

Clean and safe drinking water: A sustainable holistic approach in Semi arid region

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ABSTRACT

Water is a vital element for human life. Water has always been an important and life sustaining drink to human beings. Unfortunately it is not a renewable resource. With population over 1.2 billion, drinking water supply in India continue to be inadequate despite long standing efforts by various governmental and non-governmental efforts. Numerous water related schemes found not to have balanced approach in addressing availability and accessibility of clean and safe drinking water. Many decades of effort in the field of drinking water seem to be skewed without inclusion of equal emphasis on quality and conservation efforts.

The paper examines the ground realities of drinking water status in semi arid region with respect to source, usage, storage, quality, awareness etc by conducting 750 household survey and few group discussions in Koppal Taluk, Karnataka. The study attempts to bridge gap between the government schemes related to drinking water and ground level facts in rural areas. Authors opine that the motto should be 'last mile of connectivity and first mile of conservation' with respect to design and implementation of government schemes on drinking water supply and water harvesting.

The paper tries to formulate a practical and approachable comprehensive 360 degree approach for drinking water supply in rural areas. This model which is interwoven between stake holders brings in collective spirit for sustainable development of the community. The government by sponsoring the schemes and helping local bodies to build infrastructure the community would operate, manage, conserve and preserve the same. The issues of accessibility and affordability across the economic ladder of the society could also be mutually addressed between local bodies and community. The frame work also highlights the underline threads between safe drinking water, sanitation and community health. These three form foundation pillar for strong human force and create necessary wealth to propel the rural population out of poverty.

The paper would cover live illustration about issues of rural drinking water in semi arid districts of Karnataka and solutions to which could easily be replicated across the country. This would strengthen and push forward the revolution for drinking water in the country.

1. INTRODUCTION

While the world population has increased by three-fold in 20th Century, the use of water has grown by six-fold. Current population growth coupled with industrialization will result in increasing demand for water in coming days. According to *Nature* (2010), about 80% of the world's population (5.6 billion in 2011) lives in areas with threats to water security. More than 60% of Indian population lives in rural areas and mainly concentrated in peninsular plateau and northern plain. Industrialization and erratic usage of fertilizers in agriculture has made available little water unfit for drinking purpose. Lack of sanitation in rural areas has further deteriorated water sources like ponds and rivers. Successive governments of independent India have cherished the goal of providing access to drinking water to every household and, consequently, constructed storage reservoirs and built huge network of pipelines to supply water. Time and again the governments have also planned to link up the Himalayan Rivers with the Southern Indian Rivers which are rain fed. However, according to the 2011 census, only 17.2% of the households in rural India and 62% of the households in urban India have access to tap water from a treated source. Rapidly dwindling resources accompanied by climate change and lack of structured and long term planning and actionable measures call for a collective consciousness building in each local community to ensure sustainable usage of drinking water resources. The need envisages utilization of water in a way that would make the production, consumption, delivery and maintenance of the drinking water systems sustainable at local village levels. This would directly provide access to safe drinking water and would indirectly be beneficial in reducing the health hazards among the poor and underprivileged, provide employment opportunities to the local poor, develop consciousness in them to conserve natural resources.

Koppal Taluk in Karnataka was selected to understand the status of drinking water in semi-arid areas with a specific focus on the urban centre and villages. Koppal taluk was the ideal place for the study as more than 70% of the agriculture is dependent on rain (Government of India, Ministry of Water Resources Central Ground Water Board, 2008) and it belongs to Northern Dry Zone. The study examined the present conditions of drinking water and status of government programmes with respect to drinking water. The study conducted 750 interviews in 10 villages of Koppal taluk across various socio-economic sections of the community. These villages were selected based on demographic size and diversity, geographical spread from Koppal Town, Presence or absence of Tungabhadra river etc. Detailed interviews were conducted with senior government officials who are directly related drinking water related departments.

