

Check your understanding



- 1** In this study, the seaweed Sea Lettuce is used as a bioindicator for ocean water quality. Can you think of other organisms that can be used as bioindicators?
- 2** Why are sudden occurrences of large amounts of seaweed (so called seaweed blooms) problematic for the marine ecosystems – and often also for humans?
- 3** Can you think of a good and efficient way to monitor the occurrence and size of green tides like the ones in Ireland?
- 4** Metal contamination can make the normally edible seaweed “sea lettuce” toxic for humans. Where does the metal come from?
- 5** Can you think of other dangerous sources of metals in your daily life that you are more likely to encounter than sea lettuce?

1 Macroinvertebrates (small creatures without a spine that can be seen with the naked eye) in freshwater streams can tell us a lot about water quality. For instance, baby Mayflies and Caddisflies can only survive in fairly clean water, while leeches and snails can tolerate pollution better. Even the proverbial canary in the coalmine is a bioindicator of air quality. Canaries (and other birds) are more sensitive to toxic gases (such as carbon monoxide or methane) than humans, so they can “alert” miners if such gases are around. (In this case, alerting means that the bird dies instead of the miner).

2 When lots of extra nutrients (such as phosphorous or nitrogen), which are usually limited in quantities in the ocean, enter the water, they act as fertilizers. They cause the growth of certain seaweeds to explode. The seaweeds grow and grow, and eventually die off when nutrient levels are exhausted. All of a sudden, there is a lot of decaying biomass in the water. Decomposers are very active trying to break down these big dead seaweed masses, and they are using a lot of oxygen to do so. This uses up all the oxygen in the water, causing fish and other organism to die. Decomposing without oxygen often produces toxic gases such as hydrogen sulphide that add to the destruction.



What can sea lettuce tell us about coastal pollution?

TEACHER'S KEY

3

Taking pictures from up high – for instance by satellite! NASA and ESA (the European Space Agency) are doing exactly that. Check out the video linked to the article showing satellites in green tide action.

4

The metal could come from human activities along the coast, such as farms of factories– or from pollution that happened a long time ago – for instance from a tannery, as described in our study. These heavy metals can then accumulate in the sea mud even though the actual source of the pollution is long gone.

Please also keep in mind that water usually travel a long way to the ocean. So it can pick up pollution all along the way, along river banks, lakes, from the ground, and even the air.

However, it is important to distinguish between metal pollution of human origin (“anthropogenic”), and metals that naturally occur in rocks (called “geogenic”) and are not caused by human activities.

5

House paint in older houses often contains lead. Lead is highly toxic to humans, especially for children. So if you live in an older house, you have to be careful of chipping paint, especially from old windows or doorframes. Other sources of lead are lead pipes, car exhaust, and even certain cosmetics. Mercury, another very toxic heavy metal, was used in old thermometers. Compact fluorescent light bulbs (the spiral ones) also contain mercury, so be very careful not to break them. (If broken, they have to be treated as hazardous waste)

Sea-MAT project in Ireland
<http://www.seamatproject.net/>

