Future of Food: Journal on Food, Agriculture and Society
2 (1) Summer 2014

Drinking water issues in Rural India: Need for stakeholders' participation in Water resources management

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Data of the article

First received : 25 May 2013 | Last revision received : 25 May 2014
Accepted : 4 June 2014 | Published online : 10 June 2014
urn:nbn:de:hebis:34-2014062645601

Keywords

Access to safe water; Stakeholder participation; Water Resources Management; Integrated Water Resources Management; Millennium Development Goals

Abstract

Water is a very essential livelihood for mankind. The United Nations suggest that each person needs 20-50 litres of water a day to ensure basic needs of drinking, cooking and cleaning. It was also endorsed by the Indian National Water Policy 2002, with the provision that adequate safe drinking water facilities should be provided to the entire population both in urban and in rural areas. About 1.42 million rural habitations in India are affected by chemical contamination. The provision of clean drinking water has been given priority in the Constitution of India, in Article 47 conferring the duty of providing clean drinking water and improving public health standards to the State. Excessive dependence of ground water results in depletion of ground water, water contamination and water borne diseases. Thus, access to safe and reliable water supply is one of the serious concerns in rural water supply programme. Though government has taken certain serious steps in addressing the drinking water issues in rural areas, still there is a huge gap between demand and supply. The Draft National Water Policy 2012 also states that Water quality and quantity are interlinked and need to be managed in an integrated manner and with Stakeholder participation. Water Resources Management aims at optimizing the available natural water flows, including surface water and groundwater, to satisfy competing needs. The World Bank also emphasizes managing water resources, strengthening institutions, identifying and implementing measures of improving water governance and increasing the efficiency of water use. Therefore stakeholders' participation is viewed important in managing water resources at different levels and range. This paper attempts to reflect on drinking water issues in rural India, and highlights the significance of Integrated Water Resource Management as the significant part of Millennium Development Goals; and Stakeholders' participation in water resources management.

Introduction

India is a country known for its rich cultural association with water. All natural resources are respected and most particularly the rivers in India are worshiped on par with Goddesses. Rivers are also the sites of the evolution of major cultural complexes. India is blessed with abundant natural resources especially water, which are used for various purposes predominantly agricultural followed by domestic and industrial purposes.

The different types of water resources in India include rivers, lakes, ponds, canals, tube wells, open wells and springs. But the problem is of space and time distribution of those water resources. The country has 16 percent of the total population of the world but has only 4 percent of the water resources present on the earth. It has only 2.5 percent, out of the total geographic are of the world. It receives approximately 1100 millimetre average

Citation (APA):
Lalitha, S., and Michael Vetha Siromony, P. (2014) Drinking water issues in Rural India: Need for stakeholders' participation in Water resources management, *Future of Food: Future of Food: Journal on Food, Agriculture and Society*.2(1): 67-79

rain fall annually, however it is irregular and only during a limited period of two to three months (Gautam and Kumar, 2005). India's water resources significantly depend on monsoon rains; but at the same time, the country has a big population, large area of irrigated agriculture land and considerable industrial operation which generates high demand for water (Gosh Roy, 2011). Presently almost 80 per cent of drinking water needs are met from ground water. By 2050 the demand for water has been projected as 1180 bcm. It means all the utilizable water resources will have to be put to use by 2050 to meet the demand. Water demand will increase due to increases in population. Apart from a population bulge, greater use of energy, depletion of ground water resource, lack of awareness on water usage among the users, increased growth in packaged/bottled water, implementing deficiencies in water management mechanisms and lacunas in administering this scarce resource will adversely affect fresh water availability in India.

Despite the significant role of water in the lives of Indians awareness about handling water and its optimal usage are very poor. The Indian constitution (article 47) and Universal Declaration of Human Rights (Article 31) emphasize the fundamental rights to clean and accessible water to acknowledge human dignity. Since Independence numbers of integrated drinking water supply programmes have been implemented by the central and State Governments of India to fulfil the water needs of its citizens. Generally there is a perception among the citizens that water is a free commodity or common property and so that government is the service provider. It expects government to be more responsible of delivery issues, at the abdicating its own responsibility. Accountability and participation are less valued by the citizens thus hampering sustainable use of water. Water resources need to be protected and augmented and well managed with collective efforts for sustainability. In rural India water resources management is only possible with stakeholders' participation. Panchayat Raj Institutions (PRIs)[1] are the local governing authorities who play a vital role in enhancing community participation at village levels. Hence, there is an urgent need to enhance stakeholders' participation at different levels for water availability, accessibility, maintaining quality, sustainability, delivery and distribution. This paper attempts to examine the water issues in rural India, various rural water supply programmes, National Water Policy and the role of Panchayat Raj Institutions and the importance of stakeholders' participation towards sustainable water resources management with reference to the empirical study findings carried out by the researcher on Water Governance practices in Thiruvallur District, Tamil Nadu, India. Geographically Tamil Nadu is the eleventh largest state (50,216 Sq. Km) and ranked in top 6th in Human Development Index, 2011 and the population is 72,147,030 as per Census 2011.

