

Reviving Traditional Water Harvesting Systems as an Innovative Option for Water Conservation in Maharashtra.

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Abstract: Clean and hygienic water is the prime necessity for the survival and sustenance of life. It is also essential for a vibrant economy. The fresh water resources are depleting at a much faster pace than they are replenished. The whole country is subjected to one or the other water related issues. There are many regions in India which do not have a river or a lake and hence depends on only rain water for domestic, agricultural and industrial needs, but rainfall distribution is neither uniform nor assured. States like Maharashtra is facing acute water scarcity as the current year is the third consecutive drought year. Hence, it's necessary to adopt viable and sustainable water conservation practices. India has a deep rooted history of water management which goes back to the Vedic times. The traditional water management systems are found to be the unique, long term and beautifully engineered sustainable systems deployed by the communities during historic periods which assured clean and plentiful water supply throughout the year. The present paper deals with the necessity of reviving traditional water harvesting systems which are buried down due to sheer negligence and seeing it in the new light to cope up with growing water scarcity in Maharashtra. The paper also deals with various traditional water conservation measures adopted in India in general and Maharashtra in particular in the past and its potential to act as an innovative remedy for acute water shortages. The paper presents a scope of blending of traditional and innovative methods of water conservation for the conservation of the depleting water resource.

Keywords: Traditional water harvesting systems, reviving, Maharashtra, sustainable, innovative.

Introduction:

The UNEP has identified water shortage along with global warming as one of the two major problems for the 21st century. The demand for water has tripled during the second half of the 20th century. Water scarcity already affects one- third of the total world population. Estimate shows that one person in five has no access to safe drinking water; one in two lacks safe sanitation and polluted water is estimated to affect the health of approximately 1.2 billion people and contributes to the death of 15 million children annually.

India receives about 400 million hectare metres (mham) of rain per year over an area of 329 mha. The rainfall ranges from as low as 100mm in the Thar desert to 15,000mm in the North east (CPREEC). In Maharashtra , both urban and rural areas have been facing water scarcity especially during summer season due to reduction in availability of water. According to an assessment by

Ground Water Survey and Development Agency (GSDA), more than 75% of total number of districts in Maharashtra showed depletion of ground water levels due to human interventions. More than three crore people in 28 districts and 30% of the population of the state depend on water tankers. The problem gets aggravated due to monsoon failures. At least 80% of the total areas under agriculture is rain-fed in Maharashtra. According to Central Research Institute of Dry land Farming, the districts in Marathwada and Vidarbha face very high risk of financial losses due to changing rain patterns. The districts of Marathwada and Vidarbha are witnessing maximum farmers' suicides due to crop failure owing to deficient rainfall. Climate was never factored in policy making or annual state budget. But in the year 2014-15 for the first time it has been induced in the policy due to the unseasonal hailstorm and changing rainfall patterns extending to longer dry spells. Out of total 355 talukas in the state 226 talukas received deficient rain while 112 talukas received normal rainfall, only 17 talukas received excess rainfall.

The history of India tells us that floods, droughts or both were a perennial occurrence. If the overflow of rivers and streams could be captured and stored efficiently, the water could be used for rest of the dry season. Even rainfall as low as 100mm, if harvested properly, can meet the drinking water needs of the people.

Objectives:

The present study intends:

1. To give an insight to various traditional water management methods in India.
2. To lay emphasis on reviving of the neglected traditional methods of water harvesting in Maharashtra.
3. To establish consensus on concomitant implementation of both traditional and innovative methods of water conservation as a remedy for growing water scarcity.

Methodology:

The present paper is an informative article based on the secondary data in the form of research papers, books, journals, magazines, Newspaper articles, Government data and drafts etc.

Traditional Water Harvesting Systems in India:

Water resource, though renewable, but is a finite resource and hence limited. Rapid population growth, urbanization and industrialization has exerted pressure on the quantity and quality of both surface and ground water. Agriculture in most parts of the country still depends on the rainfall. Failure of monsoon, thus have serious implications on the economy. Adopting sustainable, effective water conservation measures is one of the key aspects to cope up with the acute water scarcity. As already mentioned that floods and droughts were regular occurrence in ancient India and hence every region has its own water harvesting system that is peculiar with reference to the geographical and socio-cultural features of that region. Water harvesting systems are practiced in India since time immemorial. The history of water management systems goes back

