



Water Resource Awareness, Connections and Impacts

Connecticut Envirothon Problem Scenario

Residents of a small New England town, Coatsville, were recently shaken by headlines in the local newspaper that brought back memories of the town's economic history. Soon after its founding, the town became a center for local development when several factories were established near the west end of the local lake. Water flowing from a dam on the lake provided power to the various businesses downstream, including several involved in clothing manufacturing. One was a woolen coat mill that was supplied with buttons and other ornamental clothing fixtures by another small factory in the town up the hill from the mill. The buttons were famous for their metallic luster imparted by copper, cadmium and lead that came from mines in nearby towns.

The woolen mill closed in the 1960s and sat idle until it was recently repurposed for residential use. The button factory was bought in the late 1960s by a printed circuit manufacturer that used some of the same metal processing equipment in its high-tech processes. The circuit manufacturer moved to a new location in the 1980s as the infrastructure of the facility became outdated and unable to keep up with modern industry standards and environmental regulations. The building is now a small cabinet-making shop owned by local craftsmen.

The lake provides various recreational activities for town residents including non-motorized boating and fishing. Two local high school students, twins Jack and Jill, were fishing at the lake over the weekend when they found numerous dead fish along the edge. The fish looked normal so they netted enough to give to their high school biology teacher so each of their science groups would have one for an upcoming vertebrate dissection class. They put the fish on ice to preserve them until they got to class.

When they presented the frozen specimen to their teacher, she was a little skeptical that they could be used since the dissections weren't scheduled for a couple of weeks. Meanwhile, she wanted to examine the fish more carefully. She called a friend who worked at a state research lab to ask if she knew anything about a fish kill at the lake where Jack and Jill found the fish. The friend happened to be an aquatic specialist and was concerned because no one else had heard about the problem. She alerted other researchers in the pathology lab who would be able to determine any possible contaminants in the lake where the fish were recovered. She also alerted water quality experts who traveled to the lake to take samples of the water around the perimeter of the lake.

Analysis of the lake water showed several chemicals had levels much higher than the natural parts per billion (or ppb) allowed under federal safe water standards. The local water officials immediately notified state officials about the contamination and they started an investigation to determine how the contaminants got into the water. Reports of the contamination were published in the local newspaper. Town officials started getting calls from residents who lived near the lake asking for more information. In response to the inquiries, town officials scheduled a public hearing to address residents' concerns and provide accurate information about the findings of the chemical tests.

Because the topography of the town changes from hilly to level areas over the entire town, some residents were concerned that the contaminants might also be seeping into recreation areas around town. Another concern among the town was the potential for contamination to seep into residential drinking water wells as 100% of the drinking water from the town is served by private wells. The water quality experts collected lake water samples and sediment samples around the perimeter of the lake in an attempt to determine the source or input of the chemicals to the lake. Additional tissue samples from the fish population were also collected by the scientists. The data collected allowed the scientists to focus in on one section of the perimeter of the lake that was also the closest to residential structures. Knowing that these residences were likely to be on well water, a request was made to the Department of Public Health and the Local Health District to collect samples from some of the drinking water wells in this area. Several of the wells came back with elevated concentrations of several chemicals that were also found in the lake sampling efforts. This finding led to the installation of groundwater test wells in



the vicinity of the homes with contaminated drinking water to help delineate the areas where the contaminated groundwater was found.

As additional data was collected from the wells, the Department of Health and Department of Energy and Environmental Protection required the Town to invest resources to find the source of the contamination. They discovered several potential sources within the town boundaries, so the Town hired a consulting firm to further investigate the contamination, find the most likely source, determine any health effects that could result from drinking contaminated water and develop solutions that could be implemented in affected areas of the Town.

The Task:

Each school team represents a consulting firm that will investigate the source of contamination, delineate a groundwater plume, identify the most likely source(s), describe potential health hazards caused by the presence of the contamination in drinking water wells and make proposals for solutions to the contamination.

The only groundwater data available for this investigation is from the drinking water wells seen on the “Coatsville Town Map: Drinking Water Sample Locations” map. You may find that this data is not sufficient to determine the source and extent of the contamination plume. As the environmental consultant, it is your task to have additional monitoring wells installed to collect more data. There are 10 possibilities for additional locations to have monitoring wells installed. However, you are limited to a budget of \$15,000, and each additional well costs \$3,000 to have installed.

To obtain data for the additional wells you have selected to install, please email Chris Sullivan:

csullivan@conservect.org

To complete the investigation, each team’s consulting firm must present a power point presentation that includes the following:

- the evidence of an event that caused an environmental concern
- a description of the potential contaminants and the source(s)
- a description of how the source of the contamination was discovered
- a description of how the contaminant moved from its source to the drinking water wells and into the lake
- a visual of the town map with a delineated contaminant plume
- a description of the resources used to assess the migration of the contaminant into drinking water wells and the lake
- a description of how the geology and topography of the area affected the direction of the movement of the contaminants
- a description of the potential for health and environmental impacts of the contaminant on the surrounding areas
- an explanation of how the team selected the additional wells to drill and confirm that the budget was maintained
- a description of how the contamination can be cleaned up
- a description of measures that could be employed to avoid future contamination

The presentation should use a maximum of 12 CONTENT slides that are:

- clear, readable, attractive, and effective to enhance the presentation
- well-organized and include a clear introduction and a strong conclusion

Two additional slides (independent of the other 12 CONTENT slides) must include (1)a list of all resources used to prepare the presentation using the MLA format: (A Works Cited typed list) and (2)a Title Slide. Please submit your final presentation in PDF format and do not include your team/school name on your presentation in effort to keep the grading of presentations anonymous. Thank you!