SAVE THE BAY: GROW OYSTERS

By Laura Pacanowsky '07

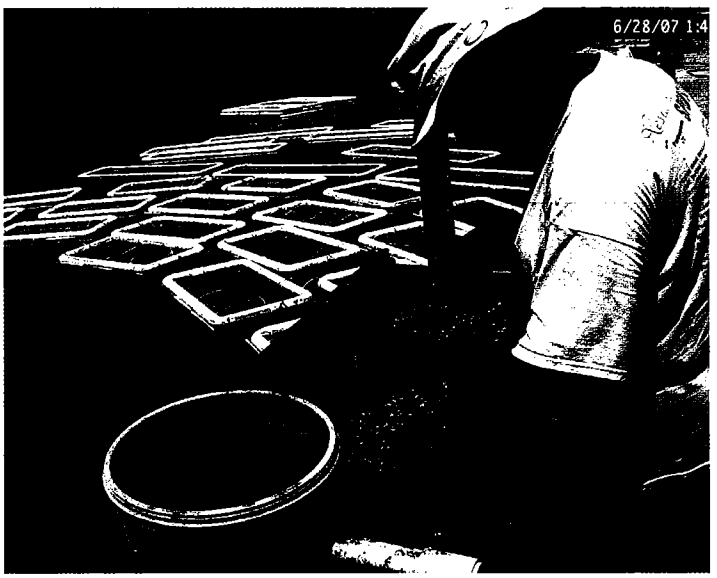
It is such a rarity to hear about an environmental solution that is not only environmentally beneficial, but also economically advantageous. All too often environmental solutions require selfless abstinence or generous donations. However, if the aquaculture oyster lives up to its potential, it could help restore the Chesapeake Bay, make money for everyone involved, and taste delicious doing it. Unfortunately, this novel concept has not gotten the publicity it deserves.

The health of the Chesapeake Bay has been on the decline for the last hundred years. Due to overharvesting, disease and pollution, the oyster population has dropped dramatically to around one percent of its historic level. Not only is this the loss of a coveted food source, but it is also the loss of a crucial filtering system for the Bay. One oyster is capable of filtering up to five liters of water per hour. More pollution means fewer oysters, which means less filtering, which leaves more pollution, compounding the damage. The government has tried to step in with restrictions on point sources of pollution and expansion of water treatment plants. Sadly, these measures have not been enough to combat all the pollution making its way into the Bay.

The aquaculture oyster is a promising remedy to the problems associated with the Bay. Aquaculture is the cultivation of the natural produce of water, including fish, shellfish and algae. For oysters, this process begins when selected oysters are allowed to spawn in nurseries. The resulting microscopic animals attach to bits of gravel or broken shells, which is where they will grow for two months. When the seed oysters are about ¼ - ½ inch long, they can be distributed to oyster farmers.

Until recently, aquaculture farmers grew their oysters on the bottom of a plat of land they rented from the state. This practice is not used as often anymore for several reasons. The Bay is so polluted with algae blooms that the sunlight can no longer reach the bottom, so the oysters are having difficulty surviving there. The oysters need the sunlight to produce algae, its primary food source. Also, on the ground the oysters are much more susceptible to the diseases MSX and Dermo (discussed in more detail below). And perhaps most devastatingly, the leased areas were also plagued by poachers, who could steal the bounty of years of patience in only a few moments. Fortunately, new innovations in aquaculture have made raising oysters a profitable venture once again.

The new trend is raising the oysters in mesh bags that use floatation devices to remain at the top of the water. Being placed in the floats position the oysters perfectly in a zone of algae, which they eat, and oxygen, which is also vital to their survival. The floats also help the oysters avoid their natural predators, crabs and cow nose rays, and have been shown to slow and even prevent the spread of disease. The floats also give the aquaculture farmer easy access for routine up-keep and sorting. Subsequently, the floats allow for an extreme increase in the number of oysters grown per area, from the Chesapeake Bay average of 12 1/2 oysters per acre to 1,000 oysters in only 30 square feet. The results of this form of aquaculture oyster farming are undeniable. The farmers are able to raise bigger, healthy oysters in the same water that was previously inhospitable.



Richard Pelz, President/CEO of Circle C Oyster Ranch

At the forefront of aquaculture oyster farming in Maryland is Circle C Oyster Ranch, which is located is St. Mary's County, Maryland. Circle C utilizes 200 feet of dock and 3.2 acres of surface water to raise oysters from free swimming, microscopic larvae to market size oysters. Circle C raises its oysters in the Floating Oyster Reef, which was designed by its CEO/President, Richard Pelz. The Floating Oyster Reef is a series of PVC pipes fitted into a rectangular shape with a mesh bag attached in the center. Each reef contains approximately 1,000 to 1,500 oysters and holds them just inches below the surface of the water.

