Saving water, creating gardens

Plant a beautiful garden while conserving water

RBC Wealth Management

There's wealth in conserving water

Welcome to the RBC Blue Water Project™ online gardening guide. This guide shares some great ideas and useful advice about how to create a beautiful and exciting garden through effective rainwater management. Written by star horticulturist and garden designer Dr Nigel Dunnett, the guide recommends key features and plants that can thrive in any of our gardens at home.

At RBC Wealth Management, we believe that money is not the only thing worth saving. Our flagship global cause is the RBC Blue Water Project, a ten-year, C$50 million donation programme supporting not-for-profit organisations that protect watersheds and provide or ensure access to clean drinking water.

As part of our company's global commitment to water, we're delighted to partner with Dr Dunnett for the second year running at the RHS Chelsea Flower Show. Both this year's show garden and our 2011 show garden bring the RBC Blue Water Project principles to life and demonstrate how outdoor spaces can play a central role in sustainable urban water management.

I know I've been inspired by Nigel's tremendous enthusiasm and ideas and I hope you will be too. Let's take action together to help conserve Earth's most precious resource now and for future generations.

Mike Moodie
Head of Wealth Management-UK
RBC Wealth Management

Dr Nigel Dunnett

is Professor of Planting Design and Vegetation Technology at the University of Sheffield, UK. He has pioneered the introduction of green roof and rain garden ideas in the UK through his books, and acts widely as a consultant on planting and garden design, including principal horticultural consultant for the London 2012 Olympic Park. Working in conjunction with landscape architecture practice, The Landscape Agency, he has collaborated with RBC to design and deliver a number of projects, including gardens at the RHS Chelsea Flower Show, that bring the principles of 'water-sensitive design' to a wide public audience.

