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Water Governance in Gujarat State, India

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ABSTRACT This paper examines the groundwater and surface water situation in Gujarat State, India. Constant depletion of groundwater and rapid quality deterioration call for legislation to prevent over-exploitation, and adoption of a rational water pricing policy based on a volumetric system. In the case of surface water governance, enhancement of institutional capacity for managing resettlement and rehabilitation problems, a complementary role for rain water harvesting, and community involvement in irrigation management including legislation on participatory irrigation management (PIM) are some of the immediate reform initiatives that have been emphasized.

Introduction

Water governance consists of a combination of administrative and politico-social measures that need to be undertaken, depending on the needs and priorities of a region for ensuring management, conservation and equitable distribution of water. It includes special water-related institutions, legislations, enforcement regulations, strategies and policies that promote stakeholders' involvement in taking decisions. In a Third-World context, with a limited role of public-private partnerships (PPP) in managing urban water services and still-nascent participatory irrigation management (PIM) in rural areas, governments have a key role in planning, organizing and implementing decisions in the water sector.

In the Indian federal system, water is a subject in the State List (items reserved in the Constitution for the state legislature to legislate upon) and not in the Central List (items reserved for the federal legislature to legislate upon). Except for inter-state river water distribution (wherein inter-state water dispute tribunals are constituted), the federal government does not have a direct role in water governance, which is by and large taken care of by the state governments and their local institutions. A large number of national institutions, such as the Central Water Commission, Central Board for Irrigation and Power, Central Ground Water Control Board, etc. have a planning, advisory and financial assistance provision role *vis-à-vis* the states which develop and execute their own plans for sustainable management of their waters.

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In this article we will focus on the state of Gujarat (generally a drought-affected, water-scarce state) in western India and examine and analyse the present state of water governance, including the management of surface water and groundwater, community participation in managing water resources and initiatives for pricing the resource.

Gujarat

Gujarat has just 2.28% of India's water resources and 6.39% of country's geographical area. This is again constrained by imbalances in intra-state distribution. The average per-capita availability of water (876 m^3) reflects the water scarcity in the state (cf. the United Nations (UN) criteria of 1000 m^3), with 407 m^3 in the north Gujarat region and 1378 m^3 in south and central Gujarat. The state has an average annual rainfall of 80 cm, with a high coefficient of variance over time and space, and as a result droughts are frequent. Out of 185 rivers, the state has only eight perennial rivers and all of them are located in southern part. Around 80% of the state's surface water resources are concentrated in central and southern Gujarat, whereas the remaining three-quarters of the state has only 20%.

As many as 6188 villages—34.3% of the total villages of Gujarat—are 'no source' villages, i.e. they do not have any definite source to get water from and they have to depend on local authorities for a water supply to be provided through tankers. This really speaks volumes about the water situation in the state. On average, three years in a cycle of 10 years are drought years. Since Indian independence in 1947, the draught years of Gujarat have been as follows: 1951, 1952, 1955, 1956, 1957, 1962, 1963, 1965, 1968, 1969, 1972, 1974, 1980, 1985, 1986, 1987, 1991, 1999, 2000 and 2003.

The pattern of surface water availability within the three different regions of the state is quite skewed, from water-abundant to totally water-scarce regions. The surface water available through the Narmada river basin is substantial—which underscores the state's dependence on the Sardar Sarovar Project on the River Narmada for its water requirements (Figure 1). As reported (Tahal Consulting Engineers, 1997), the effective storage of existing and ongoing major, medium and minor schemes including lift, check dams and percolation tanks is roughly equal to the surface water potential. Therefore, no surface water is available for further exploitation, apart from the Narmada waters.

Groundwater Governance

When the state was constituted in 1960, the net area irrigated was 682 900 ha, which had increased almost six-fold by 1997. Groundwater has contributed to more than 80% of irrigation in the state (Figure 2). At the ultimate irrigation potential of 6.85 million ha, 43% of it will be from groundwater, 31% from surface water from the state basins and 26% from inter-state allocations (Agriculture & Cooperation Department, 2000).

There has been a consistently increasing trend of groundwater utilization for irrigation purposes, which is reflected in the spectacular increase in the number of irrigation wells and tube wells in different parts of the state (Figures 3 and 4). Along with other important agronomic considerations, increased groundwater utilization in the Saurashtra region is reflected in the highest productivity

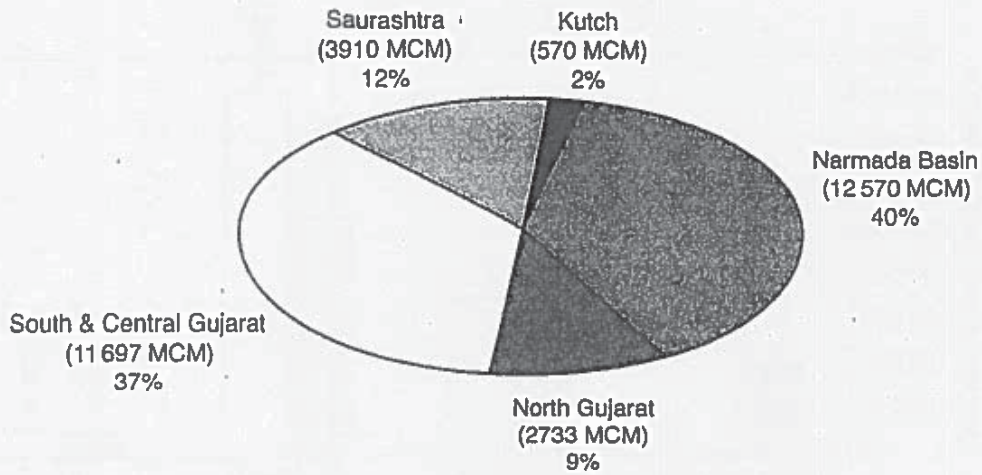


Figure 1. Utilizable surface water (31 500 MCM) in Gujarat. Source: Gupta (2003).

of food grain in this area, despite the low dependability of rainfall (Table 1). In four major groundnut-producing districts (all in the Saurashtra region), the actual yield of groundnut has not been dependent on the rainfall pattern (Figure 5). For instance, in the Junagadh district the rainfall in the three consecutive years 1996, 1997, 1998 was less than average, but groundnut production exceeded the state average. This demonstrates the significance of irrigation through excessive exploitation of groundwater in these areas.

