

New Water Pollution Monitoring Method will Help Nab Culprits

This method involves sensors mounted in a plane to target the industries polluting our precious rivers

Kanpur, U.P.: Like air pollution, water pollution has also become a challenge in the industrialized world. Even for the Ganga, worshipped all along its river plain and supporting the lives of over 400 million people, water pollution is slowly reaching hazardous levels. But soon, it will be impossible for the industries polluting our rivers to get away with their crime!

At IIT Kanpur, a recent research by Dipro Sarkar, a PhD student supervised by Professor Rajiv Sinha at the Department of Earth Sciences has devised a method by which using simple airborne sensors, water pollution levels of a river can be measured. This technology can have far-reaching consequences in bringing polluters to account - it will now be possible to visually trace the pollutants to their source, thus making it virtually impossible for the culprits to get away.

This path-breaking method involves using remote sensing based methods for measuring the water quality of the Ganga River. Traditional water quality monitoring methods are often unreliable and inadequate. Given the large scale of river systems, the remote sensing method offers a more reliable and comprehensive alternative for water quality monitoring. This advanced technology even offers the potential to identify the chemicals polluting a body of water, and perhaps, even measure their concentration.

For the pilot project, the team deployed four cameras using monochrome sensors fitted in a small aircraft. Polluted waters typically display elevated levels of suspended solids, chemical oxygen demand (COD), biological oxygen demand (BOD) and pH. The reflection of light from the surface of liquid in a water body depends on the amount of pollutants in it. At higher concentration, these changes are visible to the naked eye, but for low concentrations, the team used specialized optical filters and algorithms to isolate the wavelengths of light representing the pollutants. Using false colour composite, a method by which colour is added to images which cannot be viewed in colour by the naked eye, the team was also able to distinguish between the different parts of the river with varying concentrations of suspended sediments.

Results from this project have successfully demonstrated the use of airborne remote sensing for water quality mapping of rivers. The team is currently also working on deploying multispectral and hyperspectral imaging using cameras mounted on a drone to map the nature and characteristics of pollutants being discharged into the Ganga river. In addition, they are also trying to develop an algorithm by which one could qualitatively separate the clean area from a polluted area in a river and can also to trace back the effluent to the source. This project was partially funded by WWF-India and the IMPRINT program of MHRD.

The research by Sarkar and Prof. Sinha has recently been highlighted by a major television show titled *Mighty Rivers* by the British filmmaker, Jermey Wade (also the maker of the famous series *River Monsters*), who visited IIT Kanpur last year and filmed the work carried out by the team.