Water management in urban slums

Turning problems into opportunities.

Why we chose this topic

- 25% of slums in India are unrecognized by the government.
- Every individual has a right to clean and pure drinking water.
- It is our responsibility as citizens to uphold these rights and lend a helping hand.

Our aim

- To use the opportunity given to make a positive difference and impact on the underprivileged.
- To give an economically feasible solution to otherwise difficult issues.

“BE THE CHANGE YOU WISH TO SEE IN THE WORLD”

Water condition in urban slums

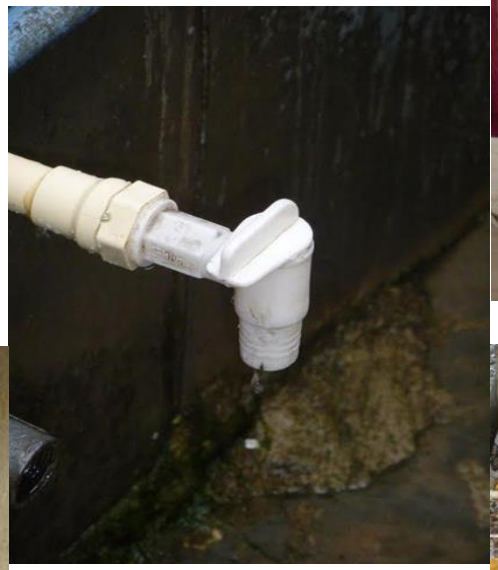
- 70.3% of urban slums receive impure drinking water, according to the Census of 2012.
- Spread of cholera, diarrhea or water borne diseases.
- Economical and effective filtration mechanisms absent.
- Presence of coliform bacteria.
- A large amount of family's income is spent for treatment of diseases and doctors appointments.

Why do these conditions exist?

- Unsafe storage of water.
- Heavy contamination during monsoons.
- Mixing of sewage water, absence of clean toilets.
- Lack of sanitation and hygiene in and near outlets.
- Lack of quality water distribution.
- Boiling of drinking water is not adopted due to shortage of fuel.
- Filtration is seen as unnecessary and time consuming, due to lack of awareness.

