From waste to wealth : Reviving grey Water with Mokra tablets and Bio trio solution

PROBLEM STATEMENT : Grey Water Management & Reuse
Wet- land Management Water Conservation

Problem & Proposed Solution

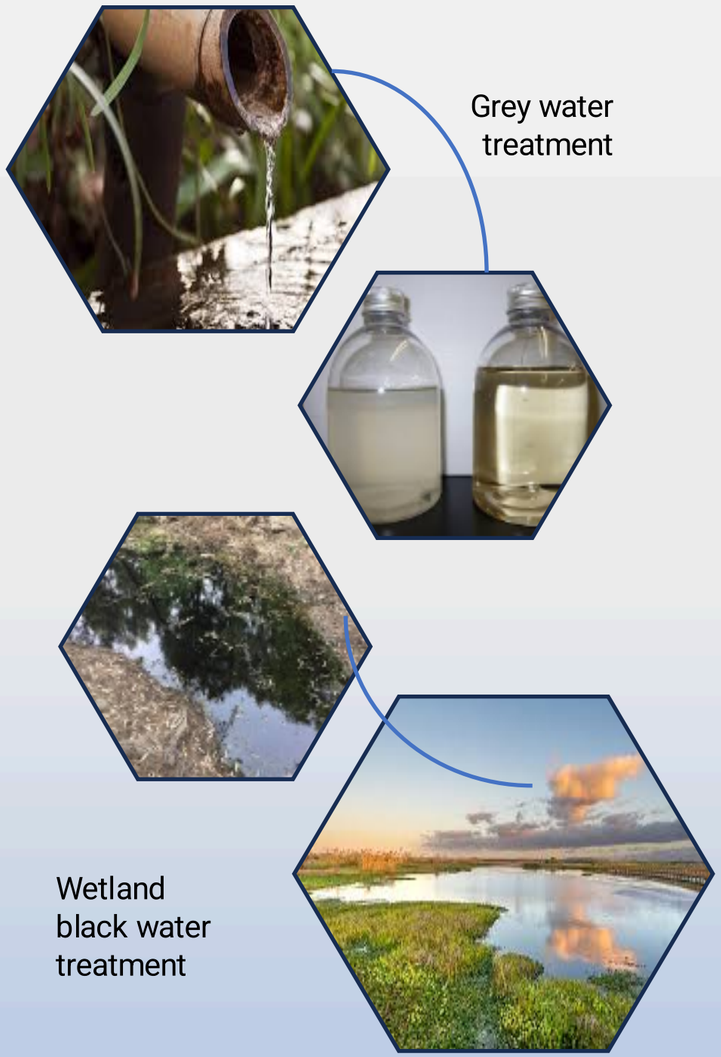
- **Problem:** Greywater and wetland water are often wasted or untreated, increasing pressure on freshwater resources.

Reuse and utilization of this water help conserve freshwater by treating and recycling them for irrigation, toilet flushing, and landscaping, reducing environmental impact and resource pressure.

Proposed Solution uses two natural product:

- ✓ **Mokra Tablets** – made from *moringa* and *okra*; acts as a natural bio-flocculant for greywater treatment.
- ✓ **BIO-TRIO Liquid** – a detoxifying liquid from *water hyacinth*, *neem*, and *banana leaf extract* for wetland water purification.

- Both supported by a **rhizobium-based plant bed** (pea and soybean) to enhance long-term purification and reuse.



Diagrammatic approach of making “ MOKRA TABLETS” and “ BIO-TRIO LIQUID”

Okra

Okra powder

Moringa powder

Nee m oil

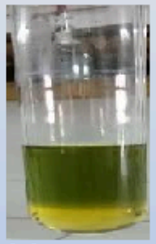
charcoal

Starch

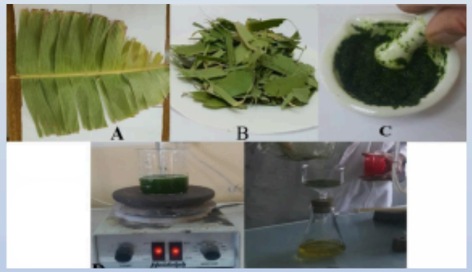
Okra powder, moringa powder. Neem oil, activated charcoal , starch respectively .
“MOKRA TABLETS”

