

PORTABLE WATER PURIFIER

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PORTABLE WATER PURIFIER

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STAGE OF INNOVATION

PROTOTYPE IMPROVISATION

DEPARTMENT OF **ENVIRONMENTAL ENGINEERING**
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WHAT IS PORTABLE WATER PURIFIER?

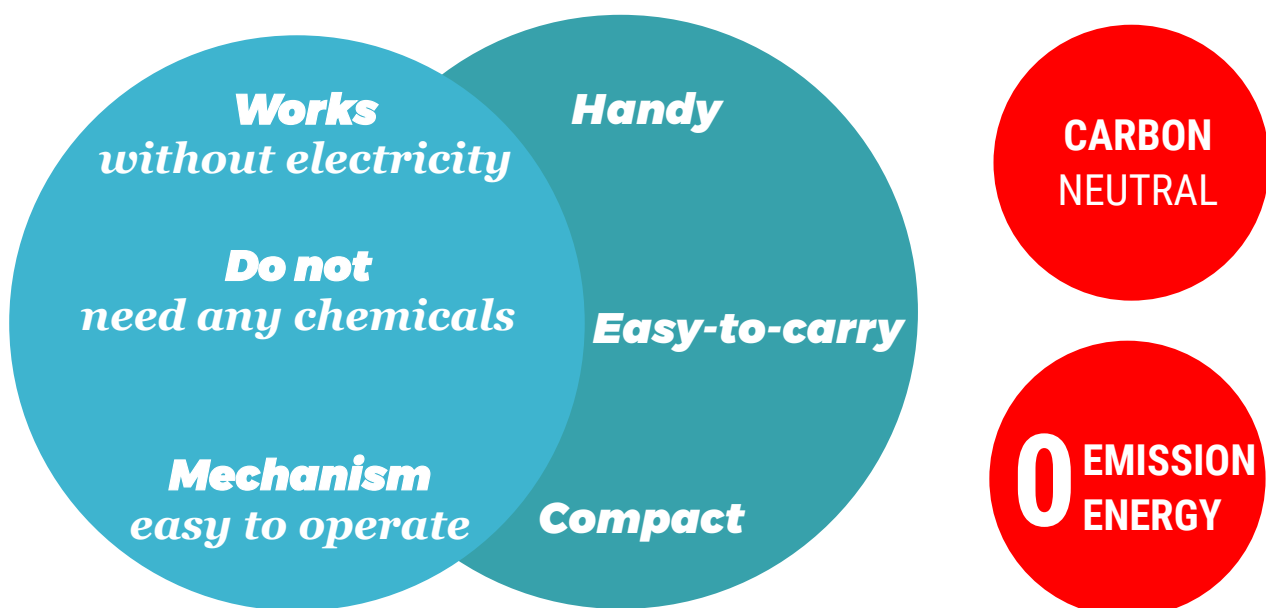
Portable Water Purifier looks like an ordinary water bottle, but it can do a lot more than just storing water.

It can effectively purify any surface water, such as, water from rivers, lakes, puddles etc. and make it fit for drinking purpose on-the-spot, without use of electricity or chemicals.

It also serves the purpose of an ordinary bottle as in-built storage is also given in the bottles, so it is helpful even when all one want is to carry a water in the bottle.

The mechanism of the bottle is so simple that anyone from a kid to an old person can easily use it, and as it is light in weight and compact in size, it can be carried anywhere, even in a backpack.

The bottle has two openings, from the bottom part of the bottle, water is filled, a screw mechanism provided in it is sufficient to generate pressure manually to pass water through membranes installed in the bottle. The second opening is to drink pure water, which is stored in the upper part.



NOT JUST A PRODUCT ITS A NEED FOR MANY

18% of the world's population lives in India and 92 million of them do not have access to clean & safe drinking water every day.

Nearly 2 carore cases of water-borne diseases are registered each year in India, which can be directly link to lack of safe drinking water and sanitation.

The problem of lack of drinking water is often in the shadows of a common misconception that it is because of lack water sources, but actually we do have water, but usually it is not in the form which is fit for drinking purposes.

The Portable Water Purifier is designed with aim to solve this problem.

It utilizes water from surface sources like rivers, lakes, puddles etc. and converts in into safe & reliable drinking water.



92M

people in India lack access to safe drinking water

20M

cases of water-borne diseases are registered every year in India.

(Source: WHO)

Life, prosperity and civilization revolves around water. With almost 20% of world's population, India is facing major problems of access, distribution and quality of water.

Water has direct impact on the well-being and health of people. Improvised water sources has drastically reduced the number cases of water-borne diseases.

Surface water sources has high potential to spread water-borne diseases as it is usually contaminated with pathogens.

According to a joint study by World Health Organization (WHO) & UNICEF, there are nearly 159 million people who collect surface water for their daily water needs, including for drinking water.