Jayanagar- 4th block

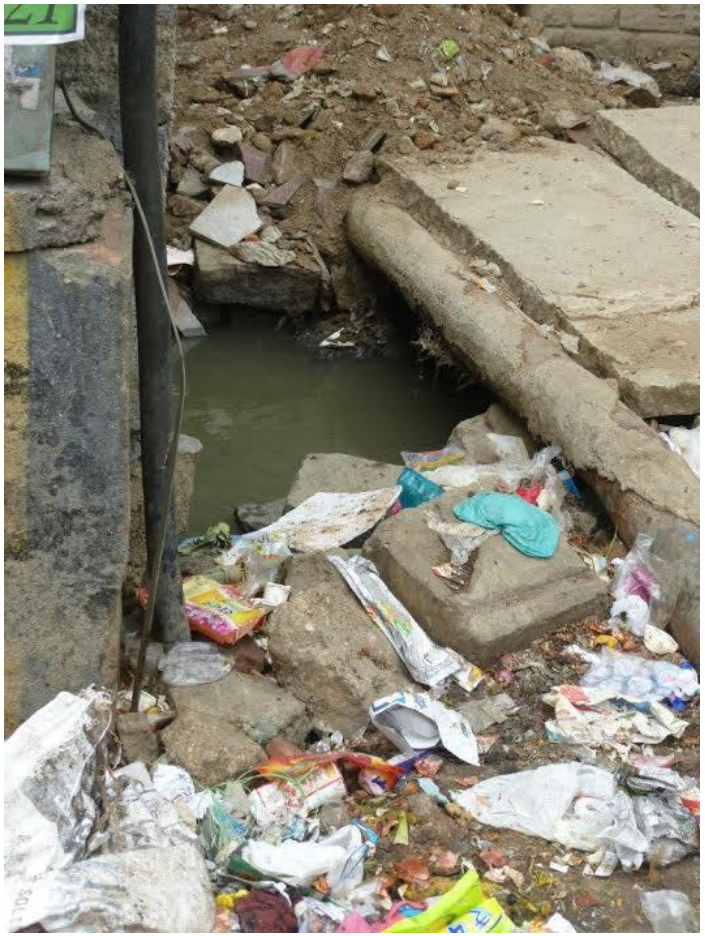
Bannerghatta- Bilekhalli



JP NAGAR 15th cross

JP NAGAR- 2nd phase

Bannerghatta- Arekere layout



Our observations

- We observed more vividly the sanitation conditions of their households
- Recorded details of water supply and BBMPs action in the area
- On interacting with the people living in the slum areas, we got a better insight into the adversity of their problems
- Collected water samples for testing

What is our solution?

- We have designed filters to purify water from these sources.
  - Tap filter : The tap filter is fitted with a rubber attachment to make it universal. There are 2 types –
  1. Activated carbon filter
  2. UF Membrane and AC
  - Potable filter : Water collected is passed through a circular filter with AC filtration.
- Provides point-of-use water treatment.
- Economically feasible filters.
- Easy to use with simple instructions.

Ultrafiltration membrane

Nylon Mesh

Activated Carbon

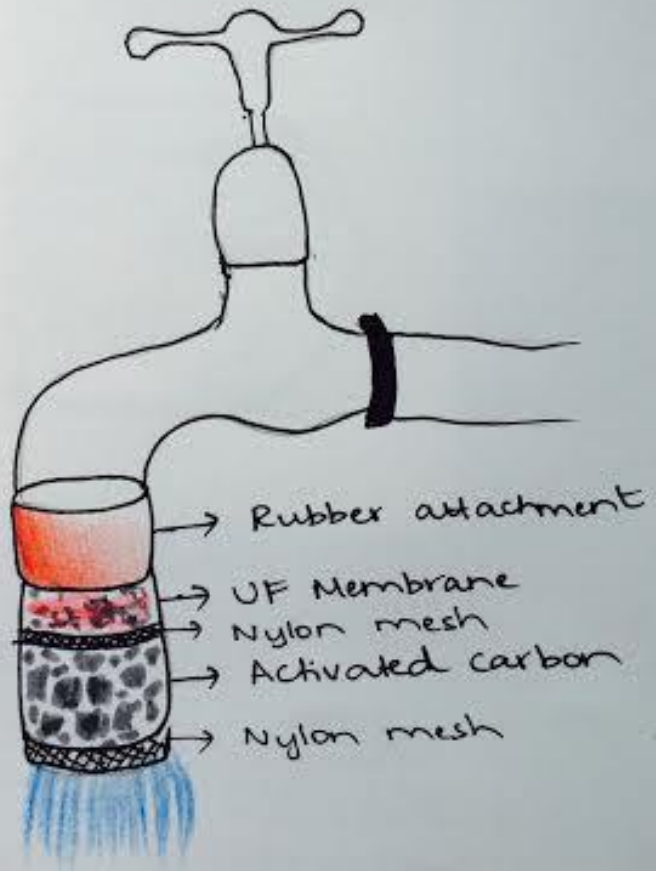
RUBBER FOR ATTACHMENT

GRANULAR ACTIVATED CARBON

ULTRA FILTRATION MEMBRANE (Poly ether sulfone)

