Conserving, augmenting and sharing water: Towards a green Gujarat[1]

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Let me begin with a Zen story.

> *A monk was known to teach in a very subtle manner. He had many disciples and he tried to teach them individually according to their sensibilities. One day, a particular disciple started to argue with him about the need for conservation. The monk asked him to bring a glass of water. The disciple brought the water. When monk had taken the water, the disciple took the empty glass, and on the way back to the kitchen, threw away the remaining droplets in the glass by inverting the glass a few times. The monk saw him doing that. He called him back and asked as to what had the disciple actually done.*
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> *The disciple said, "nothing, I just brought the glass of water as you advised and then took the empty glass back". The monk asked, "is that all, try to remember everything". The disciple narrated the entire sequence of steps he took to bring the water and then added, "while taking the glass back, I threw away just a few drops of water".*
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> *The monk said, "What! Just…."*

The disciple achieved Zen by concentrating on the word "Just" and realised that even a drop of water could have multiple destinies. Throwing it away was certainly not a responsible act.

Given the above philosophy, one would assume that problem of water should not have become so acute. But it has. I would first list the contradictions in our personal conduct and our public postures on the issue of water. I would then share a variety of innovations linked to water developed by the common people, which don't seem to attract policy attention adequately. Lastly, I would list specific recommendations that can help make Gujarat green without creating social disparity now and a legacy of ecological imbalance for the next generation.

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Part One: Water in everyday life

In the campus where I teach, the ground water table is going down every year by about 15 – 20 feet. This rate of decline is not sustainable. Our students have worked out the economics of using the wastewater of the RO (reverse osmosis) plants set up for cleaning drinking water. These plants/units waste 70 per cent water to clean 30 per cent drinking water. At present, this 70 per cent water goes down the drain. One can list large number of other practices embedded in the current design of technologies of harvesting, storing, distributing and dispensing water in which inefficiency is rampant. The absence of foot switch leads to tremendous waste of water in every household in the morning while performing daily chores. The industries recycle not even a fraction of water that they use. The houses of various cabinet ministers and other senior officers in Gandhinagar and elsewhere do not have rooftop water harvesting facilities. The water that we use for our own consumption has to have higher standards of purity. But, if the same water is used for gardens, washing and other activities, then it only shows our insensitivity towards the problem. The per capita consumption within Ahmedabad varies from less than 20 litres per person per day to more than 200 litres per person per day in our campus. It is obvious that this is not sustainable.

The extraordinary enthusiasm for deepening or digging ponds in several parts of Gujarat has to be appreciated. But concomitantly, a similar enthusiasm for conserving water is absent in urban Gujarat and rest of the country. Is it because the planners continue to make it appear that water problem is only for the rural people and the dry regions, in the other regions there is not any problem.

I will not dwell upon the water pollution issues, which have assumed most frightening proportion in different parts of the state and the country. The Pollution Control Board does not seem to find situation so alarming. I am not aware if any firm has been called to answer the pernicious practice of dumping untreated industrial effluents into the underground bores. What would our future generation say about our sense of irresponsibility? We do not enforce high standards of environmental responsibility in the industrial and municipal sectors. Worse, we do not even feel disturbed by the lax standards of monitoring.

I am not suggesting that situation is so gloomy that nothing can be done. The minimum we can do is to create awareness about the positive news. Those firms, housing societies, villages which perform best in conserving and recycling/treating waste water can be honoured and their contribution displayed on the public notice boards all over the state. Lessons about such pioneers can be included in the curriculum. Visits of the school children can be organised to such places. We have to ensure that leadership of our society at least 20 years hence will not commit the same mistake that we have done in the past and still do so often. The conditions of rivers and drains reflect the respect any society has for common good and common future.

Let me end this section by recalling an extremely innovative and pioneering initiative taken by a national leader hailing from Gujarat. It is a pity that most people in this meeting as elsewhere are ignorant about his contribution in this respect. In national consultations on water conservation and sustainable agriculture, I have experienced the same public amnesia.

Dr. K.L.Munshi was Food and Agriculture Minister in the Nehru's Cabinet and also the chairperson of Indian Council of Agricultural Research (ICAR). His lectures were published in a document called as "Gospel of Dirty Hand", 1953. Among many insightful passages in the book, let me pick up two, which are particularly relevant for managing water today.

While linking soil with soul, he drew three circles denoting hydrological cycle, nutrient cycle and local community. His suggestion was that unless we link all the three, sustainable land and water use cannot be planned.

