

# Urban Stormwater Management- Science, Policy, and Engineering Training for Smart Cities

## Overview

An increase in urban population in India will increase the pressure on land and water resources. Development will bring a suite of changes in hydrologic quantity and quality and in the behaviour of terrestrial and aquatic ecosystems as a result of increased flooding, decreased groundwater recharge, and increased sediment erosion problems, among others. It will be essential to take appropriate engineering measures to adapt to these anticipated changes. With India implementing “Smart City” projects, it will become important to understand and prepare for the various repercussions that will arise as a result of increased urbanization.

In order to formulate various water resources policies geared towards alleviating problems associated with urbanization, it is important to understand various aspects of urban stormwater management including public education, illicit detection and elimination, engineering controls for stormwater runoff from construction sites, low impact and green infrastructure development, areas of new development and redevelopment, and pollution prevention and “good housekeeping” measures for municipal operations. Taking care of these minimum measures will aid in improving the health of rivers and streams that are already impaired in the country. On top of these minimum measures, monitoring the health and condition of water bodies and modelling the impacts of stormwater runoff on various streams and rivers will be key to creating a stormwater policy able to effectively protect India’s natural resources as development and urbanization continue.

With the advancement in water quality sensor technologies, the United States Geological Survey (USGS) and several other worldwide scientific agencies have suggested the need for high frequency hydrologic datasets (quantity and quality). Given the highly variable nature of the environment, high frequency datasets can help in better understanding watershed responses and in generating more accurate datasets for watershed models. These high frequency datasets, along with targeted model results, could aid in the formulation of realistic and efficient policies to improve the water quality of India’s urban streams.

A number of models are currently in use in the United States which would likely be transferable to many urban modelling projects across India. The US EPA Storm Water Management Model (SWMM) is commonly recognized as the most defensible computer program to model stormwater in conveyance systems. HEC-HMS (Hydrologic Engineering Center-Hydrologic Modeling System) and HEC RAS (Hydrologic Engineering Center-River Analysis System) are widely used programs developed by the US Army Corps of Engineers that are used to evaluate floodplains, flood hydrology, water flow through rivers and channels, and other aspects of urban hydrology. SUSTAIN (System for Urban Stormwater Treatment and Analysis) is a US EPA developed tool to evaluate urban green infrastructure costs and pollutant reduction efficiency in urban watersheds. IDEAL (Integrated Design, Evaluation, and Assessments of Loadings) is a post construction proprietary computer program to evaluate post construction BMP effectiveness. The LID (Low Impact Development) green infrastructure computer program was developed by faculty from Clemson and Oklahoma State Universities. The overall goal of this workshop is to expose the attendees to urban water quality and quantity modelling and training them to address those issues.

## Objectives

**The objective of the training is to expose attendees to different aspects of urban stormwater management (quality and quantity)**

1. Introduce and familiarize the attendees to the science and engineering of urban stormwater management, and policy formulation,
2. Introduce the participants to the collection of high frequency hydrologic datasets for stormwater assessments (both quality and quantity), problem identification, and model development,
3. Develop and expose attendees to watershed, sewershed, and flood models to simulate urban hydrologic and water quality conditions using SWMM, and HEC models,
4. Develop and familiarize participants with Urban Low Impact Development Green Infrastructure models to alleviate urban water quality issues using EPA SUSTAIN and IDEAL,
5. Introduce participants to various processes of watershed calibration and validation during the model building process.