+

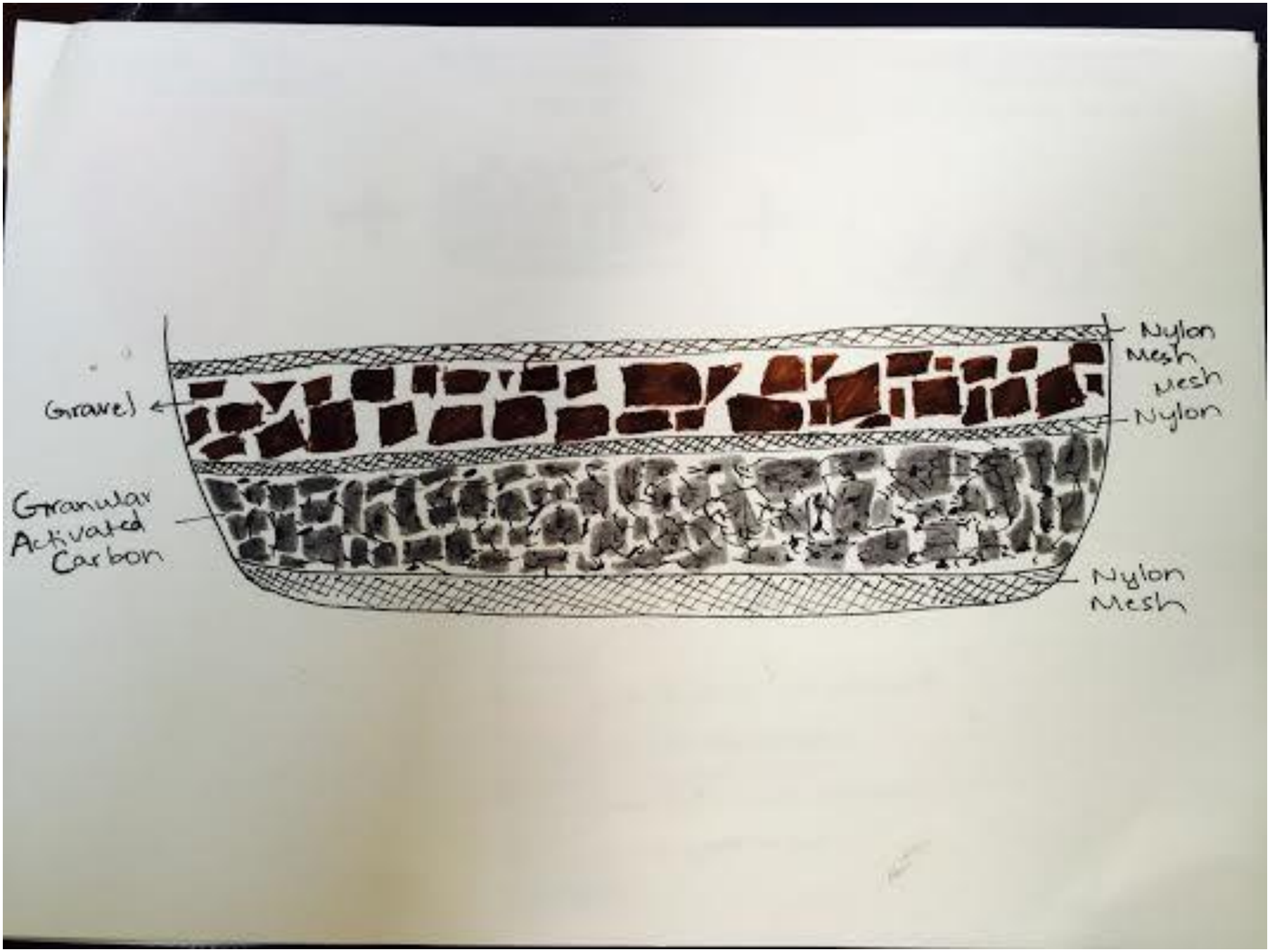
+



TAP FILTER


Nano Technology
MEMBRANE
FLOW
Hindware


Nano Technology
MEMBRANE
FLOW
Hindware

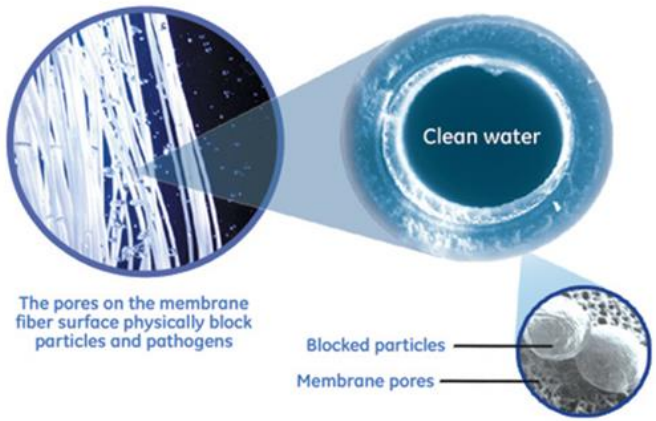

Nylon Mesh
Mesh
Nylon
Gravel
Granular Activated Carbon
Nylon Mesh

POTABLE FILTER

- Contains activated carbon and membrane for suspended particle absorption.

Materials in the filter