to the ancient period. Koutilya was the first economist of the world to define water as an economic commodity too (3rd century B.C). Koutilya was of firm opinion that agriculture could not be dependent solely on the gambling nature of rainfall but on the man-made (irrigation) water. He also advocated the need of people's participation in water management. Dams were built of stone rubble in 3rd millennium B.C. in Baluchistan and Kutch. During 3000-1500 B.C., the Indus-Sarasvati civilization had several reservoirs to collect rain water. Sringaverapura near Allahabad showed evidences of sophisticated water harvesting system using floodwaters of the Ganges during 1st century B.C. Karikala Chola in 2nd century A.D. built Grand Anicut across the river Cauvery to divert water for irrigation is still functional. . King Bhoja built the largest artificial lake about 65,000 acres in Bhopal in 11th century A.D. In the 12th century A.D. Rajatragini describes a well- maintained irrigation system in Kashmir. Based on centuries of experience communities kept on building water harvesting structures to catch, hold and store monsoon water for the dry seasons. Following are some of the traditional water harvesting methods adopted in India:

1. Zing (Ladakh): These are structures (small tanks) made to collect melting water from glaciers. A network of channels bring water from the glaciers which flows in the form of stream by afternoon and used in the agricultural fields the next day.
2. Kuhls (Himachal Pradesh): The glacial water from the rivers and streams is carried through the channels into the farmlands. The estimate shows that there are around 715 major and 2,500 minor kuhls which irrigate about 30,000 hectares of agricultural land.
3. Zabo/ Ruza system (Nagaland): This system not only conserves water but also aid in forestry, farming and fish production. The rain water falling on forested hilltops is captured and deposited in small ponds. The channels carrying run-off water also passes through the cattle yards, collecting dung and is then ultimately going to the paddy fields.
4. Bamboo Drip Irrigation System (North- east India): The tribal farmers (Khasi and Jaintia hills) use this ancient system of water management for crops requiring less water. In this system bamboo pipes are used to deliver water from the springs directly to the roots of the plants (black pepper cultivation).
5. Johads/ Madakas / Pemghara (Karnataka & Odhisa): This system includes the construction of small earthen check-dams to collect rain water. It is considered as one of the oldest technique to conserve and recharge rain water.
6. Panam Keni (Wayanad): This is the special type of well made by creating a wooden cylinder by soaking the stem of toddy palms in water until the core of the stem rots. These stems are then immersed in groundwater springs in fields and forests. The method is practiced by the native tribe known as Kuruma.
7. Ahar Pynes (South Bihar): This system incorporates the construction of reservoirs to collect flood water and artificial rivulets to collect water in the ahars to irrigate the fields.

8. Talab/ Bandhi (Bundelkhand & Udaipur): These structures may be natural or artificial. Natural reservoirs are called pokhariyan, whereas man made reservoirs are called lakes. It is used to store water for household consumption.
9. Jhalara (Jodhpur): The city of Jodhpur has eight Jhalaras. These stepwells were built to provide water for ceremonies, religious rituals and community use.
10. Bawaris (Rajasthan): These are the unique, series of layered step wells built to avoid the wastage of water due to evaporation. The rain water is collected through a series of channels and discharged into these man-made tanks. It helps in recharging the underground aquifers and raising the water table.

There are some other water harvesting structures used in India such as the Taanka, Khadin, Kund, Baoli, Nadi, Jackwells, Eri, Pat etc which are beautifully designed using the local knowledge to capture and store rain water to be used later.

Traditional Water Management Practices in Maharashtra:

Maharashtra too has an ancient history as far as water harvesting is concerned. Following are some of the techniques used for water resource management:

- The excavations at Inamgaon (Dist-Ahmednagar) in Bhima river basin showed evidences of a weir across the river to facilitate diversion of water for agricultural use.
- The concept of 'water wheel' has an Indian origin where such water lifting devices were used in Maharashtra. The concept then migrated to Persia and again arrived in India under the name of 'Persian Wheel'. These Persian wheels can still be seen in Wai town (Dist-Satara).
- Many forts in Maharashtra show evidences of the presence of water management systems then, in the form of cisterns, kunds, tanks, etc.
- A broken embankment and tank bend cultivation could be seen even today where an earthen dam was constructed across a small river in Washim (Vidarbha).
- In Aurangabad the Satvahanas constructed a huge reservoir 'Raj Tadag' during the Satvahan period (230 B.C to 230 A.D) for community water utilization. It is still functional in the form of a small lake named Harsul Tank.
- Maharashtra was under the rule of Chalukya of Badami in poet Vakaka period. The Chalukya constructed tanks known as Baravas, which were basically step wells used for irrigation. Large number of such wells are still in use for the last 1000 years across the state. The beautiful barav at village Limb(Dist-Satara) irrigates about 40 hectares of agricultural land.
- The fort of Devgiri located in the arid zone of Maharashtra is an example of an excellent, sophisticated engineering marvel in water management system. Similar types of systems are evident in the forts of Naldurga, Dharur, Ausa and others.

