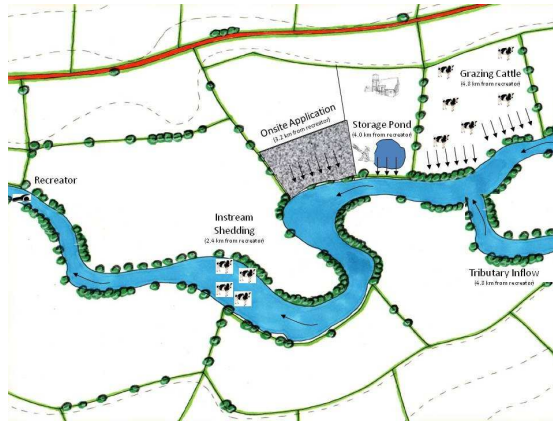


# Using an Integrated, Multi-disciplinary Framework to Support Quantitative Microbial Risk Assessments

A Quantitative Microbial Risk Assessment (QMRA) is a modeling approach that integrates a wide range of disparate data including fate/transport, exposure, and effects relationships to characterize potential human-health impacts/risks from exposure to pathogenic microorganisms. The Framework for Risk Analysis in Multimedia Environmental Systems (FRAMES) is a modeling



infrastructure that is designed to facilitate a user's ability to link disparate models and databases in a plug-and-play manner to help customize the modeling approach of an assessment design. Using FRAMES, a series of models and databases were linked to assess six potential disparate sources of manure-based pathogen contamination, simulating the fate, transport, and health impacts from three pathogens (*Salmonella*, *Cryptosporidium*, and *E coli* 0157) to a recreational receptor at a downstream point of exposure. Applying the QMRA approach within FRAMES allows an analyst to discern which pathogens might be of importance from a health stand point, when they may be important, and which sources could contribute to their importance. By combining fate and transport modeling with point-of-exposure, dose, and impact calculations, an analyst can begin to evaluate, using a more holistic analysis, the importance of the components, including manure application method, pathogen rate of release, timing of the manure loading, sequence and type of transporting media, pathogen characteristics, timing of rainfall events, duration and intensity of rainfall, antecedent moisture conditions, and landscape characteristics.

## Keywords

Integrated Modeling, QMRA, Microbial Source Tracking, Workflows, Risk Assessment, Pathogens, Watershed Management

## For More Information

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Software: <http://iemhub.org/resources/133>

Paper: <http://www.iemss.org/iemss2010/index.php?n=Main.Proceedings>

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