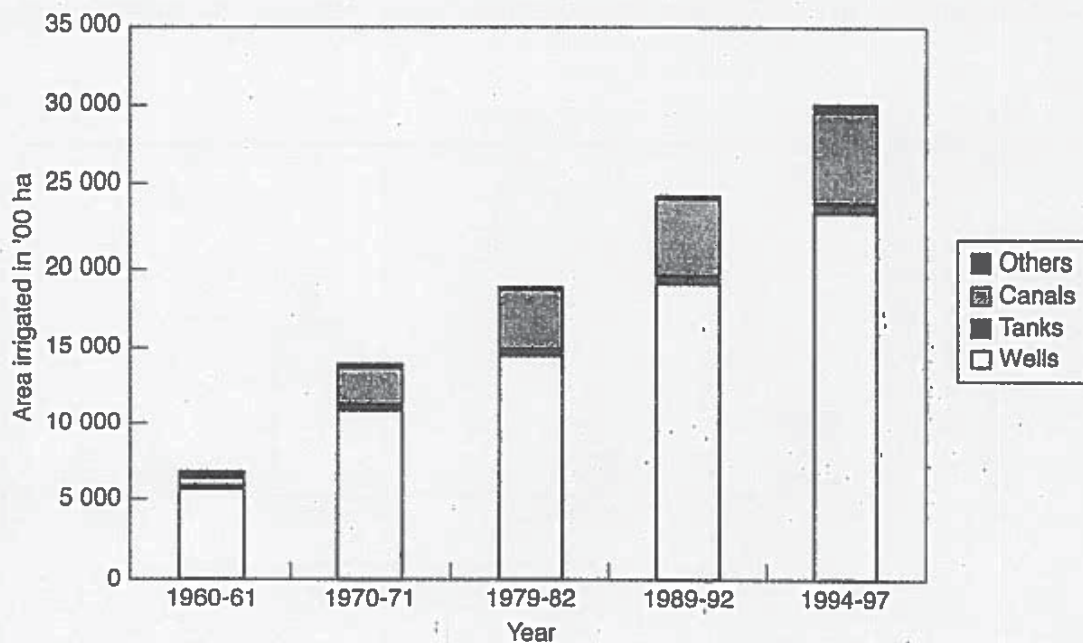


Figure 2. Sources of irrigation in Gujarat State. Source: Gupta (2002).

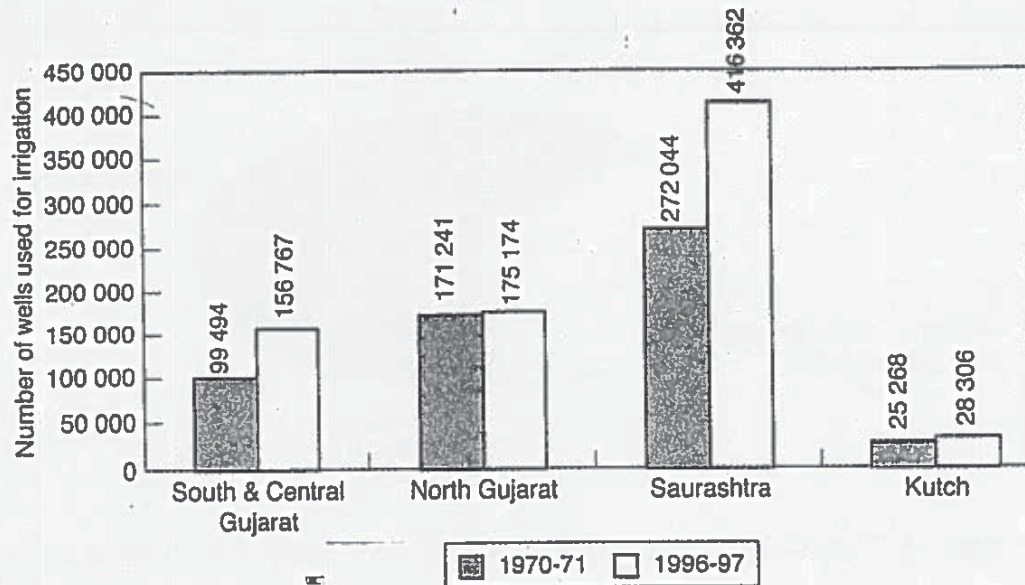


Figure 3. Number of wells used for irrigation. *Source:* Based on statistics provided by Water Resources Department, Government of Gujarat (1998).

All-round Depletion of Resources

The state has had to pay heavily in terms of severe depletion of utilizable groundwater resources all over the state. Due to the typical water-intensive crop varieties and less awareness/experience of the real value of water, the so-called water-surplus regions of south and central Gujarat have also experienced a severe loss of utilizable groundwater as compared to water-scarce regions (Table 2).

