Blue-green roofs: one-year monitoring in Viterbo, central Italy

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**Abstract.** Green roofs are nature-based solutions designed for providing multiple ecosystem services in urban or periurban areas, like for instance the reduction of runoff and consequent load for drainage systems, or the mitigation of urban heat island effect with the consequent related energy saving. The green roof effectiveness depends on several factors linked to climatic and structural conditions. It is well known, indeed, that the runoff reduction of green roof increases with increasing substrate depth, soil moisture and plant coverage. Regarding soil moisture, literature analysis shows that one of the main limiting factors of green roofs is the water availability. Indeed water sustains vegetation, and vegetated roofs during hot and dry periods can have a cooling effect better than other roof solutions. Recently, an innovative solution of (blue-) green roof (named Polder Roof) has been developed, aiming to maximize the system efficiency. Polder Roof couples a water storage below the green roof that is able to gather infiltrated rainfall. A portion of such infiltrated rainfall is then reused by green roof vegetation thanks to capillary effect allowing best plants survival in dry periods, in doing so increasing the evapotranspiration and the cooling effect. Moreover, the system is expected to reduce the urban runoff and consequently to mitigate the flood peak. A pilot and small Polder Roof having an extension of 16 m2 has been installed in Viterbo, at the experimental farm of Tuscia University, and several hydrological and climatic data has been collected and monitored in the last year. In this work, we focus on the hydrological behaviour of the system, analyzing the runoff reduction and its dependency on the antecedent rainfall. Results show that the antecedent rainfall is indeed a key variable, strongly affecting the system efficiency.