Drinking water issues and implications in rural India

Water scarcity is a serious issue in India. The 2001 census data confirms that 68.2% of households have access to safe drinking water[2]. The Department of Drinking Water Supply (DDWS) estimates that 94% of rural habitations and 91% of urban households have access to drinking water. But according to the experts these figures are misleading simply because coverage refers to installed capacity and not actual supply. The ground reality is that of the 1.42 million villages in India, the water resources of 195,813 villages are chemically contaminated. The quality of ground water that accounts for more than 85% of domestic supply is a major problem in many areas as none of the rivers has water fit to drink. High Nitrate content in water is another serious concern. Fertilizers, septic tanks, sewage tanks are the main sources of Nitrate contamination. In India, water quality is another serious problem with its states. The groundwater in the state of Maharashtra, Uttar Pradesh, Punjab, Haryana, Delhi, Karnataka and Tamil Nadu has shown considerable traces of Nitrates. The southern state of Tamil Nadu accounts for 4 percent of the total land area of the country and 6 percent of its total population, but has only 3 percent of the water resources of the country. Till the 10th five year plan the government had spent Rs.1, 105 billion on drinking water schemes.[3]

The norms being adopted for providing drinking water to rural populations in the habitation[4] are: 40 litres per capita per day (lpcd), 30 lpcd additional for cattle in Desert Development Programme (DDP) areas, one hand pump for every 250 persons, potable water sources within 1.6 km in plains or 100 metres elevation in hilly areas. In view of the gigantic task involved to provide drinking water as per norms, the Government of India has now ordered a fresh nationwide survey to enable it to take a comprehensive view. Besides drinking water supply the emphasis has to be on quality of water as well (Karalay, 2005). In the rural water supply section habitations are classified as not covered and fully covered. Not covered habitation is one which has no public or private drinking water sources point within 1.6 km of the habitation in plain area or 100 m elevation in hilly area. One of the problems being faced in the rural drinking water sector is the slippage of habitations from fully covered to partially covered and partially covered to not covered habitations due to increase in population, fall in ground water, water quality problems namely, fluoride, arsenic, iron, nitrates and bacteriological contamination.

ISSN-Internet 2197-411x OLCL 862804632

Absence of clean drinking water, leads to epidemics like cholera and gastroenteritis. The World Bank estimates that 21% of communicable diseases in India are related to unsafe water. Thus the social cultural factors include household size, consumption of the household level of education, average age of the household head, area or origin of the household among others, household sizes influence the demand for water from two angles. On the one hand it directly influences the total demand for water in the household, while on the other hand it reduces the per capita use (Reddy and Dev, 2005).

A study report on the assessment on Water Supply and Sanitation jointly conducted by Planning Commission of India, the Word Health Organization (WHO) and the United Nations Children's Fund (UNICEF) in the year 2002, suggests that the adoption of a demand driven approach and empowerment of villages; a focus on village-level capacity building, the maintenance of an integrated approach to water supply and sanitation and hygiene promotion; a requirement for partial capital cost recovery and full operation and maintenance financing users; the promotion of ground water conservation and rainwater harvesting are the various ways to enhance community participation towards drinking water issues (Van Dijik and Sijibesma 2006).

Rural water supply programmes and challenges and Role of Panchayat Raj Institutions

Early days drinking water supply in rural areas are perceived as outside the government purview. The traditional sources of drinking water in rural areas were namely, community managed open wells, private wells, ponds, river, lake and small scale irrigation reservoir. The rural water supply programmes were implemented since the 1950s[5]. The Central Government investment in the rural water supply programmes is huge. The Accelerated Rural Water Supply Programme was launched in 1972-73. Followed by Sector Development, the technology mission renamed as Rajiv Gandhi National Drinking Water Mission (RGNDWM) in the year (1991-92) emphasized water quality, technology and Human Resources Development. Between 1999-2000, a new initiative was taken to involve the community at planning, implementation and management of Rural Water Supply Schemes.