In 1984, 88.5% sub-districts of the state had less than 70% groundwater development. In 1997 these sub-districts were reduced to 51.9%, with a

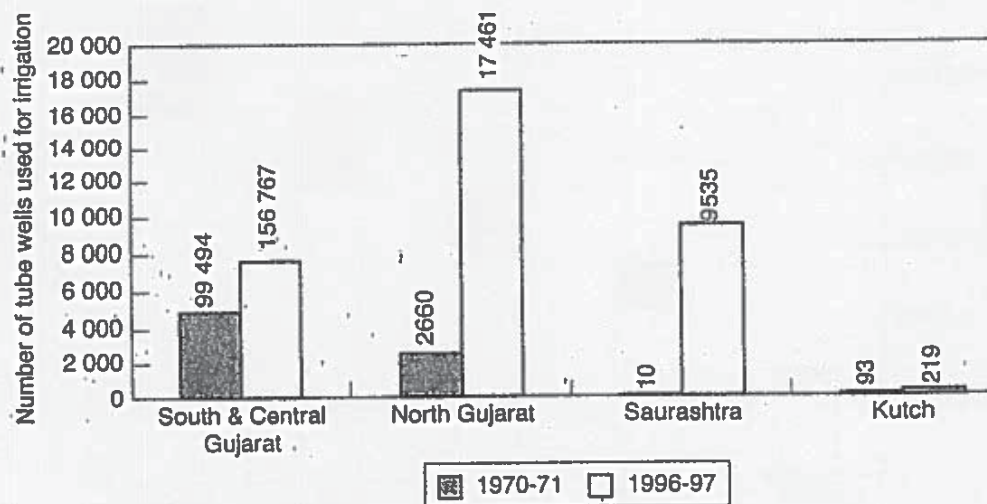


Figure 4. Number of tube wells used for irrigation. *Source:* Based on statistics provided by Water Resources Department, Government of Gujarat (1998).

Table 1. Production and yield of food grain by region (1998-99)

	South and Central Gujarat	North Gujarat	Saurashtra	Kutch	Total
Food grain area ('00 ha)	16 947	12 731	7597	1762	39 037
Percentage	43.41	32.61	19.46	4.52	100
Production ('00 MT)	23 962	17 527	13 081	1098	55 668
Percentage	43.04	31.49	23.50	1.97	100
Yield (kg/ha)	1414	1377	1722	623	1426

Source: Based on statistics provided by Agricultural Department, Government of Gujarat (1999).

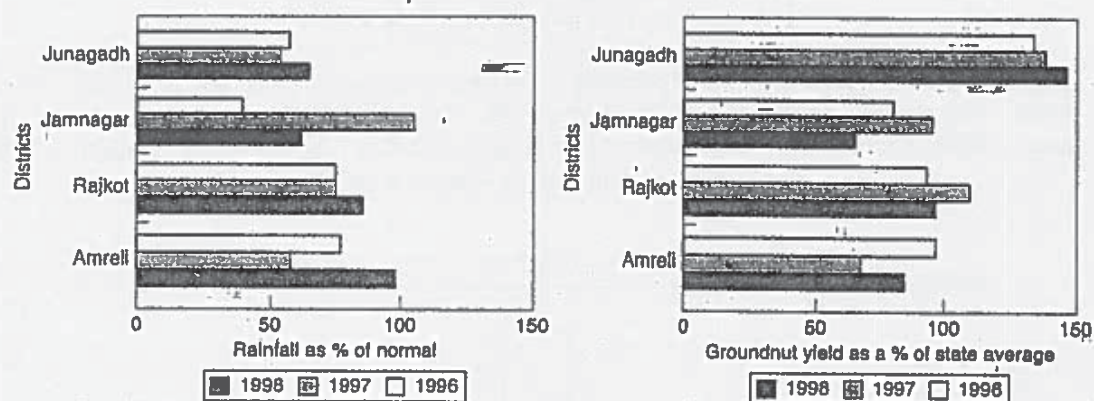


Figure 5. Rainfall pattern and groundnut productivity in selected districts of Saurashtra.
Source: Gupta (2002).

Table 2. Utilizable groundwater (MCM/yr)

	South and Central Gujarat	North Gujarat	Saurashtra	Kutch	Total
1984	6783.95	4216.87	5682.07	682.51	17 365.4
1997	4533.11	3274.33	4539.23	501.60	12 848.27
Absolute % change (1984-1997)	-33.18%	-22.35%	-20.11%	-26.51%	-26.01%

Source: Based on statistics provided by Gujarat Water Supply and Sewerage Board (1998).

corresponding increase in over-exploited (OE) sub-districts from 0.55% in 1984 to 16.4% in 1999 (Figure 6). Continuous lowering of the groundwater table has resulted in an alarming increase in the number of defunct wells, 1.9-fold over a period of 25 years (1970-71 to 1996-97). Regionwise it is many-fold in certain water-scarce regions (Figure 7).

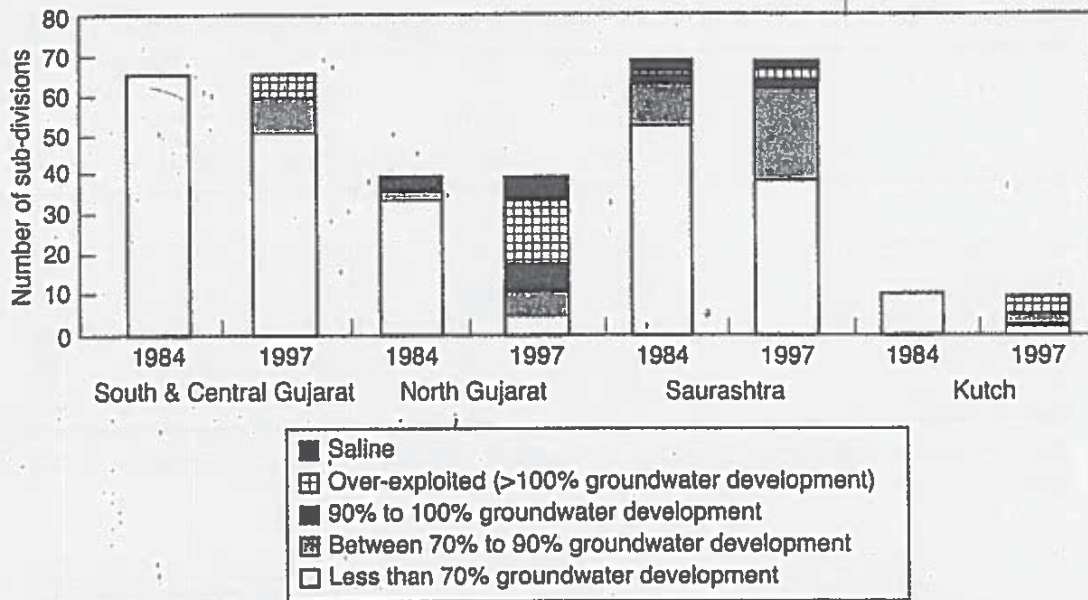


Figure 6. Sub-division-wise^a comparative level of groundwater development from 1984 to 1987. ^aThe state is administratively divided into districts which are further sub-divided into sub-divisions (talukas). Source: Based on statistics provided by Gujarat Water Resources Development Corporation (1998).