Mr. Pelz has been a true pioneer in the aquaculture field. He incorporated the Circle C Oyster Ranchers Association in 1992 and currently sits on the Maryland Oyster Roundtable, the American Farm Bureau Federation Aquaculture Advisory Commission and the Maryland Farm Bureau

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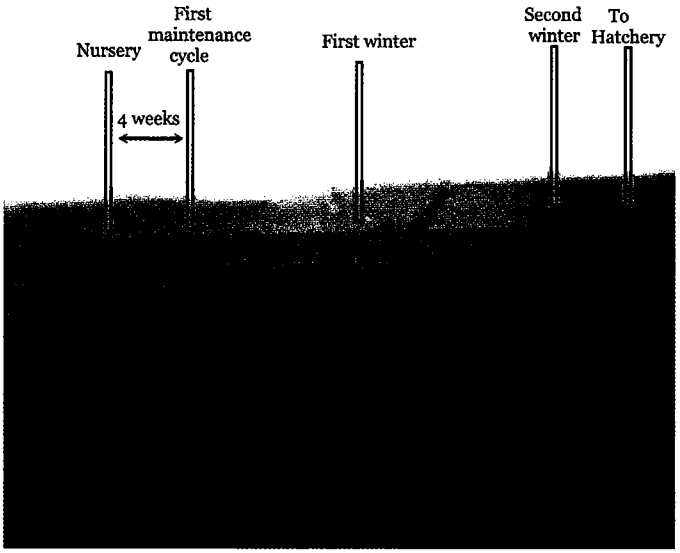

Growth rate of oyster

Aquaculture Advisory Committee. Mr. Pelz was integral in the creation and passing of the Maryland tax credit, which enabled individuals to participate in aquaculture oystering for little or no cost. He is also the holder of two patents, one relating to oyster's ability to filter nutrients and nitrates and the other relating to the clam's ability to filter biological weapons. Mr. Pelz has devoted his life to sharing the benefits of aquaculture oysters with the region.

One of the less obvious benefits of aquaculture oysters is the ability to selectively breed. Aquaculture farmers like Mr. Pelz are able to breed the oysters to be disease resistant, to grow quickly or have any number of other desirable attributes. In Maryland, the law requires that an oyster needs to be three inches long to be removed from the Bay. Studies have shown that taking the biggest (i.e., genetically the best) of a species will result in a weaker, smaller species because only the smaller, potentially diseased specimen are left to breed. Mr. Pelz has reversed this trend by selecting only the biggest and the best oysters to breed.

Over the last fifteen years, Circle C has been perfecting its strain of eastern oyster, the Lineback©. The Lineback© has been selectively bred for a fast growth rate, disease resistance, a thin shell and a deep cup shape. The result is that Circle C is able to raise an oyster from spawn to market in only 18 months. In addition, Circle C's oysters average about thirty-two percent more meat than the same size wild oyster and the thin shell can be opened by trimming the edges with scissors. Circle C sells their selectively bred oysters to individuals and to restaurants in the area.

In selectively breeding, Mr. Pelz is also combating another big threat to oyster health, disease. Specifically two parasites, which are harmless to humans but deadly to oysters in their first two years of life: MSX (*Haplosporidium nelsoni*), which thrives in higher salinity brought on by dry years, and Dermo (*Perkinsus marinus*), which tolerates low salinity and is therefore the more damaging to the oyster population. The EPA reports that all productive oyster beds in the Chesapeake Bay have been infected by Dermo. Evidence in recent years has suggested that oysters which survive the onslaught of the diseases MSX and Dermo can pass that trait on to new generations. Mr. Pelz has attempted to breed oysters that are resistant to the parasites by shipping his best specimen to Virginia to have them exposed to the disease. The oysters that prove resistant to the parasite are bred into his oyster line. Also by creating a faster growing oyster he avoids the disease because the oysters grow to market size before they would succumb to the disease.

Before their great decline in population, the oysters in the Bay could filter the nutrients and nitrates out of the entire Bay, approximately 19 trillion gallons of water, in a week. Today, it would take the remaining oysters more than a year. If more widely utilized, the ability to raise healthy oysters in large quantities in unobtrusive floats is bound to decrease the pollution in the Bay.

