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Modeling impacts of climate and landuse variability on waterborne pathogens and diseases: Issues and challenges.

Global effort to sustain clean and healthy water for communities is being challenged by a variety of stressors, such as pathogens, contaminants, toxins, pharmaceuticals associated with land- and resource-use and development, and changing climate. Over 4 million people die a year from contaminated drinking water, and 35 out of 1000 children in the rural and slums of developing countries die before the age of 5 from water related illnesses. More and more freshwater sources are becoming unacceptable for public consumption. Unfortunately, the lack of long-term data in climate variability, landuse and waterborne pathogens makes it difficult to develop robust models and predictions on climate impacts on waterborne pathogens, and our task gets even more complicated under changing landscape exploitation. We fail to recognize that there could be significant economic and health benefits from sustaining our freshwater environment for clean and health water, rather than intensifying treatment and disinfection to protect public health. Currently most climate models linked to water focus on water quantity rather than quality, and there are major challenges in modeling the impacts of climate variability on waterborne pathogens and waterborne diseases. In addition to providing a general overview of these issues and challenges for global communities, I will present results on some of the innovative tools that could be used to develop strategies to optimize and manage public health risks from water and aquatic resources under variable and extreme climate and environmental changes.