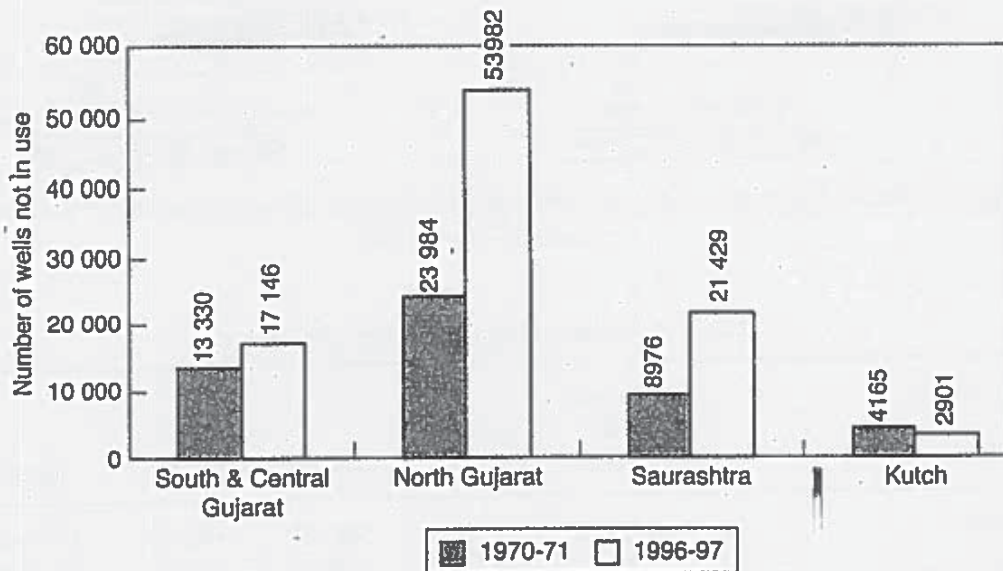


Figure 7. Number of defunct wells due to over exploitation of groundwater. Source: Based on statistics provided by Gujarat Water Resources Development Corporation (1998).

Water Quality Deterioration

This phenomenon is more pronounced in the water-scarce regions of North Gujarat and Saurashtra. Overdrafting of groundwater (as compared to the annual recharge) has caused serious water quality problems, and has also led to serious diseases such as fluorosis, kidney stones, etc. More than 25% of the villages of the state suffer from water quality problems such as excessive fluoride, nitrate and salinity, North Gujarat being the worst sufferer with more than 38% of villages affected (Figure 8).

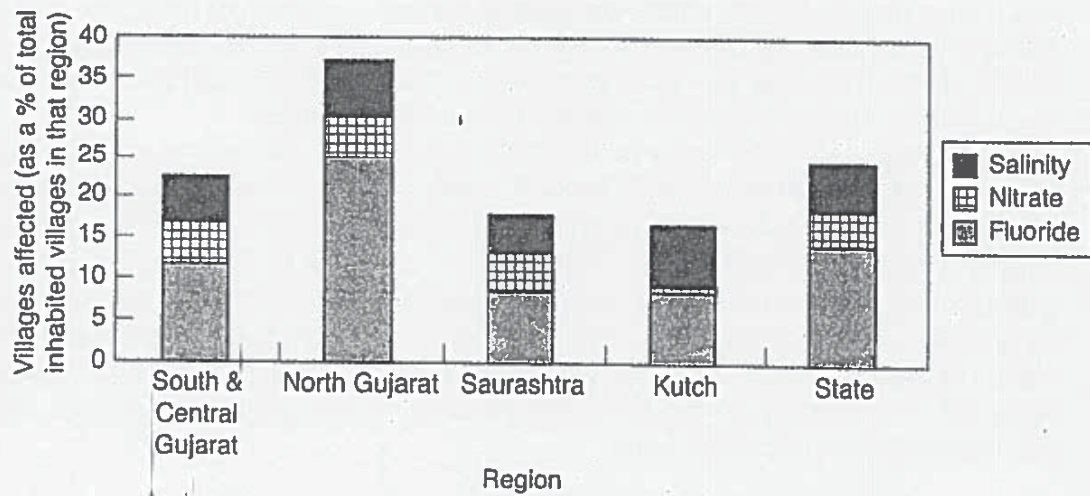


Figure 8. Water quality problems in different regions of the state. *Source:* Based on statistics provided by Gujarat Water Supply and Sewerage Board, (2000).

Having a planned target growth rate of 6.04% per annum for the next 10 years (Agriculture & Cooperation Department, 2000), the agricultural water demands are bound to shoot up. With an estimated rate of demand of 7200–9300 m³/ha, total demand at ultimate irrigation potential would be in the range of 46 728–60–357 million cubic metres (MCM). Thus, by the year 2010, agricultural water demands may exceed the ultimate utilizable water resources (both surface water and groundwater) (Tahal Consulting Engineers, 1997).

Governance Issues

With this alarming state of groundwater exploitation, in the backdrop of frequent droughts, the water managers of the state are faced with a no-win situation. Unless an assured supply of surface water is made available to farmers, any restriction on groundwater extraction will spark off widespread farmer protests. But in the meanwhile, groundwater mining is causing irreparable environmental and health damage. Nevertheless, the emphasis on groundwater recharge is also lacking. Farmers in North and Western Gujarat need to be sensitized on a massive scale about the dangerous consequences of reckless groundwater exploitation. There are some social and religious non-government organizations (NGOs) that have done some useful work in certain areas for groundwater recharge. But such fragmented efforts do not address the magnitude of the problem. It is high time that the state government introduced a legislation to prevent over-exploitation of groundwater.

