INSTITUTIONAL INNOVATION IN UNDERGROUND WATER MANAGEMENT IN SAURASHTRA REGION OF WESTERN INDIA*

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The traditional theoretical frame based on the self-interest and utilitarianism supports the tragedy of commons type outcome, in the use of common property resources. The privatisation and government intervention ub the use of such resources present more simplistic solutions and therefore, fail to provide usable techniques of resource management, as the problem lies more with the nature of resource in question.

On the other hand, the renewed interest in the institutional approach in the most recent decades, has prompted researchers in developing new prescriptions to address old and unresolved issues of common property resource management.

The underground water resource is characterised by complexities like indivisibility, invisibility and mobility as compared to those of land based grazing pastures and forests. Therefore, no means like privatisation or government intervention can adequately address management of the underground water resource.

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In this paper, therefore, at attempt is made to analyse in details, the recent institutional innovations being experimented in underground water management of Saurashtra region of Gujarat State in Western India. The case of Saurashtra is prominently distinct in the sense that it has emerged, over a period of time, as one of the most water scarce regions of India.

The Saurashtra Region : Salient Features in the Context of Water Crisis

The existence of Saurashtra region once a distinct island and now a peninsula may be traced back in the pre-historic times. The recorded and unrecorded history of the region supports that it had plenty of natural resources including water and was known for its prosperity based on such resources.

Though the region gets an average 20' of rainfall each year, the water crisis may better be attributed to its irregularity and uneven distribution over the space. Besides this, inspite of the fact that the above rainfall runs over shallow rocky hills, through about 71 small big rivers but without any scope of storing the resource through big dams except in the case of Bhadar river in Central Part of Saurashtra.

The topography of this region, of the type of inverse soucer or a bowl has made the water collection, further difficult. It has highest point of 200 feet above the sea level which results into fast run-offs of the 85 percent of the rain water. Of the rest of the 15 percent is being collected on the ground and remaining 5 percent is percolated into underground or sub-soil levels.

Population Pressure

Ever increasing population claiming ever decreasing water resource is a glazing characteristic causing crisis of this region. The region has registered terrible growth in population resulting into 5 times more of its population in 1991 as compared to the beginning of this century besides the cattle population about 3571426.

Attempting Green Revolution Without Irrigation Potential

Green revolution over fragmented, subsistence and water scarce land is a most recent phenomenon which has brought significant pressure over the underground water resource. Modernisation of agriculture started after the land reform in 1950's giving back the land holdings rights to farmers prompted to become agricultural entrepreneurs. The farmers who were cultivating land for subsistence economy started using modern farming technology including irrigating crops through diseal/electric pumps, numbering in these days, about 5 lakhs or so. There are about 7 lakhs of wells and more than 30,000 domestic wells. Each mechanised pump lift underground water four times more than that of the traditional method with bullocks. The dominent mode of irrigation in this region is mechanised/pump-lifting and it is about 85%.

It has also been observed that the farmers ao extensive and intensive farming for cash-crops, namely groundnut, sugarcane, onion and chilly etc., which consume much more water than the traditional crops. All these have resulted into farmers' attitudes to bring

more and more forest and pasture land under the cultivation.

In the past, farmers used to take one crop during monsoon season only. But now, with the help of drawal technology of the underground water, they take crops not only in winter but also in summer season. Moreover, farmers have a wrong nation that more water irrigated to crops, would yield more production. As a result, access water from the farms get evaporated. It has been estimated that 75% of the irrigated water is evaporated, 5% is consumed by crops and 20% is percolated in the ground.

This is suggestive of the fact that there is a constant withdrawal of underground water but there is very little chance to get percolated, even in rainy season.

New Industries : Recent Claimants of the Water

After 1950, the growth of small scale industrieshas become phenomenal in Saurashtra. But it has also specialised in a number of industries, in the more recent past, which consume more water. Screen printing and chemical based industries fall under this category. As the new claimants of water, they have added to the pressure of water demand. Some of the large scale water consuming industry have managed to draw water through tub-wells, which caused agitation from the surrounding village communities. This has also resulted in litigation.

The water crisis is reflected in the form of rural-urban rift over the issue of supply of water for the drinking verses

irrigation purposes. The typical case in this regard, is the supply of Bhadar-Dam water to the Rajkot city. The agitating villages have often resorted to breaking the pipe-line supplying water to Rajkot, in order to save the same for irrigation purpose.

