**1st MEETING OF THE DOCTORAL PROGRAM IN CIVIL ENGINEERING**

## UNIVERSIDAD DE CANTABRIA

### TENTATIVE PhD TITLE

SPATIAL DECISION SUPPORT SYSTEM TO IMPROVE URBAN WATER MANAGEMENT THROUGH THE IMPLEMENTATION OF SUDS

### SPEAKER

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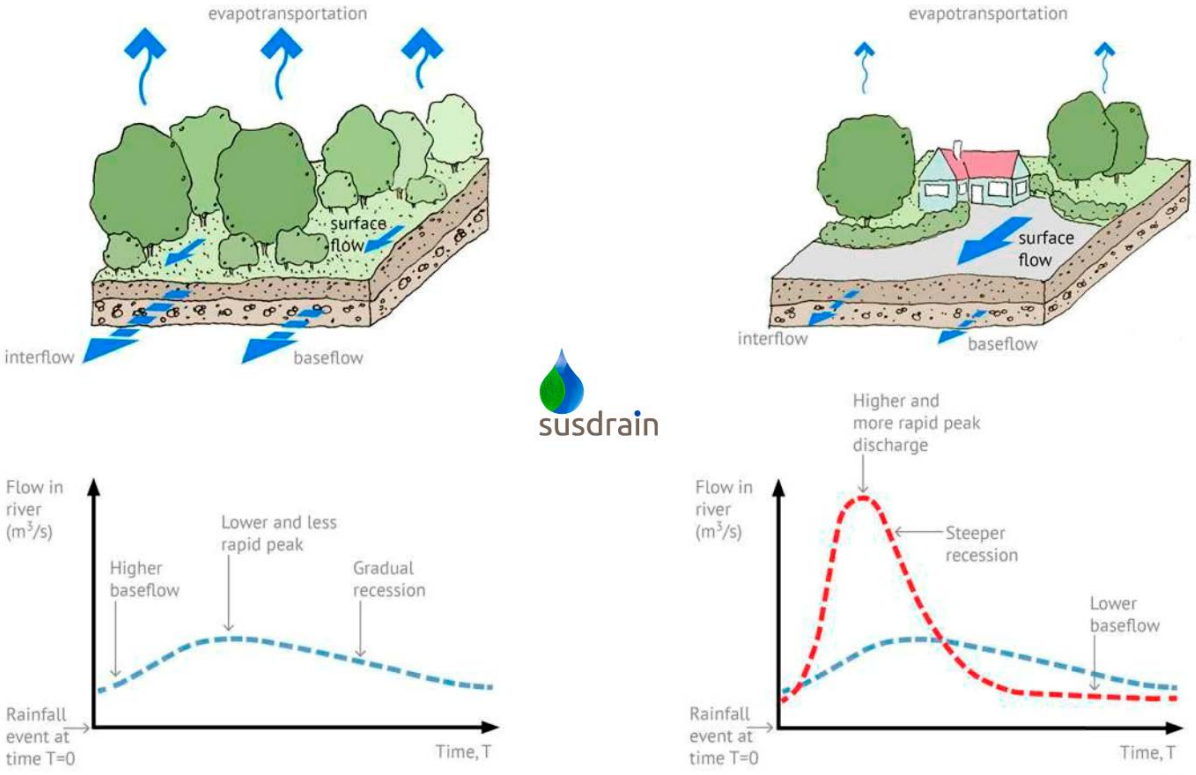
## FRAMEWORK

How does urbanization change a watershed?




- Natural drainage patterns are being altered by increasing urbanization. Rapid conveyance and discharge of runoff lead to increased flood risk, diminish of aquifer recharge and degradation of receiving waterways (Perales-Momparler *et al.*, 2015).

