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Environmental and water hazards of the constructed environment with the respect for technical and societal management of the human habitat

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While the built environmental and water cycle have benefited from significant intellectual and technological advances over the past half century, urban water phenomena remain fundamentally complex across scales that range from the watershed to the molecular level. Additionally, concepts such as a first-flush or measurements such as TSS still perpetuate yet are the basis for regulation. Regulations whether based on concentration, load or "first-flush" continue to remind us that there continues to be a significant gap in knowledge between "Best Management Practices" (BMPs) design, monitoring and modeling and a more fundamental unit operations and processes (UOPs) approach. Many current water cycle approaches within our cities are not sustainable economically and their treatment performance is non-stationary; declining with time and volume treated as well as from lack of management. Concerns over accretion and dispersion of toxics, nutrients and particulate matter within the human habitat are significant and represent a potential chronic health concern not only for the natural ecology but also for humans. Success with respect to a sustainable water cycle requires the integrated knowledge of unsteady and variable hydraulics, sediment transport, hydrologic, physical, chemical and thermal properties of loadings, combined with a fundamental foundation that includes UOP principles as well as physical and numerical models. This synthesis is critical whether the objective is hydrologic restoration, water chemistry control, water reuse, or often, a combination of these. Validated numerical tools such as continuous simulation (SWMM) and computational fluid dynamics (CFD) models have been more than capable of resolving urban water issues. At the same time, more precise application of monitoring and sampling subject to unsteady conditions, for example, granulometric analysis (in terms of particle size distributions and densities, instead of indices such as TSS) and chemical partitioning with speciation has allowed physical and numerical models to predict management behavior and misbehavior subject to such complex interactions. This presentation summarizes a series of selected vignettes on urban infrastructure, rainfall-runoff interactions, urban water and methods developed over the last decade to manage the activities within our human habitat.

Biography

John J Sansalone's research is coupling computational models of unit operations and processes with monitoring of physical models for water treatment systems, urban infrastructure and the impacted environment subject to unsteady chemical/hydrologic/physical and climate phenomena. He has over 120 peer-reviewed journal publications, 11 patents and over 200 conference and seminar presentations and graduated 24 PhDs. He is a Professor at the University of Florida, a member of the PhD Faculty at the University of Bari and a Visiting Professor at a number of universities in Italy.

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