Water Pricing and Volumetric System

Low Prices vis-à-vis High Costs

Out of the entire cropped area in the state, only around 15% is irrigated by large, medium and small surface irrigation schemes. The farmers benefiting from these irrigation schemes have historically paid very low irrigation water rates (on average US\$3.5 per hectare), whereas farmers in more than two-thirds of the

area being irrigated by private tube wells have been paying 10 times more than this amount. (Under this system water is essentially supplied volumetrically on hourly rates.) The state has been spending more than US\$15 million every year on operation and maintenance (O&M) of existing schemes.

More than US\$1 billion have already been spent on the capital costs of these schemes; the present revenue is around US\$6 million. Considering the recommendation of the Vaidnathan committee (Narmada, Water Resources and Water Supply Department (NWRWS), 2001) that in addition to O&M costs the irrigation water rates should also cover 1% of capital costs, the total revenue should be at least US\$24 million. The rates were cosmetically revised in the year 2001, but a realistic pricing structure which, besides the O&M costs, also ensures recovery of a portion of capital investments made on irrigation schemes, may not be considered unreasonable.

Equity and Justice

Consistent with the approach to economic parity, the water rates should also be within the paying capacity of the beneficiary farmers. Studies elsewhere in the state and the country have indicted that with availability of irrigation facilities the economic status of the irrigating farmers improves materially. The farmers who are not fortunate enough to have the benefits of irrigation facilities (private or public) are completely dependent on rainfall. The financial status of those farmers who derive benefits from flow irrigation is much superior compared to that of those who do not have any such facility. This is mainly because of a substantial increase in crop production per hectare and the facility of taking two or three crops in a year. Those farmers who are not fortunate enough to have any irrigation facility also contribute by way of indirect taxation, etc. towards capital investments made for irrigation schemes. The fact that they do not have irrigation facilities is only due to the specific geographical locations of their lands which make them fall outside the command areas and as a result they have no opportunity to improve their economic environment. This disparity cannot be considered as acceptable in view of the approach towards social and economic justice. The government thus has a lawful right to recover reasonable water rates as a part of their net profit from those farmers whose economic status has improved mainly due to the special benefits derived from flow irrigation facilities. This would also be logical and consistent with the general tenets of social justice, which are part of the government's guiding philosophy.

If the beneficiary farmers were assured of adequate and timely supplies of water, they would be encouraged to pay higher irrigation water rates. At present there is a general complaint from the farmers that they do not get timely water from canals. It thus becomes inevitable that a set-up must be organized under which the irrigation resources and canal systems can be modernized to assure adequate and timely supplies of water to farmers.

Volumetric System

Considering all relevant aspects, the most effective measure in order to increase utilization of the available water and bring in better efficiency of water use seems to be to follow water supply on a volumetric basis and recover rates accordingly, for the following reasons.

- Introduction of this system of supply of water would instill a sense of discipline towards economical use of water amongst the farmers and would stop wastage.
- The water saved due to economic usage would enable coverage of larger areas under irrigation, which would lead to higher overall agricultural production and thereby bring in additional income for farmers. In addition, the government would derive more revenue from water rates.
- Under the prevalent traditional irrigation methods, the use of water in excess of scientific requirements brings about waterlogging and soil salinity, which ultimately result in a reduction in soil fertility and low crop yields. With a volumetric system, since only the required quantity of water would be used, these problems would be mitigated and this would help to increase overall crop yields.
- Introduction of a volumetric method would enable proper accounting of the total water used, which would help to avoid various irregularities of unauthorized irrigation.
- A farmer purchases agricultural inputs such as seeds, fertilizers, pesticides, electricity, etc. on a weight or a measured basis and also uses them accordingly. Just as seeds or fertilizers are applied on a measured, per-hectare basis, irrigation water, which is one of the most important inputs for agriculture, should also be used on a measured basis. This would be eminently reasonable.
- When 80% of the irrigation in the state is being practiced under lift and tube well schemes, as well as through private sources, and the water rates being levied are on some form of volumetric basis (hourly basis or a volumetric basis in the case of government tube wells), it would be very reasonable to follow the same system for the remaining 20% of flow irrigation.
- The government has set up irrigation facilities with huge capital investments and there is already a programme for additional capital inputs to increase irrigation use and irrigation facilities in years to come. It is necessary to optimize production per unit of water through careful use of the water resources. In water-deficient areas, we have to consider coverage of larger areas by supplying even less water, ensuring that the yield reduction is only marginal. In this context, a volumetric supply system would be useful and effective.
- The Sardar Sarovar Narmada Project, which is a lifeline for Gujarat, is already on the anvil. As we are planning to irrigate much larger areas compared to the quantity of water available under this project, judicious use of water will be inevitable. To make this possible, the World Bank has also recommended supply of water on a volumetric basis, and even rationing the supply, with a view to deriving optimum crop production per unit of land. In this context, even now, when flow irrigation in the state is in the initial developing stage, it is essential that farmers get accustomed to using water on a volumetric basis and appreciate the underlying advantages. Cultivating such healthy habits would mitigate problems in achieving the planned irrigation when the Narmada Project is commissioned. On the other hand, if the present irrigation practices were continued, large areas under Narmada command would be deprived of an irrigation facility. More specifically, the deprived areas would be in the North Gujarat, Kachchh and Saurashtra regions, which face recurrent scarcity of water. In order to obviate such a situation in future, immediate introduction of a volumetric system is considered essential.

- In the present system, water rates for different crops being different, advanced planning for crops to be grown becomes inevitable and irrigation sanctions are to be obtained for these, only creating a compulsion to grow these crops. Under the volumetric method, a farmer is free to choose the crop that he considers appropriate. In the present system, the farmer has to pay penal water rates even in the case of unintended violation in respect of crop type, whereas in the volumetric method the farmer will have freedom to irrigate as much as he chooses and he can reduce his irrigation costs by suitably adopting better and improved management using less water.

