76	79	72
J and K	36	14	16	5	36	55	34	40
Karnataka	8	2	11	36	9	14	87	Na
Kerala	23	26	68	73	53	34	17	12
Madhya Pradesh	-	100	100	100	@	@	@	@
Maharashtra	49	54	54	55	43	40	43	37
Orissa	10	6	33	8	52	78	54	84
Punjab	67	67	64	68	28	47	37	34
Rajasthan	42	36	24	15	46	41	45	14
Tamil Nadu	13	27	37	19	81	58	60	37
Uttar Pradesh	46	28	15	47	43	66	24	44
West Bengal	11	11	73	86	@	@	@	@
India	34	26	32	43	46	43	46	36

Notes: The percentage of expenditures do not tally in the case of some of the states.

@ - No expenditures reported for maintenance and repairs.

Source: CWC (1994), *Pocket Book on Water Data*, Central Water Commission, New Delhi, March.

Table 11: Impact of Drip Irrigation

Variables	Crops Name	DMI	FMI	Advantage over FMI	
				Value	Per Cent
Cost of Cultivation (Rs/ha)	Banana	51436.65	52739.55	1302.80	2.47
	Grapes	134506.20	147914.95	13409.80	9.07
Productivity (Quintal/ha)	Banana	679.55	526.35	153.50	29.10
	Grapes	243.25	204.30	39.00	19.07
Water Saving (HP hours/ha)	Banana	7884.70	11130.35	3245.60	29.16
	Grapes	3310.36	5278.38	1968.00	37.26
Electricity Saving (kwh/ha)	Banana	5913.50	8347.75	2434.00	29.16
	Grapes	2482.80	3959.80	1476.00	37.26
B-C Ratio	Banana	2.16	1.95	-	-
	Grapes	1.76	1.42	-	-

Notes: DMI - drip method of irrigation (under well irrigation).

FMI - flood method of irrigation (under well irrigation).

Source: Compiled from Narayanamoorthy (1996).

conduit to siphon out at least a portion of incremental benefits realised in the irrigated areas to the drought-prone regions. These regions can be brought into the mainstream of development only through a massive integrated watershed development programme supported by rational groundwater, tank and minor irrigation schemes. The constraint of funds can be sorted out as indicated above.

The Second Irrigation Commission of Maharashtra may have to deal elaborately with the financial efficiency of the irrigation sector. Maharashtra experience is no different with regard to financial efficiency than that of other states. But this cannot be a reason for complacency. The recovery rates in the state are quite low and the state has highest water rates of all states. If financial autonomy in terms of self-sustenance is an essential component for developmental schemes then it becomes necessary to work more on rationalising the expenditure, instead of increasing the price of irrigation water in the sector. In this context, it will also be necessary to

hand over the management of water below the main canal to the group of irrigators and the water rates can be fixed based on the opportunity cost of water as suggested by Rath (1997). A continuous monitoring of the sector in terms of financial returns at an apex level in each of the state is necessary. This can help to narrow down the gap between revenue and expenditure.

It will also be necessary to work out trends in different components on expenditure side and the possible methods to reduce the unwarranted increase in such expenditure. The establishment component of the working expenses should be kept in check. This should be done according to basins and projects so as to identify the 'bad' and 'good' spots for treatment. As mentioned above we incorporate a development audit for the purpose of policy. A simple comparison of the expenditure pattern in neighbouring states will bring out the severity of the over-staffing and other irrational expenditure.

Drip irrigation, sprinkler irrigation, mulching, etc, are important methods for

water saving as well as productivity increasing. It would be essential to take up schemes promoting these methods at a growth rate much higher than the prevailing rate of growth. Presently, only a few pockets in the state have adopted these methods. A good regional spread can improve resource use efficiency.

Lastly, as rightly pointed out by the First Irrigation Commission [GoM 1962], it is necessary to review the situation in the sector by an independent body after every 10 years, if not by the end of each plan. This should be followed in each of the state so that experience across states could be shared. [27]

Notes

[This is a modified version of the paper submitted to the Second Irrigation Commission of Maharashtra in May 1997. The authors are grateful to A Vaidyanathan and B D Dhawan for their useful comments on the earlier drafts of the paper. The views expressed in this paper are those of the authors and have no bearing whatsoever on the institution that they work with.]

- 1 Beginning from the First Irrigation Commission of Government of India (1901-3) the problems of irrigation in Maharashtra (the then Bombay Presidency) were discussed by various committees and commissions. Pratt's Committee (1921), Bristow's work (1928), Deccan Canals Financial Improvement Committee (under the chairmanship of B S Kamat 1932), Sir M Visveswarayya Committee (1938), Cabinet Sub-Committee of the Bombay Government (1947) and the First Irrigation Commission of the Maharashtra State Government (under the chairmanship of S G Barve 1962) are major policy bodies which directly dealt with the problems of the sector. Even after the Maharashtra Irrigation Commission's Report of 1962, the problems of irrigation in the state were discussed at different levels and bodies. Perhaps Maharashtra is an unique in having dealt with the problems of irrigation in such a comprehensive manner and with such regularity.
- 2 These estimates differ significantly from those of the irrigation department.
- 3 It should be underscored here that there is nothing 'ultimate' in the ultimate irrigation potential. This estimate should be periodically revised as the changes take place in water bodies, aquifer, flow of water, water conservation structures, deforestation, type of vegetation, etc.
- 4 The First Irrigation Commission considered it "both imperative and practicable to achieve the stage of full exploitation of the resources by 1980" [GoM 1962:53]. It should be noted that this irrigation commission under the chairmanship of late Barve was manned by able technocrats and planners, but the task set forth of achieving full exploitation by 1980 was either unrealistic or the persons belonging to the very same 'tribe' (technocrats and planners) in the latter generation faltered on this account.
- 5 In the case of Karnataka Deshpande and Ramakrishna (1987) had noted that the receipts against water rates forms a small proportion of the total demand. This was also noted in the report of the Auditor General of India.
- 6 This argument should be viewed in the light of the discussion on the rationalisation of direct/indirect tax structure. It is strongly argued following Laffer's theory that lower the tax rates the higher is the compliance and the higher the rates the higher will be the evasion. But when it comes to water rates, it is always argued that the water rates should be increased in order to increase compliance and revenue. Unfortunately the arguments about non-compliance due to higher rates never get included even as a footnote on the expected trends in compliance.

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