

Front gardens to car parks: changes in garden permeability and effects on flood regulation.

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Abstract

This study addresses the consequences of widespread conversion of permeable front gardens to hard standing car parking surfaces, and the potential consequences in high-risk urban flooding hotspots, in the city of Southampton. The last two decades has seen a trend for domestic front gardens in urban areas to be converted for parking, driven by the lack of space and increased car ownership. Despite media and political attention, the effects of this change are unknown, but increased and more intense rainfall, potentially linked to climate change, could generate negative consequences as runoff from impermeable surfaces increases. Information is limited on garden permeability change, despite the consequences for ecosystem services, especially flood regulation. We focused on eight flooding hotspots identified by the local council as part of a wider urban flooding policy response. Aerial photographs from 1991, 2004 and 2011 were used to estimate changes in surface cover and to analyse permeability change within a digital surface model in a GIS environment. The 1, 30 and 100 year required attenuation storage volumes were estimated, which are the temporary storage required to reduce the peak flow rate given surface permeability. Within our study areas, impermeable cover in domestic front gardens increased by 22.47% over the 20-year study period (1991-2011) and required attenuation storage volumes increased by 26.23% on average. These increases suggest that a consequence of the conversion of gardens to parking areas will be a potential increase in flooding frequency and severity - a situation which is likely to occur in urban locations worldwide.

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