Traditional Practices to Improve the Drinking Water Quality in Rural Areas

J. Prakash
Swarnandhra Collage of Engineering and Technology (SCET)-A2, Narsapur, India

Abstract
Water is an important resource to every livingbeing. It is our duty to keep water pure. It is better to follow traditional practices to improve drinking water quality in rural areas, like using natural coagulants for the purification of muddy water, inhibits growth of fungi. We have to use copper or brass pots which protect from breed of bacteria. We have to follow water conservation measures for sustainability of sources and systems like scaling up the reform initiative for community involvement in operation and maintenance of drinking water schemes, rain water harvesting, and ground water recharge.

Keywords
Traditional Practices, Water sheds, Rain water harvesting, Natural Coagulants.

I. Introduction

Water quality is affected by both point and non-point sources of pollution. These include sewage discharge, discharge from industries, run-off from agricultural fields and urban run-off. Water quality is also affected by floods and droughts and can also arise from lack of awareness and education among users. The need for user involvement in maintaining water quality and looking at other aspects like hygiene, environment sanitation, storage and disposal are critical elements to maintain the quality of water resources.
Bacterial contamination of water continues to be a widespread problem across the country and is a major cause of illness and deaths with 37.7 million affected by waterborne diseases annually. The major pathogenic organisms responsible for water borne diseases in India are bacteria (E Coli, Shigella, V cholera), viruses (Hepatitis A, Polio Virus, Rota Virus) and parasites (E histolytica, Giardia, Hook worm).
Another major cause for concern is the pollution of ground and surface water from increased fertilizer and pesticide use in agriculture and from industrial sources. The rise in the usage of such compounds has degraded the quality of surface water resources by causing nitrate contamination.

A. The current situation-Water source problems

The major water source problems are (i) High dependence on ground water (85%), (ii) Over extraction of ground water for irrigation, (iii) Uncontrolled deforestation, (iv) Neglect of traditional practices and systems, including rain water harvesting, (v) Inadequate integrated water management & watershed development. Heavy extraction of ground water, especially for irrigation-groundwater levels in many areas have fallen by more than 4 meters. In coastal areas saline water intrusion resulted in contamination of the potable ground water aquifers. Presence of high concentration of Arsenic & Fluoride in ground waters based drinking water sources is attributed to anthropogenic & geogenic.

II. Materials and Methods

A. M.Oleifera

Plant species - Genus Moringa Family- Moringaceae. Common Name- Drum stick (Golden shower) Moringaoleifera, known as Moringa, is native to north India but is now found throughout the tropics. It grows fast and reaches up to 12m. The bark is grey and thick and looks like cork, peeling in patches. Moringa is full of nutrients and vitamins and is good in your food as well as in the food of your animals. Moringa helps to clean dirty water and is a useful source of medecines.

B. Okra

Plant species – A.esculentus Family- Mavacae Common Name- lady's finger or Gumbo Okra Abelmoschusesculentus L. (Moench), is an economically important vegetable crop grown in tropical and sub-tropical parts of the world. This crop is suitable for cultivation as a garden crop as well as on large commercial farms. Okra gum is soluble in cold water. It is used in the food industry as a good emulsifying and foam stabilizing agent. It is observed that whatever the volume of gumbo mucilage, the turbidity decreases when the pH increases. The reduction in turbidity is significant when the volume of mucilage used, confirming the preceding results. The mucilage, from its sticky nature, contains polymer molecules (Nacoulima et al, 2000). The flocculating activity can be either due to a chemical reaction, or a complex formation.

C. Copper and Copper Alloys and Anti-Bacterial Anti-Microbial Uses

Copper and Copper Alloys have long been used for their anti-biofouling properties especially in shipbuilding, water treatment systems and related applications. Less well known is the fact that slugs and snails have an aversion to Copper and generally will not cross over it. This has been used to good effect to protect mail within post-boxes from attack – Snails it seems are partial to some of the paper and glue combinations used for envelopes! It should of course be used far more widely to protect plants from attack. Equally, Moulds and fungi will not grow and are inactivated on copper surfaces. More recently it has been shown that a number of harmful bacteria such as Listeria, E-Coli & MRSA survive for much shorter periods of time on Copper and Brass surfaces than on Stainless Steel. This natural Anti-Microbial or Bactericidal property could prove of major benefit in the fight against infection in hospitals and food processing or preparation facilities.

1. Anti-Biofouling

This is simply defined as the ability to inhibit the deposition of bacteria, moulds, algae, fungi and other organic matter such as barnacles, crustaceans, etc. Copper, Brass, Bronze and Copper-Nickel have all been used to good effect in marine environments where their other properties including corrosion resistance and high strength have also made them particularly suitable solutions.

