



2nd International Conference
**Smart and Sustainable Planning
for Cities and Regions 2017**

Bolzano/Bozen (Italy), 22-24 March 2017

PROGRAMME & ABSTRACT BOOKLET



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Francesca Peroni¹, Salvatore Eugenio Pappalardo², Daniele Codato³, Alberto Diantini⁴, Federico Gianoli⁵, Luigi Stendardo⁶, Massimo De Marchi⁷

SOIL SEALING IN PADUA AND GREEN SCENARIOS: THE CASE OF SAN LAZZARO DISTRICT

Tags: soil sealing, mitigation, adaptation, urban resilience, ecosystem services

Abstract: The increase of soil sealing is presently affecting urban areas by concrete surfaces, asphalt, new buildings, and infrastructures. This phenomenon is eroding important urban ecosystem services provided by the soil system: carbon sequestration, micro-climate regulation, mitigation of hydrogeological risk, water and air purification, cultural and aesthetical services. According to ISPRA (2016) soil sealing in Italy is a crucial issue at national scale, so that 21,100 km² (7%) are, at present, sealed. Veneto is one of the most affected region showing the highest values in the Province of Padua by 40,310 ha sealed from 2012 (18,8%). The city of Padua is one of the 20 municipalities most affected by this phenomenon, showing 4,558 ha sealed only in 2015. In such context the European Commission is addressing urban policies and strategies to implement adaptation and mitigation measures to compensate soil sealing and improve ecosystem services quality (2016). The general aim of this work is evaluating the evolution of the territory in complex macro-area of Padua (the San Lazzaro neighborhood), characterized by an industrial sector, a residential district, broad communication infrastructures, and green areas. The specific aims are i) quantifying soil sealing in 2015, ii) modelling a rooftop greening scenario in the industrial area, iii) simulating the change in soil sealing by the construction of the proposed project for the New University Hospital of Veneto. To quantify soil sealing and to model alternative scenarios at urban scale the Biotope Area Factor (BAF) index has been used. This index was introduced by the Municipality of Berlin in 1994 to promote, in a perspective of re-naturing the city, high quality urban development with respect to the ecosystem, protection of biotopes. It is frequently used to quantify soil sealing by estimating the degree of soil permeability in a range from 0 (completely sealed surfaces) to 1 (complete permeability); it also includes other permeability surfaces such as green rooftops (0.7).

Historical aerial images from 1955, 1981, 1987 have been georeferenced and orthorectified in GIS environment in order to perform the diachronic analysis of the area from 1955 to 2015. Moreover, multispectral orthophotos (visible and near infrared bands) of the year 2015, at very high resolution

¹ Department of Civil, Environmental and Architectural Engineering (ICEA), University of Padua, francesca_peroni@libero.it.

² Department of Civil, Environmental and Architectural Engineering (ICEA), University of Padua, salvatore.pappalardo@unipd.it.

³ Department of Civil, Environmental and Architectural Engineering (ICEA), University of Padua.

⁴ Department of Historical and Geographic Sciences and the Ancient world (DISSGeA), University of Padua.

⁵ Department of Civil, Environmental and Architectural Engineering (ICEA), University of Padua.

⁶ Department of Civil, Environmental and Architectural Engineering (ICEA), University of Padua.

⁷ Department of Civil, Environmental and Architectural Engineering (ICEA), University of Padua.

(0.2 m/pixel), have been used to map and classify, by visual analysis, land use and land cover of the San Lazzaro area. A second level classification has been performed ranking the landuse features according to the BAF index. Finally, to quantify and cartographically visualize soil sealing, a grid analysis has been performed for all the area, by normalizing values at 1,000 m² cell. To perform the greening scenario it has been supposed that all the industrial building rooftops are potential green roofs and the value BAF index has been changed from 0 to 0.7 BAF index.

Spatial analysis about soil sealing in 2015 show that the 62.33% of surfaces in the San Lazzaro neighborhood is completely sealed (0 value), while the 31.75% is completely permeable (1 value); surfaces with 0 values are mainly located in the industrial sector, while most of surfaces with 1 value are clustered in two wide green areas of 30 and 20 hectares respectively. In the rooftop greening scenario results show a decrease to 41.20% of surfaces with 0 BAF value, a constant percentage of surfaces with 1 BAF value, while an increase of 19.4% in surfaces with 0.7 BAF value. Simulation of land use change by the proposed New University Hospital of Veneto show an increase of 69.38% in surfaces with 0 BAF value, and a reduction to 27.21% of surfaces with 1 BAF value.

This study shows that in 2015 sealed surfaces in the San Lazzaro area are quite dominant. On the contrary, the rooftop greening scenario highlight some mitigation measures which may be considered to compensate soil sealing by adapting the existing industrial buildings.

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