

SHELLFISH SANITATION

AND THE PRICE OF SHELLFISH

The differences in sanitary water quality in the Philippine, Gambian and Rhode Island shellfish growing estuaries got us thinking about how shellfish consumers might be perceiving consumption of oysters and other shellfish as a health risk and how much this perception affects the price of the oysters in the United States

By Michael A. Rice*

Back in the early 1980s, I was working in Dagupan City in the Philippines with the Philippine Bureau of Fisheries and Aquatic Resources (BFAR), a seafood trader and oyster farmers in the area to solve the problem of developing better markets for the abundant supply of farmed and wild harvest oysters that were harvested out of the local estuary. The prices obtained by oyster farmers and wholesalers in Dagupan City was only ten percent or less of the prices being received in many countries with well-developed economies (Fig. 1). At that time, water quality and shellfish meat sanitation was identified as the key reason for trade barriers preventing the Philippines from more lucrative seafood markets such as those in relatively



Fig. 1. Marketing of whole and raw shucked oysters at a public market in Pangasinan, Philippines in 1982. Photo by Michael A. Rice.

nearby Singapore and Hong Kong. To solve the shellfish sanitation program we undertook an effort to investigate whether oysters harvested from the Dagupan City estuary system could be placed in depuration systems (troughs with filtered & purified flowing seawater) for 48 to 72 hours to eliminate pathogens and coliform indicator to a level that would allow entry into the more lucrative international markets. Results of two independent studies, one by private industry and another by BFAR, showed over a thousand-fold reduction of coliform bacterial load in the depurated oysters from the oyster farms. Although these initial results were promising and led to some shucked and raw frozen oyster shipments to Singapore, in the end Singaporean public health officials rejected entry of the Philippine oyster after a few months of shipments because spot checks of the oyster meats still showed unacceptable coliform levels despite the depuration process. Apparently there is no real substitute for establishing and maintaining sanitary water quality of shellfish growing waters. So unfortunately shellfish prices remain low in the Philippines

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Fig. 2. Women of the TRY Oyster Women's Association harvesting West African blood ark clams (*Senilia senilis*) in the Alaheln River Estuary at Kartong, Gambia 2012. Photo by Michael A. Rice.

and other countries where management of sewage effluents remains an expensive challenge.

In more recent years since 2010, we have been working with women oyster harvesters in estuaries of The Gambia, West Africa (Figure 2). Much like the oyster farmers of the Philippines, prices received by the Gambian oyster women were far below prices that might be received in America or the European Union, and like the Philippines three decades earlier it was clear that sanitary

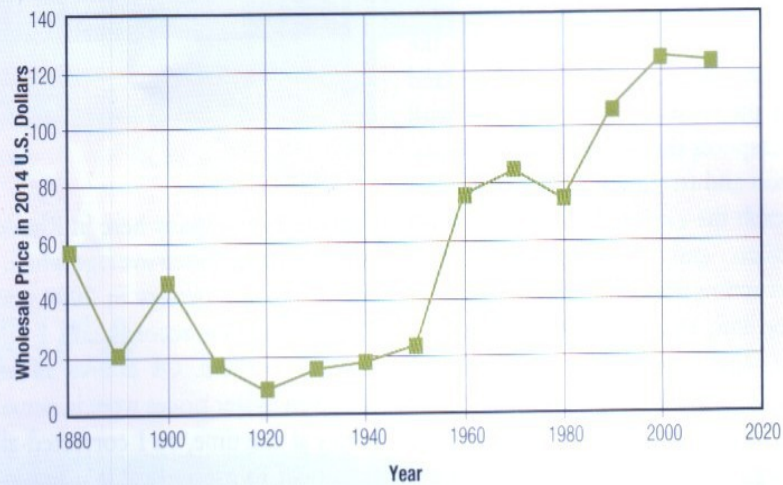
water quality is a problem. As part of the effort to describe the sanitary water quality situation, along with the Gambian water resource agency, we undertook several years of fecal coliform testing in shellfish growing waters in three different Gambian estuaries. To my great surprise we found that in general the sanitary water quality in many of the oyster growing sites actually met or exceeded internationally accepted fecal coliform water quality standards, with the only real coliform

'hot spots' occurring near coastal settlement areas and livestock rearing operations and during the Gambian rainy season of July August and September when freshwater runoff from the land is maximum. But overall the Gambian water quality is far better than that of the urban estuaries of the Philippines or even in my home state of Rhode Island when rainstorms might overwhelm the sewage treatment plants and the storm drain diverters designed to protect the treatment plants from being overwhelmed (called combined sewer overflows) dump raw sewage effluent into upper Narragansett Bay.

