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Benefits of green roofs: a systematic review of the evidence for three ecosystem services

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Highlights:

- Systematic review of selected green roof ecosystem services.
- Evidence compiled for reduction of UHI effect, air pollution and energy consumption.
- Level of evidence varies significantly from service to service.
- Documented service effectiveness varies from no effect to a significant effect.
- Effectiveness is modified by a range of parameters related to context and design.

Abstract

Green roofs are often claimed to provide a range of environmental, economic and social benefits, or 'ecosystem services'. These reported benefits, suggests that green roofs could play a significant role in sustainable urban development, and consequently green roofs are now widely used as tools in urban planning strategies. Accordingly, it is relevant to assess whether the benefits of green roofs and comparative advantages over conventional roofs rest on a robust evidence base. A considerable number of studies of the ecosystem services delivered by green roofs have appeared over the last few decades, but a rigorous assessment of the overall level of evidence is lacking. Using a systematic review approach, this study seeks to evaluate the documentation relating to three selected green roof ecosystem services: reduction of the urban heat island effect, reduction of urban air pollution, and reduction of building energy consumption. The number of studies quantifying effectiveness with original data was found to vary significantly from service to service: 17 studies reported cooling at street level ranging between 0.03 – 3 C°, four reported pollution

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