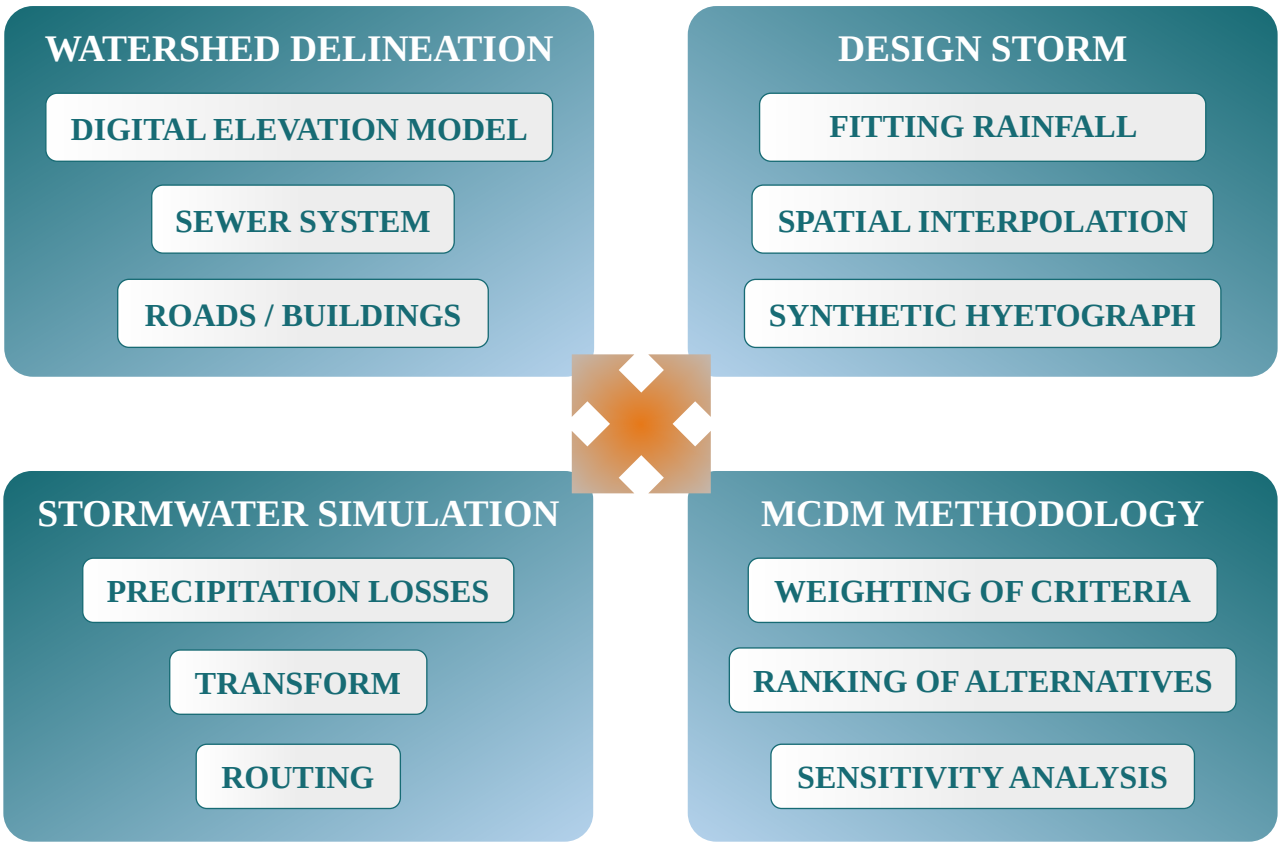
- The EU Water Framework Directive require actions to be taken to ensure good ecological and chemical status of community water. However, the extensive use of combined sewers in urban areas throughout Europe still poses problems (i.e. combined sewer overflow (CSO) spills) (Casal-Campos *et al.*, 2012).

- Sustainable Urban Drainage Systems (SUDS) emerged to help natural flow water to be restored in these environments. Their purpose is to mitigate runoff peak flow rates and reduce water pollution through infiltration, transport and retention mechanisms (Castro-Fresno *et al.*, 2013).

## AIMS

The general goal of this PhD is to design a spatial decision support system (SDSS) to improve urban water management through the implementation of SUDS, based on the combined use of Geographic Information Systems (GIS), stormwater simulation models and multi-criteria decision-making methods. To this end, four specific aims will be accomplished:

- Generate the GIS-based spatial information required to characterize the elements forming a watershed from a hydrological point of view.
- Design a synthetic storm from the fitting of a probability distribution to a series of data concerning the repeated measurement of daily rainfall.
- Simulate the hydrological processes that take place during the transformation of rainfall into runoff for different drainage scenarios, with and without SUDS.
- Develop a multi-criteria decision-making methodology to select the best drainage scenario among those proposed according to sustainable goals.



## RELATED SCIENTIFIC ACTIVITY

### ***Publications***

Daniel Jato-Espino, Elena Castillo-Lopez, Jorge Rodriguez-Hernandez, Juan Carlos Canteras-Jordana (2014): *A review of application of multi-criteria decision making methods in construction*. Automation in Construction; 45: 151–162. **Impact factor: 1.822 (Q1). Status: Published.**

Daniel Jato-Espino, Jorge Rodriguez-Hernandez, Valerio Carlos Andrés-Valeri, Francisco Ballester-Muñoz (2014): *A fuzzy stochastic multi-criteria model for the selection of urban pervious pavements*. Expert Systems with Applications; 41(15): 6807–6817. **Impact factor: 1.965 (Q1). Status: Published.**

Daniel Jato-Espino, Elena Blanco-Fernandez, Jaime Carpio-García, Daniel Castro-Fresno (2014): *A new approach for hierarchically structured decision-making problems based on nonlinear normalization and prioritized correlated aggregation*. European Journal of Operational Research. **Impact factor: 1.843 (Q1). Status: Under review.**

Daniel Jato-Espino, Elena Castillo-Lopez, Jorge Rodriguez-Hernandez, Susanne M. Charlesworth (2014): *Geographic location system for the detection of urban road sections sensitive to runoff accumulation*. Journal of Hydrologic Engineering. **Impact factor: 1.624 (Q1). Status: Under review.**

Daniel Jato-Espino, Susanne M. Charlesworth, Joseba R. Bayon, Frank Warwick (2015): *Rainfall-runoff simulations to assess the potential of different SUDS for mitigating surface water flow in urban watersheds*. SUDSnet International Conference, Coventry (United Kingdom). **Status: In preparation.**

### ***Mobility***

3-month internship (September 1 to November 30, 2015) at the **Centre for Agroecology, Water and Resilience (CAWR)** at Coventry University.