Environmental Case Study
Green Bay, Wisconsin
PCB Contamination in the Fox River

Introduction

Polychlorinated biphenyls (PCBs) were discovered in the 1970s in the sediments of a 40-mile section of the Fox River, which flows into Green Bay and Lake Michigan. Estimates show that more than 98 percent of the PCBs were discharged to the river by area paper mills that manufactured carbonless copy paper from 1957 to 1971. PCBs were banned in 1976, but their harmful legacy remains within the sediments of the Fox River. Once released into the Bay and Lake Michigan, PCBs are extremely difficult to remove.

The Fox River contributes more PCBs to Green Bay and Lake Michigan than any other watershed source. Researchers calculate that 160,000 pounds escaped the river into Green Bay and Lake Michigan and that an additional 600 pounds are flushed from river sediments each year. Recent detailed analysis shows that some of the river sediments (hot spots) contain concentrations of PCBs exceeding 50,000 ppm. Additionally, estimations indicate that over 70,000 pounds of PCBs are contained in over 10 million plus cubic yards of sediments.

A risk assessment estimates which chemicals found in river sediments are harmful to the ecosystem (fish and wildlife) and to humans. In addition to PCBs, over 350 chemicals (i.e., dioxins, furans, mercury, DDT, ammonia, various pesticides) were found in the water, sediments, fish, and wildlife. Of these, the Wisconsin Department of Natural Resources (WDNR) determined that PCBs pose the greatest health risks to the ecosystem and to humans. Additionally, the assessment found that the cancer risks from exposure to PCBs by eating fish and waterfowl are 100 to 1000 times greater than present health standards set to protect human health. Noncancer risks such as neurological problems are fifty times higher than those of state and federally established health standards.

PCBs concentrate in fat tissue as the chemical is passed up the food chain. This is defined as differential magnification or biomagnification. Thus, those animals at the top of the food chain, including humans, have concentrations 100,000 times greater than those found in organisms at the bottom of the food web (e.g., planktonic organisms such as algae). While the affect on human health and reproduction is real, it may take years of regularly consuming contaminated fish to build up the toxic levels of PCBs in the tissues necessary to cause observable health or reproductive problems. The Wisconsin DNR consumption advisory warns against eating fish with concentrations greater than 1.89 ppm coming from the Fox River and Green Bay. Large walleye (>20 inches) in the lower Fox River generally have average PCB concentrations greater than 5 ppm.

The Issues

PCB Remediation

Although there are few "new" PCBs coming into the Fox River from industrial and municipal sources, PCBs from the sediments (re-suspension) continue to make their way into the food web of the river and the bay. This contamination ultimately makes its way to human consumers. For this reason, removing the contaminated sediments from the river is a high priority among the Fox River Intergovernmental Partners (WDNR, U.S. EPA, U.S. Fish and Wildlife Service, NOAA, and the local First Nation peoples).

Arguments for remedial action primarily center on determining responsibility for contamination of the Fox River and for assigning cleanup costs. A local group of scientists (Science and Technology Advisory Committee of the Public Advisory Committee) strongly recommended that the contaminated
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Sediments dredged from the lower Fox River be disposed in an engineered landfill where the chemicals are removed permanently from the aquatic ecosystem. They further concluded that there are no scientific or technical reasons to unnecessarily delay the cleanup action.

The cost of the cleanup will be very expensive. Estimates can reach as high as $700,000,000 to completely remove and landfill the contaminated sediments. Obviously, there is no cost at all for the no-action plan. However, if the no action is taken, it will require hundreds of years for the river to make any significant reduction in the PCB concentrations. During this time of inaction, hundreds of pounds per year will make their way to the bay and Lake Michigan where they become unrecoverable. Because little has been done to clean up the river sediments the United States, EPA is considering placing the river on a National Priorities List (NPL) and designating the lower Fox River as a Superfund site, making it eligible for clean-up action. Additionally, the Fish and Wildlife Service is progressing with a Natural Resource Damage Assessment consideration to assign monetary damage to the resource and to determine financial responsibility for the pollution of PCB to the river.

It is hopeful that after twenty years of debate, the process of river cleanup will begin and the assignment of responsibility for the pollution will occur.

References

Websites
3. Environmental Protection Agency at http://www.epa.gov/opptintr/pcb/

Key Principles
1. Polychlorinated biphenyl (PCB) contamination
2. Biomagnification in the food chain and human health
3. Government and private concerns over pollution cleanup

Ethical Considerations
1. Who should be responsible for the cost of monitoring PCB contamination in food and water?
2. What are the costs, benefits, and feasibility of remediating all PCB contaminated areas?
3. What are the justifications for not remediating an area with PCB pollution?

Resources
7. Environmental Protection Agency at http://www.epa.gov/opptintr/pcb/
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Civic Engagement & Service Opportunities

2. Write or e-mail your local politicians about quality of nearby waterways.
3. Form a student group having an environmental preservation mission.
4. Set up a public forum at your school discussing water quality issues in your area.

Learn more about community service as part of your educational enrichment by visiting the following websites: http://www.learnandserve.org/, http://www.servicelearning.org/

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