

The theme of National Science week in 2017 is Future Earth. Future Earth is an organisation created to advance global sustainability science and has eight key challenges that it hopes to address before 2025.

One of these key challenges is to deliver water, energy and food for all.

In the last 100 years the amount of water used globally has increased dramatically. It is estimated that by 2025 up to 1.8 billion people worldwide will not have access to clean drinking water.

Currently, approximately 80% of all illnesses in developing countries are caused by poor water and sanitation conditions. According to the World Health Organisation approximately 1.8 billion people use a water source which is contaminated by faeces. This results in approximately 842,000 people dying every year from diarrhoea, including 361,000 children under the age of five.

Poor water quality is also responsible for a number of other illnesses. According to UNICEF, arsenic poisoning, cholera, fluorosis, Guinea Worm disease, schistosomiasis and typhoid are all illnesses which could be prevented if people had access to clean water.

Your challenge is to create a device which can be used to create clean drinking water from a contaminated water source.

Your device must remove the following substances from water:

- Sand particles
- Schistosome and Guinea Worm larvae
- Heavy metals e.g. lead and arsenic
- Faecal bacteria e.g. *Vibrio cholera*, *Salmonella typhi* and *Escherichia coli*.

If possible, your device should add the following substances to water:

- Fluorine

Your device will need to be:

- Reusable
- Transportable
- Self-powered (cannot require electricity)

You will need to draw a scale diagram of your device showing the components within it, the materials that the components are made from and the scientific reasons why the components can be used to remove the contaminating substances from your water.

Many people who do not have access to clean drinking water are living below the poverty line and may find it difficult to find the money to buy your device. They may rely on charities or organisations to supply the device. Therefore, your device will need to be as cheap as possible to produce. You will need to include the pricing for your device, including a breakdown of the prices of each material within the components of the device.