



### **Innovations for Extreme Climatic Events**



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Water JPI WaterWorks2014 Cofunded Call 18 May 2016, Rome

# CONSORTIUM

PRINCIPAL INVESTIGATOR	INSTITUTION	COUNTRY
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# **INXCES** Organisation



# FOCUS AREAS

#### Floods

#### Droughts



#### Water Pollution

### **Ground Settlement**







# Flooding Risks

- Climate change exerts large influence on the catchment hydrology, and urban drainage
  - Expansion & increasing density of urban areas
  - In cold regions winter frost /ice formation
- Flood risk visualization tools for urban catchments
- Drainage design guidance for snowmelt plus rain event
- Better specification of frozen soils conditions in modeling





## **Resilience of Treatment BMPs**

- Increased use of low cost stormwater treatment BMPs
  - Peak flow reduction and pollutant removal
- Disruption of stormwater treatment BMPs(Flood/Drought)
  - Physical damage/ adsorbent loss/ pollutant release
  - Higher loads / multiple contaminants
- Need to
  - Assess the resilience and life cycle impacts of water treatment BMPs
  - Develop multifunctional and robust treatment systems
    - Treatment train concept





# Drought & Urban Subsurface

- Drought complex, invisible and slow phenomenon
  - Lower groundwater levels
  - Subsidence and ground instability
- Urban subsurface provides ecosystem services
  - Regulating (flood attenuation, remediation)
  - Carrier (infrastructure, buildings, heritage)
  - Provisioning (water, energy, raw materials)
- Safeguarding of subsurface ecosystem services lacking.
- Decision makers are not aware of benefits of subsurface and risks caused by drought
- Innovative monitoring tools for drought risks to subsurface eco-system services
  Water



### **General Objectives**

- Develop new management tools for holistic integrated urban water management planning and risk assessment, including subsurface variability, ground- and storm water.
- Improve the understanding of the effects of climate change on soil-water interaction in urban and peri-urban areas
- Identify and enhance the benefits of urban ecosystem services for mitigation of extreme climatic events.



## **Project Implementation**





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WP3

WP1 Integrated Risk Assessment

WP2 Sub & Surface Water Management

Tech Innovations for Risk Assessment & Mitigation



WP4 Dissemination/Outreach



WP5 Project Management



# WPI-Integrated Risk Assessment

- Coupling the surface and subsurface in risk assessment and mitigation of extreme hydroclimatic effects.
- Simulations of the runoff for conditions of rainfall on snowpacks/snowmelt and frozen soils
- Applying the road map (TRUST) procedure to sustainability & selection of innovations

#### Leader: Prof. Maria Viklander





### WP2-Surface – subsurface water

## management for ecosystem services

- Formulation of technical and management criteria for selection of Low Impact Development(LID) locations.
- Development of strategies for improved selection of LIDs based on urban ecosystem services and groundwater infiltration potential
- Connecting ecosystem services values in the selection process for mitigation measures





# WP3-Tech Innovations for Risk Assessment and Mitigation

- Disaster Risk Management Quick Scan (DRM Quick Scan)
- Spatial time-series analysis of Interferometric Aperture Radar (InSAR) observations in urban areas
- Testing of filter media/ treatment config. for robust performance of stormwater BMPs









Leader: Tone Muthanna Associate Prof.



## WP4-Dessimination and Outreach



























POPULAR SCIENCE

> TECHNICAL REPORTS







### Leader: Dr.Floris Boogaard





### Scientific and Societal Impacts











## **Originality and Value Aspects**

- InSAR to identify areas susceptible to extreme events
- Catchment size 3D visualization of flood and drought risk
- Nature-based system coupled with in-situ advanced treatment for water recycling and reuse
- Differential design requirements for pipe capacity and volume detention in stormwater systems
- Developing a novel methodology for assessing runoff generation in urban catchments
- Integrating the technological innovations in risk assessment management



### Expected Outcomes

- Improved environmental impact alleviation of climatic events
- A holistic approach to the urban water balance and improved management of urban water resources
- A new urban monitoring station and shallow subsurface monitoring in Bucharest and Better prediction of changes in groundwater level
- Incorporating rain-on-snow and snowmelt events in flood risk assessment
- Prototype of nature-based water quality filters and treatment train
- Guidelines for improved design of stormwater systems for extremes



# **THANKYOU!**