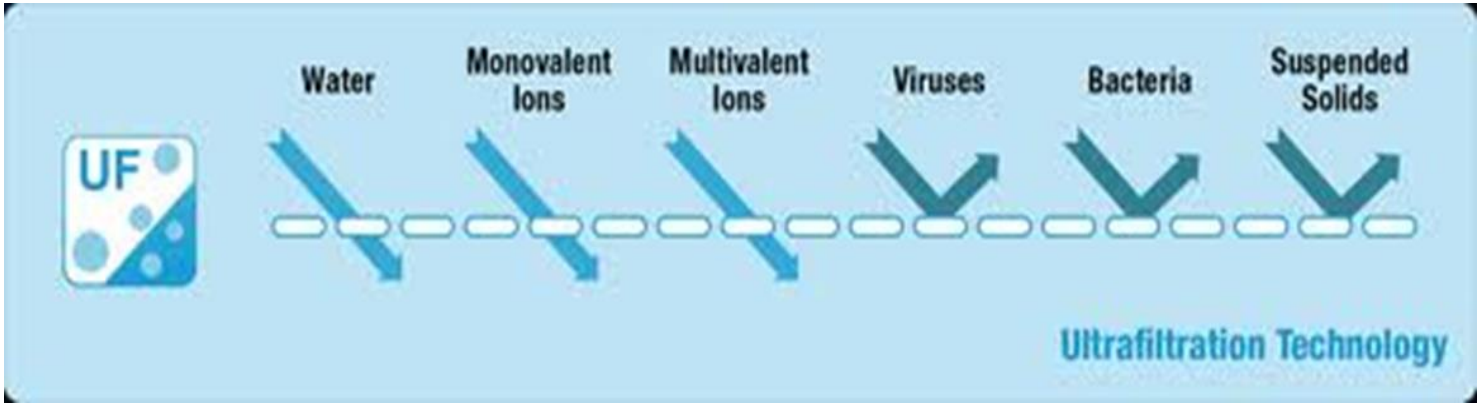
1. Ultra filtration membrane(Polyether sulfone)
2. Activated carbon
3. Nylon mesh



Mechanism of filtration

Ultrafiltration membrane

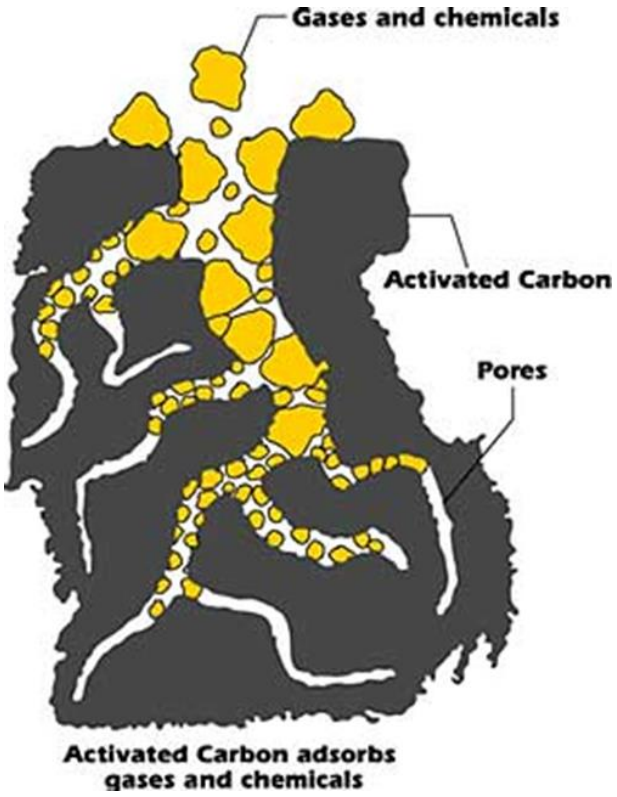
- Cheap compared to Nano-filtration membranes
- Low energy consumption
- Eliminates suspended matter and pathogens
- No chemicals required (aside from cleaning)