2. STUDY RESULTS

2.1 Source of Drinking Water (Availability)

The survey enquired about the source of drinking water in 750 households across 10 villages of Koppal Taluk. The source of drinking water was found out season wise. The survey suggests that there is no seasonal change in the source of drinking water and it is the same for all the three seasons. 90 per cent of the households are dependent on the tap water supplied from the respective Gram Panchayat in their village. Depending on the village, the tap water is drawn from bore-wells that are dug for drinking water purpose or from the canal. Nearly 6 percent of the respondents have private bore-well as source of drinking water and do not use any piped water connection from the panchayat. About 1.5 per cent goes to open tank in the village to fetch water. It is interesting to note that no household members are going to the Canal or open well to fetch water. Among ten sample villages, four have irrigation either through Tungabhadra canal or through Hirehalla Yojane. However, most of the households prefer to get drinking water from the piped water supply scheme of the Gram Panchayat.

A few Gram Panchayats like Agalakeri are covered under the Jala Nirmal Yojane of the Government and have got bore wells with piped distribution network to supply drinking water to each household. These bore wells are dug in places near canal or pond in order to get water throughout the year.

The distribution of households by source of drinking water according to the 2001 census data released by the District Statistical Officer, says that in 2001, nearly 60.86 per cent of the total population of Koppal district used taps as source of drinking water. This was followed by hand pump (25.37 %), tube well (6.39%), well (4.05%), tank or pond or lake (1.54%), river or canal (1.26%), spring (0.13 %) and others (0.4%). When we compare the data obtained with the statistics of the 2001 census, the study survey shows that 90 per cent of the population is now obtaining piped source for drinking water.

2.2 Accessibility

59 per cent of the houses get drinking water at their premises itself. Usually these are localities or hamlets of the villages which are close to the pumping station of water or the Gram Panchayat area. 40 per cent of the households have to go less than a kilometer to fetch water from the source. These households fetch water from the common taps that are provided at the end of their street or a common place in their locality of the village or neighbouring house that got pipeline in front of their house. Only 1 per cent of the surveyed population goes more than a kilometer to get drinking water. This indicates that the accessibility of water is not an issue in the area. A remarkable achievement has been made by government programmes in terms of accessibility of drinking water.

FGD results revealed that the houses, who can afford to pay Rs 500/house to the gram panchayat in rural areas and Rs 5000 to the municipality in urban areas, are able to get pipe line in front of their houses. The houses, which cannot afford to pay these amounts, either go to the neighbouring house or common taps that are provided at the end of their street or a common place in their locality of the village to fetch water.

In more than 59 per cent of the household, the responsibility of getting drinking water is with adult women member of the family, be it wife of the family head, daughter/ daughter-in-law or mother. In 26.78 per cent of the households, adult male fetches the drinking water. It is interesting to note that male children out number female children in getting the water from the source. 8.3 per cent of the households send male children to fetch water, while in 5.72 per cent of houses female children fetch water.

FGDs in all villages except Koppal town, revealed that compared to last ten years, now members of the households, especially women, spend less time in fetching water as the distance travelled to reach the water source is reduced. Most of them have pipes line in front of their houses. Some of them said that hardly they spend any time to fetch water as these households use pipes to fill water storages inside bathrooms as well. In some places, people shared that lots of time is wasted as there are frequent power cuts (5-6 times in a day) which results in erratic water supply.

2.3 Awareness about Safe and Clean Drinking water

94 per cent of the sample population are aware of importance of clean and safe drinking water to avoid water borne diseases. Though there is awareness about impact of safe and clean drinking water on health, people are not treating/filtering water before consumption and are also not maintaining cleanliness around community based water sources like taps, open wells.

2.3.1 Source of Awareness

Water is one of the important parameters that determine the health of a household. It is interesting to know that doctors play an important role in creating awareness about importance of safe drinking water. As many as 57 per cent of the sample households point doctors for making them aware of significance of safe and clean water. TV and other social media also create the awareness to the extent of 10-15%.

