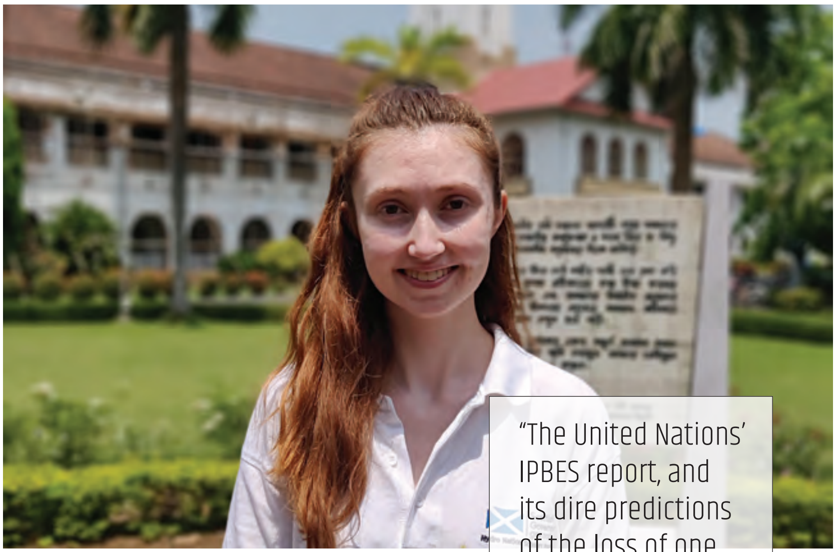
The global quest for clean drinking water

"Nature and its vital contributions to people, which together embody biodiversity and ecosystem functions and services, are deteriorating worldwide". That was the stark message from the United Nations' Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), in their landmark report published earlier this month (May 2019).



"The United Nations' IPBES report, and its dire predictions of the loss of one million species, saddened but did not surprise me"

Victoria Porley,
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Human impact on the world is huge and unless radical action is taken it will lead to catastrophic and irreversible damage.

As a scientist working at the University of Edinburgh, this report, and its dire predictions of the loss of 1 million species, saddened but did not surprise me. Over many years of study, I have seen the problems of environmental pollution. My research is concerned with water purification – a particular problem for India, where a significant portion of the population live in rural areas, without access to water of a sufficient standard.

Cleaning dirty water can be difficult, usually requiring chemicals and an energy source – a major problem in areas with limited infrastructure. The use of chlorine to purify water is common, but those carrying out the work requires training. Chlorine can also taint the water, and it is not always effective against certain parasites.

Ultraviolet (UV) light is another way to treat dirty water. However, UV technologies are very energy intensive. The lamps also need to be replaced every 6-12 months. For these reasons, UV is not suited to most rural areas.

The challenge therefore for scientists is to develop low-cost, low-energy methods of providing clean water, that require minimal training or ongoing technical support. One method involves the use of low-cost catalyst materials which are activated by sunlight (photocatalysis). This approach is an easy-to-use, point-of-source method, with no requirement for expensive equipment or specially trained professionals. It also does not produce any malodorous or dangerous by-products.

Bringing this technology from its current R&D stage to one which can be widely used is our next challenge. For the University of Edinburgh, collaboration with other experts is vital. One of our key partners is the Indian Institute of Technology Kharagpur (IIT KGP). Earlier this year I spent several weeks at the Kharagpur research facility, learning first-hand the problems faced by people living in villages and rural areas.

Having developed and tested catalyst materials with my colleagues back in Edinburgh, the next step was to test it on field. My IIT KGP colleagues and I took water samples from a range of villages, all of which contained bacteria. Our tests were encouraging. The catalysts we had developed – a modified form of titanium dioxide – demonstrated the ability to purify the water more effectively than by using the sun's own UV power alone. However, we still detected the presence of some bacteria in the treated water. These findings will help in the next stage of research.

With the global population having doubled since 1970, up to an estimated 7.6bn today, the pressures on our planet are huge, and are growing more and more severe by the day. We face climate change, food security, pollution and other challenges now. Not having enough clean water to sustain life is undoubtedly one of the biggest threats. It is clear that the quest for clean drinking water is far from over. I am determined to make a significant contribution in helping provide clean drinking water to those who need it the most. d

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