Mechanism of filtration

Activated carbon

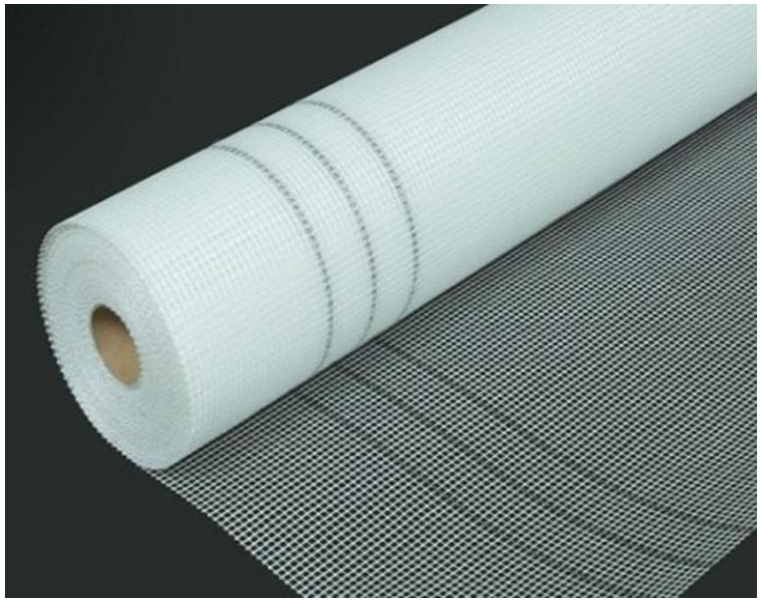
- Large surface area for absorption.
- Traps organic chemicals



Mechanism of filtration

Nylon mesh

- High elasticity and strength
- Smooth and dry surfaces, fine pores improves filtration



Our water filter

- Awaiting BBMPs and BWSSBs official certification for supply of product

- We have gained the support of a NGO for distribution of product and educating people dwelling in slums on its usage.

- 6 month guarantee
(Replacement required every 6 months, however we recommend disposing after 6 months)

- We gained the support from technicians in India's largest water filter company 'Kent', for the development of our product and its guarantees.

Economic Feasibility

- Activated carbon filter – Rs.60 / filter *
- UF Membrane filter – Rs.300 / filter
- Potable filter – Rs.150 / filter *
  (Prices are determined by taking into account all material costs, no profit included)

- Kent UF filter – Rs. 2,500 – Rs.6,000 (Average)

* Approximately

Products in the market

- Established brands such as Kent, Prestige, supply tap filters, with UF mechanism, economical feasibility absent.
- No company has designed filters specifically for slums (This information was gained from BWSSB)

Visit to slum (JP Nagar 2nd phase)