We have identified this problem as a very important factor for the health of people across the nation.

The WHO report on health (3rd goal in Sustainable Development Goals) in SDG identifies drinking water as an important indicator for control of infectious diseases and for overall health security of the nation.

The Portable Water Purifier removes almost all the contaminants usually present in the surface water sources and makes it suitable for drinking.

The pressure requirement to pass water through membranes can be easily generated manually by screw-mechanism provided, and so electricity is not required for operation.

As it is handy & compact, it can be easily carried in a backpack just like an ordinary water bottle and can be used anywhere.

Because of its simple operation, it is easy-to-use for anyone from a kid to an old person.

WHAT IT REMOVES?

TURBIDITY
COLOUR
ODOUR
TOTAL HARDNESS
CHLORIDE
SUSPENDED SOLIDS
PATHOGENS

EVERYONE & ANYONE CAN USE IT !

The design of the *Portable Water Purifier* is such so that anyone, from a kid to an old person can use it easily and effortlessly.

Some of the very important users and applications:



SECURITY FORCES:

As it works without electricity and give safe drinking water instantly it is a great force-protective tool to military personnel.



REFUGEE CAMPS:

There is always high possibilities and chances of disease outbreak in any refugee camps especially from unsafe water as thousands of people are living in temporary sheds and supply system.



NATURAL CALAMITIES AFFECTED AREAS

After any natural calamities especially floods, tsunami & cyclones; the affected areas are full of water, which are the main cause of water-borne diseases. But with the help of the Portable Water Purifier, this water can be turned into safe and reliable drinking water.



ADEVENTURERS:

It can be a great companion to adventure lovers such as trekkers & mountaineers. Because of Portable Water Purifier, they do not need to carry heavy water bottles, they can simply purify and drink water available in streams and puddles.

JOINING DOTS TO MAKE A BIGGER PICTURE

Once identifying the immense need, we needed to figure out the technical solutions that are available and how can we innovate a product that can address the problem and give solution to it.

As Environmental Engineering students, we take environmental integrity very seriously at The Green Denizen.

So we needed to find a solution which can give efficient water purification without electricity & chemicals and which can be made portable, handy & easy-to-use.



Membrane filtration technology comes under advanced treatment of water and it is one of the most reliable, effective & efficient mode of water purification today.

Many membrane technologies are available today and its choice depends upon the contamination reduction, water capacity and flow rate.

Generally surface water contamination includes microbes, hardness, turbidity, macromolecules, colour, odour & bad taste.

We have installed 10 nm Ultrafilter Membrane & a membrane of activated charcoal which can effectively remove these contamination and is efficient to give almost 4500L of safe drinking water.



Ultrafilter membrane works on the principle of low-pressure filtration.

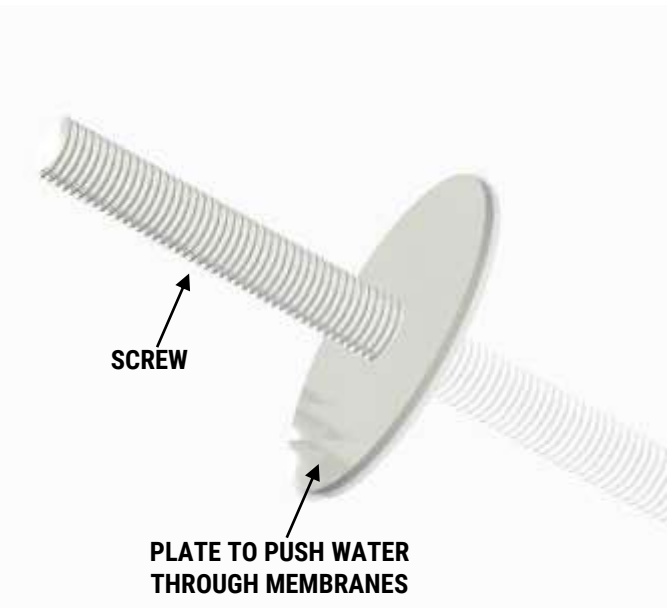
Its 10 nm pore-size removes almost all the bacteria & viruses and makes water microbial activity free.

The Ultrafilter membrane can work at as low pressure as 4 psi, which can be easily generated manually, so that electrical power is not necessary to use.

USING SCREW MECHANISM OVER PISTON & PUMP MECHANISMS TO GENERATE PRESSURE,

Piston & pump system generates enough amount of pressure but the working is not user-friendly especially to young kids and elderly people as they are not able to push and pull much easily.

If someone applies way more pressure than required, it can damage the membranes and water might get through the membrane without getting filtered.



We come up with solutions to these problems by designing a screw mechanism to generate pressure.

When the wheel at the bottom of the bottle is rotated the power screw converts this rotatory motion into linear motion and pushes the water through membranes by generating pressure enough to filter the water.

