

## Easy and Inexpensive Ways to Control Water Pollution

National Third  
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Water pollution has become one of the biggest issues of the modern era and the most hazardous of all the water pollutants is oil. The pollution due to oil effluents not only destroy the aquatic life but also make the water completely unsuitable for irrigation. Debanjan Mukherjee (20) and Nikhilesh Das (19) from Guwahati were in class nine when they devised a simple set up to combat oil pollution of water bodies and submitted their entry to NIF.

### The Young Enthusiasts

Debanjan is presently studying in 1st semester (electrical) at Assam engineering college. His father is a mechanical engineer, working in the railways and his mother is a housewife. Being the only child of his parent he got enough freedom to explore his talents. From childhood, he has taken part in co-curricular activities such as debates, speech competitions,

seminars etc. He is a die-hard fan of sports; the favorites being cricket, football, volley ball, and chess.

Nikhilesh's father is a business man and mother is a school teacher. He has been a good student throughout his school years. He represented his school at various science exhibitions, debate, quiz and speech competitions; and won many prizes at state level. He has had a keen interest in science since his early childhood. When he was just in class six he made a herbal repellent for cockroaches and rats, which was very effective. When he was eleven years old he underwent a bone grafting operation in his left leg and was bedridden for three months. For another four months he could only move using a walker. His friends and relatives feared that he would never be able to stand and walk. But it was his immense mental strength that he overcame the odds and now has recovered fully. His dream is to become a nuclear scientist and find a solution to the never ending energy crisis of the world.

Nikhilesh and Debanjan devised the project titled "water pollution and some easy and inexpensive ways to control it" when they were in class nine. They put forward their views and ideas to their parents and teachers who acknowledged the novelty and encouraged them to go forward with their ideas. The only hardships then were the lack of experience and proper time management. But with proper guidance and motivation they succeeded in their project. They participated in the regional level science fair and got selected for the eastern India science fair. They got the "best state exhibit" award and a fair amount of recognition.

### **The project**

Basically their project puts emphasis on curbing oil polluting the water. Staying at Guwahati and seeing the pitiable condition of the river Brahmaputra

behind the Numaligarh refinery moved them a lot. Not only Guwahati but throughout the country tons of oils are thrown directly into the water bodies, thereby, destroying the ecosystem and its balance. So, they thought of helping the environment in an "inexpensive and easy" way.

They were discussing possible ways of addressing this problem when Nikhilesh recollected his childhood experience. He shared that when he was a child his mother always used to put oil in his hair, which he disliked a lot because the oil used to stick to his hair. They thought that human hair must be possessing some property because of which the oil sticks to it<sup>1</sup>. They experimented with it and succeeded.

Both of them then were surfing the internet one day when they came across an article about an oil tanker spillage in the Persian Gulf. They read about the death of sea-gulls and other migratory birds whose feathers had got soaked in oil rendering them unable to fly. They brought some bird feathers and put it over some engine oil floating in water kept in a beaker. When they picked up the feathers, they found much of the oil sticking to the feather<sup>2</sup>.

Another incident gave them their third ingredient. A carpenter, at Nikhilesh's house, cleaned some oil off the floor by putting and rubbing some saw dust<sup>3</sup> over it. They tried it in and succeeded. The use of hay was also serendipity. After finding four such ingredients that could absorb oil, they planned to combine the four and test the efficacy in curbing oil pollution.

### **The Experiment**

One day Nikhilesh and Debanjan took 4 beakers from school and collected some waste human hair, sawdust, bird feathers & straw from different places and then poured water on the 4 beakers and then added oil to each of the beakers. Then, they added waste human hair, sawdust, bird feathers & straw respectively and on the very first attempt all the oil present in the



beakers was absorbed and removed completely. Later on analyzing further they found that the oil was removed due to the phenomenon of adsorption.

### **Advantages and possibility of diffusion**

There are many advantages of this idea. Firstly, the materials that have been used in removing the oil effluents from water such as waste human hair, sawdust, bird feathers & straw, are all wastes themselves. Hence this process involves using one waste to clean up another. Secondly, this system is very much effective and cleans up almost 100 per cent of the oil effluents from water. Thirdly, this is a simple, cost effective and environment friendly idea and can be used economically in refineries.

Before submitting this project to NIF, they had presented this idea in State Level Science Fair held in Guwahati in the year 2005 where they won the first prize and also won the very prestigious Tulika Das Memorial Award. They were selected to present the project in the Eastern India Science Fair held in BITM Kolkata in the same year where they bagged the best State Exhibit Prize. This event was even telecasted on a number of local news channels and was covered in a number of news papers including The Telegraph. Both of them are now completing their studies and plan to work more on such innovative ideas that can solve persistent problems of the society.

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<sup>1</sup> While hair does not technically absorb the oil, the oil does coat the hair. The oil is unable to completely absorb into the hair. Instead, the oil coats the hair by latching onto cracks and holes in the hair shaft. ([http://www.ehow.com/how-does\\_5267579\\_hair-absorb-oil.html](http://www.ehow.com/how-does_5267579_hair-absorb-oil.html)). United States Patent 5453191 describes a device comprising human hair which may be used to absorb oil which is floating on water. Human hair is formed into a generally planar layer. The layer may comprise a center scrim to which the human hair is attached. The device is buoyant when saturated with oil and water. The device is used to remove oil from water (United States Patent 6146529);

<sup>2</sup> The feathers of birds have natural oil cover for protection. This natural oil breaks down/partially dissolves due to the crude oil, which then sticks to it. (<http://www.newton.dep.anl.gov/askasci/zoo00/zoo00161.htm>) United States Patent 4919820 discloses a method of removing oil from a body of water using waterfowl feathers.

<sup>3</sup> Among all the existing techniques used for oil treatment, sorption is a popular technique because it is cheap, simple and effective. Among the various sorbents used, sawdust appears to be the most attractive material in terms of cost, versatility and abundance. Banerjee, S.S., Joshi M.V. and Jayarama R.V. *Treatment of oil spill by sorption technique using fatty acid grafted sawdust*. Chemosphere 64 (6): 1026-1031, 2006.