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I International Conference on Research for Sustainable Development in Mountain Regions

Book of Abstracts

INSTITUTO POLITÉCNICO DE BRAGANÇA
Centro de Investigação de Montanha
Embrapa
United Nations Educational, Scientific and Cultural Organization · UNESCO Chair in Sustainable Mountain Development
University of the Highlands and Islands Oilthigh na Gàidhealtachd agus nan Eilean
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Urban Climate in a small mountain city with a complex terrain - Bragança (Portugal)

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Cities have singular climate as a consequence of the multiple interactions with buildings and other artificial structures, including such effects as the urban heat island (UHI) and changes ventilation patterns, with effects on urban air quality and energy use. Under such conditions, urban climate analysis is increasingly considered as a necessary activity that should be part of the urban planning practice, especially when addressing the effects of climate change. Although there has been a wide development of climate studies across different countries, further improvement is needed to address a wider diversity of geographic locations and conditions, including studies taking place in cities with complex terrain, such as mountain settlements. Following a trans-national project, BIOURB (POCTEP - INTERREG), a monitoring network was introduced in Bragança (Portugal), a small city located on a mountainous region. The methodology consisted on the cross-interpretation between data from a network of sensors and the analysis of the major factors influencing such climate conditions (topography, land use and artificial structures), allowing for the identification of major climate transformations represented as an Urban Climate Map, with the ultimate goal of providing useful indications for urban design. Urban climate monitoring was carried out with a combination of 24 temperature and relative humidity sensors, four wind anemometers and three weather stations. The location of the equipment took into consideration different Local Climate Zones (LCZs), topographic aspects and the potential rural to urban gradient. Results from recent years show that while addressing a small, though complex, urban reality and despite the proximity to rural surroundings, many meteorological data variations can be attributed to the presence of urban elements, including the UHI effect and changes on wind patterns. Additional variability can also be attributed to topographic effects, including cold air drainage and background wind exposure as a result of the local mountainous context.