POLITECNICO DI MILANO

PhD in URBAN PLANNING, DESIGN, AND POLICY - 38th cycle

PNRR_351_DOTT_RICERCA Research Field: ECOLOGICAL TRANSITION AND NEW PARADIGMS FOR SPATIAL PLANNING: PERFORMANCE INDICATORS TO SELECT NATURE-BASED SOLUTION AS DESIGN TOOLS FOR REGENERATING CONTEMPORARY CITY

Monthly net income of PhDscholarship (max 36 months)
€ 1195.5 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	The environmental, ecological, and social emergencies caused by human activities in the Anthropocene Era are impacting human well-being and the quality of urban life. Adaptation to climate change, disaster risk prevention and resilience are the main challenges that cities need to address in the next future. Global warming affects water resources in multiple ways ranging from a rise in temperature, low precipitation patterns and snow cover, and an increase in the frequency of flooding and droughts.Therefore, managing stormwater in cities is an urgent issue considering the risk of floods and water pollution and the increasing number of people living in urbanised areas affected by disaster risk events. Adopting an ecosystem services approach for defining Nature-based solutions (NbS) has emerged as a valuable method for addressing stormwater management in urban areas through the provision of runoff mitigation, stormwater treatment. NBS have a significant impact on current urban development practices if they are integrated into planning practices. The National Recovery and Resilience Plan (PNRR), approved as part of the Next Generation EU programme, addresses the emergences presented before in its mission two Green Revolution and Ecological Transition, and, specifically, in its fourth component, reserved to the protection of the territory and the water

	resource. This fourth component is based on the development of an advanced and integrated monitoring and forecasting system, intended as the supporting tool to address three primary objectives: adaptation to climate change and hydrogeological risk reduction, protection of air quality and biodiversity, fostering of the sustainable management of the water resource. The achievement of these purposes requires a new role of the planning practice as coordinator or main actor of water management interventions. The PNRR could become an opportunity to rethink the role of planning in Italian society and its outdated paradigm. The proposed research aims to propose an innovative solution for stormwater management in urban areas and to integrate climate, environmental, and ecological issues in the planning practice as primary challenges to lead the development of contemporary cities.
Methods and techniques that will be developed and used to carry out the research	The Green and Blue Infrastructure could be recognized as the strategic and spatial ?backbone? that identify and differentiate the Nature-Based Solution interventions, working locally to regenerate specific parts of the existing city but integrated into a comprehensive frame for the ecological-based re-composition of the urban structure.The research will be developed using the ES approach for assessing and mapping the performance of an ecosystem in providing benefits to human well-being and for climate-proof cities. The ES assessment can suggest the spaces that provide the most relevant services for regulating the urban water cycle, such as runoff mitigation - which is useful for reducing the runoff volume and attenuating and delay peak flow - and stormwater treatment for decreasing the concentration and load of pollutants. To increase the quality of spaces in performing and high provision of ES, NbS can restore, protect, and manage open green spaces to enhance multiple urban ES. Several projects have developed guidelines and good practices promoting the use of NbS and investigating the diverse typologies of NbS as well as benefits and the design variables. What is missing is how the implementation of NbS for stormwater management can be integrated into the planning process.

	The research aims to address this issue, articulating the activity in 3 steps: the first one consists of a literature review of planning experiences that have used ES and NbS to mitigate the effect on climate change with particular regard to stormwater management. The second step will be dedicated to defining quantitative and qualitative indicators (or composed indicators) to set the most performance NbS according to a specific need/challenge, also identifying the location where NbS needs to be designed to manage possible floods disasters. Specifically, the research will be able to support decision-makers in selecting the best NbS using the framework of the Green Infrastructures strategy as promoted by the European commission.The last phase validates the previous findings by defining a method to integrate NbS considerations in the planning process using case studies. These design applications should act as a testbed for the innovation presented in the second phase and as guidelines for future replicability. To carry out the research, the candidate will spend a six-month period at the Norwegian University of Life Sciences in Oslo.
Educational objectives	The research project aims to test innovative approaches in constructing the contemporary city project, ecologically oriented, addressing the challenges posed by climate change from an adaptive and resilient perspective. In this sense, the educational objectives of the research program aimed at building a profile of a qualified researcher capable of addressing the environmental and ecological challenges of the city in terms of design and spatial planning solutions, acquiring skills in environmental and ecological assessment, and innovative planning tools' implementation. In particular, the researcher will acquire specific knowledge of theoretical and practical features in the design and planning methodologies aimed at improving the conditions of urban naturalness and biodiversity and enhancing the permeability of urban soils through sustainable urban drainage technics and using Nature-based solutions (NBS). Furthermore, the urban planner¿s profile that will be formed is expected to be able to use high-specialized GIS tools to map and

	evaluate ecosystem services, define ecological sustainability indicators as support to compare different planning scenarios and give coherence to the design solutions within an overall spatial planning framework. In this sense, the researcher profile that is trained will have to acquire skills to work with other environmental and ecological disciplines necessary for the evaluation of the ecosystemic functions of urban soils and the definition of intervention methods aimed at increasing urban naturalness and water management. Therefore, the training objective is the acquisition of a reflective technical knowledge about the design of urban open spaces and the definition of green and blue networks as a design tool to support actions aimed at the ecological transition of the territory.
Job opportunities	According to the educational objectives and its international orientation, the PhD program trains highly qualified researchers and professionals in the fields of spatial planning and environmental assessment, design and management of green and blue infrastructures projects, and urban governance. Researchers with such profile may be employed by Italian and international academic institutions, public bodies and research centres, public and private development agencies, and other private firms.
Composition of the research group	12 Full Professors 11 Associated Professors 1 Assistant Professors 45 PhD Students
Name of the research directors	Andrea Arcidiacono, Silvia Ronchi, Stefano Salata

Contacts

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Further information is available at: Handbook a.y. 2018/2019 of the PhD Program in Urban Planning, Design and Policy (UPDP) in http://www.dastu.polimi.it/index.php?id=1146

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	834.84 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	
By number of months at the company	0
Institution or company where the candidate will spend the period abroad (name and brief description)	Norwegian University of Life Sciences
By number of months abroad	6

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

Financial aid is available as follows to purchase books and material, participation in courses, summer schools, workshops and conferences:
1st year: max 1.624,30 euros per student
2nd year: max 1.624,30 euros per student
3rd year: max 1.624,30 euros per student

Total amount: 4.872,90 euros per student

There are various forms of financial aid both for research and teaching activities. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.


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