Later in 2002 the *Swajaldhara*[6] was scaled up by considering the initiatives taken in the year 1990's-, such as Sector Reform Project which become crucial in framing Swajaldhara guidelines. The National Rural Drinking Water Programme (NRDWP) is an initiative of the Department of Drinking Water supply, Ministry of Rural Development Government of India, sprung up during the Tenth Plan to ensure people drinking water scarcity in rural areas at household level with community participation and Panchayat Raj Institutions, to deal the issue of sustainability of source and system and ensuring potable water. The (NRDWP) viewed water as a public good and basic need. It also ensures to change the perception of Conventional 40 Litre Per Capita Day (lpcd) norms into drinking water security at community level. However, households are the basic units of the community. It is also projected that by 2022 every person should have 70 lpcd within 50 meter from their households.

Water supply and sanitation is the basic responsibility of the state under the Constitution of India and following the 73rd and 74th Constitutional Amendments, the States may give the responsibility and powers to the Panchayati Raj institutions (PRIs) and Urban Local Bodies (ULBs)[7]. The Though State/Central Governments are taking necessary steps to address the issue of water scarcity in rural areas like policy formulation, planning, designing and executing water supply schemes and coordination and harmonization of standards yet there are some challenges which often affect the rural masses to exercise their fundamental rights.

The issues related to water quality, availability, reliability and sustainability are the challenges ahead to the State and Central Governments. In India the perennial surface water resources, rivers and streams are wiped out due to over use and extraction. Water scarcity occurs when the supply of water is unable to meet demand. Climate change is also another human included stress. Low water tariffs/unpaid tariff have left the finances of most the local bodies in very bad shape leaving no maintenance and no new developments. Public opinion of water as a practically free commodity at free of cost is yet to change. The system of drinking water supply in rural areas is drawing attention and gaining momentum after the PRIs came into reality. It is the pressing issue of the people and the elected members of PRIs as they primarily focus on the subject of rural water supply vests with Panchayat Raj Institutions (PRIs). The Panchayats play a major role in providing safe drinking water and managing the water systems and resources (Sharma et al, 2008). Therefore, PRIs/local bodies must be empowered to take up operation and maintenance activities related to rural water supply systems. Providing capacity building to local communities by giving requisite training to pump operators, community based organizations especially Village Water and Sanitation Committee, Self Help Group women to operate and maintain hand-pumps and the components of other water supply systems as well as to generate demand for adequate sanitation facilities.

Table 1: Per capita availability of water in India

The Projected population in million in the years are		
Year	Population in Million	Per capita availability in cubic meter
2025	1394	1341
2050	1640	1140

Source: Singh, 2006

Women: Stake Holders at Challenges

Even though many water supply schemes are implemented in India, the precious time of women is at stake due to them having to spend their time fetching water or waiting at the source/supply without even knowing when and how long the water will be available. There are lots of unmet needs concerning water for the people. The culture of safe drinking water has to be stressed as the disease burden is mostly water related. The water bodies are to be conserved with the participation of the people particularly women and the youth. The habit of safe drinking water is to be developed and periodically the quality testing of water with public knowledge and public involvement is to be inculcated. There is less water equity in rural India and the marginalized and poor are affected as they are forced to drink the available unsafe water which harms their health. Making available safe water is a governance as well as human right issue as it is right to a safe life. Therefore the welfare state and the PRIs have to take it on themselves as the priority and the foremost responsibility.

National Water policies of India

The National Water Policy (NWP) is the primary document stating the position of the Government of India (GOI) on water resource issues ranging from drought and flood management to drinking water provision. The NWP serves as a guideline to help planners and managers develop the country's water resources to their maximum potential. It also stresses the development of comprehensive water data system, basin/sub-basin wise water planning watershed management, fixation of water allocation priorities, enhancing, project planning and implementation capabilities, the achieving of sustainability in the uses of ground water in conjunction with surface water ensuring that drinking water needs are met, integration of water and land use policies, adequate financial allocations for water programmes and time bound implementation of such projects. The document specially underlines conservation, integrated use of land and water, participatory management, better floods control and management practices and appropriate legal framework for water sharing and distribution among states regions and all stakeholders (Dhar, 2003).

The first National Water Policy was devised in 1987 and drinking water was given utmost priority. The National Water Policy-2002 advocates that water is a prime natural resource, a basic human need and a precious national asset need to be governed by national perspectives and planned, developed, conserved and managed on an integrated and environmentally sound basis. It has also insisted the paradigm shift in the management and improving the performance of existing water resources (Ghosh Roy, 2011). The present Draft National Water Policy-2012 endorses that water is a natural resource, fundamental to life, livelihood, food security and sustainable development. Water is viewed as a scarce resource. Water mismanagement and climate change led to water scarcity. The immediate concern is to have a legal framework to ensure holistic and balanced development. The significance of Integrated Water Resources Management (IWRM) is viewed as a main principle of planning, development and management of water resources. The National Water Policies 2002 and 2012 endorse the role of PRIs in Water Resources Management.