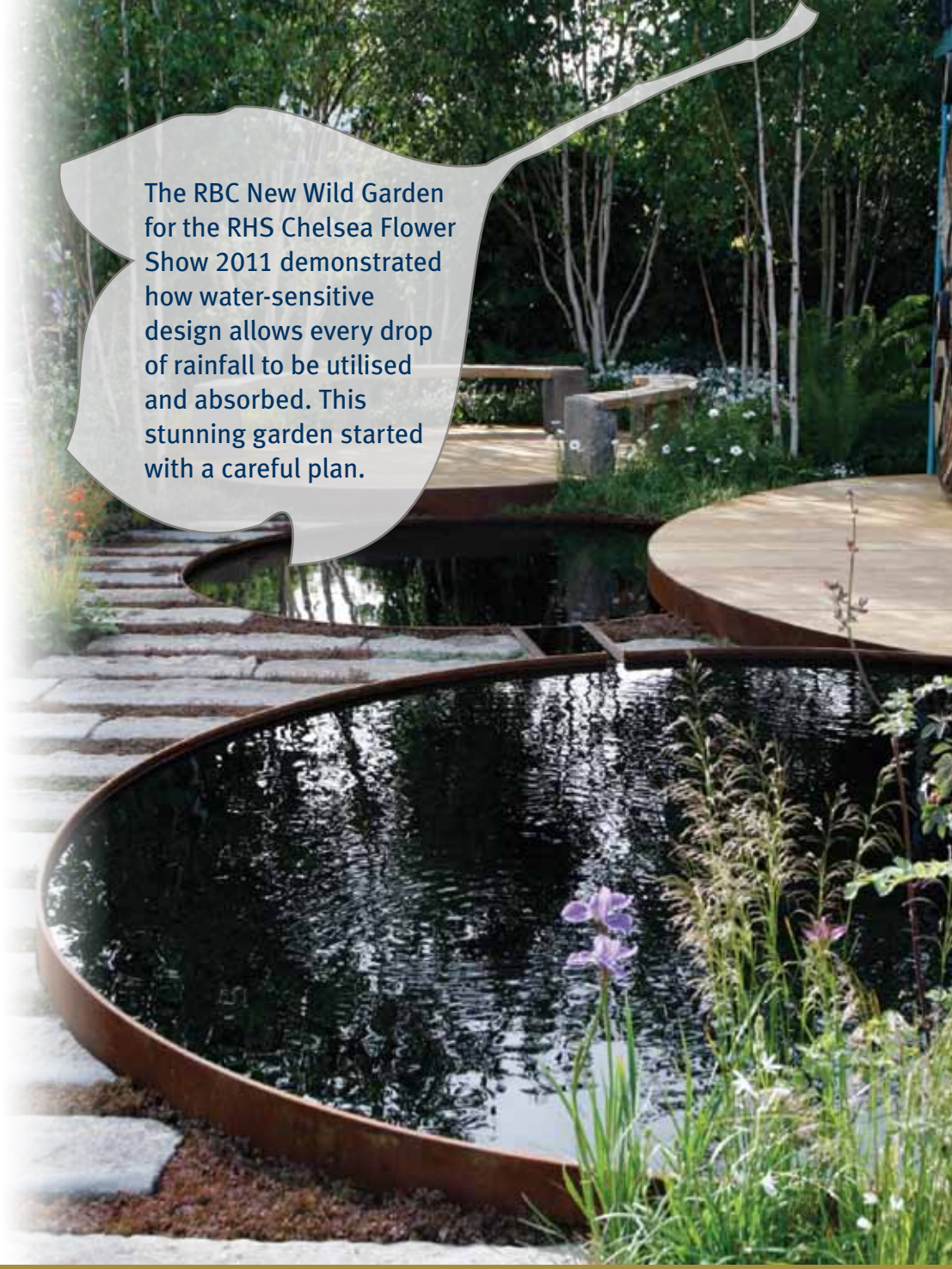
Introduction

Water brings our gardens and landscapes to life. But water is an unpredictable and precious resource, no longer in unlimited, cheap supply.

In the era of unpredictable climate, water issues are now at the fore, with too little water due to severe drought, too much of it due to flooding and both happening frequently in the same place. Over the past decade regions in Europe, North America and Australia have had exceptionally hot and dry summers, while in the same year being subjected to prolonged and sustained flooding events.

How we manage our gardens, landscape, towns and cities can contribute even further to these problems. In built-up areas, the large proportion of 'impervious surfaces' (pavements, roads, rooftops, parking lots) that don't let rainwater seep back into the soil contributes to flooding. Following severe rainstorms, the system of drains, pipes and sewers may not cope with the surge of stormwater, which is polluted. In the US, half of the pollution in stormwater comes from runoff from domestic gardens and yards. Reducing or eliminating runoff water brings significant benefits.

With some careful thought and planning, it is possible to plant gardens that contribute positively to addressing these issues. This booklet offers some practical design ideas for water-sensitive gardens.



The RBC New Wild Garden for the RHS Chelsea Flower Show 2011 demonstrated how water-sensitive design allows every drop of rainfall to be utilised and absorbed. This stunning garden started with a careful plan.

The rain chain: Soaking up every drop

The aim of water-sensitive design or artful rainwater management is to capture and soak up every drop of rainfall that hits the garden.

In this way we can reduce the amount of runoff that could contribute to flooding, and make as much rainwater as possible available to support plant growth.

This can be achieved by:

- Minimizing the total amount of stormwater runoff by reducing the amount of impermeable surfaces.
- Using landscape and soils to naturally capture, move, and divert the excess rainwater runoff from buildings, paths, driveways and surrounding landscape to make the most of natural rain- and snowfall.

The whole garden becomes a ***rain garden***, incorporating a range of features to capture rainfall and create a water-conserving, zero-runoff garden that is not only beautiful, but great for wildlife. This type of garden has much more meaning than one designed for decorative effect alone. With each feature removing a proportion of the excess stormwater runoff, linking the features together creates a 'stormwater chain', making the garden water cycle visible and real.

Rain gardens are about water in all its forms, still and moving, above and below ground, and the rich planting opportunities that take advantage of it.