Subsidy : Causing Water Abuse

As the water is traditionally being considered as a common property resource on the basis of its assumed abandence. The scarcity should have been reflected in terms of "pricing" though municipal corporations levy taxes on drinking water, it is nominal and carries subsidy to a large extent. This has induced water misuse and further aggravated the crisis in the region.

In short, all these factors, geographical coupled with human ones are responsible for the water crisis in the region.

Water Crisis Scenario

The water use increased extensively and intensively over a period of atleast, last four decades has accelerated water crisis more in the form of continuously decreasing sub-soil water levels in different sub-regions of Saurashtra. The underground water table was marked between 30 to 40 feet below the surface in 1950. This has sharply declined and reached as low as 200 feet below the surface. What may gradually be understood as the minimum required drawal of the sub-soil water is now being considered as the over drawal. This has increased infights among competing claimants of the common resource. Females are seen fighting on the public water-stands. Political parties and social workers take out big processions and female-folks are seen going with pots over their heads.

Government Approach

The water crisis in Saurashtrahas conteminated to severity inspite of the fact that Government of Gujarat has been trying, through its various agencies to construct new water supply projects for the purpose of irrigation as well as drinking. But the problem of water management in Saurashtra is different from the rest of the parts of Gujarat in the absence of any perenial river.

The issue, therefore, boils down to the needies down-to-earth, small scale, microlevel, projects of ground water conservation. The water should be stored exactly where the rainfalls. Obviously, Government machinery cannot comprehend such a required point.

The Narmada dam or Sardar Sarovar Project is of the type of a command system which has always remained on the agenda for continuous debate. In fact, the availability of adequate water supply to the interior micro-level landholdings in Saurashtra is seriously doubted. The water in Saurashtra is the need of the present time which cannot be left to high hops only which talks more about the future when a large portion of Government finances and personnel running irrigation projects have been diverted to the big projects like this, are cannot move from the Government to help to the small and marginalised farmers.

The approach of the Government is to conserve the ground water and supply, even drawing water from the ground. This is no longer a proved/successful in solving the water problem. It, in fact,

aggrevate the problem. Reason behind this is that Government's actions are mostly for the immediate relief and ground water is prone to evaporate highly in hot season.

Institutional Approach in Water Management

It is very much known that Isarel facing similar situation of water scarcity, has pioneered a number of techniques of rain-water harvesting and its conservation. Among other developed countries, France, Germany and Canada are also found storing rain-water through the system of wells and reservoirs.

The water conservation idea was very much known to the people of this region long before. People used to store rain-water diverting from house-roofs into big plastered underground tanks prepared in their compounds. They used such a water for domestic purpose. However, this indigenous method was severely limited to very few house-holders and therefore, did not serve the purpose of bringing permanent solution to the problem.

Since last five to six years, enlightened individuals institutions and socio-religious organisations have become highly sensitive and active towards solving the above problem. Several Hindu religious cultural organisations like Swadhaya Parivar (hereafter SP), Swami Narayan, Vaishnava, Anada Bawa Trust, etc., are at work. There are others like Saurashtra Lok Manch Trust (hereafter SLMT) Lok Bharati, Gopal Dham, Vivekanand Research and Training Institute, Saurashtra Patidar Samaj, Science and Cultural Society, Rural -

Development Foundation, Vrukha Prem Trust, Girpat Trust etc. These institutions are engaged in water harvesting and recharging work.

Of all these, the work with its organisational set up, the SP and SLMT covering the total region are evidently known, while other religious leaders just make appeals to their disciples. Several institutions have worked for their institutes only. In this paper, therefore, I shall highlight underground water management approaches, methods techniques andoutcome of two evidently known institutions : the SP and SLMT. However, a case of an individual institution, solving the water problem permanently is described.

Role of Swadhyaya Parivar (SP)

The SP is a non-political and non-formal organisation headed by Rev. Pandurang Shastri beloved by a respected term "Dada", is based on ancient classical philosophic treaty Gita of the Lord Krishna - a dominant figure, known as "Yogeshwara" also. The SP's basic philosophical foundation is to awaken the humans performing altruistic acts with selfless love and that too without expectations of any reward.

Its program of activities include, water harvesting and recharging farm wells in rural areas, house bore well, popularly known as 'Dandkies', recharging in urban area along with soakpits preparing etc., which holds prime importance under the umbrella of SP's activities concerned with socio-economic transformation including reinventing the commons, environmental development etc.

