



University of Genova

Department of Earth, Environmental  
and Life Sciences

Doctorate Course in Earth and  
Environmental Science and  
Technology

Università degli Studi di Genova



Dottorato in Scienze e Tecnologie  
per l'Ambiente e il Territorio

## Curriculum in biology applied to agriculture and the environment

Research Theme n. 3

Titolo (Italiano) <b>Verde urbano e Nature-based Solution per la mitigazione delle polveri sottili</b>
Title (inglese) <b><i>Urban green and Nature-based Solution for particulate matter mitigation</i></b>
Tutor (name and email) and eventual co-tutor ENRICA ROCCOTIELLO <a href="mailto:enrica.roccotiello@unige.it">enrica.roccotiello@unige.it</a>
<b>Program description including the formation program abroad</b> Nature-Based Solutions (NBS) as the set of alternative solutions to conserve, manage in a sustainable way and preserve the functionality of natural ecosystems or restore it in ecosystems altered by human, which face the challenges of society in effective and flexible way: the increase of human well-being and biodiversity, climate change, food and water security, the risks of disasters, social and economic development (IUCN 2016). Among these NBS, all those types of technological green better known as green and blue infrastructures are functional to the urban context. In these infrastructures, plant species can be used for the improvement of air quality through the capture of atmospheric particulate matter. NBS can therefore also be used for PM <sub>x</sub> mitigation through specific leaf capture that allows the removal of contaminants from polluted atmosphere. This study aims to evaluate the performances of the plant component within Nature-based solutions at the urban scale, specifically in the areas adjacent to ports with related emissions, evaluating their ability to improve environmental quality (air pollution mitigation, mitigation of the heat island phenomenon, etc.). This initiative will be networked with citizen science activities and practical experiences through internships in a company (Spinoff of the University of Genoa/IIT, SMEs manufacturers of urban NBS like green roofs or vertical greening systems) and completed by formation program abroad in one of the Institution involved in the different project partnership of the tutor to connect the NBS to IOT and other relevant field for the large scale application of this NBS. The best performing species and technological solutions capable of maximizing their performance will be identified with the final aim of creating NBS capable of constituting small ecosystems that also provide a significant contribution to air pollution mitigation and increasing of local biodiversity. This study aims to: (1) evaluate the performances of particulate matter removal by plant species in NBS in the context of urban ecosystems; (2) identify technological solutions that maximize these performances and the related ecosystem services provided; (3) identify and test multi-species NBS solutions capable of contributing to the PM <sub>x</sub> decrease
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Tutor's publications (max 3) 1. Perini, K., Castellari, P., Giachetta, A., Turcato, C., Roccotiello, E. (2020) Experiencing innovative biomaterials for buildings: Potentialities of mosses Building and Environment, 172, art. no. 106708 DOI: 10.1016/j.buildenv.2020.106708 2. Perini, K., Roccotiello, E. (2018) Vertical greening systems for pollutants reduction Nature Based Strategies for Urban and Building Sustainability, pp. 131-140. DOI: 10.1016/B978-0-12-812150-4.00012-4 3. Perini, K., Otelé, M., Giulini, S., Magliocco, A., Roccotiello, E. (2017) Quantification of fine dust deposition on different plant species in a vertical greening system Ecological Engineering, 100, pp. 268-276. DOI: 10.1016/j.ecoleng.2016.12.032

