

GREEN ROOFS AS URBAN WATER MANAGEMENT TECHNOLOGIES: EXPERIMENTAL STUDIES

Monday, September 30th 2013 , 2pm- 4 pm, Aula TA11

Scuola di Ingegneria e Architettura - Via Terracini n. 28

Università degli Studi di Bologna



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Abstract

In this seminar, Eng. Carson and Eng. Marasco will present the **Columbia University's green roof monitoring network**, established in July 2011, which consists of six green roofs in New York City.

The primary instrument in these systems are the 12 custom designed **drainage pipe flow meters** installed at each green roof. The flow meters have been developed and upgraded over their two years of deployment to improve accuracy, measurement range, usability, durability, and independence. Each flow meter has been calibrated in a custom flow chamber, which closely mimics the in-situ flow conditions into rooftop drainage pipes.

Topics covered include system development, analysis methodology, and quantification of green roof performance based on resultant data. More specifically, the analysis methodologies and results discussed will be **stormwater retention modeling** using CRE methodology, seasonality and size dependence of rainfall capture, extreme-event performance of green roofs, and peak runoff rate modeling by empirical methods.

To analyze large amounts of monitoring system data efficiently and accurately, Daniel and Tyler have developed a **MATLAB package** to automatically import data, apply calibration equations, separate precipitation events, export relevant environmental data, analyze results, and identify system errors. This MATLAB package has been upgraded over two years to significantly expand the number of analysis metrics.

The seminar will also address the establishment of University of Bologna's monitoring systems and how the collaboration can foster a new understanding of green roof function.

The University of Bologna research group will talk about the **Bologna Green Roofs Project**.

Eng. Stojkov and Dr. Conte will present the *Green Roofs Project*, that studies two green roof prototypes on a lab of the Engineering and Architecture school, via Terracini complex, of the University of Bologna were realized to be **studied** and **monitored**. Real scale technologies (1:1) and an attentive and continuous environmental monitoring project aim at obtaining reliable results on the experimental built system. The results will be fundamental in order to understand the **environmental and economic benefits** of those green technologies and to find the necessary **implementations** to optimize their performance and future design.

Roof design and construction, monitoring instruments, collected data and first considerations will be presented.

Prof. Speranza and Dr. Ferroni will present the experience of the “*Bologna Green Roofs Project*” aiming at testing the performances of some herbaceous perennial wild species on the green roof TV5. Species tested are *Bromus erectus* (Gramineae), *Lotus corniculatus* and *Dorycnium pentaphyllum* (both Leguminosae). The choice of these species takes in account their capability of growth in semi-xeric environmental conditions, very similar to those of a green roof in Mediterranean area, with a limited availability of irrigation water. First results of the experience show better performances for the two legume species, on all the levels of tested depth (8-10-12 cm). These results are useful to individuate a pool of xero-tolerant species, for sustainable green roofs in Mediterranean and sub-Mediterranean areas.

The seminar will end with future research developments and partnership with the Columbia University.

PROGRAM

Seminar on green roofs as urban water management technology

Monday, September 30th, 2013

Via Terracini 28, Room TA11

2 pm - 4 pm

2:00 PM

The monitoring project for New York City, Columbia University. Stormwater runoff and green roof retention for 4 green roofs studied in the City of New York (CU Paper)

Tyler Carson - Columbia University

Daniel Marasco - Columbia University

3:00 PM

Bologna green roof prototype: roof design and construction, monitoring instruments, collected data and first considerations

Irena Stojkov - CIRI EC

Andrea Conte - DICAM

3:30 PM

The role of wild plants on the Bologna prototype green roof TV5

Maria Speranza - DipSA

Lucia Ferroni - DipSA

04:00 PM

Closing and discussion