Integrated Water Resource Management adaptation in India

Water is a natural resource that has to be harnessed, treated, used and conserved collectively by all the users. Making it available and participation are keys. Management means coordination of activities to achieve the defined objectives. The classical theories of Management namely, Administrative Management theory of Henry Fayol and Behavioural approaches of Hawthorne Studies 1930s emphasizes the participatory planning and significance of human relationship for successful management, and the importance of water which is one of the physiological needs stated by Abraham Maslow[8]. Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources. The Global Water Partnership (GWP)

ISSN-Internet 2197-411x OLCL 862804632

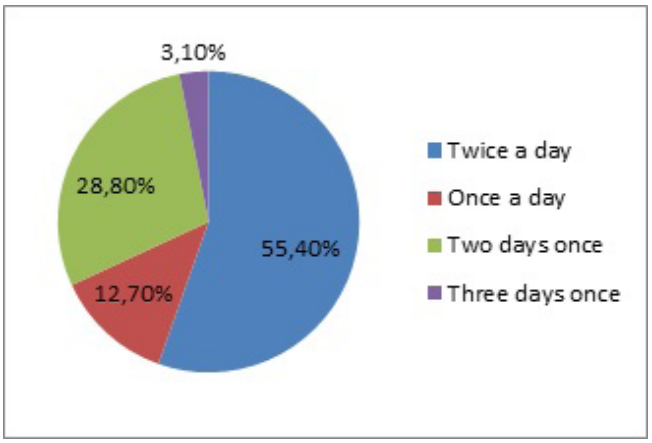

Figure 1: Frequency of water availability in the respondents' locality

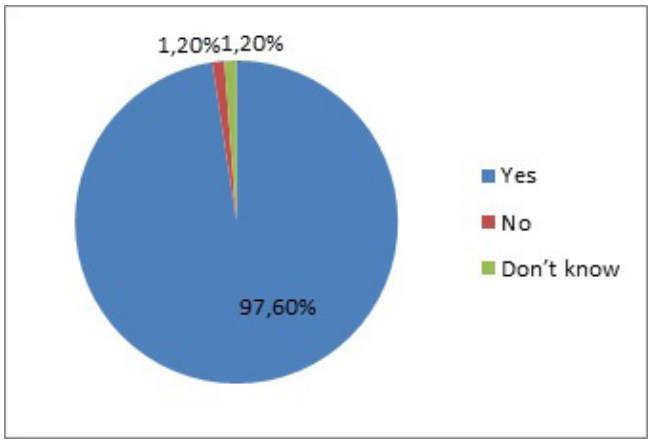

Figure 2: Respondents' view of water as a public good

defines that Integrated Water Resources Management (IWRM) is a process which promotes the coordinated development and management of water land and related resources in order to maximize economic and social welfare in an equitable manner without comprising the sustainability of vital eco systems and the environment.[9]

Water management in irrigation or efficient utilization of the water will also increase crop intensity and productivity and suitable crop pattern (Sen & Das 1986). Water is important for food production. If water resources are not managed well, it will become a major constraint to the achievement of food security.

The way forward for efficient, equitable and sustainable development and management is internationally accepted. Democratic participation in governance and human health is demanded. It is designed to replace the traditional, fragmented-sectoral approach. IWRM in taking river basin / sub-basin as a unit should be the main principle for planning, development and management of water resources. But in reality, lack of integration between sectoral water-related policies, which leads to fragmented programs and inefficient utilization of technical capacities and financial resources, lack of decentralization and efficient local administrative structures, coupled with low capacity in end-users, which minimises the opportunities to operationalise IWRM at the grass root level[10]. Thus, the concerned departments, organizations at Centre- State Governments levels should be restructured and made multi-disciplinary accordingly.

The Indian scenario depicts that the availability of water in adequate quantity is also a challenge throughout the day. The analytical framework of IWRM at the macro level insists on the inter-sectoral approach and the implementation of the Inter-ministerial coordination. In India a central Ground Water Authority has been constituted under the Environmental Protection Act to serve as a monitoring body which has a greater responsibility towards the water sustainability at macro level. Community participation at different levels is also important to put the concept of IWRM in-to practice. The analytical framework of IWRM also emphasizes the changes in the utilization and availability of the water resources and in the water resources system itself and it may be applied at the micro level i.e. at village-level for the coordinated efforts that are needed to promote the water resources development[11]. India has not yet reached the level of Water Resources Development as has already been achieved by many developed countries; therefore, there is a need for India to undertake developmental measures along with management measures (Draft Guide line for IWRM, 2010).