Mr. Pelz has had astounding results where he operates his floats in St. Jerome Creek. When Mr. Pelz first arrived on the creek, he couldn't see to the bottom, he never spotted any crabs in the area and there were few waterfowl. Mr. Pelz and a friend spent five hours fishing off the dock and only caught two small fish. Since then, he and his friends have received nine citations from the Department of Natural Resources fishing contest for the size of the fish caught off the dock. Mr. Pelz's neighbors have testified at public hearings that the crabs and birds have returned to the cove. In fact, during a record low season Mr. Pelz was able to hop into the creek and simply grab crabs for dinner. He says that "[t]hey used to be knee deep in black muck and now we make footprints in the sand." Mr. Pelz's portion of the creek is so much cleaner than the surrounding areas that it has drawn attention from crab educational boats, kayakers and other boaters.

Given all the environmental benefits aquaculture farming has on the Bay, government subsidies should be offered to aquaculture farmers. By itself, running an aquaculture farm is not the most lucrative job. However, if the farmers could get subsidies for all the spillover benefits his farm has on the health of the Bay, more people might consider doing it. The subsidies would go a long way towards encouraging aquaculture, which would make the Bay a healthier environment for the inhabitants of the Bay and the people eating them.

The aquaculture oyster could have an even bigger impact on the environment if it is utilized commercially in the impending nutrient trading system. Nutrient trading is the transfer of nutrient reduction credits between companies

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that are emitting more nutrients than they are prescribed by law and entities that are emitting less than their share so they can sell their credits. Nutrient trading has been used in Virginia since 2005 and was adopted by Pennsylvania in September 2006. The Maryland Departments of the Environment, Agriculture, and Natural Resources, in conjunction with the Patuxent River Commission have been exploring the development of a nutrient trading program in Maryland since March 2003. If a nutrient trading program is eventually adopted in Maryland, the potential for aquaculture increases exponentially.

In anticipation of nutrient trading, Mr. Pelz has patented the oyster's natural ability to filter nutrients and nitrates from the water. He plans to offer the services of his oysters as an alternative to waste water treatment plants. Virginia Tech was given a $540,000 grant to administer a three year program to test Mr. Pelz's theories. Mr. Pelz anticipates that he will be able to offer the same pollution removal for hundreds of dollars, while the waste water treatment plants will be charging thousands. He estimates that each float of three inch oysters can filter out approximately 2.2 pounds of nitrogen and phosphorus combined, specifically 1.77 pounds of nitrogen and 1.43 pounds of phosphorus. The possibilities are almost limitless.

For the individual, the benefits of aquaculture oysters are abundant and free of charge. Mr. Pelz conducted a survey that showed that 90% of people were interested in having aquaculture oyster floats, but no one was willing to pay anything for it. Tony O'Donnell introduced a bill for a $500 tax credit for the purchase of supplies for aquaculture oyster floats. It passed through the House and Senate unanimously. The tax credit has allowed Mr. Pelz to design a way to get three floats, complete with his selectively bred oyster seed to the individual for no charge. He estimates there might be fifteen minutes of maintenance required to raise the oysters to market size (each float has to be flipped over). In around 18 months, the individual should have at least four and a half bushels of oysters, worth around $675 or several delectable oyster roasts. Alternately, people without a taste for oysters can just leave them in the floats. The oysters should live for up to 8 years and will spawn every year.

Whether you are interested in the free meals or the environmental impact, there does not seem to be a downside to aquaculture oysters. Aquaculture oysters are essentially a mobile natural filter that can be used to clean harmful nutrients and nitrates from the Chesapeake Bay. In the age of impending nutrient trading in Maryland, oyster filters would be a cost effective alternative to expensive waste water treatment plants. It is also becoming a lucrative industry to raise and export the oysters to restaurants. A cleaner Bay would also mean more natural oysters, which used to be the most valuable commercial fishery in the Bay. With so many positive attributes, it's hard to believe that this practice is not more widely used.

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Chinese Environmental Law

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ties to U.S. environmental law in the early 1970s when its basic infrastructure was being erected. In both countries environmental policy has evolved from ad hoc efforts to relocate polluting industries to emphasis on end-of-the-pipe pollution controls, followed by efforts to encourage process changes to achieve source reduction. To achieve truly dramatic changes in environmental conditions, China will have to integrate environmental concerns more closely into its energy, land use, transportation, housing and tax policies that often affect environmental conditions far more than environmental laws and regulations. China has adopted ambitious plans to improve energy efficiency, reduce pollution, and produce more energy from renewable sources. But it also has demonstrated that it is much easier to adopt plans and environmental laws than it is to develop the supporting institutions–such as strong NGOs, effective administrative agencies, an independent judiciary, an environmental bar, and an informed public–that are necessary to ensure their effective implementation and enforcement.

This article is adapted from Robert V. Percival, "Environmental Law in China," Paper Presented at "The ABA Environment, Energy and Resources Law Summit: 16th Section Fall Meeting," Phoenix, Arizona, September 18, 2008.