2. Combating Slugs & Snails

Copper strip has been effectively protecting wall mounted mail boxes in the West of England for over 10 years. It apparently gives them a shock similar to when cooking foil makes contact with an amalgam tooth filling! This is an excellent and very

environmentally-friendly alternative to other methods that generally involve undesirable chemicals and pesticides. Note that the Copper is most effective when kept bright and shiny. An effective range of products has been commercially available for some time but these have not yet become well known: ~ Copper Slug Rings – Adjustable rings to scrunch lightly into the soil around target plants ~ Copper Snail & Slug Tape – Self-adhesive tape for application to plant pots or pet-food bowls ~ Slug & Snail Shocka Mats – A roll of ground-cover fabric coated with copper - Cut the mat to size and place under pots or use to create a collar around susceptible plants like hostas, strawberries and lettuce.

3. Combating Micro-Organisms

Recent and ongoing research at various laboratories throughout the world, notably pioneered at Southampton University, has shown that Copper-based alloy surfaces are a better solution than Stainless Steel as they inactivate the MRSA 'superbug' which persist on stainless for extended periods.

4. Applications

As has already been shown, these valuable properties of Copper alloys can be exploited in a wide range of applications, which can be sub-divided as follows: (i) Anti-Biofouling (ii) Pest Control (iii) Anti-Microbial Applications – Anti-Biofouling Copper was first used in this application during Nelson's time. When 60/40 Brasses were developed and hot rolled brass sheet became available this was a better choice and lower cost so would have been used on the CuttySark. Today Copper Nickel alloys are the preferred solution due to their improved strength and higher corrosion resistance. (iv) Hull cladding for ship building and boat building (v) Solid hulls (The Copper Mariner was one of the early vessels to have a solid Copper-Nickel hull and after 16 years it has not required lifting for hull cleaning) (vi) Cladding the legs of marine structures such as oil rigs, piers, jetties, etc. Applications – Anti-Microbial Copper and Copper alloy surfaces can now be considered a better solution than the traditionally used Stainless Steel in a number of applications where the inactivation of various organisms such as bacteria (MRSA, E-Coli, Listeria) moulds and fungi is desirable. (vii) Touch Surfaces and Door Furniture in health-care facilities (Handles, Levers, Knobs, Push-Plates, Grab Bars, Railings, Switch Plates, etc.) (viii) Taps, Sinks and Work Surfaces in Health-Care Facilities (ix) Patient Handling Equipment (x) Taps, Sinks and Work Surfaces in Food Processing/ Preparation Facilities (xi) Drinking Water and Water Treatment Systems (xii) Food Preparation Surfaces (xiii) Cooking Pots, Pans and Utensils copper and health (xiv) Copper is necessary for the growth, development and maintenance of bone, connective tissue, brain, heart and human life (xv) Copper is involved in the formation of red blood cells, the absorption and utilization of iron, plus the synthesis and release of life-sustaining proteins and enzymes (xvi) Copper is known to stimulate the immune system, repair injured tissue and promote healing (xvii) Copper is essential for the normal growth and development of a human foetus, infants and children.

D. Rainwater Harvesting

Rainwater harvesting is a technique of increasing the recharge of groundwater by capturing and storing rainwater. This is done by constructing special water-harvesting structures like dug wells, percolation pits, lagoons, check dams etc. Rain water, wherever it falls iscaptured and pollution of this water is prevented. Rainwater harvesting is not only proving useful for poor and scanty rainfall regions but also for the rich ones. The objectives of rain water harvesting are i) to reduce run off loss ii) to avoid flooding of roads iii) to meet the increasing demands of water iv) to raise the water table by recharging ground water v) to reduce groundwater contamination vi) to supplement groundwater supplies during lean season. [2]

1. Traditional rainwater harvesting

In India it is an old practice in high rainfall areas to collect rainwater from roof-tops into storage tanks. In foot hills, water flowing from springs iscollected by embankment type water storage.In Himalayan foot-hills people use the hollow bamboos as pipelines to transport the water of natural springs. Rajasthan is known for its 'tankas' (underground tanks) and khadins (embankments) for harvesting rainwater. In ancient times we had adequate talaabs, Baawaris, Johars, Hauz etc. in every city, village and capital cities of out kings and lords, which were used to collect rainwater and ensured adequate water supply in dry periods. [2]

2. Modern techniques of Rainwater Harvesting

In arid and semi-arid regions artificial ground water recharging is done by constructing shallow percolation tanks. Check-dams made of any suitable native material (brush, poles,rocks, plants, loose rocks, wire nets, stones, slabs, sacks etc.,) are constructed for harvesting runoff from large catchments areas. Rajendra Singh of Rajasthan popularly known as "water man"has been doing a commendable job for harvesting rainwater by building check dams in Rajasthan and he was honoured with the prestigious Magsaysay Award for his work.