Just what is it about The Gambia that allows for surprisingly good water quality in their shellfish-growing estuaries? As it turns out, most of the population of the county lacks the flush toilet systems that have been

Fig. 3

CT & RI Oyster Prices / Bushel



Inflation adjusted prices of a bushel of oysters in Rhode Island and Connecticut 1880 to 2010. Data from Dr. Clyde MacKenzie of the National Marine Fisheries Service and William and Greg Silkes of the American Mussel Harvesters Company. Key dates of interest are: 1880-1920 heyday of oyster production in America; 1900 and the widespread introduction of the flush toilet in US; 1900-1925 period of widespread public health problems with shellfish; 1920 lowest oyster prices at \$8.65 per bushel (inflation adjusted); 1925 National Shellfish Sanitation Program begun in the US; 1929-1940 Great Depression in the US; 1939-1945 World War II; and 2000 highest prices at \$124.65 (inflation adjusted).


around in most developed countries since the turn of the 20th Century. In most Gambian villages, even in the densely populated periurban capital city region of Banjul, much of the human wastes are confined on land in pit latrines or flush toilets with cesspools that allow for soil attenuation and treatment before coliforms reach the estuary. This lack of flush toilets and basic sewerage infrastructure with effluent pipes dumping into the estuaries explains why dry season fecal coliform counts are generally low and highest counts are found almost exclusively during the August rainy season as non-point source runoff contamination from the land.

The differences in sanitary water quality in the Philippine, Gambian and Rhode Island shellfish growing estuaries got us to thinking about how shellfish consumers might be perceiving consumption of oysters and other shellfish as a health risk and how much this perception affects the price of the oysters in the United States. Back in 1996, Dr. Clyde MacKenzie of the US National Marine Fisheries Service published a historical review of the major oyster producing estuaries of North America. In his review, provided a table showing the wholesale oyster prices from several of the estuaries including Connecticut and Rhode Island from 1880 on a decadal basis up until 1990. This is fortuitous because these oyster price data go back to a time in American history prior to the widespread adoption of flush toilets and sewerage systems in large cities and “honey wagons” would be employed to collect the night soils from basement toilets or outhouses. The collected wastes were often hauled to nearby farms and spread as fertilizer. To complete MacKenzie’s decadal oyster price series to the present, William Silkes and his son Greg of the American Mussel

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Harvesters Company here in Rhode Island provided their average wholesale prices for oysters in 2000 and 2010 from their records and I am grateful to them. Of course all of the given oyster prices were in actual prices at the time, so I corrected all the prices to present value using inflation data from the US Bureau of Labor Statistics.

The inflation corrected oyster prices in Connecticut and Rhode Island were relatively high prior to the widespread introduction of flush toilets and the construction of sewer systems during the decades of the 1900s and 1910s (Figure 3). Lowest inflation adjusted oyster prices were in 1920 at a time when water borne typhoid and cholera outbreaks were common in the news and known to be associated with raw shellfish. The National Shellfish Sanitation Program (NSSP) of the United States began in 1925 due to these disease epidemics and that public health effort greatly increased the safety of shellfish consumption. Unfortunately it has not been until 1960 when the oyster prices began to match or exceed what the prices were in the 19th Century prior to the widespread adoption of the flush toilet and public sewerage systems. This 40 year lag in the rebound in oyster prices after the NSSP may have been caused by residual negative perception by consumers about the health risks of eating raw shellfish. Over the last 50 years or so, the consumption of raw shellfish has been regaining popularity in America and prices have reflected the rising demand.

Obviously there are many other factors besides sanitary water quality that affect the price of shellfish, but it is clear that the industry and governmental partnership in assuring that water quality in shellfish growing waters and proper handling of shellfish from harvest waters to the consumers’ plate does play a major role in maintaining an economically successful shellfish industry. 



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