2.4 Water Treatment at Households

71% of the households use only cloth to filter and 6% of the households are not even filtering water before consumption. It was observed during the field visits that people wash their feet, hands and clothes in the common place where community taps are kept resulting in stagnation of water in and around of community taps. Better filtration method like RO or UV water filters would certainly improve the quality of water especially the removal of TDS and fluorides.

FGDs with women in Koppal town showed that as households get water once in 6 days for 2 hours, women are busy in filling water as there is fear that water supply may stop and do not find time to filter water while fetching and hence use only a cloth filter. Women also shared that though doctors always advise them to boil water to prevent illness, people follow the advice irregularly or only when they fall ill.

2.5 Storage of Drinking Water

Most of the households across all the 10 villages store water only for a day. This also indicates that the gram panchayat supplies water on a daily basis or on a regular basis to the households.

FGDs in Koppal town showed that the households get water once in 6 days for only 2 hours (from 6 am to 8 am) so they have to store water. In order to store water for 5 days, each house has about 2 barrels and 25 – 30 plastic pots (*koda*). In one of the 10 villages the main problem that the households face is irregular power cuts (about 9-10 times in a day), due to which water cannot be pumped at regular timings so lot of time is wasted in waiting for the women.

2.6 Assessment of quality of water and Public Health

Water sample from all 10 villages was subjected to chemical analysis to understand chemical composition. 9 out of 10 samples had more Fluoride level than the threshold level of 1.5mg per litre. 5 out of 10 samples had higher level of TDS (Total Dissolved Solids) than the threshold which is 1000 mg per litre. The most conspicuous observation across all 10 villages was the incidence of joint pains among youth (23 to 40 years) and more than 40 year age group. In some of the villages as high as 50% of the people were prone to joint pains and on an average 30% of the people were suffering from joint pains due to higher fluoride content in the water. Presence of joint pains in the age bracket of 23 to 50 years in the population is an indication of reduced productivity and disability in their most productive years. This has serious impact on the agricultural productivity of the village and indirectly the nation. This also has an impact on the income levels of the household. Fever and cold occurrence is more in children i.e. below 14 years age during rainy and summer season.

In nutshell, majority of the households have been given drinking water access through piped sources. With more than 40 years of government's effort starting from National Rural Drinking Water Supply Program, 1969, to provide drinking water to all households has given the yield. However the effort in providing last mile connectivity seems to have forgotten first mile of conservation itself along with quality aspects of drinking water. The below results on water conservation throws appalling status of water harvesting thus threatens the sustainability of water supply infrastructure.

2.7 Water harvesting (Awareness)

Table 1. Awareness about water harvesting

Villages	Awareness Yes	Awareness No
Agalakeri	0	75
Alawandi	0	99
Belagatti	2	49
Kamanuru	1	71
Kanakapur	1	50
Kinnal	0	102
Koppal (Town)	26	125
Lebageri	0	50
Madinuru	0	73
Muddaballi	4	74
Total	34	769

In the sample population, there is little awareness about water harvesting and its benefits. Only a few respondents in Koppal town are aware of water harvesting. One of main principles in Swajaldhara and National Rural Drinking Water Programme is to take up conservation measures through rain water harvesting and ground water recharge for sustained drinking water supply. At grassroots, there is lack of awareness about recharge structures for rain water harvesting. Since most households are dependent on bore wells (i.e. ground water) for drinking water, there is need to take up conservation measures for rain water by the Government and community, otherwise there would be serious crisis for water source in the near future.

2.8 Aspiration for quality water Vs Intention to pay for it.

It is interesting to see that 88% of the respondents aspire to get safer and cleaner water compared to present available drinking water. Surprisingly, 60% of them are willing to pay additional money (though nominal) for getting cleaner and safer water while the remaining 40% are not willing to spend more. This clearly indicates the gap between the aspiration and intention to have safe drinking water.