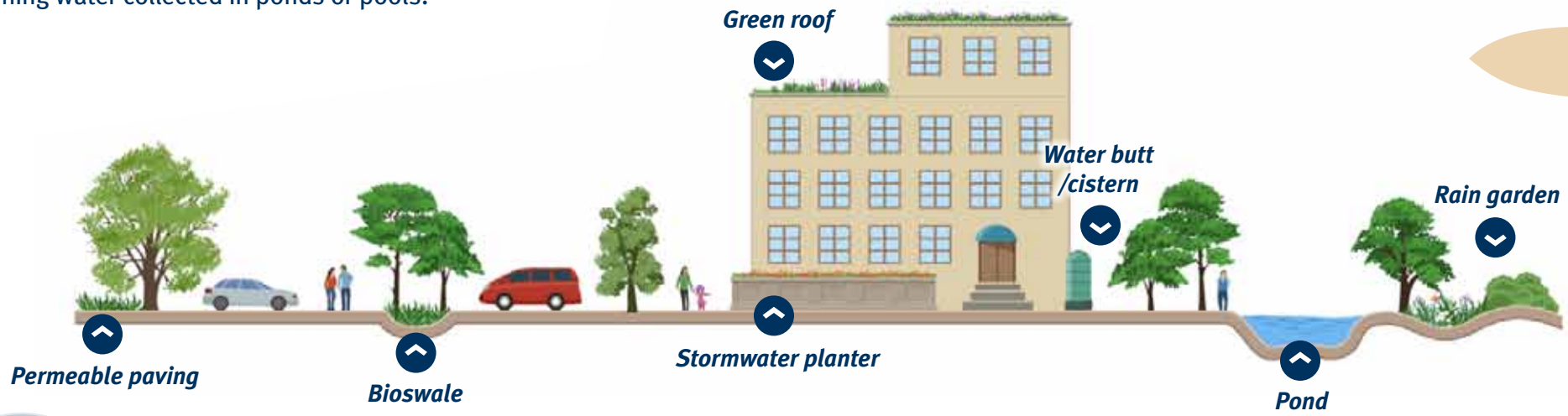
For the majority of the time, rain gardens, such as the RBC Rain Garden at WWT's London Wetland Centre, appear no different than normal gardens.

Disconnecting downpipes: Planning a water-sensitive landscape

Working with water in the garden is all about understanding where the stormwater runoff is being produced, how it flows through the garden and how to capture it.

The most obvious starting point is the roof of the house and other structures in the garden. Water is usually collected in gutters, sent to the downspout or downpipe and then down the drains and away. The water-sensitive approach aims to 'disconnect' those downpipes and feed the rainwater into rain gardens and other features which will absorb a proportion of that runoff. Each feature can overflow into another, connected by linear channels or swales, with any remaining water collected in ponds or pools.

The total amount of runoff from buildings can be reduced further by converting conventional roofs to green roofs, which act like giant sponges, soaking up rainwater, and using stormwater planters at the base of buildings to capture water from the roof.



Green roofs

What are they?

Layers of living vegetation installed on top of buildings.

The green roof at the RBC Rain Garden at WWT's London Wetland Centre will soak up nearly half the rain that falls on it each year.

Green roofs bring life to what would otherwise be dead, sterile surfaces.

Green roofs provide ideal conditions for wildflower meadows.

DID YOU KNOW?

Green roofs support a wide range of plants.

How do they manage water?

They reduce the amount of water runoff and the rate of runoff flow.