International Conventions and Millennium Development Goals and its relevance in rural India

The UN Water Conference, in 1977 passed a resolution on the right to have access to water. In Rio-Brazil in 1992 – the World Summit on sustainable Development - emphasized the protection and quality of fresh water resources as one of the main activities of sustainable development. Ministerial Declaration at the second World Water Forum in the Hague in March 2000 and the deliberations at 3rd World Water Forum at Kyoto in March 2003, also called upon nationals towards water security in the 21st Century and make water as every-body's business. Ministerial Declaration at Freshwater Meet in Bonn 2001 placed greater commitment on agreed principles of water resources management and called upon for new partnership to create water wisdom, cleaning up water sheds to reaching communities and innovative solution for sustainable use, protection and man-

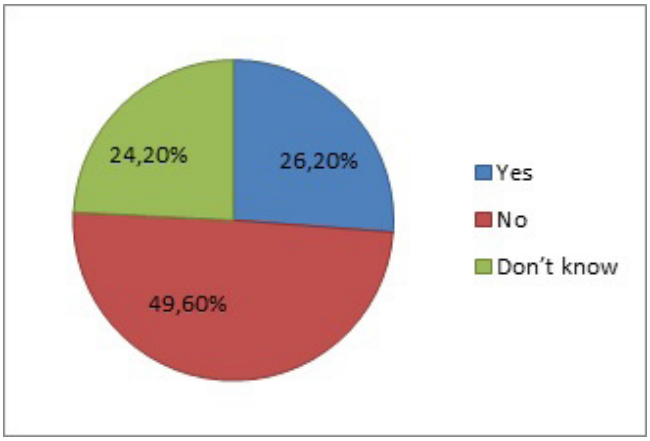

Figure 3: Respondents' opinion about revival and conservation of water resources in their locality

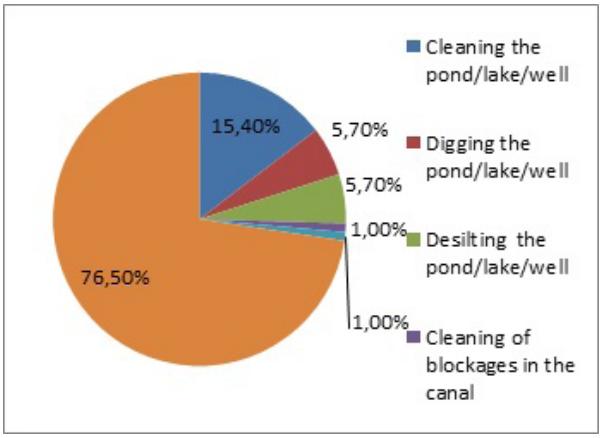

Figure 2: Type of measures taken by the respondents towards revitalizing water sources (*Multiple response N=260)

agement of fresh water. The International Conference on Water and Environment in Dublin, Ireland in January 1992 also gave rise to four principles in bringing reform in the water sector.

International organizations such as the World Bank, Asian Development Bank, United Nations, World Water Council and Global Water Partnership also emphasizes the importance of the protection of fresh water resources and its sustainability through community participation. Further the Millennium Declaration of the UN has stressed the global goal of halving the population without sustainable access to water supply and sanitation by 2015. Thus water management is the key to achieve the MDGs. It is also highly stressed by the MDGs that safe and secured water supply will enable all the groups in a community for active participation towards water resource management.[12]

Furthermore, the objectives of the MDGs and human rights namely, to preserve and protect human dignity ascertain that access to water is a basic human right. Article 47 in the Constitution of India 1949 confers the duty of the State to raise the level of nutrition and the standard of living and to improve public health and the constitutional right to access to clean drinking water can be drawn from the right to food, the right to clean environment and the right to health, all of which have been protected under the broad rubric of the Right to Life guaranteed under Article 21 of the constitution. In addition to article 21, Article 39 (b) of the Directive Principles of State Policy (DPSP), which the Constitution declares to be non-justiciable, recognizes the principle of equal access to the material resources of the community. Article 39 (b) and states that 'the State shall, in particular, direct its policy towards securing that the ownership and control of the material resources of the community are so distributed as best to sub serve the common good'. [13] India is committed to the MDGs. Drinking water is relevant in most of the MDG goals as water is central to health and development and to be disease free. It is very much possible to bring drinking water to everyone with prioritizing, planning funding with stakeholders' participation and with government providing services to the neglected and deprived population.