It generates only necessary pressure per rotation of the screw so that necessary pressure can be easily generated and unnecessary excess water can be avoided.

OTHER SIMILAR PRODUCTS & HOW WE ARE DIFFERENT

There are many similar products available in market which offers similar services.

They also work with the help of membranes and purifies water without electricity or chemicals.

The Portable Water Purifier stands out in important factors.

PORE-SIZE

It is one of the main and most important factor that stands out our Portable Water Purifier.

It has 10 nm of pore-size which gives almost 99.99% reduction in microbes.

While most products available in market offers 100 nm pore-size which is coarse than 10 nm.

CONTAMINANTS REMOVED

As Portable Water Purifier consists a 10 nm Ultrafilter membrane and an activated charcoal cartridge, it an effectively & efficiently remove almost all the contaminants found in surface water.

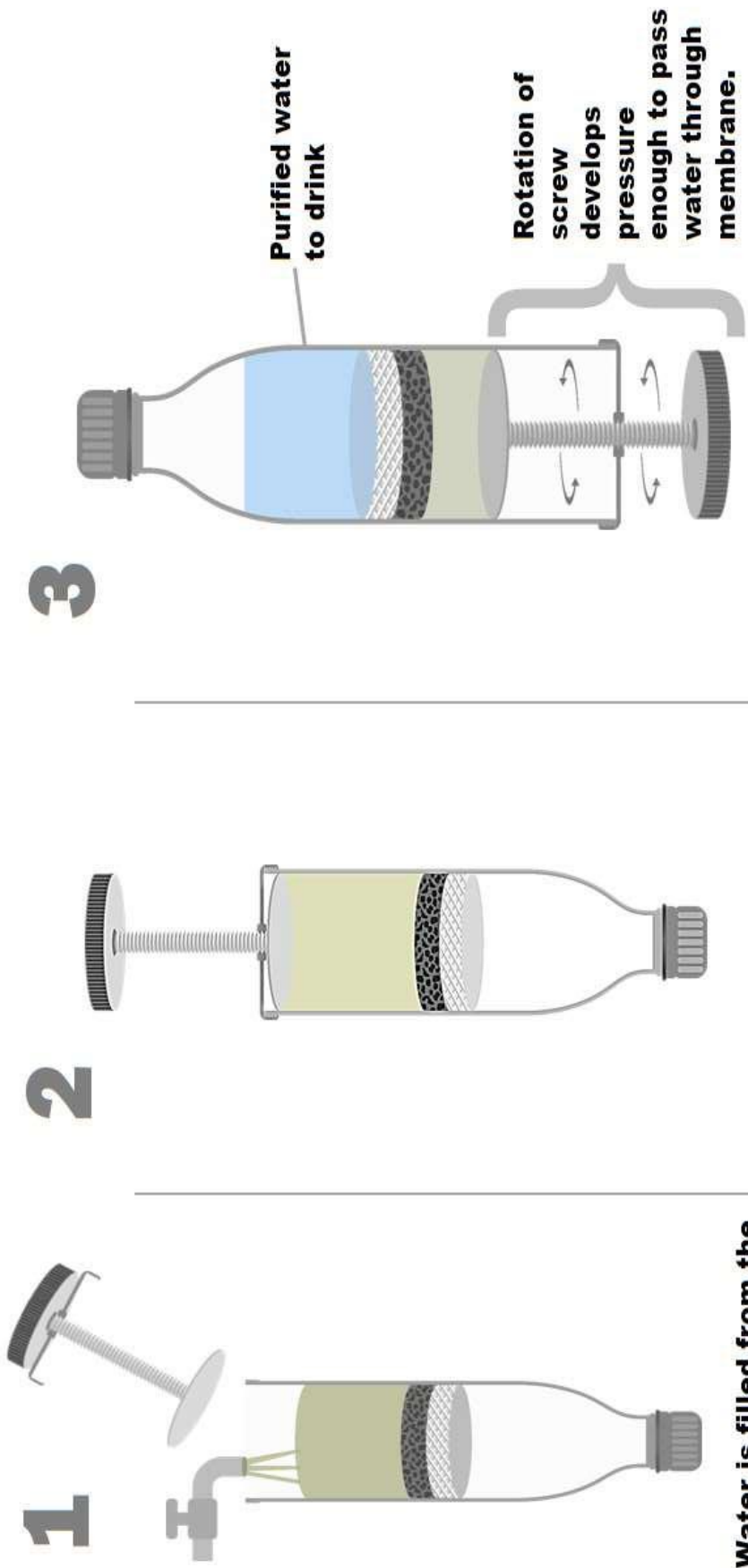
WATER THAT CAN BE USED

Any surface water source can be used in Portable Water Purifier including streams, lakes, rivers, puddles etc. except sea water.

Coarse pore-size filters needs water from comparatively cleaner water sources.



Working Mechanism Step by Step



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