## **DMNS FAIR**

Queens College, City University of New York Division of Mathematics and Natural Sciences Faculty Achievement In Research

## MY NAME: Greg O'Mullan

## **MY DEPARTMENT: Earth and Environmental Sciences**

**MY RESEARCH:** 

My lab studies the role of microbes within aquatic environments. Some of the microbes that we study are helpful, meaning that they perform a useful function in the environment, such as helping to clean up pollution or recycle nutrients. Other microbes that we study can be harmful, such as pathogenic bacteria in drinking water or recreational water that may pose a threat to public health.

We study these microbes by collecting samples from the field and transporting them back to the lab for analysis. Once in the lab we cultivate the microbes or analyze DNA from the microbes to learn more about their diversity and metabolism. Through these steps we can count the number of bacteria in a sample, characterize the different types of bacteria that are present and learn about their function in the environment. For example, we may want to determine how many and what kind of pathogens are present in a drinking water sample and understand what sources of pollution are contaminating the water supply. In other studies, we want to understand the types of microbes that help to remove pollution from water contaminated with excessive nutrients from sewage or fertilizer runoff into rivers or estuaries.

My lab currently has four major research directions:

- 1) water quality sampling in the Hudson River to investigate sewage contamination and the persistence of pathogens in the estuary;
- 2) investigation of the microbes remediating nitrogen pollution in the Cape Fear Estuary of North Carolina and Hudson River marshes;
- 3) investigation of microbial aerosols and the connection between water quality and air quality along the urban waterfront;
- subsurface carbon sequestration experiments (the pumping CO<sub>2</sub> into saline aquifers) and investigation of the impact of acidification (decreased pH) on the types of metals and microbes found in aquifer water.

## MY RESEARCH IN 140 CHARACTERS:

I am an environmental microbiologist studying water quality issues including nutrient pollution, pathogens in the environment, and aquifer acidification.