Participation of Stakeholders in Water Resources Management

Stakeholders are those who fall in to three categories like primary stakeholders (affected population) secondary stakeholders (local authorities) and tertiary/external stakeholders (agencies). The stakeholders have roles and a say in water resources management. The stakeholders' participation is democratized when they participate in the water decision-making and water related activities take place through public hearings, stakeholder involvement in administrative bodies, organization of user associations and for general environmental concerns, a greater permissiveness in the rules governing standing to act in either administrative or judicial forum. Thus, stakeholders may participate in policy making, legislative discussion, general water administration, and field level activities (Solanes and Villarreal, 1999).

One of the guiding principles of the Dublin statement on water and sustainable development also envisages (Miguel Solanes and Fernando Gonzalez-Villarreal, 1999) stakeholders' participation at different levels. It is also emphasized in the National Water Policy-2002, India that the stakeholders' need to participate in water resource management. Hence there is an urgent need to ensure

ISSN-Internet 2197-411x OLCL 862804632

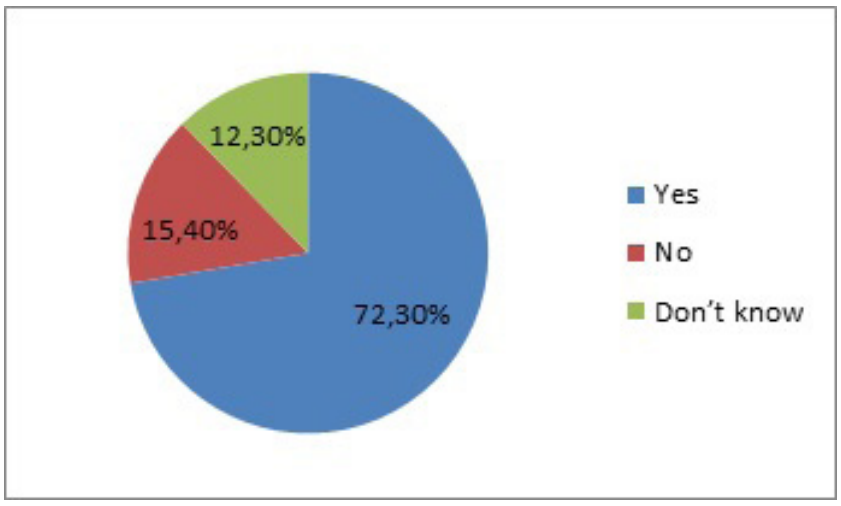

Figure 5: Respondents' opinion on provision of IEC resources for better household water practices

stakeholders' participation in the revival of water resources, water handling practices and their participation at all levels to ensure sustainable water resource management. In India though the stakeholders' participation is envisaged through Gram Sabha at the Panchayat level but is still the congenial environment to participation and is not there in the country due to lesser sensitivity, lack of social equity social and caste classification or stratification. The rights based approach is to be followed in drinking water rather than it being an entitlement.

Empirical Evidence

The first author conducted a research study on "Water Governance Practices in Thiruvallur District Tamil Nadu", India to understand the role of governing authorities, the benefits of rural water supply programmes, the availability of water resources, access to water, water demand and participation of the stakeholders in the revival of water resources. She had interviewed 260 respondents (122 males and 138 females) from six Village Panchayats. Mixed methods were used like a structured interview schedule, focus group discussions, participant observation and social mapping to find the facts. The service providers' namely, elected members (Panchayat Presidents), Government officials (Engineers from Tamil Nadu Water Supply and Sewerage Board) and members or office bearers of Community Based Organizations (CBOs) were also interviewed by the author.

Study Findings

This study reveals that the stakeholders need to be given information, education and communication (IEC) and training on water resources management. The local governing authorities and community based organizations play a pivotal role in service delivery and rejuvenation of the water resources. It was also found that one third of the respondents depend on a variety of sources to meet their water supply requirements. A few have their own well or bore well. Others take water from their neighbours or from neighbouring communities. A few respondents even trek to the next village to tap the resources there. However, nearly three fourths manage with the locally available resources. Nearly a third had complaints about the colour, salinity and odour of the drinking water supplied to them. Colour is the most common complaint followed by salinity and bad odour. The results are illustrated in Figure1. The result with numerical data is enclosed in the Annexure. Figure 1 shows that more than half of the respondents have access to water at least two times a day. About a third are less fortunate as they can avail it only every other day or even at less frequent intervals.