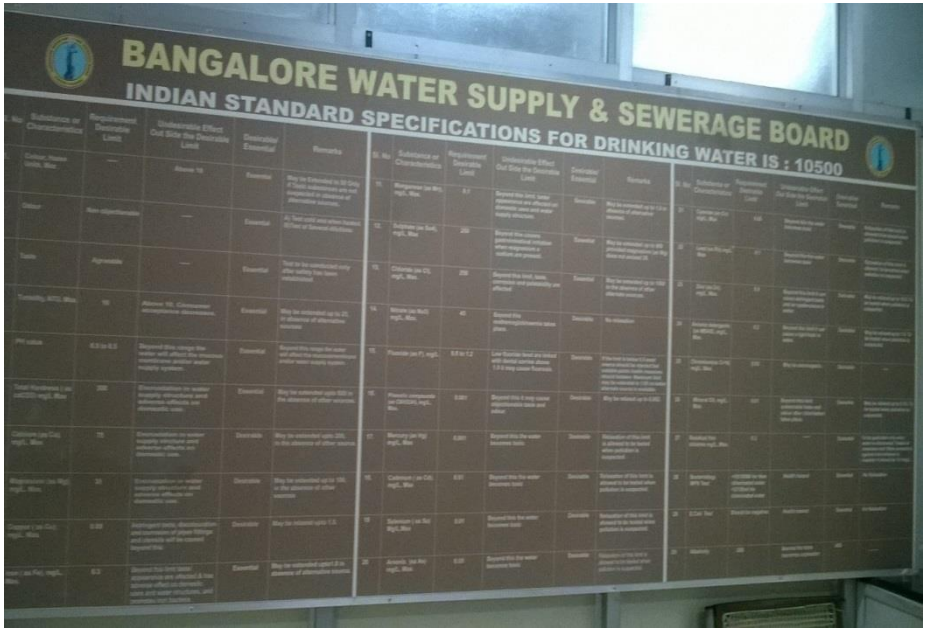
- Educated them on the importance of filtration
- Explained the method to use the filter
- Collected samples for testing