The whole program is enacted through developing spirituality in human beings with a principle of self-help and helping others.

According to Sheth, Dada's close familiarity with the alarming problem through ever growing contacts with people at all levels, led him over a decade ago to recognise the need for replenishment of underground water. He inspired SP followers to devise methods of recharging of village farm wells by harvesting rain water. The SP activities developed proficiency in the method of recharging by acquiring knowledge about various type of reservoirs and their physical setting. They started the work of recharging of wells and reservoirs in the year 1992 and recharged about 78000 farm wells in the region by May 1994. While in 1995, they have a target of recharging one lakh wells. For this, they have developed an excellent net-work. SP activities are determined to move around in their respective areas and encourage owners of wells to recharge them. The manual labour for recharging wells was provided in the usual swadhyaya spirit by fellow Swadhayis who offered their energy in the form of Shram-Bhakti (divotional labour), No reward in any kind was accepted by the hords of the voluntary workers who regarded labour as an offering to the God.

Besides recharging wells in the farms, according to Sheth and Hathi, the SP activities are found busy in persuing people in diverting waste-water used by villagers and urban people in the underground by soakpits connected to households. The soakpits collect drainage water which percolates underground to contribute in a very tiny quantities, to the water table in a neighbourhood.

As in the cases of recharging of wells, the soakpits were made with the many of devotional workers organised by SP members. The total number of soakpits is 17050 in 2103 villages, while of 33 checkdams, 7 new check dams, SP activities constructed and about 26 repaired and house bore-wells mostly in urban areas have been recharged numbering about 51474.

The average expense of recharging a well is about Rs. 500/- (16 US dollars). However, there are several exceptions in which the expenses were between Rs. 12,000 to 15,000 (400 to 500 US dollars) because such a work involved long distance pipelines and digging canal. There is no donation or gift involved but a self-help and devonational help.

Approach and Techniques of SP

We visited several villages, observed the recharged farm wells and found that :

SP followers who hold expertise in water harvesting and recharging activities go to villages as a part of their Bhav Feri (emotional contact). They meet people either in group or in person. They do not take even a cup of tea or food from the village people and they explain the importance of recharging farm wells and its methods. While explaining, they use local language and give message of Dada with an example, "On a particular religious day, you offer water to the secred tree. It is good but at the same time, the earth known as mother, who gives you water for days and night of the year and to the tree also. You do not return it to

the mother. One should return it to the mother. One should not be so selfish. We should love our earth mother too by replacing the water that we have been receiving. Another example that they give as said by 'Dada' is that; "From your bank account, if you go on drawing the amount through cheques one by one and do not deposit the amount in between, a day would come, the bank balance of your account would be exhausted."

On giving such examples to the village people, of whom there are SP members get convinced easily. Once one is convinced, SP activities, immediately, would propose him, "let us go to the farm well and complete the work for recharging the well. In this way, SP activities do not leave the loose end.

On seeing such a work done by SP activities with self less work others get motivated for recharging their farm wells, sometimes even after a year. The approach and techniques are applied for urban peoples for recharging their hand pump bore wells and soakpits are the same.

In the beginning, SP activists faced with problems of motivating people who were not SP members. There were various types of resistance i.e. farmers were not ready to hear the SP activists only because, they were cheated many a time by many others who talked about agricultural development and did nothing for them. Moreover, several farmers told to SP activists on the face that they will be getting some commission out of this work

while several others had doubts that their wells would be useless if rain water is diverted because, alongwith the rain-water, there would be dust and dirts also. Very few told that if rain water is diverted into my well, is there any assurance that I shall get the water. Reason is that water might flow away in any nearby empty wells. How I am going to be benefited ? The SP activists hear all such problem with cool head and explain in details giving solutions with high patience.

Now this activity has taken a shape of campaign of diverting rain water into earth holes and conserving in reservoirs with a local language dictum : rain-water of the village in village, farm water in farm and house water in house, i.e. no drop of rain water should be allowed to flow away from the village, from the farm and from the house.

This program is being carried with no donation from anybody but with self-help, inspired by awakened human beings through SP activities.

The method of recharging farm well etc. is very simple and inexpensive SP organisation maintain the list of persons who recharged their farm wells village-wise, district-wise and region-wise. This shows their selfless work commitment. All these work have drawn attention of mass-media including national television network.