Figure 2 depicts the attitude of the respondents towards water. An overwhelming proportion (97.6%) of the respondents feels that they view water as public good. It means that the community felt that it is the responsibility of the government to provide water free to the residents of the community and they need not pay for it. It is revealed from Figure 3 that nearly 25 percent of the respondents feel that there is a need for revitalization and conservation of water resources. Others do not think so. Perhaps they may not be aware of the importance of water conservation and they must be educated on that. Nearly 25 percent of the respondents have adopted useful measures of conservation and revitalization such as cleaning up, desilting and sinking new wells (Figure 4). The large number (76.5%) said that they did not think about it. Thus this segment of the population needs to be made aware of water management or managed to

build its capacity and understand the importance of rejuvenating the water resources to meet water demands in future.

Discussions

This study reveals that more than half of the respondents get water twice a day whereas others (28.8%) get two days once and three days once (3.1%) and this shows lack of access to drinking water for them. These findings correlate with the conclusions of Hardener Raj Gautam's study (2009). Gautam notes that water is the very basis for the existence of human as well as all other forms of life (Gautam2009). Access to safe water and sanitation is a critical socially and economically and in many cases a political issue, which determines the health of individuals and communities and the productivity of nations.
In India more than 700 million people live in about 1.42 million habitations spread over diverse ecological regions. Meeting drinking water needs of such a large population can be a daunting task especially in the backdrop of different level of awareness, disparities in socio-economic development, education, and poverty, a range of practices and rituals and water availability. It was found that nearly half of the respondents (49.6%) did not think about revival of water sources in their locality. This shows their lack of awareness about water conservation and water resources management. Thus these people need to be given training on water resources management. Archana Mishra, (2006) articulates that water Resources Management is an integrating concept for a number of water sub-sectors such as hydro power, waste supply and sanitation, irrigation and drainage, and environment. The integrated water resources perspective ensures that social, economic, environmental and technical dimensions are taken into account in the management and development of water resources. The study findings reveals that about a third are less fortunate access towards potable water as they can avail it only every other day or even at less frequent intervals. At village level, as per the Amendment to the Constitution of India, the subject of rural water supply rests with the Panchayati Raj Institutions (PRIs). The Panchayats are to play a major role in providing safe drinking water and managing the water system sources (Thapliyal et al, 2008). Hence they have greater say in providing water to the citizens with equity and justice.

This study further reveals that a small percentage (23.5%) of the respondents at least have taken steps to revitalize the water resources whereas the majority of 76.5 percent did not even think about it. Efficient management of water only will pave the way for sustainable development. The eleventh Five year Plan (2007-2012) states that the sustainable development and efficient management of water is an increasingly complex challenge in India. India with 2.4% of the world's total and 16% - of the world's population has only 4% of the total available fresh water. This clearly indicates the need for water resource development, conservation and optimum use.

In order to address the issue of water crisis the people need to be motivated to participate in the water resources management activities or schemes related to water management implemented by government and other agencies. Mishra (2006) has emphasized the important of people's participation in rain water harvesting. Furthermore Mishra says that it is becoming more widely accepted that unless people are actively involved in the development projects which are aimed to help them, the projects are doomed to fail. It is important that the beneficiaries participate in every stage of the project. When the project is being planned, people should be consulted, and their priorities and needs assessed. During the construction phase people again should be involved supplying labour but also helping with field layouts after being trained with simple surveying instruments.

Figure 5 explains that 72.3 percent of the respondents realized the importance of provision of IEC resources for better household water practices. This indicates that community need to be empowered though water literacy for better water management at household levels.

Suggestions and conclusion

In rural India the system of administration is well established with the jurisdiction of a geographical area called the District. The District is the administration as well as planning unit and further divided into development blocks and currently the Panchayats and towns and urban local bodies are added from the effective decentralization. At the district level instead of Departments, water authorities were created for the faster decision making and autonomy. Predominantly the water resources for drinking purpose depended on the local resources and certain regions may have larger drinking water projects covering larger area transcending districts including externally aided (World Bank funded). With gradual awareness and better functioning of local bodies and by questioning, discussion and deliberations and debate in the Gram Sabha meetings would make the system function effective and accountable particularly in water governance. The information on water availability, reliability, quality and quantity needs to be shared with households, community based organizations, Anganwadi[14] schools and other learning institutions for ensuring community participation at all levels. With the average

ISSN-Internet 2197-411x OLCL 862804632

2% annual growth of the population and migration both in and out, has to be taken into account while planning.