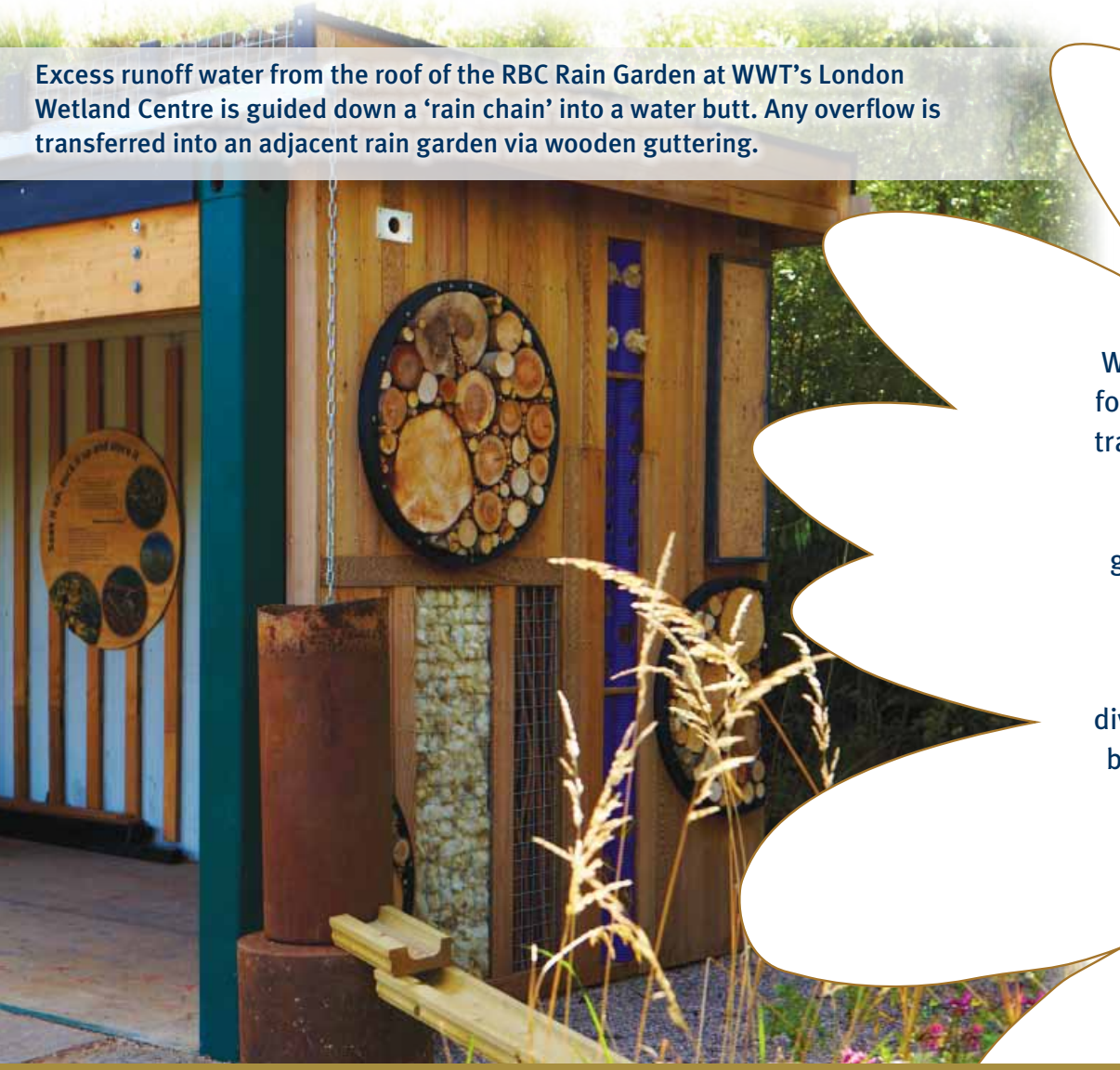
Green roofs are roofs that have had a layer of vegetation added to them. Garden sheds, porches, summerhouses, balconies, garages and small extensions offer great potential for planting green roofs. Greening up these surfaces not only improves the view, but it also turns such buildings and structures into attractive focal points and features in their own right.

The most common types of green roof are composed of Sedum species, but there are many other options available depending on the objectives. Green roofs also offer new opportunities for growing alpine plants, commonly used in rock gardens.

Rain barrels and water butts

What are they?

Medium-sized containers connected directly to downspouts.



Excess runoff water from the roof of the RBC Rain Garden at WWT's London Wetland Centre is guided down a 'rain chain' into a water butt. Any overflow is transferred into an adjacent rain garden via wooden guttering.

DID YOU KNOW?

Rain barrels store water for future garden irrigation.

How do they manage water?

They collect and store moderate amounts of water for small-scale non-drinkable uses.

Water butts and water barrels have long been used to capture rainwater for use in the garden. Until fairly recently they tended to take the form of traditional wooden barrels, or metal or plastic barrel-shaped containers, and very often were fairly makeshift affairs using any old leak-proof container, with the downpipes emptying directly into the barrel. Now garden catalogues are full of a wide range of water butts that can make a positive aesthetic contribution to the garden.

Instead of downpipes emptying directly into the barrel, rain barrel diverters are readily available. Diverters tap into the downspout, but can be turned on, or off when the barrel is full. Rain barrels should be fitted with a screen or tight-fitting lid to prevent breeding of mosquitoes.

