

Projet européen "NATURAL WATER RETENTION MEASURES"

Lieu :
Programme : Dispositifs alternatifs de gestion des
eaux pluviales
Superficie :
Calendrier : 2014-2015
Maîtrise d'ouvrage : Office International de l'Eau
(OIE)
Équipe de projet : ATM
Mission : Expertise

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U9: Rain gardens

I. NWRM Description

Rain gardens are small-scale vegetated gardens used for storage and infiltration. The term 'rain garden' is often used interchangeably with 'bioretention area' (although the latter could also be applied more loosely to other measures such as filter strips or swales).

Rain gardens are typically applied at a property level and close to buildings, for example to capture and infiltrate roof drainage. They use a range of components, typically incorporated into the garden landscape design as appropriate. These components may include:

- Grass filter strips to reduce incoming runoff flow velocities and to filter particulates. For example, these may be used at the base of roof drainage downspouts to slow and filter roof runoff as it enters the rain garden.
- Ponding areas for temporary storage of surface water prior to evaporation, infiltration or plant uptake. These areas will also promote additional settling of particulates.
- Organic/mulch areas for filtration and to create an environment conducive to the growth of micro-organisms that degrade hydrocarbons and organic matter. These may be particularly effective where rain gardens are used to treat excess highway runoff.
- Planting soil, for filtration and as a planting medium. The clay component of the soil can provide good adsorption for hydrocarbons, heavy metals and nutrients.
- Woody and herbaceous plants to intercept rainfall and encourage evaporation. Planting will also protect the mulch layer from erosion and provide vegetative uptake of pollutants.
- Sand beds to provide good drainage and aerobic conditions for the planting soil. Infiltration through the sand bed also provides a final treatment to runoff.

The filtered runoff is then either collected and returned to the conveyance system (using an underdrain) or, if site conditions allow, infiltrated into the surrounding ground. They aim to capture and treat stormwater runoff from frequent rainfall events, while excess runoff from extreme events is passed on to other drainage features as part of a SuDS 'train'. Rain gardens should be planted up with native vegetation that is happy with occasional inundations.

Rain gardens are applicable to most types of development, and can be used in both residential and non-residential areas. They can have a flexible layout and should be planned as landscaping features, enhancing the amenity value.

Extraits du Rapport →
"Jardins de Pluie"

Expertise de douze fiches techniques réalisées dans le cadre du projet européen «Natural Water Retention Measures» mené par l'Office International de l'eau (OIE) en collaboration avec plusieurs laboratoires de recherches et bureaux d'études et de conseils européens pour la Direction Générale de l'Environnement de la Commission Européenne.

Chacune de ces fiches concerne un dispositif spécifique (noues, toitures végétalisées, pavés perméables, etc.) et suit un plan précis :

Description du dispositif

- Illustrations
- Applicabilité géographique : type d'usage des sols (milieu urbain, agricole, etc.) et région de l'Europe
- Échelle (taille des bassins versants récupérés)
- Impacts biophysiques (ralentissement du ruissellement, augmentation de l'évapotranspiration, etc.)

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II. Illustration



Example of rain garden (photo courtesy of Andras Kis)

III. Geographic Applicability

Land Use	Applicability	Evidence
Artificial Surfaces	Yes	Rain gardens are primarily applicable to urban areas, where they are incorporated in to developments to reduce surface runoff. They are applied in locations that may otherwise be an artificial surface (e.g. conversion of a car park to incorporate rain garden features) and/or to take the runoff from artificial surfaces. In terms of CORINE land uses, they are most likely to apply to: Urban Fabric; Industrial/Commercial/Transport Units; Artificial non-Agricultural Vegetated Areas
Agricultural Areas	No	
Forests and Semi-Natural Areas	No	
Wetlands	No	

Region	Applicability	Evidence
Western Europe	Yes	Rain gardens can be designed to be useful in any part of Europe, as long as the vegetation is adapted to be suited to the local conditions.
Mediterranean	Yes	

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Baltic Sea	Yes	
Eastern Europe and Danube	Yes	

IV. Scale

	0-0.1km ²	0.1-1.0km ²	1-10km ²	10-100km ²	100-1000km ²	>1000km ²
Upstream Drainage Area/Catchment Area	✓					
Evidence	Individual components of rain gardens are designed only to capture runoff from a small surface area, for example a roof or car park. In combination, a suite of rain gardens may capture total runoff from a larger area.					

V. Biophysical Impacts

Biophysical Impacts	Rating	Evidence
Slowing & Storing Runoff	Store Runoff	Medium Rain gardens are effective at capturing runoff from small and medium sized rainfall events, providing limited storage and encouraging infiltration. Some rain gardens are designed to meet specific criteria than others. For example, the 'Rain Garden Guide' in the UK and 'Rain gardens: a how-to manual for homeowners' in the US both provide guidance for informal incorporation of rain gardens that does not require detailed design, instead being more focussed on encouraging property owners to make low-cost contributions to reducing runoff, recognising that permeable surfaces and vegetation will almost always improve the situation compared to hardstanding and rapid runoff through a traditional drainage system. In these cases, the ability to store and slow runoff is rarely quantified, although simplified sizing calculations are included.
	Slow Runoff	Medium Some more formal case studies do exist and are providing limited data to quantify local impacts on runoff (for example case study UK-04, Day Brook, where data is being collected in 2014). A further example in Lambeth, London in the UK anticipates reduction in peak runoff rate of 70-96% for a 1 in 2 year event, 8-39%