R E S U L T S

In the whole of Saurashtra region, people have become conscious about underground water crisis and have been found accepting methods of recharging their farm wells and house bore-wells. Hathi who is a college teacher in Economics and committed SP activist, has calculated the economic benefits during 1993-1994. It comes to about 7570 million rupees. In our personal talk with several farmers who recharged their wells during the last two to three years, we found that they are benefited much and the purpose of recharging is well served. There are number of beneficiars. I would mention one of them whom also we visited personally.

In a village sixty kms. away from Rajkot city, a family of five brothers has about 150 acres of land with no irrigation facilities. He digged about ten tube-wells and wells but all of them had failed. Young members of the family were about to migrate to cities for labour work especially in diamond cutting and polishing industries. When SP activists met the family, explained the system of recharging the farm-wells and its benefits, the family was convinced and recharged their wells. They spent about Rs.15 thousands, even at the close of monsoon./ The family was benefited by the last two showers of monsoon. Water table of wells and tube-wells was raised and they could irrigate some land in winter. After a year they were benefited very much. They told us about the economic and social benefits. According to their calculation the economic earning was about more than Rupees one hundred and fifty thousand.

SP has developed about 8 methods with various techniques, depending on topology of wells and area of water harvestings - surface water storage/conservation, through farm ponds, plugging water canals, water reservoirs besides, tube-well, well, house bore well and soakpits recharging. All these function either as indirect recharging or direct recharging.

Sheth, Hathi, Shah etc. have described in details how the check-dam at the small and tiny village, "Chokali" having about 998 population, was constructed in 1994 by the SP groups of the Chokali and nearby 13 villages offering selfless energy, skill and labour in order to preserve the water of the river and to raise the water table for wells in neighbouring villages. According to Shah the entire project was executed by an extremely innovative deployment of collective labour over thousands of males and females from villages around the dam site. They offered their energy in the spirit of devotional labour (Shram Bhakti). Hathi has calculated the man-power for this project : "SP activists numbering 4847 completed the check-dam work in four months only."

The cost of the check-dam as per the Government statistics for the similar work was estimated 700 to 800 thousand rupees, while SP members completed the work with the expense of about Rs. 5000, including expenditure for buying digging aids.

Role of Saurashtra Lok Manch Trust (SLMT)

The Saurashtra Lok Manch Trust (SLMT), a voluntary organisation registered in 1993, is headed by Mr. Antala in co-operation

with other office bearers of the SLMT. The President, Mr. Antala in personal talk said that he was aware of the problem of water crisis in the region and the failure of the Government in solving the problem since last many years. The SLMT felt the need of easiest method of recharging of wells and water conservation. The rain-water could be stored and injected into check-dams, ponds, wells and tube-wells etc. For this, an awareness program, as he felt, was the need of the time. This institution, therefore has launched the program known as "Jal Sanchaya Abhiyan" (Water Conservation Campaign). According to their reported statistics, in the year 1992, about 3000 and in 1993-94 about 10,000 wells are recharged and hoped that they would cover the whole region and problem of water would be over by 2000 AD.

While in personal talk Mr. Antala, reported the above information, and added that while he was in his native village in 1988, he saw several farmers diverting rain-water from their farms into their empty wells and used that water for irrigating a very limited land in winter season.

From this, he picked up the idea of water conservation and recharging wells. He later established SLMT in 1992. The purpose of SLMT is driving the Awareness Movement of the people, by the people keeping in view constructive attitudes. He told further that people have adopted the wave of welcoming such movement openly. According to an article appeared in yearly volume of Western India Times News, 1994 the SLMT has decided to recharge about one lakh wells and for that 750 to 1000 thousands rupees as donation are to be collected from industrialists and wealthy peoples.

Approach, Techniques of SLMT

The SLMT is a social institution. Mr. Antala as its President is actively involved in carrying out the program. As he reported, the SLMT is highly active in providing information and motivating people for recharging their farm wells. For this purpose, the SLMT has prepared printed pamphlets and booklets with pictures of recharging methods and techniques and they distribute them in thousands of numbers to village people through co-operative societies, Village Taluka and District Panchayats, etc.

The SLMT has displayed charts during 47 large gatherings besides holding about 165 village meetings. It has also displayed charts on stalls in 42 group marriage ceremonies. All these, as a part of the Jal Sanchaya Abhiyan (Water Conservation Campaign) have been supported and co-operated by the press, electronic media, Hindu religious heads of some sects, Daily news paper and periodicals published in various cities have also played instrumental role in this campaign.