Stormwater planters

What are they?

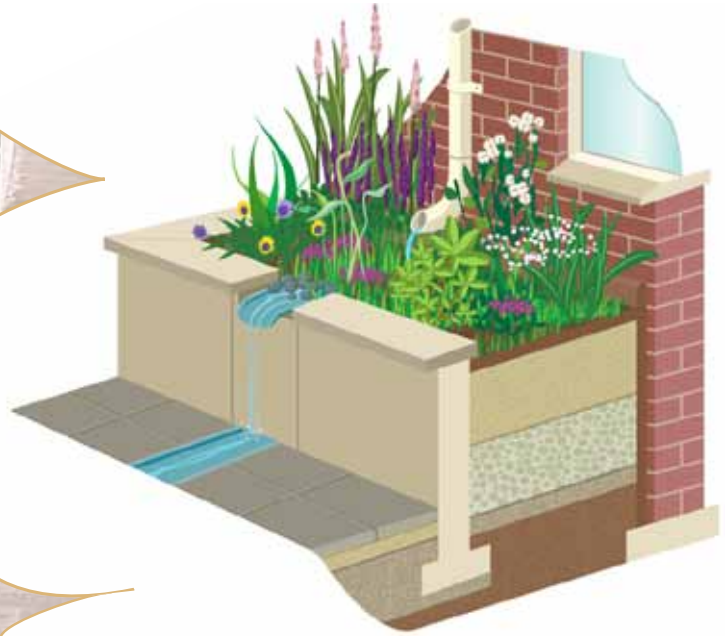
Above-ground plant containers that intercept water from the roof.

Stormwater planters can be situated directly beside a building to absorb the rainwater runoff from the roof.

How do they manage water?

They reduce runoff through infiltration, evaporation, transpiration and storage, plus provide some pollutant removal.

Stormwater planters are above-ground boxes partially filled with soil in which plants are grown. Their great advantage is that they are situated directly against a building, fitting into the smallest of schemes.



The stormwater planter consists of a lined planter, waterproofed against the building, containing free-draining soil. A layer of gravel at the base, separated from the soil with a geotextile, encourages water to seep away. Placed over soil, the water naturally infiltrates into the ground; over paved surfaces, placing a drain at the base will allow water to escape. During heavy rainfall, an outlet at the top allows excess to spill over.

Porous or permeable paving

What is it?

Paving materials and construction that allow rainwater to run through, rather than being shed from them.

The path in the RBC New Wild Garden for the RHS Chelsea Flower Show 2011 featured strips of planting in between the main paved areas to absorb rainwater runoff.

How does it manage water?

This type of paving reduces the quantity of surface runoff from small to moderate storms and provides some pollutant removal.

The large areas in many gardens covered in poorly draining hard materials make a significant contribution to the amount of stormwater runoff. Runoff can be reduced by replacing this type of paving with materials that let the water soak through into the ground.

Replacing stone and paving with aggregates such as gravels is one way to do this. Driveways, paths and car parking areas can be surfaced with re-enforced grass instead of pavers. Where constructed features are used, the gaps between stones can be left unfilled to allow water to drain through.

Bioswales

What are they?

Vegetated channels and linear depressions, very useful for linking other stormwater management features together.

RBC Blue Water Garden for the RHS Chelsea Flower Show 2012 features linear bioswales as the centrepiece of a formal garden scheme.

Bioswales can also be installed alongside driveways and parking areas in front gardens and yards.

Colourful planting in a bioswale in the RBC Rain Garden at WWT's London Wetland Centre.

DID YOU KNOW?

Bioswales in the London Olympic Park are situated along all the main paths.

How do they manage water?

Swales temporarily store and move runoff water, and promote infiltration.

Swales are shallow, long, low depressions in the ground that are designed to collect and move stormwater runoff. As well as transporting water, one of their main functions is to allow water to infiltrate into the ground. They are not meant to be permanently full with water, but rather to encourage accumulation of rainfall during rainstorms and hold it for a few hours or days, allowing the water time to infiltrate down into the soil.

Rain gardens

What are they?

Shallow planted depressions that collect rainwater runoff from an adjacent building, paved areas or landscape.

For the majority of the time, rain gardens appear no different than normal gardens.

