HSLU Hochschule Luzern

Technik & Architektur

Bachelor's Thesis in Energy and Environmental Systems Engineering

Monitoring of the urban heat mitigation potential on a green roofs

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Abstract

Green roofs play a vital role in mitigating urban heat and managing stormwater. A qualitative assessment of green roofs is conducted to find out the environmental benefits of it. A mixture of literature review and data analysis was done for the assessment.

The effectiveness of green roofs in reducing runoff depends on factors like vegetation, substrate depth, irrigation, rain event size, and their impact on stormwater quality. Additionally, these roofs contribute to biodiversity by providing habitats for various plant and animal species, creating diverse microhabitats through varying substrate depths and drainage systems, resulting in an observed increase in floral and faunal diversity over time.

Green roofs offer another distinct advantage in heat mitigation, demonstrated by lower infrared sensor measurements on vegetated roof (bush and grass) regions compared to concrete roof surface.

For measuring the surface temperature, three different sensors were compared, namely IR (Infrared), ch0 (Channel 0, contact sensor horizontal (on the surface)) and ch1 (Channel 1, contact sensor vertical (in the soil (1cm))) . From the three, IR emerges as the optimal choice for measuring surface temperature on green roofs due to its highest average correlation factor, accurately reflecting the true surface temperature of the green roof present in Mendrisio, Ticino.

In conclusion, green roofs offer a multifaceted solution with positive impacts on urban environments, addressing heat mitigation, stormwater management, and biodiversity enhancement. Despite challenges, their distinctive features position them as valuable elements in sustainable urban development, necessitating ongoing research to comprehend their long-term effects and interactions with broader urban green spaces and infrastructure.

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