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### Emerging trends towards zero maintenance sustainable water filters for rural areas

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#### Abstract

Water is required for sustaining life. Having access to clean and affordable drinking water is akin to a luxury in India while almost all of the people living in the developed region have access to improved drinking water, more than 30% of people living in the rural areas do not have access to improved drinking water. According to the World Bank, 85% of rural India's drinking water requirements are satisfied by groundwater sources. These vital resources are depleting, and witnessing contamination that is threatening the lives of both the rural as well as the urban population. Filtration is a simple water treatment process capable of removing colloids, suspended solids, and pathogens from drinking water sources. Its main removal mechanism is size exclusion. A well-designed filtration system will be able to generate a clean stream of drinking water.

**Keywords:** Low cost, low maintenance

#### Introduction

Poor sanitation and hygiene cause pathogens to contaminate surface water and groundwater. Ingestion of contaminated water often results in waterborne disease, causing one to experience health symptoms such as diarrhea, vomiting, and gastroenteritis. In India, about 1.4 million children die from diarrhea diseases every year as a consequence of usage of contaminated water. Aquifers, or underground water, provide 85% of drinking water, but 56% of the country is facing a drop in the water levels. People are aware of the dangers of contaminated water, but usually, do not have the resources to obtain clean drinking water. A study by Organisation for Economic Co-operation and development says that every rupee invested in clean water in India can yield 4-12 rupee of economic return.

Solutions such as RO water purifying systems and other filters may seem like decent alternatives, but these are either costly, or negatively impact the environment. In fact, using RO purifiers does more harm than good, as the machines tend to waste more water than they treat. For communities in rural areas, the majority of drinking water-related issues are due to pathogens from poor sanitation, resulting in infection and diarrhea. One cause of this is that these communities often do not have access to centralized water treatment facilities. This has led to the present day crisis where most of the urban households and industries need to use sustainable water filtering systems to access to pure water. However, most of the population who live in rural areas cannot afford these high-cost technologies and are forced to use contaminated water.

Though India is water rich country with 4% of world's water resources, still we are facing acute shortage of clean drinking water. Let's take an example of Uttarakhand, famous for "Panch Prayag", still there is crisis of clean drinking water, because of lack of water filter in these fragile environments. Being a Himalayan state, it is Quite challenging for government to maintain water filtration on timely basis. Thus, Government is working on "Zero maintenance sustainable water filter" to make it possible to reach clean drinking water to every rural area of our country including Himalayan states.

Water being a state subject, sometimes it becomes problem for state government to provide filtered water specially in rural areas, due to scarcity of fund. So this is the need of the hour to spread awareness among public, community, tribes about Zero maintenance sustainable water filter.

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Because of low maintenance costs government can easily target every rural area without having any funding issue. Timely maintenance of water filter or setting up a new water filter every 5 year is not possible for state government. That's why these days there is an awareness about low maintaining water filters.

### **Zero maintenance sustainable water filters which could be used in rural areas**

Point-of-use (POU) systems are key solutions for treating water in developing communities; they are typically user-friendly, low cost, low maintenance, and grid-independent. Importantly, they treat and reduce the number of pathogens in water supplies, and many POU systems have been deployed and used by these communities, improving their livelihood.

Second is Gujarat based startup like "sustainable livelihood initiative India" a water purifier that makes polluted water drinkable within minutes and has no movable parts, thus saving on maintenance and replacement. The system is named "Vardan", and cleans water at 8 paise per litre. Vardan' aims to be the World's Cheapest Complete Water Purifier. There are no complex membranes or mechanical parts used in Vardan. This brings down the maintenance costs drastically to almost zero. A RO filter wastes at least a litre of water as reject for every litre of water purified. Vardan wastes nothing. The Ultraviolet (UV) Germicidal light used in Vardan is powered by PV Solar Cells made from e-waste. Hence no external energy is required. The purification system will last at least 10 years at negligible maintenance (changing UV light and Activated Carbon chamber).