How do they manage water?

They promote infiltration of water back into the ground.

Rain gardens are planted shallow basins designed to collect and hold stormwater runoff. Following heavy rainfall, runoff flows into the area and gradually infiltrates through the bed of the garden. The gardens will fill up with water and temporarily become mini lakes, but this lasts for a short time only.

Planting can be diverse, incorporating all possible types of vegetation – trees, shrubs, perennials, bulbs, grasses – although typically they are dominated by perennials. The key consideration for the plants is that they are able to withstand periodic covering with water, but not dependent on continuous flooding, and able to grow for much of the time in dryer conditions.

Rain-fed ponds

What are they?

Areas which capture stormwater runoff and which will permanently retain water.

The edges of a rain-fed pond where the water level rises and falls can be very beneficial to a wide range of wildlife.

In this formal water feature, the water plants will survive even if water levels become very low.

DID YOU KNOW?

Even small areas can be modified to capture rainfall for growing water plants.

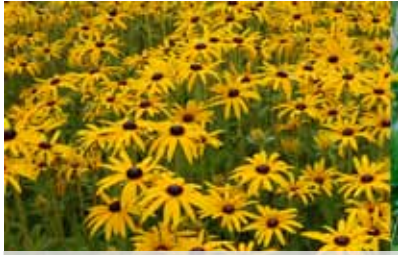
How do they manage water?

Ponds are one of the final elements in the stormwater chain, providing a final resting place for runoff water.

Because the amount of water entering a pond will vary according to the amounts of rainfall, the levels in a rain-fed pond will go up and down, exposing an area around the edges at times of low water. This 'draw-down zone' is very important because it provides excellent opportunities for beautiful planting, but it is also very important for wildlife – providing habitat and feeding opportunities for many birds and insects.

Rain garden plants

The table shows a list of dependable flowering perennials for use in rain garden plantings. These plants will grow well in normal fertile soil and tolerate periodic covering with water, but will not survive extremely dry conditions.



Golden flowers of Rudbeckia fulgida

Marsh Marigold or Kingcup (Caltha palustris)

Name	Common name	Height	Colour	Bloom time	Wetter soil	Dryer soil	Sun exposure
Astilbe	False Spirea	60 cm – 1.0 m	Various from white to purple	July – Aug	✿	✿	☀
Caltha palustris	Marsh Marigold	30 cm	Yellow	Apr – May	✿		⛅
Echinacea purpurea	Purple Coneflower	1.0 m	Purple	July – Oct		✿	☀
Helenium autumnale	Sneezeweed	1.0 m	Yellow	Aug – Oct	✿		☀
Helianthus ‘Lemon Queen’	Sunflower	1.0 m	Yellow	Aug – Sep		✿	☀
Inula magnifica	Giant Inula	2.0 m	Yellow	July – Sep	✿	✿	⛅
Iris pseudacorus	Yellow Flag	1.0 m	Yellow	June – July	✿	✿	⛅
Iris sibirica	Siberian Iris	0.5 m	Blue	May – June	✿		⛅
Liatris spicata	Marsh Blazing Star	1.0 m	Blue	July – Sep		✿	☀
Lobelia cardinalis	Cardinal Flower	0.6 m	Red	July – Sep	✿		☀
Lobelia siphilitica	Great Blue Lobelia	1.0 m	Blue	Aug – Sep	✿		☀
Lychnis flos-cuculi	Ragged Robin	40 cm	Pink	May – June	✿		☀
Lythrum virgatum	Purple Loosetrife	1.0 m	Purple	July – Aug	✿	✿	⛅
Monarda didyma	Beebalm	1.2 m	Red	July – Sep	✿	✿	⛅
Persicaria bistorta	Bistort	80 cm	Pink	May – June	✿	✿	⛅
Primula florindae	Candelabra Primula	60 cm	Yellow	June	✿	✿	☀
Rudbeckia fulgida	Black-eyed Susan	1.0 m	Yellow	July – Oct	✿	✿	⛅
Thalictrum	Meadow Rue	90 cm	Cream	May – July	✿	✿	⛅