As participation commences from the planning level, it must be encouraged at grass root level which can never be compromised. People with the vast local knowledge and knowing the ways to revitalize the water resources may also be encouraged and need to be connected with Information, Communication and Technology (ICT). The district level planning committee needs to be educated and refreshed with various levels of interaction has to focus and make even futuristic goals taking into account of development and management of water resources. The committee at various levels should consciously assess the source supply and plan for the future. They should ensure every year there is augmentation of drinking water as well as taking into account the climate change impact and also vulnerability of the district to flood and drought and other disasters which affects the drinking water availability. The impact of climate change on agriculture could result in problems with food security and may threaten the livelihood activities upon which much of the population depends. Drinking water availability and supply is also energy related aspect, hence that also become part of the drinking water management. The district should plan in such a way in to fulfil the set targets and may strive to achieve the standards prescribed by World Health Organization.

There are districts of different types like hill districts, flood prone districts, cyclone prone, drought prone districts and multiple disaster prone districts. These must be given greater importance in the provision of portable water according to rural water supply norms. Women are the household managers and have a greater role in water management and so need to be sensitized towards better water handling practices. Youth and other potential human resources need to be encouraged towards revitalizations of water resources, water budgeting and water auditing. Water literacy needs to be enhanced by discussion, debate, in the Gram Sabha meetings and in common forum. The observation of world water day would create awareness among the community on water scarcity and a need for water management. Water resources mapping, assessment and planning, water budgeting, auditing and law enforcement in user charge payments, use of the latest technology and structures, water conservation measures, revival of water resources and traditional knowledge on water harvesting must be done by community based organizations for collective action and PRIs should be responsible authority for maintenance. Government must change its role from service provider to the facilitator to involve stakeholders' participation. The community needs to be empowered through capacity building training programmes by trained personnel's like community development specialists to understand the water related issues and act collectively towards water resources management.

Acknowledgement

We would like to express our sincere thanks to Dr. Rema Saraswathy, Dr. Paul Dayanandan, Dr. Haans Freddy and Dr. Ramajayam for their constructive comments to strengthen the paper. Our special appreciation goes to anonymous reviewers of FOFJ journal who assist to sharp our manuscript with critical comments.

Conflict of Interests

The authors hereby declare that there is no conflict of interest.

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1. In India, Panchayati Raj system is a three-tier system in the state with elected bodies at the Village, Taluk and District levels. It ensures greater participation of people and more effective implementation of rural development programmes. There will be a Grama Panchayat for a village or group of villages, a Taluk level and the Zilla Panchayat at the district level.

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4. A rural habitation is defined as a locality within a village where a cluster of families reside. The total population should be 100 or more for consideration for coverage under the rural water supply norms

5. Rajiv Gandhi National Drinking Water Mission, Department of Drinking Water Supply, Ministry of Rural Development, Government of India, 2010

6. Swajaldhara is a centrally sponsored rural water supply scheme launched in 2002 for enhancing community participation.

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14. The word Anganwadi means "courtyard shelter" in Hindi. They were started by the Indian government in 1975 as part of the Integrated Child Development Services program to combat child hunger and malnutrition.

Appendix

The following tables reveal the study results with numerical data;

Data fro Figure 1 Frequency of water availability in the respondents' locality

S. No.	Frequency of water availability	Frequency	Percentage
1.	Twice a day	144	55.4%
2	Once a day	33	12.7%
3	Two days once	75	28.8%
4	Three days once	08	3.1%
	Total	260	100.0%

Data fro Figure 2 Respondents' view of water as a public good

S. No.	Public Good	Frequency	Percentage
1.	Yes	254	97.6%
2	No	3	1.2%
3	Don't know	3	1.2%
	Total	260	100.0%

Data fro Figure 3 Respondents' opinion about revival and conservation of water resources in their locality

S. No.	Opinion about revival and conservation of water resources	Frequency	Percentage
1.	Yes	68	26.2%
2	No	129	49.6%
3	Don't know	63	24.2%
	Total	260	100.0%

ISSN-Internet 2197-411x OLCL 862804632
UniKassel & VDW, Germany- June 2014

Data fro Figure 4 Frequency of water availability in the respondents' locality

S. No.	Type of measures	Frequency	Percentage
1.	Cleaning the pond/lake/ well	43	15.4%
2	Digging the pond/lake/ well	16	5.7%
3	Desilting the pond/lake/ well	16	5.7%
4	Cleaning of blockages in the canal	3	1.0%
5	Others	3	1.0%
6	Not applicable	99	76.5%
	Total	280*	100.0%

Data fro Figure 4 Frequency of water availability in the respondents' locality

S. No.	Opinion	Frequency	Percentage
1.	Yes	188	72.3%
2	No	40	15.4%
3	Don't know	32	12.3%
4	Cleaning of blockages in the canal	3	1.0%
	Total	260	100.0%

ISSN-Internet 2197-411x OLCL 862804632