## An integrated water quality forecasting model to restrict the harvesting of shellfish following extreme weather events

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Prince Edward Island (PEI) hosts one of Canada's largest shellfish aquaculture industries and a significant portion of its land area is occupied by agriculture. Aquaculture leases located downstream from agricultural land are especially vulnerable to contamination during extreme weather events. Fecal coliforms, principally Escherichia coli (E. coli), are bacteria that live in the digestive tracts of warm-blooded animals, such as domestic and farm animals. Since fecal coliforms are not normally detected in sea-water in significant concentrations, their presence compromises the safety of a shellfish growing area. There is a need to accurately forecast the spatial distribution of harmful bacteria under a variety of different environmental conditions. Geographical Information System (GIS) possesses a dynamic capability of integrating and analyzing spatial and ancillary data obtained from different sensors and methods. The development of an integrated GIS-based tool which models ideal conditions for E. coli growth dependent on hydrological, meteorological and tidal conditions can respond to that need. The tool will be a result of combining a river runoff model and coastal hydrodynamic model. Particle tracking of E. coli will be modeled from coastal watersheds with contrasting land use and weather characteristics. Forecast information will provide the predicted spatial extent of potential contamination given certain parameters and will be used to improve the efficiency of regulatory sampling, reduce unnecessary closures and identify major sources of contamination.





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