569d Controlling Environmental Risk to an Urban Stream Via Tmdls: Ballona Creek Case Study

Rita A. Kampalath

As technology progresses, knowledge of the impact human activity has on the environment also increases. In recent years, concern over the deleterious effects of industrial and agricultural activities, land development and land usage has grown, particularly in terms of the effects that these activities may have on the quality of our already limited water supply. Water bodies in urban areas are particularly susceptible to negative human impact since they are often exposed to unusually high pollutant loadings from storm water runoff and urban waste streams. With channelization diminishing the natural capacity of the land to take up chemicals, discharged pollutants are often transported to receiving water bodies or sensitive habitats such as estuaries and wetlands that connect to the urban streams. In urban streams that are in close proximity to shorelines, this can cause concern not only for the species that use the streams and nearby more natural sections of water as important habitat, but also for the large populations that may use the water for recreation, fishing or as a source of potable water.

In order to control discharges to streams, the current approach taken by the U.S. Environmental Protection Agency (USEPA) is to require that states set Total Maximum Daily Loads (TMDLs) allowable for toxic pollutants that were identified at concentrations of concern in particular streams. Determination of TMDLs vary from agency to agency, although ultimately, the USEPA must approve of the proposed limits in order for them to be accepted. Setting a discharge limit on a particular pollutant is meant to ensure that the quality of the water will be maintained at a level protective of all users of the stream, but at the same time should still be a realistic limit with regards to economic and technological considerations. Meeting the above goal is a fairly complicated task, as many factors must be taken into account, including the nature of the specific pollutant with regards to transport properties and reactivity, flow characteristics of the stream, location of the discharge, usage of the water body and activities that contribute to contaminant loading of the stream.

Ballona Creek, in the Los Angeles area has been a source of concern recently due to the high levels of a number of pollutants such as pesticides, PCBs, PAHs and metals. Because point discharges to the stream from industry are currently fairly well-regulated, the cause of the high pollutant concentrations is thought to be primarily due to storm water runoff from the urban landscape that comprises the vast majority of the Ballona Creek watershed. While the Creek is not generally used as a source of drinking water, parts of it are used for recreational activities including fishing, and the Creek discharges directly to the Pacific Ocean close to frequently used beaches. In addition, the section of the Creek just before the ocean discharge is an Estuary region that is not channelized like the rest of the Creek and serves as important habitat for a number of species in the area, including some that are considered sensitive populations.

In the current work, proposed TMDLs for Ballona Creek are evaluated using detailed transport models. The first is WASP 6.0, a water quality model developed by the USEPA and frequently applied to TMDL development. This model was used to investigate the effects of varying flow rates, stream volumes and loading scenarios on pollutant concentrations. The second model is a simulation developed using the finite-element FEMLAB PDE software to illustrate the effect of varying discharge location on the concentration depth profile in a stream, and how this might effect decisions on monitoring locations in order to get accurate representations of the concentration in the stream. Based on these simulations, it was determined that while the proposed TMDLs were effective in maintaining protective concentrations in the stream under the specific conditions used as the basis of the TMDL calculations, they were not as effective under conditions of low flows or stream volumes, which occur regularly in Ballona Creek. The potential implication of contamination at the TMDL limit will be discussed with respect to

bioaccumulation issues and impact on environmental quality of Ballona Creek and its associated Estuary region.