Activity P1: Investigating how dirty water can be cleaned

This activity allows pupils to discuss and describe what can be seen in sample(s) of dirty water. The activity then encourages them to work in groups to investigate how to use the equipment supplied to obtain the greatest amount of clean water from a measured sample of dirty water.

Equipment:

Sieves
Colanders
Different sized flour sieves
Nets or mesh, such as pond dipping nets
Containers such as clear beakers, jugs, jars or lemonade bottles with the top third cut off
Funnels or, if not available, inverted cut-off tops of the lemonade bottles
Filters made of different materials e.g. paper towels, jay cloths, coffee filters, scraps of fabric, kitchen roll.
A container of dirty water.
Note: *Dirty water is best made up by adding soil, stones, sand, powdered clay, plant debris and small pieces of plastic to tap water, but you could use water collected from a local pond. Remember that pond water could contain disease-causing microbes so you need to take hygiene precautions and ensure that pupils:*

- *cover cuts or abrasions on their hands or lower arms with waterproof plasters or gloves;*
- *do not eat, scratch their noses, or rub their eyes during their investigation;*
- *wash their hands with appropriate cleansers after being in contact with the pond water and before eating or drinking.*

Method:

1. As a class discuss what dirty water is and what makes it dirty.
2. Give each group of pupils a container of dirty water and ask them to describe what it looks like and what can be seen in the water.
3. Show the class the selection of equipment available to use during their investigation to obtain clean water from their sample of dirty water.
4. Ask each group to:
    - decide which equipment to use in their investigation and in what order it will be used;
    - write down a list of the equipment they intend to use and
    - make a list of the steps they intend to follow in their investigation.
5. When each group has completed part 4, give each group a measured sample of dirty water and then set the groups a time limit (say 20 minutes) to work on their investigations to produce clean water from their dirty water sample. (Remind pupils that they have to stick to their planned investigation and can neither change the equipment nor the steps in their plan)
6. Once “cleaning” is complete, place each group’s clean water in the same type of clear beaker or jar. Label each beaker/ jar and line them up against a light background.
7. Ask the pupils to judge for themselves which group’s water is the cleanest. Points can be awarded by the class or by giving each a rank order (e.g. 1 point for the dirtiest water up to (say) 6 for the cleanest). Repeat this in respect of the volume of water cleaned (e.g. 1 point for the smallest volume of clean water obtained up to 6 for the largest volume of clean water).

8. Add the points together to find the winner.
9. Ask the winning group to explain to the class about what they did in their investigation and why they thought their investigation produced the best results. (Other groups could also offer some feedback, especially if they have identified any aspect of their investigation which did not work as expected)
10. Finally, ask the pupils to give their conclusions. Is the cleaned water suitable for drinking?

Recording of results

Each group could write up the plan of their investigation, make a summary of the results, evaluate the methods used and suggest possible further work. This written-up work could be used as part of a display which includes their cleaned water samples together with a sample of the original dirty water.