Water hycinth

Water hyacinth extract



Neem extract



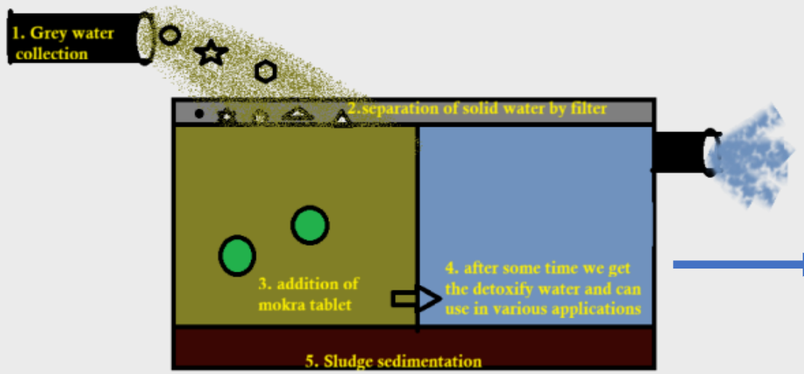
Banana leaf extract

Water hyacinth extract , neem extract , banana leaf extract respectively
“BIO –TRIO SOLUTION”

TECHNICAL APPROACH

Process of implementation

Greywater Treatment with MOKRA TABLETS:



Excess water is sent to nearby wetlands

1. Clear top water → reused for cleaning, gardening, or toilet flushing
2. Add Mokra Tablet → allow coagulation and settling.
3. Collect greywater → remove solid particles
4. Settled sludge → reused as organic fertilizer

Wetland Water Treatment with BIO-TRIO (Innovation):

1.

Plant bed

2.

Bio-Trio Solution

1. Prepare rhizobium-based plant bed (pea, soybean)
2. Add Bio-Trio Liquid into wetland water → Plant roots and bio-liquid together remove toxins and microbes.
3. Output → cleaner reusable water and improved soil fertility

IMPACT AND BENEFITS

❖ The proposed solution promotes sustainable water management by treating and reusing grey and wetland water. This approach reduces pollution, conserves freshwater, supports biodiversity, and improves rural livelihoods through eco-friendly practices.

Impact

- Reduces greywater discharge by Reusing it .
- **Prevents wetland pollution** & restores ecosystem health.
- **Improves water quality** thus supports fishes, plants, and biodiversity.
- Provides clean water back to the community for **farming and household use.**
- **Improves hygiene** and **reduces waterborne diseases** in rural areas.

Benefits

- Low – cost (Rs 5 per tablet and solution cost Rs 59 per litre) and eco – friendly cause it uses local plants like okra, moringa, banana leaf .
- **Saves freshwater** demand by 30-40% .
- **Easy to apply and simple process to maintain** (students, rural people can manage it).
- **Creates extra income** from plant bed harvest and mokra tablets.
- **Supports rural livelihood** while restoring the natural ecosystem.

Feasibility & Viability

Product 1: Mokra Tablets (Moringa + Okra + Charcoal + Starch)	**Product 2: Bio-Trio Liquid (Water Hyacinth + Neem + Banana Leaf Extract)**
• **Feasibility** Made from **locally available, low-cost raw materials**. **Simple preparation**: drying → grinding → mixing → tablet pressing. Works through **coagulation, flocculation, and adsorption** → removes turbidity ,odor, micro nutrient. Requires only **basic lab tools**- Grinder, dryer, tablet press mold. Easy to store, transport and use.	• **Feasibility** Uses **waste biomass (water hyacinth)** + medicinal plants. **Easy process**: collection → extraction → filtration → bottling. Targets **organic load, microbial contamination, and odor**. Requires only **basic tools** (grinder, filter setup, storage bottles). Can be used directly in **wetland water treatment**.
• **Viability** **Affordable** (₹ 5– 7 per tablet at pilot scale). **Environmentally safe**: Biodegradable and non-toxic. Produces **sludge that can be reused as fertilizer**. Suitable for **households, schools, and communities** for greywater treatment. Can be scaled up with simple equipment for **mass production**.	• **Viability** **Cost-effective** (~₹ 40-55 per liter). **Eco-friendly solution**: uses invasive plants like hyacinth. Helps in **wetland water reuse** and improves water quality. By-products can support **plant growth (Rhizobium beds)** → adds income. Scalable from **community to municipal level** with simple upgrades.

Research Support

Key Research Evidence:

- Moringa Seeds → Reduced turbidity by 90– 98% and BOD by 85% in wastewater.(Ndabigengesere et al., Water Research, 1995; NIT Jalandhar Study, 2022).
- Plant-Based Alternatives (Okra, Tamarind, Banana peel) → Achieved 85– 90% turbidity removal in lab tests.(VIT Vellore, 2020; Yin, Process Biochemistry, 2010).
- Legume-Based Agents (Innovation) – Fenugreek gum & Guar gum show strong flocculant properties; rarely applied to greywater.(Ghosh et al., Desalination & Water Treatment, 2013; Sharma et al., Colloids & Surfaces A, 2006).
- Community Implementation – Plan India " Seeds for Life" project proved feasibility of plant-based coagulants (Moringa) for safe water.

Thank you