Hydrol Current Res 2014, 5:4
http://dx.doi.org/10.4172/2157-7587.S1.015

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference on
Hydrology & Meteorology
September 15-16, 2014 Hyderabad International Convention Centre, India

Sustainability of water quantity and quality within the urban water cycle

John Sansalone and Saurabh Raje
University of Florida, USA

The built environs including urban land uses, infrastructure systems and activities therein, generate particulate matter (PM) and metal loads in rainfall-runoff that are equal to or greater than untreated wastewater discharges and second only to treated wastewater discharges as a source of nutrient loads to receiving waters. *Quantifying the nutrient, metals and PM load recovery and economics thereof for the urban water cycle is beneficial for all stakeholders. The idea that sustainability of urban water is quantifiable is critical in all economic conditions. These sustainability operations are essential and coupled with operations that recover gross solids (detritus), coarse PM and associated nutrients* (or metals) from the built environs that accumulates as urban watershed inventory; inventory that is transported through, stored in, and on urban drainage infrastructure systems. PM is a mobile substrate and the primary vehicle to and from which nutrients partition from source areas to inland and coastal waters. Control of rainfall-runoff PM is challenging; in part due to the wide gradation of PM, solubility of nutrients, complex geometries of many urban drainage systems and urban water best management practices (BMPs) and episodic events with highly unsteady flow rates. Such challenges and the expense associated with resolving such challenges have led to the common examination of a spectrum of BMPs as black-box systems. The economics and nutrient load reduction of primary maintenance operations (pavement and urban infrastructure appurtenance cleaning) are compared to the functionality of current BMPs whose performance deteriorates as a function of increasing maintenance periods. Experience has demonstrated that there continues to be a gap in knowledge transfer between the design, analysis and monitoring of these BMPs and fundamental unit operations and processes (UOP) concepts, sustainability requirements for BMPs, as well as new developments in the behavior of green urban infrastructure. Tools such as UOP concepts, laser diffraction, computational fluid dynamics (CFD) and continuous simulation modeling are removing urban water controls from the category of "black-boxes". With such tools we can now demonstrate treatment viability as a function of the hydrologic, physical, chemical, biological and thermal phenomena for rainfall-runoff or snowmelt. This synthesis is critical whether the objective is hydrologic restoration, source and near-source control, water chemistry control, water reclamation and reuse, or often, a combination of these. However, storm water systems that do not provide some level of hydrologic restoration, for example through "green" infrastructure materials, are not sustainable. Further advances with respect to sustainability of urban water require tools such as continuous simulation models, smart sensors and modeling advances such as CFD. The urban water cycle is complex but these complexities can be resolved as presented herein with coupling continuous simulation tools and CFD with physical modeling data.

jsansal@ufl.edu

Flood flow modeling incorporating ungauged sub-basins

Sangita Deb Barman and Parthasarathi Choudhury
National Institute of Technology, India

Floods cause enormous economic damage and human suffering and needs flood control measures to minimize the losses due to floods. The present study focuses on evaluation of flood control alternatives for a river system incorporating flows from multiple gauged and ungauged sub-basins. A linear programming (LP) model incorporating flows from both gauged and ungauged sub-basins is presented in this study to determine the relative impacts of upstream catchment flows on the downstream flood flow. Flow contributions for different ungauged sub-basins are computed by applying unit hydrograph technique. The model uses multiple inflows routing model to determine effects of the upstream flows on the downstream station in a river system. The model is applied to Barak river system, Assam with downstream flow at Badarpurghat. Three flood events are used in the study. The LP model is run for various upstream conditions to evaluate impacts of flood flow at the downstream locations. Model results demonstrates the extent of flow regulations required in the upstream gauged and ungauged sub-basin to create safe flow at the downstream locations.

dbsangita@gmail.com