# Carbon for water treatment: Introduction Activity

## Introduction

We need water in our daily lives for many things such as washing, drinking, cooking, and irrigating crops. But water can become polluted from many sources. Ask your class to think of as many different sources of pollution as they can. The following headings can be useful prompts:

1. **Agriculture**
   1. Livestock waste (this may contain pharmaceuticals and pathogens)
   2. Fertilizers
   3. Pesticides, herbicides, fungicides
2. **Domestic wastewater**
   1. Cleaning products
   2. Sewage
   3. Pharmaceuticals
   4. Personal care products (make-up, shampoo, soap etc)
3. **Industrial sources**
   1. Organic solvents
   2. Metal species (*e.g.* from processing parts for technological devices or machines; also from mining)
   3. Organic chemicals (*e.g.* dyes used to colour clothing)
   4. Shipping (various sources *e.g.* leaching of anti-foulants from paint on ship hulls)
4. **Stormwater runoff**
   1. Road salts
   2. Oil
   3. Particulates from cars (*e.g.* platinum from catalytic converters or rubber and carbon from tyres)
5. **Oil industry**
   1. Spills
   2. Discharge from oil refining (if unregulated can include organic components as well as sulfur compounds)
   3. Spills/leaks from domestic and commercial vehicles
   4. Unregulated discharges
6. **Radioactive substances**
   1. Decommissioned power plants
   2. Accidents
   3. Medical waste
   4. Weapons testing
7. **Natural sources** 
   1. Natural oil fissures
   2. Arsenic leaching into ground water
   3. Volcanoes

## Discussion

Once you’ve introduced the idea that there are numerous types of water pollution it’s useful to consider how problems might vary between different countries. Possible questions are:

*How might regulations help to improve water quality?*

*How might regulations vary between different countries? (Bear in mind that enforcement can also vary)*

## A chemist’s perspective

In an ideal world, we wouldn’t generate water pollution in the first place! Regulations help to improve water quality by ensuring that release of harmful materials is minimised. Sometimes, regulations are essential to stop highly toxic materials building up in the environment.

Many chemists are trying to find solutions to water pollution by designing molecules that are less toxic or break down easily in the environment to harmless products. This is called ‘Green Chemistry’. The key is to design a molecule that works where it is needed but doesn’t cause environmental harm.

Alongside this, it is important that chemists also design new ways to remove pollutants from water. For example, arsenic pollution causes many people to become ill and even die every year in countries like Bangladesh. Arsenic is naturally present in the groundwater and can enter the body via drinking the water in a well or by growing crops using that water.

One type of material that chemists are investigating is porous carbons. These actually have lots of applications, for example in batteries! But they can also be used to remove pollutants from water.