- The city of Aurangabad is famous for its 52 historic water channels (Nahar) drawing ground water from the adjoining hillocks, many of which are still functional . The nahars could not only provide water for drinking and irrigation but also to generate mechanical energy i.e, Panchakki for running a flour mill. The presence of Nahar system is also evident in places like Junnar, Tisgaon, Sinner, Pune, Sangli and Ahmednagar.
- The Phad system (Bandharas) of investigation showcases an equitable distributive of irrigation water to the agricultural fields across rivers in Sahyadri (Tapi basin).
- In the Phad system the scientific technique of crop rotation was practiced. The phad system of irrigation had a participatory democratic approach.
- One such participatory irrigation practice known as Khajana Well near city of Beed in Marathwada is still functional and is an excellent example of ground water irrigation.
- The water policy of the Central Government came into existence in 1987, State Government in 2003, but Chatrapati Shahu Maharaj of Kolhapur introduced the first water policy of India way back in the year 1908.
- Aad (deep well) is the water harvesting structure which fulfills the domestic water needs of a family, which is supported by a village tank for recharging.
- Dev taki on the top of Sinhagad fort near Pune is an example of efficient harnessing ground water which satisfies the thirst of around 15 lac tourists in a year.
- The horrible famine towards the end of 19th century forced the British Government to implement irrigation schemes through the construction of dams such as Khadakwasala, Bhatgahar etc, and lakes such as Vihar, Tulshi, Powai, Tansa for drinking and industrial water requirements of Mumbai.
- During the same period the TATA's, a private company was allowed to construct five reservoirs on rivers of Krishna basin for the generation of hydro-electricity. This could be cited as the first example of privatization of water in India.
- In the eastern part of Vidarbha (Zadipatti) an intricate water management system through the creation of series of tanks during the period of Gond Raja is still evident. Nearly 40,000 tanks were constructed about 400 years ago in Vainganga basin. This method is also popularly known as 'Ramtek Model'.

Reviving Traditional water conservation methods: A Viable Alternative

The longevity of various traditional water harvesting methods mentioned earlier in the paper suggests that these systems were simple, sustainable, effective and environment friendly. The current acute water shortage and frequent drought spells in Maharashtra calls for an urgent need to revive these traditional systems of water harvesting and coupling them with the innovative modern systems of water management that will ensure an equitable water security to everyone. The Government of Maharashtra looks to bring sustainable irrigation practices by reviving traditional water conservation methods as an option to address the problem of water shortage. The Centre's Pradhan Mantri Krishi Sinchai Yojana (PMKSY) intends to

achieve convergence of investments in irrigation at the field level, improve on farm water efficiency to reduce wastage of water, enhance the adoption of precision-irrigation and other water saving technologies (more crop per drop), enhance recharge of aquifers and introduce sustainable water conservation practices. The Centre also appreciates the creation of new water sources including surface and ground water like in Jalyukta Shivar adopted by the State Government of Maharashtra. The State Government has decided to promote rain water harvesting. It intends to strengthen the carrying capacity of traditional water sources and will rejuvenate traditional water systems like Jal Mandir of Gujarat, Khatri, Kuhl of Himachal Pradesh, Zabo of Nagaland, Eri of Tamilnadu, Dongs of Assam, Bandhas of MP and Katas of Odhisa. Nearly 500 traditional structures to aid water conservation that were built during the 1972 drought are being revived as part of a better water management strategy by the state government. The state has given priority to drought –prone districts across Marathwada and parts of North Maharashtra. In Vidarbha , the revival of traditional water structures that have been lost due to neglect will be reconsidered as a medium for effective irrigation of barren lands. Hiware Bazaar village which lies in the drought-prone Ahmednagar district is an example for the rest of the country. The village started water conservation efforts in 1994 by adopting watershed management, crop rotation and drip irrigation. The conservation program included rain water harvesting, digging trenches around the hill contours to trap water, afforestation and building of percolation tanks.