Groundwater flow can be intercepted by building groundwater dams for storing water underground. As compared to surface dams, groundwater dams have several advantages like minimum evaporation loss, reduced changes of contamination etc., In roof top rainwater harvesting which is a low cost and effective technique for urban houses and buildings, the rain-water from the top of the roofs is diverted to some surface tank or pit through a delivery system which can be later used for several purposes. Also, it can be used to recharge underground aquifers by diverting the stored water to some abandoned dug-well or by using a hand pump. [2]

III. Results and Discussions

Move away from dependency on one source to a combination of sources. Greater emphasis on individual roof-water harvesting. The right of individual exploitation of groundwater needs to be restricted both for economic reasons and for equitable distribution. For mitigation of quality problems steps have been initiated to shift form ground water based to surface water used schemes and also conjunctive use of ground water, surface water and roof-water harvesting.

A. Dual water supply and waste water treatment

To reduce the burden on fresh water sources, the option of dual water system is being worked out in several parts of the country. The success of this system lies in the fact that filtered purified water is used only for drinking purposes while other source of water may be used for purposes other than drinking. This is also is cost saving measure as resources spent on providing clean water is saved by using alternate sources. Waste water treatment can also be another effective means of reducing the burden on freshwater sources. The treated waste water can be used for purposes other than drinking. One example of effective wastewater treatment is

in Mehsana district of Gujarat where wastewater from homes in villages is used for agriculture. The wastewater coming out of homes is collected in a pond which is then auctioned to farmers for use in agriculture. The subsequent boxes depict the use of dual water supply in Gujarat and Madhya Pradesh.

B. Exploring Simple, Low Cost Treatment Technologies

Once contamination is detected in a water source, there is need for treatment. In case of rural areas, modern water purification technologies might not be viable. In villages, it is important that simple technologies that are easy to use and can be operated without much technical know-how be promoted. The price factor is also important as technologies with high operational and recurring costs might not be useful. In India, one cannot neglect the use of traditional methods of water purification.The use of traditional methods, however, should not be publicized unless its effectiveness has been proved through appropriate research.

Water purification can be carried out at the household level and at the community level. When one is talking about community based water purification systems, issues of ownership and equitable distribution becomes important. Social factors can play a role in determining access to water. In case of community based water purification systems, there should be a mechanism of contribution by the community and they can be made responsible for maintenance to ensure sustainability.

C. Traditional Practices of Water Purification Action

(i) Strychancspotatroum (Kataka seeds) are natural coagulants used for the purification of muddy water. (ii) Morengaolifers (drumstick) seeds are used as a coagulant. They also inhibit the growth of bacteria and fungi. (iii) Vetiveriazizanoides (khas) are laid in a clay jar which has a few tiny holes in its bottom. Water filtered through this layer of roots is not only clear but also has a pleasant smell. (iv) Dusting of water with plant ashes, earth from termite hills, paddy husks or crushed seed coats from elaichi(Elettariacardamum) improves clarity of water.(v) Osimum sanctum (Tulsi) is a water purifier with antibacterial an insecticidal properties. (vi) Water stored in Copper or brass pots do not breed bacteria. The selection of an appropriate technology is governed by acceptance by users. Use of modern technologies such as reverse osmosis and ozonation are effective in the treatment of water but their feasibility in a rural setting needs to be worked out in terms of capital expenditure and manpower in operating and maintaining such systems. There is also a need for proper field testing before any product is launched with proper certification and validation by prescribed authorities.

IV. Conclusion

Awareness, surveillance, monitoring and testing, mitigation measures, availability of alternate water sources and adoption of hygienic practices continues to remain roadblocks. There is a need to promote sanitary inspection along with the community based water quality monitoring and surveillance at the grass root level as a mechanism to identify problems and to take corrective measures. One of the greatest challenges has been the convergence of various departments associated with water: water and sanitation programmes have operated largely in isolation from programmes in health and education. A wider approach is needed where water and sanitation issues are looked at with the aim of reducing disease, improving hygiene, improving educational levels and reducing poverty. It is our duty to create awareness among people about the above mention traditional techniques to improve the quality of water which is necessary for our health.

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