<b>Modules</b>	<b>A: Duration :</b> February 27 – March 6, 2017 <b>B: Venue :</b> Department of Hydrology, Indian Institute of Technology Roorkee <b>The detailed workshop schedule will be available by November 30, 2016.</b> <b>Number of participants for the course will be limited to twenty five.</b>
<b>You Should Attend If...</b>	<ul style="list-style-type: none"> <li>▪ You are a student or faculty from academic institution dealing water related topics;</li> <li>▪ You are a civil, environmental, or agricultural engineer. You are an environmental regulator interested in urban water quantity and quality issues, and high frequency water data gathering;</li> <li>▪ You are a person from industry/research org., and interested in learning about urban stormwater engineering.</li> </ul>
<b>Fees</b>	The participation fees for taking the course is as follows: <b>Participants from abroad : US \$200</b> <b>Industry/ Research Organizations: ₹ 10,000</b> <b>Academic Institutions: Faculty: ₹ 5,000 &amp; Student: ₹ 2,000</b> The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

## Training Faculties



**Dr. Debabrata Sahoo** is a professional engineer and professional hydrologist, and is currently working as a senior engineer and Task Leader at Woolpert. He is leading the watershed stormwater quality monitoring, data analysis, and modelling efforts in the company. He has served multiple local governments in South Carolina, USA such as Greenville County, City of Greenville, City of Columbia, City of Mount Pleasant, and Charleston County. In addition to serving various local governments, he has helped the South Carolina Department of Transportation, US Department of Environment Protection, and the Department of Defense in their stormwater management program.



**Dr. Sumit Sen** is working as an Assistant Professor at the Department of Hydrology, Indian Institute of Technology, Roorkee, India. He is involved in teaching post-graduate courses, such as Watershed Behavior and Conservation Practices; Watershed Modeling and Simulation, Planning and Management of Watersheds, Hydrometeorology; and Engineering Hydrology. His research area focuses on watershed management, monitoring and modeling; rainfall-runoff modeling. He has been developing an experimental watershed in the Yamuna River Basin by intensively instrumenting the Aglar watershed.

## About Roorkee

Roorkee is a part of the State of Uttarakhand and is located at the foothills of Himalayas. Roorkee Railway Station is on the main line of Northern Railways having direct links to Delhi, Mumbai, Calcutta, Amritsar, Jodhpur and Shri Ganganagar. The place is also within easy reach by road from Delhi (200 km) and Chandigarh (180 km). It is located on Delhi – Haridwar and Delhi – Dehradun bus routes. Roorkee is ideally located near several tourist places, like Dehradun (70 km), Mussorie (100 km), Haridwar (32 km) and Rishikesh (50 km).

## Registration

Registration forms are attached with the brochure. Duly filled registration forms can be sent to the coordinator both by online and offline mode.

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## Course Co-ordinator

**Dr. Sumit Sen**

Phone: 01332-284754

E-mail: [ssenhfhy@iitr.ac.in](mailto:ssenhfhy@iitr.ac.in)

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**REGISTRATION AND ACCOMODATION REQUEST FORM**  
**Urban Stormwater Management- Science, Policy, and Engineering Training for Smart Cities**  
**Training Workshop**  
**February 27 – March 6, 2017**  
**Department of Hydrology, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand**

1. Name of applicant (in block letters): Ms./Mr./Dr. ....
2. Designation .....
3. Full Address for Communication: .....  
.....  
.....
4. E-mail id: .....
5. Phone numbers: Mobile....., Landline.....
6. Highest Academic Qualification: .....
7. Do you need accommodation for your stay during course: Yes/No (on payment basis)
8. Details of DD: Amount ....., DD No. ....., Issuing Bank.....

**Affix passport  
size photograph**

**Date:**

**Signature of Applicant**

Note:

- (i) Application should reach DOH Office at the above address latest by 31 Jan, 2017. Scanned copy may be sent by e-mail.
- (ii) Participation in the workshop, only if you have received confirmation of admission.
- (iii) Registration fee for participation should be paid through Demand draft in favour of "DEAN SRIC, IIT Roorkee", payable at Roorkee.

Complete filled application form along with DD, send to

**Dr. Sumit Sen,**  
**Department of Hydrology, IIT Roorkee**  
**Roorkee – 247 667 (Uttarakhand)**  
**Phone: (01332)284754**  
**Fax: (01332) 2273560**