☀ Sunny ⛅ Partial Sun/Shade

Further information

Books

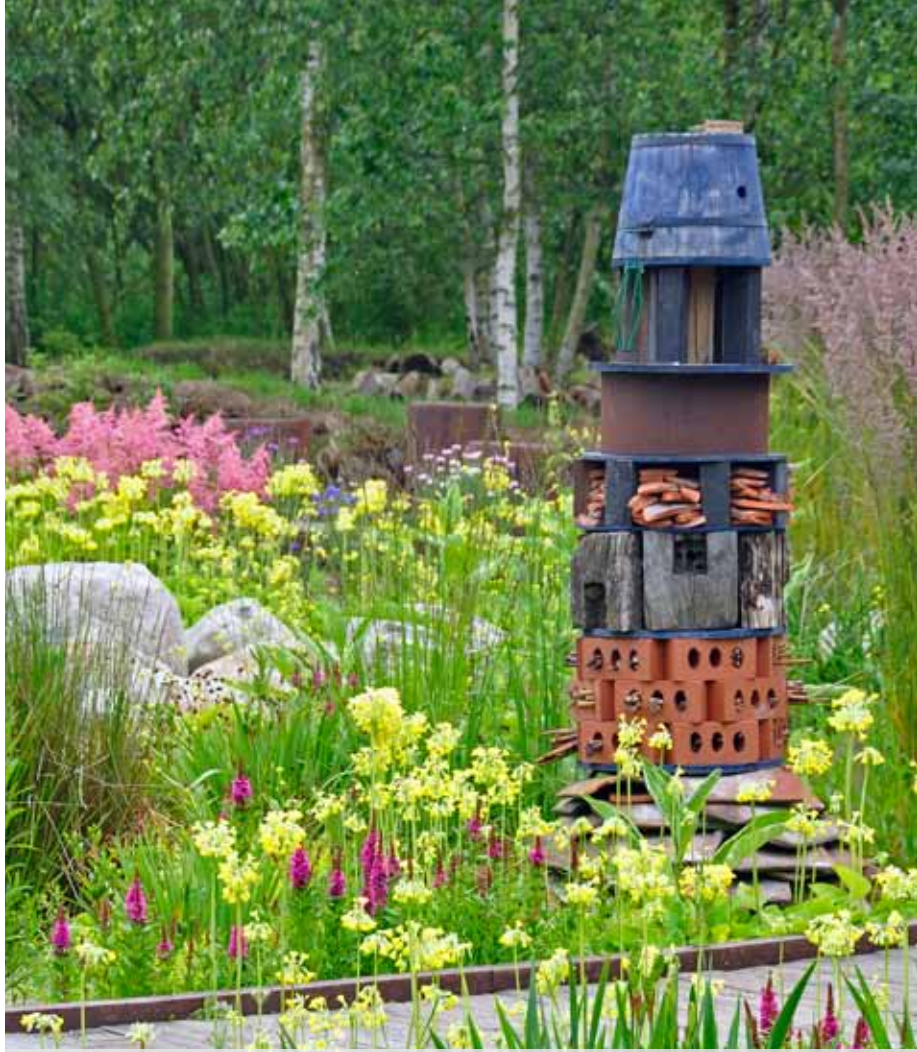
Rain Gardens: Sustainable Management of Water in the Garden and Designed Landscape. By Nigel Dunnett and Andy Clayden. Published by Timber Press.
The Damp Garden. By Beth Chatto. Published by Orion Books.

Web resources

Rain Gardens – www.raingardens.org
Rain Garden Design Templates – www.lowimpactdevelopment.org/raingarden_design/whatisaraingarden.htm
RBC Blue Water Garden at the RHS Chelsea Flower Show – www.rbc.com/chelsea
RBC Blue Water Project – www.rbc.com/bluewater

Gardens to visit

RBC Rain Garden – Wildfowl & Wetlands Trust, London
RBC Rain Garden – Wildfowl & Wetlands Trust, Slimbridge
(formerly the RBC New Wild Garden from the 2011 RHS Chelsea Flower Show)
www.wwt.org.uk



Yellow-flowered Primula florindae (the Himalayan Cowslip) growing in the RBC Rain Garden at WWT's London Wetland Centre.

Yellow Flag Iris (Iris pseudacorus) on the edge of a pool.

Massed pink, red and white flowering Astilbe.