Proposal to the SMC

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A Project to Standardize Hydrologic Modeling Methods for Water Quality and Hydromodification Assessments in Southern California

Problem Statement

Stormwater Monitoring Coalition (SMC) members agencies who are Municipal Separate Storm Sewer (MS4) permittees presently use hydrologic models for the design of BMPs to improve storm water quality, to assess compliance with Total Maximum Daily Load (TMDL) targets, and to mitigate the adverse impacts of hydromodification on natural drainage systems. However there is no agreed approach to standardizing the data that goes into the computer models, on parameter assumptions, and data validation. For example, a study of six independent modeling results for the Ballona Creek Watershed using literature and local data produced mass load estimates that varied by -68% to 118% because of the differences in the assumptions and methodologies in the models used to project results. (M Park et al., *Accuracy and Precision of the Volume-concentration Method for Urban Stormwater Modeling*, Water Research 43, 2773-2786 (2009).

The current hydrologic modeling practices vary widely among SMC member agencies. As a result, methods for hydrologic computations for storm water quality fate and transport or flow-based impacts from hydromodification assessment also differ. Engineers working on local projects are left to specify model parameters and, without a standardized procedure, BMP performance and mitigation projections will vary from one county to another. This inconsistency is also a barrier to sharing information on BMP design and performance among SMC partners.

The proposed project to develop a standardize approach for hydrologic modeling for water quality assessments is all the more important now because regulators are increasingly resorting to these models to evaluate TMDL and NPDES permit implementation and BMP performance.

Project Objective

The goal of this project is to:

1. develop a consistent hydrologic method for modeling storm water quality, implementing LID strategies, and assessing hydromodification impacts.

2. obtain agreement among SMC members on acceptable computer model(s), design storm definitions, and the allowable range for model parameters specific to the southern California region (or subregions),
3. produce an associated guidance document for implementing the standardization to improve consistency and to enable the sharing of information on BMP performance (and the factors that affect performance) among SMC members.

Tasks

Phase 1

1. Conduct a literature review of hydrologic models and approaches for standardization that are being used across the Counties of Ventura, Los Angeles, Orange, San Bernardino, and San Diego in Southern California.
2. Convene a workshop of practicing modelers, consultants and SMC member agencies to:
    a. evaluate available models and criteria for application throughout Southern California
    b. tabulate the mechanisms
    c. define the assumptions
    d. survey uses of the models
    e. specify key model parameters for standardization
    f. specify data needed for calibration, verification, and estimation of model's parameters.
3. Evaluate hydrologic modeling software in terms of documentation, technical support, and training program.
4. Compare results for a range of hypothetical but realistic inputs, and summarize the differences and their significance with assistance of county staff and/or their consultants.
5. Compare model outputs and the important differences.

Phase 2

6. Develop frequency-based design storms to comply with the NPDES' requirements.
7. Develop guidelines for estimating models' parameters.
8. Select a few gaged watersheds representing the range of Southern California's hydrologic characteristics and test the application of hydrologic models including: calibration, validation, and verification. Two (or more) hydrologic models may be needed for different model applications.
9. Make recommendations for improvements and standardization.
10. Develop a user's manual and post it on the SMC web site.

Schedule

This project will be completed over three years.

Tasks 1, 2 and 3: to be completed within eighteen months after approval of the project by the SMC and funding is made available.

Tasks 4, 5, 6, and 7: to be completed from month eighteen to month 30 after project start date.

Tasks 8, 9, and 10: to be completed from month 30 to month 36 from project start date.

Tasks

Budget

	Year 1	Year 2	Year 3	Project Total
Salaries and Wages Principal Investigator and Researchers	$20,000	$20,000	$20,000	
External Researcher	$30,000	$31,000	$32,000	
Graduate Student Researchers (2)	$43,000	$44,000	$45,000	
Employee Benefits	$42,000	$43,000	$43,000	
Travel	$1000	$1000	$1000	
Sub Contract	$10000	$10000	$10000	
Supplies and Expenses	$3700	$2600	$700	
Total Direct Costs	$149,700	$151,600	$150,800	
F@A at 54%	$80,800	$81,900	$81,400	
Cost Requested	$230,000	$231,500	$$232,200	$693,700

The estimated project cost is $694,000 with an average annual budget of $231,000.

Project Team

The project team will include Prof. Michael Stenstrom, Dr. Xavier Swamikannu, Dan Radulescu, and graduate students from the UCLA Institute of Environment and Sustainability.