



PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 38th cycle

Research Area n. 1 - Water Science and Engineering

**PARTENARIATO PNRR Research Field: NATURE-BASED SOLUTIONS FOR
WATERRELATED RISK MANAGEMENT IN URBAN AREAS****

Monthly net income of PhDscholarship (max 36 months)

€ 1200.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

**Motivation and objectives of the research
in this field**

**RETURN: PARTENARIATO ESTESO MULTI-RISK
SCIENCE FOR RESILIENT COMMUNITIES UNDER A
CHANGING CLIMATE**

CUP D43C22003030002 - Decreto di concessione D.D.
1552 del 11/10/2022 D.D. 341 del 15/03/2022

Avviso pubblico per la presentazione di Proposte di
intervento per la creazione di "Partenariati estesi alle
università, ai centri di ricerca, alle aziende per il
finanziamento di progetti di ricerca di base" - nell'ambito
del Piano Nazionale di Ripresa e Resilienza, Missione 4
"Istruzione e ricerca" - Componente 2 "Dalla ricerca
all'impresa" - Investimento 1.3, finanziato dall'Unione
europea - NextGenerationEU.

Traditional stormwater management, based solely on
conveyance and temporary storage, is not enough to
address the goals of urban safety and environmental
protection, as established by EU Water Framework and
EU Flood Directive. In recent years, other strategies have
been developed, essentially based on the distributed
control of stormwater runoff by enhancing local
interception, infiltration, and detention. This approach
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	<p>interception, infiltration, and detention. This approach mimics the natural processes of the water cycle in natural catchments and the related strategies are so-called "Nature-Based Solutions". Such solutions bring more, and more diverse, natural features and processes into cities, landscapes, and seascapes, through locally adapted, resource-efficient, and systemic interventions. They contribute to the achievements of some challenging Sustainable Development Goals in Agenda 2030 of the United Nations, such as Goal 11 "Sustainable cities and community", Goal 13 "Climate action" and Goal 15 "Life on land". They are also an important part of the European Green Deal transition, essential in making Europe climate neutral in 2050. However, there are still some issues that must be addressed for their effective application and that will be the object of the research. Nature-Based Solutions have to be integrated into traditional urban drainage systems, as single elements or also combining different solutions.</p> <p>Often, especially in Italy where cities have areas with historical interest, the retrofitting of dense urban contexts with few free spaces, can be difficult; measures have so to be adapted to space availability and to existing urban settlement. Moreover, the systemic application of Nature-Based Solutions across the entire urban area can positively impact multiple features: the mitigation of flood risk, the improvement of the quality of infiltrated waters and the groundwater recharge, the reduction of activation of combined sewer overflows and wastewater treatment plants by-passes.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The research will be carried out in different phases, the main of which are:</p> <ul style="list-style-type: none"> -functional analysis of different Nature-Based Solutions in terms of both quantity and quality stormwater control -analysis of interaction and combined effects of different Nature-Based Solutions -hydrological and hydraulic modeling of different schemes for the integration of Nature-Based Solutions into existing urban drainage systems at different urban scales -stochastics modeling of Nature-Based Solutions behavior under continuous rainfalls, in order to take into account



	chained effects in runoff and storage processes.
Educational objectives	<p>The main educational objective is the acquisition of enhanced knowledge and expertise on the:</p> <ul style="list-style-type: none"> - Nature-based strategies for enhancement of waterrelated ecosystem services - sustainable management of water resources - hydrological processes and their evolution in time - effects of urbanization on water cycles - strategies for freshwater protection from pollution and waste - strategies for building resilient, auto-adaptive urban drainage systems <p>etc.</p>
Job opportunities	<p>Job opportunities are, e.g., in:</p> <ul style="list-style-type: none"> - public agencies involved in environmental protection, urban sustainable planning and development, and water resource management - private consultancy firms in the water resources and engineering sector - private firms for water system management. <p>Freelance expert in the water sector and environmental protection.</p>
Composition of the research group	<p>0 Full Professors 1 Associated Professors 2 Assistant Professors 1 PhD Students</p>
Name of the research directors	Anita Raimondi, Gianfranco Becciu

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad



Amount monthly	600.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): approximately 1630,00 euros per PhD candidate per year, on average.

Teaching assistantship (availability of funding in recognition of support to teaching activities by the PhD candidate): there are various forms of financial aid for activities of support to the teaching practice. The PhD candidate is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer availability: PhDs have their own computer for individual use.

Desk availability: individual assignment for the entire career.