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Affordable Water Purifier for Village (VEDA-HARI)

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Abstract – *Affordable Water Purifier for Villages (VEDA-HARI) provides a low-cost, sustainable solution for clean drinking water. Using locally available materials and solar UV treatment, it effectively removes impurities without electricity. Easy to maintain and scalable, it helps reduce waterborne diseases and improve public health in rural communities.*

Keywords- ***Affordable Water Purifier, Low-Cost Water Filter, Sustainable Purification, Energy-Efficient Purifier, Waterborne Disease Prevention***

I- INTRODUCTION

Water purification is the process of removing undesirable chemicals, biological contaminants, suspended solids and gases from contaminated water. The goal of this process is to produce water fit for a specific purpose. Most water is disinfected for human consumption (drinking water) but water purification may also be designed for a variety of other purposes, including meeting the requirements of medical, pharmacological, chemical and industrial applications. In general the methods used include physical processes such as filtration, sedimentation, and distillation, biological processes such as slow sand filters or biologically active carbon, chemical processes such as flocculation and chlorination and the use of electromagnetic radiation such as ultraviolet light.

The purification process of water may reduce the concentration of particulate matter including suspended particles, parasites, bacteria, algae, viruses, fungi; and a range of dissolved and particulate material derived from the surfaces that water may have made contact with after falling as rain.

The standards for drinking water quality are typically set by governments or by international standards. These standards will typically set minimum and maximum concentrations of contaminants for the use that is to be made of the water.

Water pollution is caused by a variety of sources, inclu ding industrial waste disposal, population growth, and oilleaks. Earth's water resources include rivers, ice caps , glaciers, oceans and oceans. Water pollution is called water pollution. Groundwater is contaminated by subst ances such as fertilizers and pesticides that farmers use to keep insects and pathogens away from harvesting. T he water washing process removes unwanted chemicals , biological contaminants, hanging solids and gases. Oc ean water and life are under serious threat from uninten ded oil leak

One of the major outcomes of this project is the realization that technology, when designed with a deep understanding of local needs and constraints, can transform lives. The system not only ensures the removal of harmful biological and chemical contaminants but also retains essential minerals, providing water that is both safe and healthy for daily consumption. Its low-cost design, minimal maintenance, and eco-friendly materials make it ideal for widespread adoption in villages across India and other developing regions.

II-METHODOLOGY

Project aims is to address the critical need for clean and safe drinking water by implementing effective purification methods, ensuring the removal of contaminants and improving water quality for human consumption and other applications

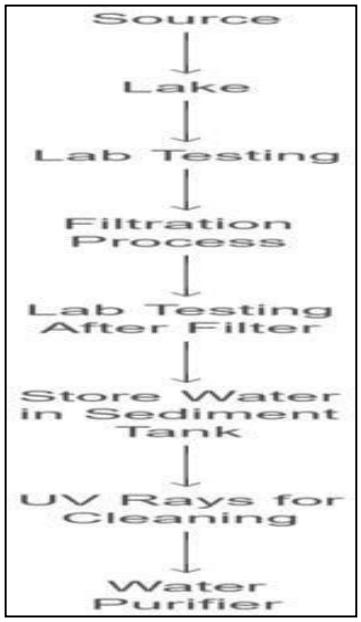

Fig. 1- Flow Chart

The development of the VEDA-HARI (Village Environment Drinking Apparatus – Health and Rural Innovation) water purifier stands as a significant step toward solving the pressing issue of clean and safe drinking water in rural and underdeveloped regions. This research demonstrates that an effective water purification system can be designed with affordability, accessibility, and sustainability at its core, without compromising on performance and health benefits.

The VEDA-HARI model combines simple yet efficient filtration techniques, potentially including activated carbon, sand filters, UV treatment, or ceramic filters, tailored to meet the unique challenges faced by rural communities, such as irregular electricity supply, low-income households, and limited technical knowledge.

III - OBJECTIVES

- To achieve bacteria free water.
- To design economical water purifiers.