Extremely distraught by the prevailing situation of the dirty drainage channels in cities and villages around, he observed that a civilisation which does not keep drains clean, may not last too long. The civilisational character, he implied, was apparent in the quality of management of drainage. He also realised that mere exhortation will not help. Neither reliance on government alone would help.

He developed a revolutionary idea of a land army. The first unit of land army comprising students from Delhi University took up the challenge of cleaning Najafgargh drain in Delhi. His vision was that such units of land army comprising youth would move from place to place and help local communities in taking charge of their destiny by managing land and water use in a sustainable manner. Neither the planners, nor the young students know about land army today. May be such indifference is deliberate. If we share such instances from our recent history, it would be difficult for the planners, leaders and senior civil servants and industrialists to be so irresponsible about water use.

Part Two: Innovations for managing water

Cultural, institutional, educational and technological innovations are required to transform the situation with regard to land and water use. In fact, when we conserve water, we invariably conserve land also. It is a different matter that the section which dealt with soil conservation in the erstwhile Central Water and Power Commission (CW & PC) divided into Central Water Commission and Central Electricity Authority has almost disappeared today. The catchment area planning is seldom incorporated in an integral manner in the most river valley projects today. Leaving that aside, let us look at what kind of creative solutions can be discerned from the grassroots initiatives.

Institutional innovations:

There are villages in Gujarat, which have evolved very creative ways of ensuring water quality and conservation. In Surendranagar, there is a village, which has nine temples and one Dargah around the pond. It seems that possibility of anybody entering from ten directions to pollute the water was prevented by putting fear of God in the mind of community members. During various social functions, the young couple is expected to go and seek the blessings of all the ten shrines.

In many villages of north Gujarat, there is a custom that community members clean up the catchment area of the village pond before it rains. Any excreta of the animal or other such debris is removed so that when the rain water drains into the pond, it does not bring impurities with it.

The management of virdas in Kutchch is governed by collective norms in several villages. Right from Tharad Taluka to Banni area, there are a whole variety of technological and institutional arrangements to conserve fresh water in saline soil and saline sub soil water.

Premjibhai has worked with local communities in Saurashtra to experiment with a very wide variety of village ponds with design and management innovations.

The story of Rajsamdhiyala in Rajkot district is quite well known. The young Sarpanch of this village not only mobilize the community in digging ponds with the help of local administration but also succeeded in achieving the highest standards of cleanliness in any village. I will not be surprised if this village can be a benchmark for the whole country.

Variety of institutional arrangements have evolved in past to manage water collectively so that the need of various sections of society is met adequately. Many of these arrangements are coming under strain. We will see in the next section whether technological innovations can reduce the erosion of institutional values.

Technological innovations:

For different kinds of water bodies, different technological innovations have been developed by individuals as well as communities.

a. *Saline soil, saline ground water in dry land regions*
The conservation of rainwater through virdas in such regions is a traditional technology. Despite all the advancement in science, we have not been able to develop any method more sophisticated than these in such regions. An innovation within this was discovered a decade ago in Tharad area. Farmers have developed a lateral bore with the help of water jet so as to increase recharge rate of water from four sides. In conditions where ground water is saline, the only way fresh water supply can be increased after the rains have drained the salts and saturated the capillaries, is through such bores (Chokkakula and Patel, 1994; Ferrouki and

Suthar, 1994). Recently in Karnataka a similar practice has been observed in non-saline regions (Shree Padre, Honey Bee 17 (1 & 2), 32-33).

Public investment in improving the efficiency of such traditional technologies improvised in recent past is almost non-existent.

b. *Semi circular check dam:*
Most check dams are straight line or a single arch design. Bhanjibhai designed semi circular arches after getting the inspiration from the old railway bridges to deflect the pressure with lesser thickness of the dam. One can thus build more dams in the cost that would have been required for a single straight line check dam. Premjibhai has further improvised the design and built several more check dams in Saurashtra. The state government is yet to replicate this design.

c. *Using compressed air to extract water from deep bores:*
Use of one way valve to push compressed air through a pipe to extract water from deeper bores where under normal circumstances, a submersible pump would have been required. However such pumps can work only when electricity is available. Compressed air pumps can help extract water with the help of diesel engine from deep bores. It is a different matter that excessive extraction of ground water is posing serious problems in many parts of the state. One has to create wider awareness in this regard.

d. *Zero head turbines:*
Given a large network of irrigation canals built in the state due to Narmada project, generation of electricity through the flow of water can be an attractive option for decentralised, distributed energy supply. Such turbines have been developed in northeast at very low cost. National Innovation Foundation (NIF – www.nifindia.org) and Honey Bee Network (www.sristi.org) have scouted large number of such turbines requiring either very low thrust or velocity or both of water. These can also be used to lift water in the regions where gravity flow would not be feasible.

e. *Water recharge technologies: Directing rain water straight into the well*
This is one innovation which is very harmful and must be discouraged. Many farmers did not realise that total absence of direct recharge of the well in the history of water management all around the world was not without reason. It was discovered long time ago that if water was allowed to go into the well from the top, then the silt along with the water might settle and close the pores through which water was entering from below or side ways. In our Shodh Yatra in Saurashtra region, we have come across examples of failed wells because of such practice. Recharge must always be done through filter wells.