Governance Issues

Nevertheless, the following issues and problems have to be considered, and sorted out before adopting the volumetric system of supply in a big way.

- The water supplied to each field has to be measured under this system. Because of the small size of individual land holdings, there will be a large number of fields to be catered for, resulting in larger administrative expenditure.
- The existing distribution systems will need some modifications. Forty-hectare outlet blocks will have to be reduced to 8-ha blocks. Installation of appropriate devices for measuring the quantities of water supplied will be necessary.
- Measures will have to be taken to avoid farmers tampering with measuring devices.
- To enable water to be supplied to individual farmers and accounts to be maintained farmer-wise, more employees will be needed and this will result in an increase in maintenance and repairs' operational expenditure.

Surface Water Governance

Sardar Sarovar Project

As mentioned earlier, most of the unutilized potential of surface water in the state lies in the Narmada river basin, where the Sardar Sarovar Project is being constructed. The Sardar Sarovar Project on the River Narmada is a multi-state, multi-purpose river valley project, born out of the deliberations of a constitutional body, following the principles of 'equality of right' and 'equitable utilization' of the whole course of an inter-state river. This unique project is planned to irrigate 1.9 million ha of land, increase the agricultural production by 8.7 million tonnes per annum (worth US\$430 million), generate environmentally friendly hydropower with an installed capacity of 1450 MW, supply drinking water to 8215 villages and 135 urban centres of Gujarat (around 20 million people), generate 1 million jobs (mostly in rural areas) and prevent rapid processes of desertification, salinity ingress and rural-to-urban migration. The command area and drinking-water supply areas of the project are the worst water-scarcity-hit areas of the state.

The vast command area of about 1.9 million ha is to be irrigated by the 532-km-long, concrete-lined main canal, its 42 branches and thousands-of-kilometres-long network of distributary canals. For judicious, timely and equitable distribution of water, ensuring the rights of the tail-enders in the command area (as much as 700 km away), 92% of whom are small and marginal farmers, the

'controlled volume concept of operation by computer-aided remote monitoring and control system' is being adopted. To ensure participation of the beneficiary farmers, irrigation water will be supplied on a volumetric basis to the water users' association (WUA) of each village service area (VSA) (200–500 ha), which will also be involved in the preparation of a rotational water supply (RWS) calendar, ensuring just and equitable water distribution.

Resettlement and Rehabilitation

Resettlement and rehabilitation (R&R) of project-affected people (PAP) has been one of the most controversial, ticklish and complex governance issues of surface water management in the state. The state has witnessed national and international agitations spearheaded by some of the top NGOs and social activists. One positive fall-out of this struggle has been the continuous evolution of a generous rehabilitation package which takes into account the impoverishment risks inherent in involuntary displacement.

A participatory approach to R&R was made compulsory in the Sardar Sarovar Project after the highest court of the country appointed a 'Grievance Redressal Authority' in 1999. The R&R strategy was recast (a shift from property compensation focus to people-centred development focus) and a detailed Grievance Redressal System was established with the involvement of NGOs, PAP and village bodies' representatives, and the methodology of mid-course corrective action for rehabilitation was improved by initiating Immediate Grievances Redressal Schemes and a Single Window Clearance System. These measures built up inter-agency synergies between various departments of state government and the R&R efforts, and also led to expeditious settlement of PAP's grievances relating to infrastructure, land entitlement, alternative jobs, etc (Gupta, 2001).

The financial resources to deal with R&R problems are not usually in short supply. Government rural development efforts focused on the poor are backed by more than adequate resources that sometimes cannot be disbursed. What is most often in short supply is the necessary human resource capability to address the complex problems that beset R&R programmes. Those with the professional skills to tackle these issues, whether in government or in the non-governmental sector, are seldom willing to reside for any length of time in these marginal areas. Frequent transfer of good staff to more attractive locations reduces the continuity of intervention and the quality of work (Mathur, 1998). In the author's experience of the Sardar Sarovar Project, senior bureaucracy views the R&R work as one of their last choices. Once posted involuntarily, most of their time is spent in planning an exit strategy rather than whole-heartedly involving themselves in reconstruction efforts. This definitely affects the quality of R&R service delivery.

Governance Issues

The institutional capacity to deal with R&R issues still requires considerable strengthening. Training, which has largely been concerned with imparting a particular set of techniques, will need to be redesigned to counteract a dominant oustee-blindness (Mathur, 1998). Apart from short courses at a minimal number of academic institutions, there are no centres for dealing with the complex issues that surround resettlement and rehabilitation. To date there are no substantial

courses offered in this field to those entering the Indian Administrative Service (IAS); as it is likely that R&R issues will occupy an increasing part of the work of District Collectors (the Chief Executives of Districts) who belong to the IAS, greater efforts need to be made to train the staff involved in R&R. Such training, while focusing on the specifics of R&R management, should be seen as an important opportunity for changing the ways in which practitioners approach the resolution of development problems—an opportunity to enhance trust and mutual support networks, and to effectively co-ordinate development interventions in dealing with difficult, but not intractable, problems. R&R efforts are at the forefront in dealing with this reorientation and they need to be perceived as integrated development projects in their own right, if they are to avoid the confrontational stances that have so often characterized them in the past.

