

Removal of Toxins and Heavy Metals

While oysters provide important ecosystem services, the effects of their restoration should not be oversold. Some restoration proponents have argued, for example, that New York Harbor would be completely clean if the oyster populations were restored to their nineteenth century numbers. Unfortunately, this is not true. While oysters are effective in filtering nitrogen, nutrients, and particulate organic matter, they do not break down most industrial pollutants including heavy metals and PCBs (Kurlansky, 2006). By filtering large quantities of water, oysters bioaccumulate toxins in their shells and tissue at much higher levels than seawater concentrations (McNevin, 2007). Bioaccumulation is the buildup of a contaminant or toxin in an organism, usually sequestered in the tissue. These toxins will eventually be released back into the water when the oysters die and decompose unless the oysters are harvested, removing the toxins in the process.

In New York Harbor, industrial pollutants accumulated in the silt and sludge from decades of industrial pollution. Periodical dredging of the Harbor for ship navigation only stirs up these toxins, making any oysters grown in these waters too toxic for human consumption (Kurlansky, 2006). Since the oysters can capture but not break down these toxins, filtering is not a viable pollution control technique for these contaminants. In this case, bioextraction, the farming and harvesting of certain shellfish and seaweed in order to remove nutrients or toxins from the water, is a more promising technique.

The removal of heavy metals, though, is not just an issue for the human consumption of fish and shellfish. The health and mortality rates of oysters are also significantly affected by the concentrations of heavy metals in the water. Higher levels of mercury, silver, copper, and zinc have been shown to be very toxic to the embryos of the American oyster (Calabrese, 1973).

Reducing these concentrations through bioextraction, then, would help to protect the oysters being restored in New York Harbor.

By filtering large quantities of water, oysters bioaccumulate toxins in their tissue and shells. Oysters in the polluted waters eventually become toxic and unsafe to harvest for human consumption. When they die and decompose, the accumulated toxins are released back into the water. Bioextraction, then, will be necessary in order to remove the toxins from the water.

Restoration projects will require the removal of oysters in order to be effective in reducing concentrations of heavy metals and industrial toxins in the water.

References

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