All India Radio, Television like Door Darshan, Zee TV, BBC and Reuter have recorded interviews of the leaders of the SLMT and methods of recharging. Moreover, it has activised local self - government, co-operative societies, District co-operative Banks', elected political leaders who are prepared to sanction loans to farmers for water recharging purposes.

R E S U L T S

On the basis of the information that has been reported here, there is no doubt about the concern of the SLMT regarding the water problem. The approach that has been accepted, it seems, is to provide knowledge of recharging wells through using all possible

methods and techniques of propaganda and thereby hoping to change people's attitude in favour of recharging wells and making provision for loan or subsidy as financial assistance to farmers. It also claimed that the focus of propaganda work is extended from Saurashtra to other parts of India.

Lok Bharati Experiment

Lok Bharati is an institute providing training in agricultural development based on the principles of Gandhian ideology. The institute in the past had no water problem, in fact, diverted surplus water flow into natural canal for the cause of soil conservation. After few years, the Institute suffered from acute water crisis for drinking and irrigation purposes.

One experinced engineer advised in 1974 to prepare a canal linking seven farm ponds of the institute. The teaching members and students laboured themselves accordingly. The water flow was diverted into seven ponds through four hundred meter length canal that they prepared. Each farm pond was lower in level than the previous one. The access water of the seventh pond was diverted into small river passing towards the nearby village known as Sanosara. Moreover, the institute prepared new wells into each pond.

This experiment is quite successful from the perspective of water conservation/storage and water recharging of farm and a village wells. Five wells of the institute, one well of the village Sanosara and 30 wells of the surrounding farm wells are recharged and water table is increased to the level that was 20

year's age. This experiment is beneficial to the institute, directly while to the villages around indirectly. Moreover, it provides knowledge and techniques to those who wish to carry out such recharging work for common peoples.

SUMMARY AND TENTATIVE CONCLUSIONS

The Saurashtra peninsula shaped like an inverse saucer and covered by sea, was rich in natural resources in general and water resource in particular. The average rainfall in the last fifty years has remained almost steady. However, the geographical factors coupled with human ones are not friendly to the water resource, including underground one.

Indigenous efforts based on the limited storage and use philosophy of water management are and were very limited and not at all sufficient in solving the crisis. This is because more and more people for their self-interests use modern technology to draw the underground water as there is no control of Government on limiting the number of farm-wells, tube-wells, house bore-wells etc. and also limiting the use of water or regulating the drawal of waters from private wells and its trading also. All these result into stock depletion during six months in a year. This also creates hazards for drinking water.

On tne other hand, the Governmental institutions are found engaged in planning for permanent solutions like Sardar Sarovar Dam Project, constructing dams and check-dams and its maintenance, indicative of water conservation and supplying the same for various purposes. In absence of the surface or ground water, government's sections, for immediate relief, are mainly limited to drawal of

fast depleting underground water by the tube-well device which is not a permanent or long term solution of the problem (Sheth 1994). It is a fact that the Governmental approach even at present is highly based on drawal and supply side management which is least concerned with underground water conservation.

While the ground water has its main limitation that it's major part of the stock gets evaporated because of the shallow dams and check-dams besides dry and eratic wind in the region. The Government is not in a position to solve such problems of ground and underground water crisis.

Various institutions committed to the cause of the water problem of the region have come out with various indigenous methods. They not only conserve the water, which is likely to be evaporated in large quantity but undertake repairing and preparing dams, check-dams and farm ponds. In addition, they do work of recharging wells inside, house bore-wells and soakpits. It is evident that water diverted into sub-strata of land beneath is more safe and gets less chance of its evaporation rather than the conservation of surface water. Though the emphasis is on the diversion of rain water into wells and earth, there is no neglect of ground water conservations which can indirectly recharge the surrounding areas. Three to four types of institutional management of ground and underground water are narrated in this paper.

They all, put together, serve the purpose of conservation of the resource, either through managing water on the ground or underground. SP, when compared to other institutions provide an unique

illustration of the institution working with the spirit of impersonal altruism. SP activists do not necessarily have any stake personally. For example, in the case of Chokli project, SP members worked not for themselves, but for the others, as well. This suggests that they preferred to contribute their labour for the good of the commons.

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