3. ANALYSIS

In India, although the provision of rural water supply (RWS) is primarily the responsibility of the respective State Governments, the Central Government contributes a significant part of the program funds for rural water supply. Throughout the five years plans, the Central Government introduced a variety of policies and programs to address issues related to drinking water. The first National water supply and sanitation program was introduced in the period 1951-1956 as a part of the Government's health plan. The first major attention to rural water supply came with the Accelerated Rural Water Supply Program (ARWSP) in the 1970's. Following the International Drinking Water Supply and Sanitation Decade (IDWSSD, 1981-91), the second major push came by establishing the National Drinking Water Mission (NDWM) and later introduced Sector Reform Project (SRP) in 1999. The SRP is the world's largest Government sponsored demand based and participatory drinking water supply program. The Millennium Development Goals Report (2010) showed that sanitation and drinking water are often relatively low priorities on domestic budget allocation and official development assistance despite the relation between public health, poverty

reduction and economic growth for the nation. A careful analysis of the budget allocation and the schemes shows that there are some consistent inconsistencies as mentioned below.

Programmes/Schemes focus only on supply with little consideration of quality of water

Most of the programmes focus on addressing availability and accessibility of drinking water with little action on quality of drinking water being supplied. Supply of water per se will not serve the purpose as drinking water and health are highly correlated subjects. In some of the sample villages, fluoride content was as high as 2.94 mg per litre against the threshold of 1.5 mg per litre and 50% of the population in age group of 23 to 50 years were suffering from joint pains thus reducing the productivity and efficiency of human capital. Though there are monthly reports being sent to district health department regarding the occurrence of illness, little is being done to address quality of water being supplied.

Poor quality of implementation of the scheme at grassroots and lack of water harvesting measures.

Programmes are being implemented for the sake of implementation without conviction and sustainable approach. Approach should be an integrated and holistic which can only bring paradigm shift in the drinking water arena. The study shows that majority of the villagers are unaware of water harvesting and its significance. Supply of drinking water to all households can be sustainable only if the sufficient water is available. Unless ground water is recharged with focused approach, availability and supply of water will be under threat. Hence water harvesting is equally important to achieve the long term goal.

Inadequate funds and the States inability to draw more funds because of low utilization levels in the previous years.