Rainwater Harvesting *vis-à-vis* Regional Water Transfer

Harvesting of the rainwater through micro-structures such as check dams, percolation tanks, retention basins, etc. has often been projected as a viable alternative to eliminate water scarcity in Gujarat. From the standpoint of technical considerations such as dependability, carry-over storage, flood control, power generation, submergence, evaporation and life span (serviceability), and social considerations such as equity in distribution, the regional transfer of water through the Sardar Sarovar Project has practically no alternative. Typically, small tanks of around 40–100 ha in size inundate almost as much as they irrigate, around 0.9 of a hectare for every hectare irrigated (usually irrigating one crop only, whereas large dams irrigate much more than one, apart from also providing power). Thus, even if it was technically possible (which it is not) to find enough small tank sites to hold the same amount of water, the land lost as a result of inundation could well be over 1.0 million ha, against 37 000 ha for the Sardar Sarovar Project (World Bank, 1990). The absence of regular, adequate and dependable rainfall, which is common in most of western India, makes it difficult to overcome water scarcity by rainwater harvesting alone. An analysis clearly shows that for the worst scarcity-hit districts of the Saurashtra region, even if an effort is made to harvest the rainwater to its maximum potential, the per-capita availability remains much less than 100 m³ per year (Table 3). In these calculations, 50% of the area has conservatively been considered to be effective in rainwater harvesting, which otherwise remains at 30–40% normally (Frederick, 1995; Seckler *et al.*, 1998). Similarly, the evaporation losses after storage have been assumed to be 50%, but in reality, for storage with a depth of less than 2 m, it could be around 60% or more (Prabhu, 2000). Further, the calculations are based on the normal rainfall values, but the data for the last 10 years show that their reliability is in the range of 20–40% only.

However, this does not mean that this water management alternative is ineffective or impractical. In Gujarat, water-harvesting structures such as check dams, percolation tanks, safe stage works, etc. are constructed under a micro-watershed development programme by agriculture, rural development and water resources development schemes of the state government. So far a total of 22 697 such structures have been constructed to harvest 1047.62 MCM of water, and 2250 works are in progress which will store approximately 100.32 MCM of water. However, due to failure of the monsoon the existing 1047.62 MCM

Table 3. Rainwater harvesting

District	Normal rainfall (mm)	Area ('000 km ³)	50% effective area ('000 km ²)	Volume (MCM)	50% net evaporation loss, etc. (MCM)	Projected population (2001) (millions)	km ³ per capita per year
Jamnagar	497.2	14.1	7.0	3505.2	1752.2	1.77	987.32
Rajkot	621.2	11.2	5.6	3478.7	1739.3	2.85	609.58
S'nagar	507.0	10.5	5.2	2661.7	1330.8	1.37	969.24
Amreli	540.0	6.8	3.4	1836.0	918.0	1.42	645.50

Source: Based on information provided by Water Resources Department (2001).

storage, created at a cost of Rs. 4008 million (around US\$100 million), have not been effective in solving the drought conditions in the water-scarce regions.

Thus, in Gujarat, both water management alternatives, micro as well as macro, have to be considered as complementary to each other, and experience has shown that these are in no way mutually exclusive solutions. However, in the present situation, and looking at the scale of the problem, regional water transfer through the Sardar Sarovar Project is inevitable.

Community Involvement in Irrigation Management

Historically in the state, organizational, technical and socio-political factors have impeded efficient irrigation management. Over-emphasis on an engineering and construction approach by the parent agency, the Water Resources Department, has prevented the development of water distribution expertise and the necessary human resource development to deal with socio-cultural, economic and locally relevant factors for tertiary water distribution. The department's dealings with individual farmers have not permitted evolution of an 'area approach' to planning irrigation. This has led to sub-optimal and inefficient use of the canal network and water, allowed easy scope for unauthorized withdrawal and also excessive use of water. Generous pay packages, security of job and local political influence have led to high costs, a poor work culture and a lack of accountability in canal operations and maintenance (these are common ailments of most government organizations, making the government by and large ill suited to managing economic activities). This has also resulted in inadequate funds for actual maintenance works, unsatisfactory delivery services and erosion of the department's credibility with farmers (Buch, 2003). Incorrect assessment of created irrigation potential (gap between actual and designed storage capacity of a reservoir, estimated life of the reservoir), inadequate water available for irrigation due to faster expansion of non-agricultural sector water demand, non-availability of water for irrigation during frequent drought years, higher than anticipated conveyance losses and fast changes in envisaged cropped patterns in the design of the projects are some of the technical factors that have aggravated the problem. The government cannot make an optimal irrigation plan without the meaningful involvement of farmers. The irrigation department being in total charge of the irrigation network, farmers do not feel motivated to

conserve and make judicious use of water, or adopt crops and cropping practices keeping their collective interests in mind. This overriding image of the government as a 'provider' has led to a *dependency syndrome*, so much so that the farmers feel they have no role to play in the management of the system although it directly benefits them. The water for irrigation is subsidized to such an extent that the value of water—a critical input for agriculture—is not understood by the farmers. It is almost as if the farmer is 'obliging' the irrigation department by taking water and paying dues even partially. At the same time, inadequate funds have led to poor maintenance of the canals. This has led to seepage and other losses, which has made the farmers even more dissatisfied with the system. The department cannot easily deal with conflicts of interest amongst different farmers' groups. A more irregular and insufficient supply than promised leads to competition for the scarce resource, which induces violation of rules. The farmers indulge in breaking of structures and illegal diversion of water. The deprivation of tail-enders along the canals is notorious, and it seems that officers are diffident in enforcing regulation (Buch, 2003). The philosophy of treating water like an economic good to be harnessed, utilized and accounted for like other economic resources does not pervade the government's irrigation management. The present approach is top-down and the prescriptions are handed out from the top, and irrigation is managed more according to standard administrative procedures than to local variable needs.

Efforts to mobilize farmers to take up the management of the canals have not been very successful, largely because of the manner in which the participation of farmers is projected. In most cases the message to the farmers has been that the government can no longer afford to manage the system and therefore whether you like it or not you have to take it. Thus, participation of the stakeholders is almost thrust upon them in a manner that they are most likely to run away from.

Some Success in PIM

The action plan prepared by State Government in 1995 aimed to cover 50% of the command area of the state irrigation systems through PIM by 2003. As a result, quite a few success stories have emerged in Gujarat, demonstrating inherent capability of the farmers, if properly motivated and organized, to manage with efficiency, equity and a sense of responsibility. Sixteen irrigation co-operatives (ICs) have been operating in the Dharoi reservoir command area. Some of the highlights of their performance during the 2001–2002 period have been as follows.

