Encourage the use of water-permeable surfaces in urban land-scaping.

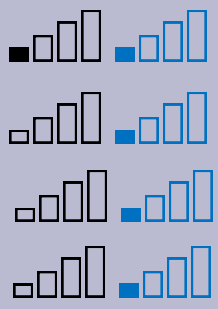
MANAGING ECOSYSTEM SERVICES

URBAN

USE WATER PERMEABLE SURFACES

GOODS & SERVICES

| | | |
|---|---|---|
| Climate Regulation | ↑ | |
| Erosion Control | ↑ | |
| Flood Control | ↑ | |
| Water Quality | ↑ | |



These pages represent a review of the available evidence linking management of habitats with the ecosystem services they provide. It is a review of the published peer-reviewed literature and does not include grey literature or expert opinion. There may be significant gaps in the data if no published work within the selection criteria or geographical range exists. These pages do not provide advice, only review the outcome of what has been studied.

Full data are available in electronic form from the Evidence Spreadsheet.

Data are correct to March 2015.

**KEY**

**Quality of Evidence**

Good

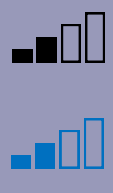
Medium

Poor

**Quantity of Evidence**

Number of sources showing direct evidence

Number of sources showing indirect evidence



**Magnitude and Direction of Effect**

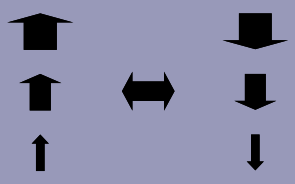
Direction

Magnitude

Strong

Medium

Low



MANAGING ECOSYSTEM SERVICES

URBAN

USE WATER PERMEABLE SURFACES

**Provisioning Services**—providing goods that people can use.

**Cultural Services**—contributing to health, wellbeing and happiness.

**Regulating Services**—maintaining a healthy, diverse and functioning environment.

REGULATING

**Climate Regulation:** ***Weak Evidence*****:-** Carbon storage in city soils in the UK was found to be higher than that of equivalent agricultural soils. However, there was no significant difference in soil carbon between that under urban greenspace and that under impervious surfaces[1]. This suggests that permeable surfaces have no beneficial effects on carbon storage in urban soils.

**Erosion Control:** ***Moderate Evidence:-*** A review of storm-water management in the USA suggests that the most effective way to deal with storm-water run-off (including issues of erosion) is to manage it locally by promoting infiltration using techniques such as permeable surfaces[2].

**Flood Control:** ***Strong Evidence:-*** A bioswale, incorporating engineered soil and trees installed in a parking area in the USA reduced run-off by 89%. The engineered soil provided better aeration and drainage for tree growth than a control with compacted urban soil[3]. An analysis of long-term changes in imperviousness in Leeds found that over a 13% increase in imperviousness was observed over a 33 year period[4]. Most of this was due to paving of front gardens. This is predicted to have an effect on increasing frequency and magnitude of flood events. ***Weak Evidence:-*** A study from the USA found that 6.6% of the urban footprint of a county in Indiana was for car parking, with a significant increase in water run-off[5].

**Water Quality:** ***Strong Evidence:-*** A bioswale incorporating engineered soil and trees installed in a parking area in the USA reduced total pollutant loading by 95%[3].

# REFERENCES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