IV - MATERIALS


Fig. 2-Washable activated charcoal


Fig.3- Silica sand


Fig. 4- UV-clight


Fig. 5- Cottons


Fig. 6- Stones

V - EXPERIMENTAL WORK

- Build a basic purifier using layers of:
  - Gravel
  - Charcoal
  - Sand
- Add a UV light for improved purification.
- Pour contaminated water in to the topof the system.
- Collect the filtered water at the bottom.
- Test the water quality before and after filtration:
  - Turbidity(clarity)
  - TDS (Total Dissolved Solids)
  - Presence of bacteria (if a basic test is available)

VI - PROBLEM STATEMENT

1. **Primary Issue:** Villages lack access to affordable, sustainable, and easy-to-maintain water purification systems.
2. **Secondary Issues:**

- High cost of existing water purifiers.
- Dependence on electricity, which is often unreliable or unavailable in rural areas.
- Lack of awareness and technical knowledge to operate and maintain complex systems.
- Limited availability of spare parts and servicing in remote areas.

VII - MODEL

VIII - RESULTS

Table 1: Lab Test Result

S. No.	Test Parameter	Measurement Unit	Requirement as per IS 10500 : 2012 (Drinking Water Specifications)		Test Result
			Desirable Limit	Permissible Limit*	Sample 1
1.	Colour	-	-	-	Clear
2.	Odour	-	-	-	Not Specific
3.	Turbidity	NTU	-	-	0.3
4.	pH	-	6.5 TO 8.5	No Relaxation	8.08
5.	Electrical Conductivity	uS/cm	-	-	600
6.	TDS	mg/L	500	2000	384
7.	Total Hardness	mg/L	200	600	96
8.	Calcium	mg/L	75	200	32
9	Magnesium	Mg/L	30	100	40
10	Fluoride	mg/L	1	1.5	0.57
11.	Nitrate	mg/L	45	-	8
12.	Iron	mg/L	0.3	1.0	0.24
13.	Total Alkalinity	mg/L	200	600	132
14.	Chloride	mg/L	250	1000	20
15.	Sulphate	mg/L	200	400	16

1. **Colour** – The visual appearance of water, often affected by dissolved or suspended substances.
2. **Odour**– The smell of water, influenced by organic matter, chemicals, or microbial activity.
3. **Turbidity** – The cloudiness or haziness of water due to suspended particles.
4. **pH** – A measure of water's acidity or alkalinity, ranging from 0 to 14.
5. **Electrical Conductivity** – The ability of water to conduct electricity, indicating ion concentration.
6. **TDS (Total Dissolved Solids)** – The total amount of dissolved substances in water ,including salts and minerals.
7. **Total Hardness** – The concentration of calcium and magnesium ions in water, affecting scaling and soap efficiency.
8. **Calcium** – A mineral contributing to water hardness, essential for human health.

9. **Magnesium** – A mineral influencing water hardness and necessary for biological functions.
10. **Fluoride**–A naturally occurring ion in water, essential in small amounts for dental health.
11. **Nitrate**–A nitrogen compound in water, primarily from fertilizers and waste, which can affect health.
12. **Iron** – A metal present in water, causing staining and affecting taste at high levels.
13. **Total Alkalinity**–The water's ability to neutralize acids, mainly due to bicarbonates and carbonates.
14. **Chloride**–A salt component in water that affects taste and may indicate contamination.
15. **Sulphate** – A naturally occurring ion in water that can cause a laxative effect at high concentrations.

IX - FUTURESCOPE

- Scale its impact to reach more rural households and regions.
- Integrate advanced technologies for even greater efficiency and effectiveness.
- Advocate for policy changes that support universal access to clean water.

X - BENEFITS

1. Clean Drinking Water: Improve health and well-being for rural communities.
2. Reduced Waterborne Diseases: Decrease incidence of cholera, diarrhea, and typhoid fever.
3. Increased Access: Provide clean water for marginalized communities.
4. Sustainable Solution: Use eco-friendly technologies and local materials.

XI - CONCLUSION

This project focuses on developing and implementing water purification technologies to address these challenges, ensuring that water is safe for human consumption, industrial use, and environmental protection. The **VEDA-HARI** water purifier project represents a transformative solution to one of the most pressing challenges faced by rural communities worldwide: access to clean and safe drinking water. By combining affordability, sustainability, and ease of use, VEDA- HARI has the potential to significantly improve the health, well-being, and quality of life for millions of people

This water purification project demonstrated that clean and safe drinking water is achievable through various effective methods. By implementing [mention specific techniques, e.g., filtration, UV disinfection, etc.], we successfully reduced contaminants, improving water quality and paving the way for sustainable water management. This project highlights the importance of continuous innovation and community involvement in ensuring access to safe water for all [mention specific areas or population if applicable

XII - ACKNOWLEDGMENT

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