There are a large number of innovations about use of water in agriculture which have been documented by the Honey Bee Network over the last two decades[3]. A general

[3] Chokkakula, et al., "Harnessing Wisdom for Watershed Management", CMA Mimeo, 2003

principle is, the more water we give to the crop, more pest we will have. Alternate row irrigation practice developed by a Haryana farmer, Harbhajan Singh has diffused widely because of saving of water and lesser pest attack. An eminent organic farmer, Bhaskarbhai Save provided water to his plantation through a channel in between the two rows of trees. The idea of roots growing horizontally towards water and in the process harnessing more nutrients from soil was found to be very viable. It reduced the water supply and improved the productivity. Whole range of rotor water sprinklers have been developed by Anna Saheb in Karnataka which sprinkle water in the radius of 140 feet and as a bonus wash the eggs of the pests as well. Farmers in Kerala also use compressed water spray in crops like cardamom to control external pests. Use of saline bottles for drip irrigation is just another example of farmers realising the importance of economy in water use. The fact, however, remains that public policy of free electricity or electricity on the basis of horsepower irrespective of the consumption encourage farmers to use water recklessly. Despite being a committed supporter of farmers' knowledge and wisdom, I must admit that perverse incentives can distort the value systems and encourage irresponsible use of natural resources.

Part Three: Way Ahead

Large-scale policy changes are required at micro and macro level to conserve, augment and distribute water in a sustainable manner.

1. Every urban housing society or campus must be allowed to get electrical connection or renew it every year only if it recycles and conserves a particular proportion of its water requirement, say 30 per cent.

2. No new building use permission be granted till water recharge arrangements have been made.

3. The urban water reform policy must be urgently developed to regulate extraction, utilisation, emission or effluents, waste water treatment and use of water for gardens, etc.

4. The drainage water treatment as well as use must be monitored. Release of industrial waste water without adequate treatment for use in irrigation must be strictly monitored to prevent pollutants entering the food chain.

5. The incentives for recycling, conserving and utilising sustainably should be made more robust and widely known.

6. Technologies which waste ¾ of the water they treat such as RO systems must be discouraged or compulsorily linked with salt extraction and recycling of waste water.

7. High degree of iniquity in water distribution in urban areas must be discouraged.

8. Household technologies for water treatment must be encouraged so that water borne diseases do not take a heavy toll of public health. At the same time, the quality of water treatment in municipal supplies must be improved so that those community members who cannot afford private water treatment do not suffer unnecessarily.

9. The link of water use efficiency with over all sustainability of agriculture systems has to be demonstrated through on-farm trials in different agro ecological regions. I am not aware as to how many such trials have been taken up in farmers' fields and what have been the results. But such findings would help motivate farmers to take steps to economise water use.

10. All the political leaders, MPs, MLAs and Ministers (one could forgive the bureaucrats) should be required to conserve rooftop rain water in their houses so that they can motivate their constituents accordingly.

11. The use of more than 50 horsepower engines to extract fossil groundwater (which is never going to be recharged) must be very heavily taxed so that such non-sustainable practices are curbed urgently.

12. Large scale trials and demonstration of water based innovations in different parts of Gujarat should become part of public policy in a manner that more and more people feel encouraged to innovate.

Industrial water use efficiency and waste water treatment policy should be articulated with greater transparency and accountability. The water dripping from the air conditioner is distilled water. By conserving this water, one can economise the purchase of distilled water. There are large number of such practices, which can easily improve the economics of water conservation, augmentation and more equitable sharing. While some fear that future world wars would be around the water, we have already been witnessing the violence around water disputes in many parts of the country. The urban requirement today when met through rural extraction generates immediate tensions. When farmers are advised to conserve water without similar efforts in the cities, they feel disappointed and demotivated.

I, therefore, hope that this conference will create sufficient consciousness among the policy makers so that through water use efficiency and fairness in its distribution, steps towards making Gujarat green will be taken immediately.