Supplemental Material

The closer, the better? Untangling scientist-practitioner interaction, knowledge use, and engagement

Study 2 Materials

Your Role

Throughout the study, you will assume the role of **Director of Utilities** for a large city in the Great Lakes region. Among your many responsibilities, you are in charge of providing clean drinking water. A major concern for your city is water quality impairment due to harmful algal blooms in Lake Erie. Lake Erie is the only source for your city's drinking water.

Causes of Harmful Algal Blooms (HABs)

Harmful algal blooms can occur naturally, but the number of occurrences has increased since the mid-1990s. One of the potential causes of HABs is thought to be the use of phosphorus-based fertilizers and household products. These human sources of phosphorus run off into the lake, particularly after heavy rain events. Another potential cause of the increase in HABs is linked to the invasion of zebra and quagga mussels in the Great Lakes. These mussels eat the 'good' algae, but release organisms like blue-green algae back into the water. Climate change is also a consideration here as heavy rainfall during the peak agricultural season might lead to greater phosphorus run off into the lake and higher temperatures might favor harmful algal blooms.

Consequences of Harmful Algal Blooms

Harmful algal blooms may force you to close beaches for swimming and even shutoff drinking water supplies in order to protect public health. The blooms produce dangerous toxins that can result in a wide range of symptoms in humans including fever, headaches, muscle and joint pain, blisters, stomach cramps, diarrhea, vomiting, mouth ulcers, and allergic reactions. In severe cases, seizures, liver failure, respiratory arrest, and (rarely) death may also occur. Ensuring safe drinking water is thus pertinent and it may require increased costs for water treatment.

Your Responsibility

As the **Director of Utilities,** you must decide how to handle future toxic HABs. The city has seen roughly 15 toxic HAB days annually over the past few years, though the number fluctuates from year to year. Under current management and facilities, each day with a toxic HAB costs your department $800,000 dollars. This amount covers costs associated with testing drinking water, monitoring recreational waters, providing bottled drinking water to residents, and water treatment.

After the last toxic HAB, which lasted several days, the City Administrator granted you a one-time budget of up to $60 Million dollars to address HABs over the next five years. The City Administrator, however, privately discouraged you from spending the entire amount; the funds were originally earmarked for a popular Health Department program that provides low cost health screening to underserved children and vulnerable populations. Furthermore, the City Administrator has speculated that proposed policies at the state level might tackle the underlying sources of phosphorus that cause HABs, which could cause the number of HABs to decline. Any money you do not spend from the $60 Million will be reallocated to the Health Department.

Your staff has identified five options for managing HABs within this budget. Each option has tradeoffs in terms of how much money you must invest upfront versus how much money you could potentially return to the Health Department. Due to the serious repercussions your choice might have for the Health Department, you will have to justify the choice.

Your Options

The management options available to you are as follows. The table below summarizes the costs.

A. Invest $0 upfront. Continue to deal with the HABs as they occur, paying $800,000 for each HAB event.

B. Invest $15 million upfront to add monitoring systems that allow you to catch HABs early. This reduces the cost of treatment to $600,000 per HAB.

C. Invest $30 million upfront for monitoring systems and preventative chemical treatment. This reduces treatment costs to $400,000 for each HAB.

D. Invest $45 million upfront for monitoring systems, preventative chemical treatment and a new filter for the water treatment plant. This would reduce the cost of each HAB event to $200,000.

E. Invest $75 million upfront to build a new water treatment facility. This long-term investment would ensure proper treatment of the water and avoid future costs associated with toxic HAB days. However, it would require borrowing additional funds and may be unnecessary if the number of toxic HAB days decreases in the future.

Fig. S1. HAB scenario presented to participants in study 2.

		TOTAL PROJECTED COST OVER 5 YEARS ASSUMING…		
OPTION	**Cost per HAB day**	10 HAB days/year	15 HAB days/year	20 HAB days/year
A. Invest $0	$800K	$40M ($20M left)	$60M	$80M (Borrow $20M)
B. Invest $15M	$600K	$45M ($15M left)	$60M	$75M (Borrow $15M)
C. Invest $30M	$400K	$50M ($10M left)	$60M	$70M (Borrow $10M)
D. Invest $45M	$200K	$55M ($5M left)	$60M	$65M (Borrow $5M)
E. Invest $75M	$0	$75M (Borrow $15M)	$75M (Borrow $15M)	$75M (Borrow $15M)

* Over the past few years, there have been roughly 15 HAB days per year, though the number fluctuates.
M = Million, K = Thousand

Fig. S2. Comparison of treatment option costs presented in Study 2.