Third one, Slow-sand water filters such as the model designed by the fellows of the Institute of Catholic Bioethics effectively reduce coliform bacteria, bacterial indicators for the quality of water, to safe limits for drinking: Most slow-sand filters can remove 99% of bacteria, and some are even effective in removing some viruses (the Institute of Catholic Bioethics did not test the filter for removing viruses and parasites however). Through four months of testing, the slow-sand water filter developed by the fellows of the Institute of Catholic Bioethics has proven to reduce coliform bacteria by approximately 99% under ideal conditions Slow-sand filters have been shown to not only improve public health, but also stimulate economic growth. More than 200 million hours each day are spent by women and children collecting water from distant and often polluted sources. Rather than spending their day in the classroom, children are spending their day collecting water. Without education, progress is very difficult for rural area.

Fourth one is, The unique low-cost solar water purifier (SWP) does not require electricity and can be produced by village craftsmen, claim its developers at the Nimbkar Agricultural Research Institute (NARI), an NGO working at Phaltan in rural Maharashtra. Also, unlike commercially available water purifiers, the SWP does not suffer from problems like filter clogging or wastage of water. They have used cotton cloth as water filter.

Fifth one is, Bamboo charcol, During water purification processes, bamboo charcoal even dissolves its rich mineral contents into the water, so the purified water becomes mineral-rich. Apart from the use of bamboo, they also propose to use gravel and pebbles in various stages to aid particle sedimentation and thus further purification.

### **Why there is a need of zero maintenance sustainable water filters**

Communities still do not have purification systems to enjoy safe drinking water, especially in rural communities. Technical and financial challenges do not permit the implementation of purification systems. The World Health Organization (WHO) established simple, acceptable and low-cost measurements for the communities to improve the microbiological quality of the water preventing diseases, including death caused by diarrhea. The reason decentralized low-cost systems, such as the homemade adsorption processes widely used in under-developed area is that, lack of funding with government and some Himalayan states have a very fragile environments that construction work is not easy there. So, moving towards Zero Maintenance Sustainable Water is the only viable solution right now. And it will be a win win situation for government, environment and community ie, if public will switch towards zero maintenance sustainable water filter, it will reduce the burden of government funding and people will get clean drinking water, that will help them keep hydrated, and prevent them from any waterborne disease and similarly there will be no adverse impact on environment also.

### **Water purifier in rural market**

In the last few years, numerous multinational and national company launches low cost water filter, which is designed to be used in rural households that have no electricity or running water, using ash from rice milling to filter out bacteria. The device, which will cost less than 1,000 rupees such as The Tata Swach, Pureit and Zero-B etc. Multinational and national company profit making business and monopoly in replacement for filter after filtering of 1500-2500 liter of water. Changing for filter it costs about 40% of new one filter.

### **Conclusion**

The provision of clean drinking water has been given priority in the Constitution of India. Various steps taken by India's central, state, and local governments taking to address water issues with community level. One of the greatest challenges has been the convergence of various departments associated with Water. Role of Civil Society and Communities to create awareness towards zero maintenance sustainable technology in rural area. For example, Anna Hazare has transformed the village of Ralegan Siddhi in Maharashtra into a model sustainable village through water harvesting and cooperation. Another example is Rajendra Singh, whose NGO Tarun Bharat Sangh has transformed the Alwar District of Rajasthan through community based efforts in water harvesting and water management. Now time and demands for clean water in every household in rural area with Low cost technology water treatment technology. Unsafe drinking water not only adversely affects the individual and the family, but society as a whole. Water is essential for life; therefore, it is one of the highest priorities in the lives of people who find themselves in situations in which clean water is unavailable. Finding drinking water becomes the central focus of daily life rather than education, employment, and development. The immediate need for sustainable water filter takes a higher priority than anything else and hinders further development, preventing developing countries from breaking out of a devastating cycle of poverty. Water being a state subject, sometimes it becomes problem for state government to provide filtered water specially in rural areas, due to scarcity of fund. So this is the need of the hour to spread awareness among public, community, tribes about Zero maintenance sustainable water filter. Because of low maintenance costs

government can easily target every rural area without having any funding issue.

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