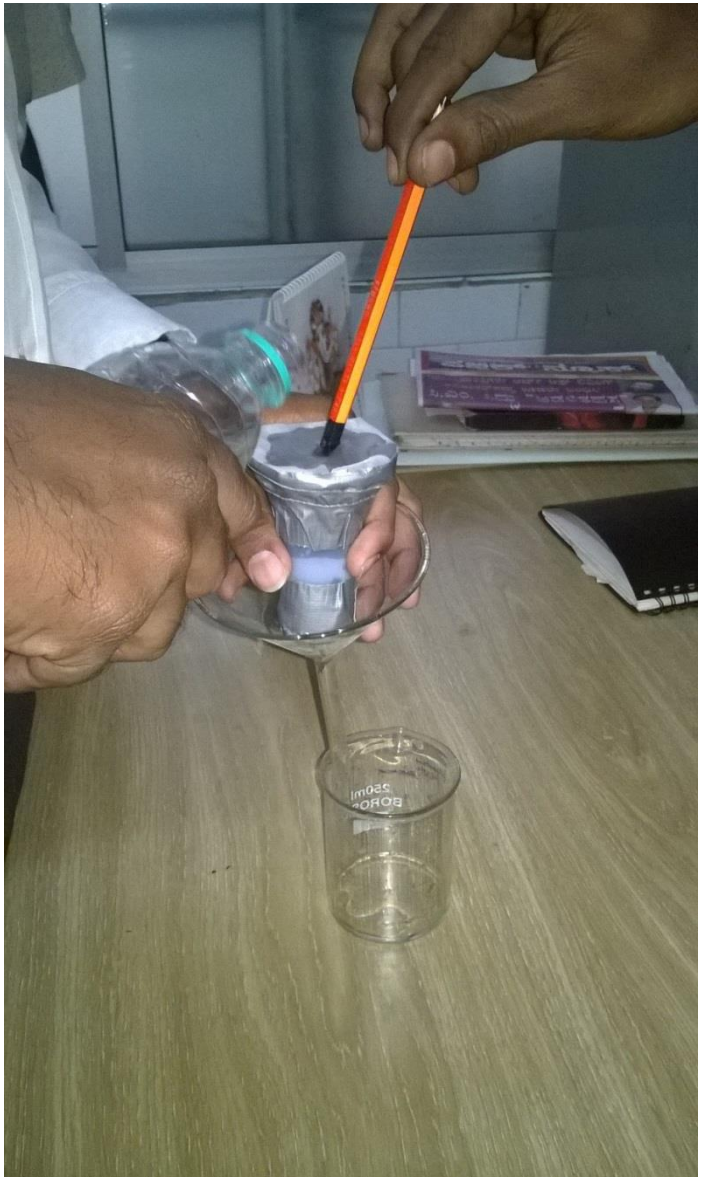
Water quality test

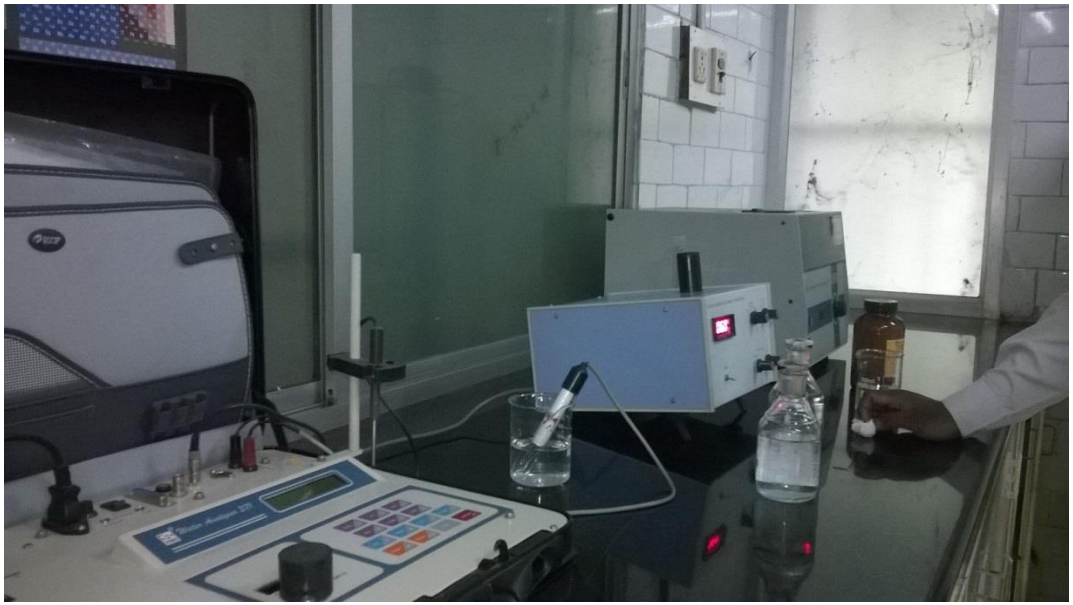
- Visited BWSSB to test a water sample for the following parameters :

Factors	Before filter	After filter
Turbidity	24.1 NTU	6
pH	7.4	Normal
TDS(Total dissolved solids)	161 mg/L	Normal

- The filtration was done with our activated carbon filter.


BANGALORE WATER SUPPLY & SEWERAGE BOARD
INDIAN STANDARD SPECIFICATIONS FOR DRINKING WATER IS : 10500





Effective in removing turbidity, color and odor

Challenges

- The UF Membrane possesses a problem of frequent clogging. Thereby giving a usable duration of 6 months before clogging.
- Water pressure is required for purification, hence a height of 25ft and 2 inches(minimum) of pipe is required for substantial purification.
- Pressure is required for purification through the UF membrane. Hence, only tap water can be purified with it.

The process of designing and developing a product for the overall benefit of the public, is a long process.

The NGO we are working with as well as the BWSSB, have offered their long-term support.

Our project does not end here, we will continue working until we are certified by the BWSSB to distribute the devices and our goals are achieved in making a **positive difference.**

Thank you!