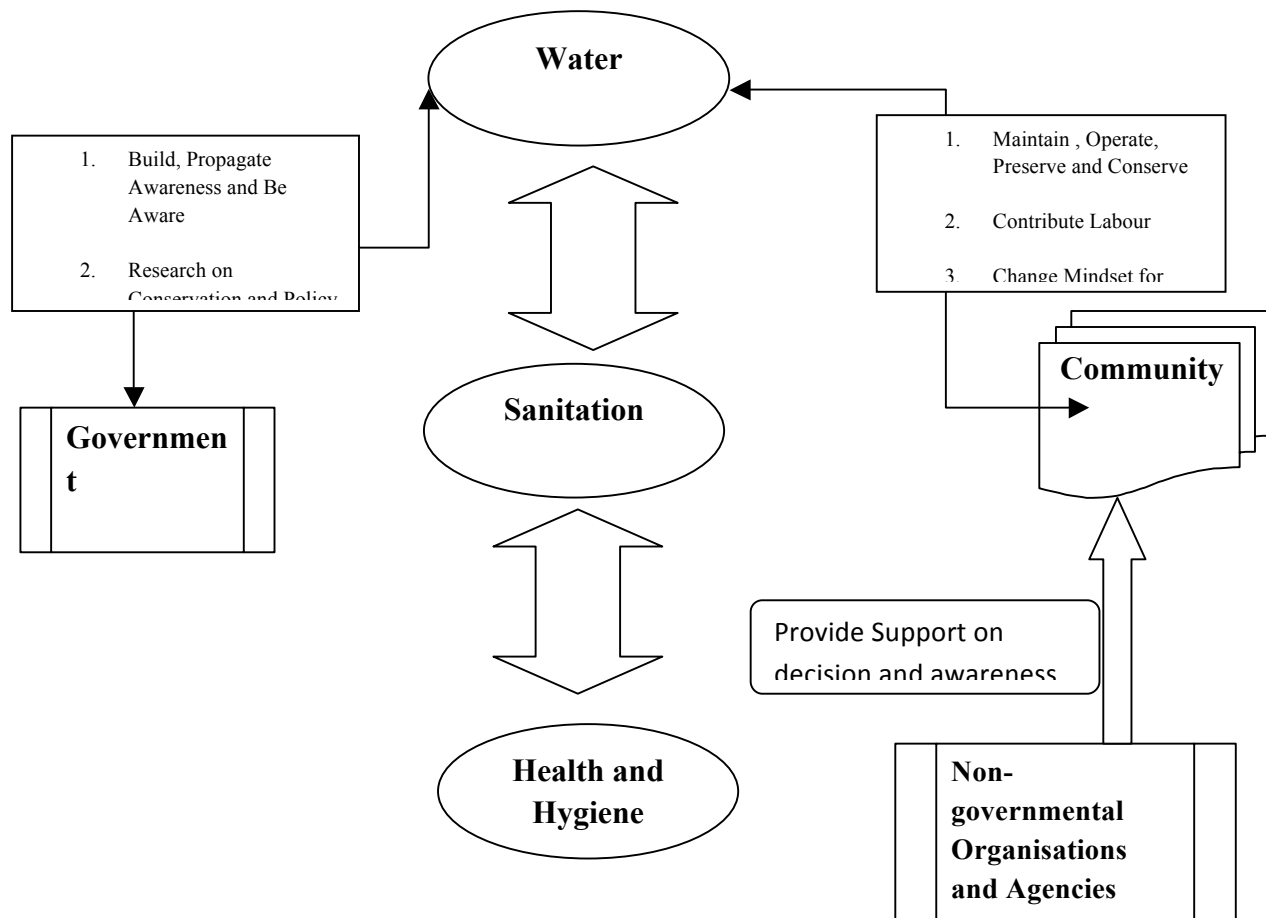
Most of the states under Total Sanitation Campaign have utilized less than 40% of the budget. Utilisation of the fund in Koppal district is only 26%.

4. WAY FORWARD AND RECOMMENDATION

At National, State and grass root level there is wealth of experiences in the areas of water, sanitation and health. At present this is scattered among diverse institutions including ministries, government departments, private institutions, civil societies like NGOs. Recognizing the connections and priorities of these sectors, there is ample scope to bring together these experiences and document best practices and what works and what does not which can be used as a planning and implementation tool and also to promote cross-sector learning. Hence we propose a model called '**Co-ordinated Effort for Enrichment of Water**' (CEEW). The model has been described below.

The model is visualized keeping in mind that Water-Sanitation-Public health are a continuum and are not different facets of community development. It aims to cover all the white spaces existing in design, implementation, co-ordination, management, maintenance and operations of programs and infrastructure with respect to water, sanitation and public health.

'Co-ordinated Effort for Enrichment of Water' (CEEW) Model



Under the model the study recommends following action plan for improvement of overall situation of drinking water, sanitation and public health in a semi-arid area like Koppal as explained below. The broad action plan mentioned in the diagram has been explained according to the themes and requirement of Koppal taluk, where the survey was conducted. The same might be extended to any district in the state.

Government

The government would be involved only in being aware, building and propagating.