- In consultation with farmers, they planned to cover 20 000 hectares of command area by supplying four waterings.
- A fifth watering could be supplied by the irrigation department, due to the conservative, controlled and disciplined method of water distribution by ICs in their command area at minor and sub-minor level.
- Around 40 km of canals were cleaned by farmers' groups in 16 villages, costing Rs. 54 800 (US\$1100), before they received irrigation water.
- In order to become self-sufficient, on average, water rates 48% higher than the government rates were decided by 15 ICs. A total of Rs. 612 418 (US\$13 000)

were collected from member farmers in advance. After paying 100% dues to the government, Rs. 286 146 (US\$6000) were retained by ICs.

- Before release of water, all the ICs' appointed operators did crop planning and budgeting for water distribution.
- One hundred and eighty-nine new farmers in a 166-ha area received canal water for the first time, as a result of cleaning of the conveyance system and adopting a tail-to-head water distribution system.
- Two ICs experimented with switching over to the system of volumetric pricing of water supplied to them by the department.
- Communication and co-operation improved between the Irrigation Department and farmers.
- In the ICs' managed command area of 15 villages, they had collected from farmers demands for irrigation, checked and assessed the actual area irrigated by each farmer, and collected water charges accordingly. The Irrigation Department verified this in 15% of the area and found that the ICs' assessment was correct (NWRWS, 2002).

Despite all this, against a targeted 900 000 ha of irrigation command area of Gujarat that was to be turned over to farmers' associations by 2003, only 45 253 ha had been handed over to 144 WUAs or ICs by March 2001.

Need for a Fresh Approach

There is a need to redefine the role of government by delegating micro- and ground-level management of water distribution and system O&M to the farmer, while retaining its role to oversee water management in the broader perspective of the development programme and regulate sector management in meeting the present and future needs of the society with reference to all types of users. PIM is not to be viewed as the government abandoning farmers. It is about a new partnership between government and farmers based on mutual accountability to agreements, cost sharing and capacity building. Under the new approach the government should shift its focus away from downstream irrigation management to management of river basins and head works, regulation of the sector, technical and financial support services, and capacity building. Therefore, PIM would be mainly about two things: (1) empowerment of water users to become organized clients who determine what irrigation services they receive; and (2) a new partnership of accountability that has to be established between farmers and government (Buch, 2003). This would require strong political will to enact a legislative instrument giving a statutory basis to PIM. This should be coupled with capacity building of stakeholders, with the help of NGOs, and creation of mechanisms for giving incentives/disincentives, monitoring and feedback.

A new bill for enacting legislation on PIM has been prepared in the state. It provides, *inter alia*, for the following.

- WUAs at the primary level—all landholders of the command area and their spouses as members.
- Distributory committees (DCs) at secondary level—all presidents of WUAs as members.
- Branch committees (BCs) at the tertiary level, for projects with a command area of 100 000 or more hectares—all presidents of DCs as members.

- Project committees at the project level—all presidents of DCs/BCs as members.

It is proposed that government will transfer irrigation systems to the first two tiers of WUAs as soon as they are elected; formation of BCs and the transferal of respective irrigation systems to them may be done in the second stage at an appropriate time, but simultaneously for all projects; this should be after WUAs at the primary and distributory levels have become fully functional and their management has somewhat stabilized. It has also been proposed that government may use its discretion about constituting project committees and transferring entire medium and major projects to them on a selective basis, after evaluating all aspects, such as performance of the PIM up to branch level, extent and type of non-agricultural (including hydropower) users of water in the project, etc. This should be on a project-to-project basis. The functions of a WUA have been envisaged as follows:

- to draw up its own irrigation programme, subject to main system constraints;
- to prepare and implement a water supply schedule for each irrigation season;
- to levy and recover irrigation charges;
- to maintain in good repair the irrigation system transferred to it;
- to resolve disputes;
- to maintain records/accounts;
- to formulate bylaws;
- to train farmers in economic use of water and the employment of technologies for increased agricultural productivity.

The draft bill also proposes to empower the management committee by two-thirds majority, after serving notice, to discontinue water supply to a member who:

- damages, obstructs or alters an irrigation system;
- interferes with water supply;
- violates the schedule of irrigation.

Governance Issues

It is necessary to have a performance audit of WUAs so as to ensure that each WUA diligently carries out the tasks and roles assigned to it and that the irrigation system remains in an efficient form and water distribution is managed for the best benefit of the community. Therefore, it will be necessary to have clear rules, strong sanctions and periodic irrigation management audits of WUAs and the Irrigation Department after management transfer. Outcomes of the audit should have consequences, such as eligibility for future government assistance and powers of government to take back the management of irrigation sub-systems if WUAs collapse or fail to comply with their 'Irrigation Management Transfer Agreements'.

The future success of PIM in Gujarat State will greatly depend on the enactment and effective implementation of this proposed legislation.

Conclusion

We have seen that the water scarcity situation in the state has left little option but to urgently take up sector reforms. While there is a sound effort to part-commission Sardar Sarovar Project, there is an urgent need to draw up regulations on groundwater exploitation in certain regions of the state. Water pricing reforms have also been taken up half-heartedly. Full cost recovery of O&M, in addition to recovery of at least 1% of capital expenditure per year, should be the guiding principle for water managers in the state. Resettlement and rehabilitation of Sardar Sarovar Project-affected people has been streamlined to a great extent in recent years. However, the human resource development and orientation of those involved in the task requires greater attention. Perhaps declaration of a standardized state resettlement and rehabilitation policy will make the stand of the state government more transparent; PIM needs a simultaneous legislative/administrative initiative with full involvement of grass-root NGOs. Without capacity enhancement of WUAs, the full benefits of an expanding irrigation infrastructure cannot be achieved. The time is fast running out and water managers in the state of Gujarat have to brace themselves to take immediate initiatives for long-pending water sector reforms.

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