

Abstract

Runoff from manured fields is often considered to be the source of microorganisms in the surface water used for irrigation, recreation, and household needs. Concerns of microbial safety of this water resulted in development of predictive models for estimating the concentrations and total numbers of pathogen and indicator organisms leaving manure fertilized fields in overland flow during runoff events. The KINEROS2 surface flow model (Woolhiser et al., 1990; Semmens et al., 2008; www.tucson.ars.ag.gov/kineros) was developed to simulate event based runoff from small agricultural and urban watersheds. Simulator of Transport With Infiltration and Runoff (STWIR) is an add-on module for KINEROS2 that describes overland transport of soil and manure-born microorganisms. This transport is computed based on advection-dispersion equation (module STWIR) coupled with the kinematic wave equation (module KINEROS2) and includes the following processes:

- microorganism release from surface applied manure;
- influx of microorganism from irrigation water;
- advective-dispersive transport of microorganism with runoff water;
- infiltration of microorganism into the soil;
- straining of microorganisms from the infiltrating water by plant litter and vegetation layer;
- exchange of microorganisms between runoff water and the mixing zone of soil at the surface;
- attachment and detachment of microorganism at the solid phase;
- microorganism die-off in manure, runoff water, soil mixing zone and soil solid phase.