Revival of Traditional Malguzari Tanks in Bhandara District (Vidarbha) : A Success Story

The Malguzars (Zamindaars) or tenants made tanks or ponds known as Malguzari tanks for water harvesting in eastern Vidarbha, Maharashtra two centuries ago which provided water for irrigation and fish production. About 7,000 irrigation tanks are lying in a state of neglect in the water deficient region of eastern Vidarbha. These Malguzari tanks have a collective potential to irrigate more than 125,000 ha of farm land. Estimates show that only 20% of the land in Vidarbha is under irrigation and remaining 80% cultivated land depends on the rainfall. Hence, reviving the tanks could meet the irrigation requirement of large number of farmers. The state government took ownership of the Malguzari tanks after the Zamindari/ Malguzari system got abolished during 1950. Before that the Malguzars used to construct, own and maintain the tanks. The state government started collecting water tax, which angered the Malguzars, who felt that they were the rightful owners and hence they filed a case in the Supreme Court. The Supreme Court agreed with them but didn't specify that who will be responsible for its maintenance. Thus, about 1000 tanks remained unmaintained amidst the fight between the state and Malguzars. In 1983, an independent committee ruled that the tanks which had great irrigation potential were indeed the government's responsibility to maintain. But no one took heed of this and once again the tanks remained unmaintained. In the year 2008, Shirish Apte, an Executive Engineer of Minor Irrigation Division of Bhandara

belonging to the Malguzar family and having a great interest in water conservation decided to initiate the process of reviving these tanks with financial support from the government. The Janbhora Malguzari tank located 35 kms away from Bhandara was the first tank that was restored by him. The first step of reviving these tanks was to desilt them by removing the fine sand and earth that is carried along with running water and gets deposited as sediments. After desilting, the boundary wall of the tank was strengthened. The process of revival took more than a year. The rejuvenation work has resulted in recharging groundwater levels and has also increased agricultural and fish production. It has also generated employment opportunities. The process of revival witnessed community participation. The benefits of the Jambhora Malguzari Tank to the region has forced the administration to initiate the process of restoring another 21 Malguzari tanks in Bhandara. The revival of Malguzari tanks shows that water conservation can be also achieved by the implementation of simpler and cheaper methods which are environmentally sound rather than bigger projects like construction of dams. On the same lines small villages like Patoda (Aurangabad), Wadhona, Vizora, Sunderwadi, Padmavati, Bhorkheda and Vadod Tangda in Jalna, Horti village of Tuljapur Taluka in Osmanabad, and several others in Maharashtra are taking the help of traditional water management practices to solve the problem of water scarcity.

Conclusion:

Availability of fresh water is indispensable as far as survival of life and economic growth is concerned. Indiscriminate exploitation of this infinite resource calls for the need of adopting water conservation practices. While looking for the innovative methods of water conservation in this contemporary world of scientific and technological intervention we should not forget the simpler, cost-effective, viable, and environmentally sustainable age old water harvesting methods which have the potential to capture and store water which can be used during the dry seasons. Identifying such traditional practices and reviving it for the optimum utilization and conservation of water resource is of paramount importance. Combining these traditional water harvesting systems with the modern rain water conservation techniques could be the answer to India's growing water scarcity.

References:

- Adete Dahiya., Smart Villages battle droughts with innovative water conservation practices, May, 2016.
- Aparna Pallavi., Restore malguzari tanks to irrigate eastern Vidarbha: study, Down to Earth, June 2012.
- Bhim Singh Rawat, Local water conservation methods: Viable alternative to rejuvenate depleted groundwater aquifers, COUNTERVIEW.ORG, June 2016.
- CPREEC, MoEF&CC, Govt. of India, Traditional water harvesting systems of India.

Dr. D.M.More, Traditional water management practices of Maharashtra.

G N Kathpalia, Rakesh Kapoor, Water policy and Action Plan for India 2020: An Alternative, November 2002.

Kranti Ukey, Kapildeo Indurkar, Water conservation through construction of water harvesting structures (Vanrai Bandharas) in Thane district with special reference to Shahpur Taluka: A step towards sustainable development, Vision 2020 leveraging 'Make in India', vol -1, 2016.

Makarand Purohit, Rejuvenating traditional water system in Maharashtra, India water portal.org, August 2016.

Manish Rajankar, Traditional water management systems of eastern Vidarbha: Community Conservation-1, SANDRP.

The Economic Times, Maharashtra looks to bring sustainable water irrigation practices, August 29, 2015.

The Indian Express, Maharashtra: State to revive water conservation structures built during '72 drought, May 29, 2015.

Traditional water conservation systems of India, The Better India.