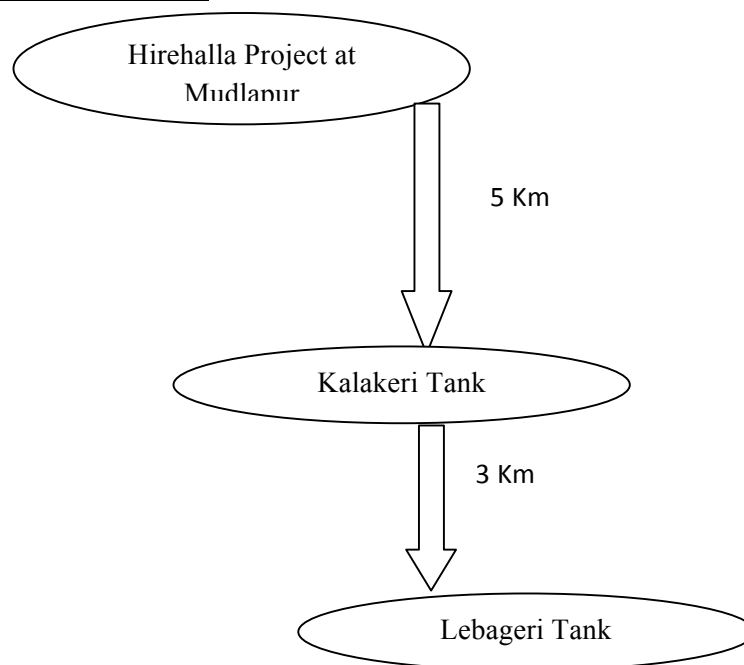
1. **Being Aware** of ground realities like facts about resources, diseases, infrastructure and its condition on a continuous basis has to happen at all levels of the government from gram panchayat level to state level. The state would then recommend appropriately to the centre for schemes and grants.

Implicative Illustration – Being aware would fill the white space such as non-response on H₂S or Flouride levels in water. Just religiously following report formats would be avoided and better action based MIS can be generated once the government is aware of the facts and figures at the ground on a regular basis.

2. **Building** infrastructure has always been focus area of the government since Independence. However, the quality aspects and completeness of projects have been an issue. Special feedback from the community has to be sought for any infrastructure projects that affect them.

Implicative Illustration – Recently Hirehalla yojane has been completed in Koppal district which covers Kinnal village. While doing a PRA exercise at Lebageri (neighbour village) on water resource mapping, it was revealed that the Hirehalla project is connected till Mudlapur and it is only 8 km away from Lebageri tank. Connecting Hirehalla with Kalakeri tank and then to Lebageri tank would significantly improve the water table levels of all the villages and re-charge certain bore-wells and wells in the area. Lebageri tank is 32 hectares in area and when filled will provide water for 2 years for both Lebageri and Kamanuru village.

Map drawn by community in PRA exercise



Community

Community has to **maintain, operate, conserve and preserve** the resources and infrastructure built and provided by the government. The government on its part can integrate schemes already existing for involving the community and incentivize them. Few examples are given below –

1. Using community labor for building re-charge pits along the roads of the area to collect water and gradually allow seepage of water into ground. This would significantly improve the water table levels and re-charge dried sources. This would also help in increasing availability of resources during summer season. The labor could be paid through schemes like MGNREGA.
2. Maintenance of public toilets could be arranged through covering the same under MGNREGA. This would bring better sanitation in villages and encourage people to do the work.

Community must also **conserve** resources of water and land. Rain Water harvesting should be followed more extensively and widely. The same should be made mandatory for all famers having more than 2 acres of land and above by the gram panchayat in the semi-arid areas. Building necessary structures for the same should be supported by the government. Similarly land degradation due to open defecation and sewage let out should be checked by the community by building co-operative collection for human and animal excreta and preparing bio-manure.

Community should change their mind set for better future by using community toilets or household toilets. NGOs and other agencies as detailed in the Annexure 5 can provide support to the community in making decisions for better and sustainable future.

Other Agencies

It will be useful to set up state resource centre on water, sanitation and health for collection, compiling and disseminating information on water resources. The centre can play an important role in advocacy at policy level and can also network agencies including departments, NGOs/INGOs, private institutions work in water, sanitation and health sectors.

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