Coastal Water Contamination Increases with Population

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The increase in coastal area population is directly correlated to an increase in contaminated waters and shellfish bed closings, according to University of North Carolina Wilmington Research Professor Michael A. Mallin.

In his article “Wading in Waste,” which appears in the June 2006 issue of *Scientific American*, Mallin pointed to a recent study which has shown that over 85 percent of all beach closures and advisories in 2004, over 19,950 days, were a result of excessive counts of bacteria in the beach waters.

Living in Wilmington, N.C., Mallin has seen firsthand a boom in population and the development that comes with an increasing popularity of costal areas. Large areas of farmland, forests and wetlands are being turned into resorts, strip malls, restaurants, office complexes and other industrial areas.

With this development comes another change. Soil, which acts as a filter for removing the fecal bacteria and other viruses from runoff water, is replaced with impervious materials such as asphalt and concrete. When storm water runoff moves across these impervious surfaces it carries

pesticides, fecal matter, heavy metals and other dangerous materials with it. This polluted water in turn contaminates shellfish beds, recreational areas and drinking water. This contamination causes illnesses such as gastroenteritis, conjunctivitis, cellulitis, ear infections, respiratory infections, hepatitis and Guillain-Barre syndrome.

This problem is especially true in coastal areas where development is heavy and wetlands have been decimated. Storm water runoff is not treated like human sewage is, so heavy rains can cause an overflow of polluted water into streams, lakes and estuaries. In coastal areas where sewage hookups are not an option, septic tanks cause other problems. Areas where septic tanks are located in sandy soil are susceptible to becoming saturated with contaminated water, resulting in runoff into shellfish beds and into fresh and seawater areas. The problem is magnified in areas with less then 10 percent of wetland coverage and a high percentage of impermeable surfaces.

Working at the UNCW Center for Marine Science Mallin has conducted a decade long study of tidal creek areas in New Hanover County, an increasingly populated area in southeastern North Carolina. The study found that the average fecal coliform counts were higher in the creeks with higher population and a higher percentage of developed land in their watersheds.

To reach this conclusion, Mallin and his team collected and analyzed more then 1,000 samples of fecal coliform bacteria and E. Coli throughout six different tidal creeks in New Hanover county and compared them to various demographic and terrain characteristics in the surrounding area. The article also states that when wetlands are replaced by impervious surfaces in watershed areas, rainfall will increase the amount of bacteria present in the surrounding area. Oftentimes shellfish beds will be closed automatically after a rainfall because of the tendency for these areas to have a higher bacterial pollution after storm water

runoff runs through the area.

As mentioned earlier, contamination by fecal bacteria is the leading cause of beach closings in the United States. These closings now affect roughly one third of the nation's monitored beaches. Mallin cited other researchers who have found that a high population or area of high tourist interest during the beach season; is directly correlated to the number of closings. Beaches such as Myrtle Beach, S.C., and Doheny State Beach in Orange County, Calif., are two of the more commonly contaminated beaches, closed 54 days and 312 days, respectively, in 2004.

These areas have a population of over 300 people per square mile and often times can see a fecal bacteria indicator count of thousands of colony forming units (CFU) of E. Coli and Enteroccus for every 100 milliliters of water when the highest acceptable level is 235 (CFU) and 104 (CFU) respectively. At one point, the Enteroccus level for Doheny State Beach reached 38,800 (CFU), which anyone can tell, is not normal or safe.

Mallin does offer some solutions for these problems.

He suggests that having a plan for environmentally sound development and coastal population growth is the best way to approach the future. By minimizing the amount of impervious surfaces when constructing new residential areas, office complexes and commercial areas will keep dangerous runoff down because the water will be allowed to filter through soil and dangerous contaminates will be removed. Construction companies can use a new semipervious concrete that allows water to permeate into the soil and also can support the weight of automobiles.

Parking lots can also be downsized in tourist areas, as large lots are designed to hold enough people for the holidays and shopping seasons as opposed to everyday traffic. Preserving wetlands and if possible,

expanding them will increase these naturally filtering soil; an area of greater than 13.5 percent of wetlands per watershed area is desirable.

Finally, Mallin suggests that when planning for coastal development, communities should put restrictions on the amount of area covered by asphalt, concrete and other impervious surfaces to between 10 and 15 percent.

Source: University of North Carolina Wilmington

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