

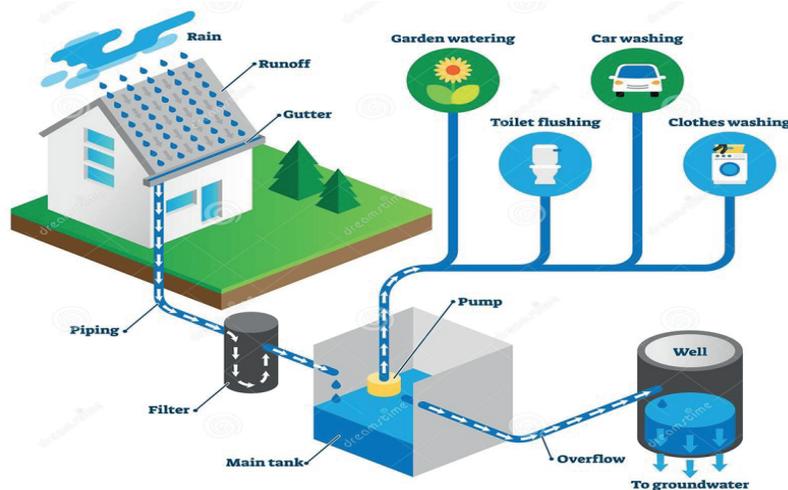
# GOOD PRACTICE SHEET N° 6 INSTALLATION OF RAINWATER COLLECTION SYSTEM (RWCS)

## What is a rainwater collection system?

Rainwater collection systems refers to rainwater harvesting. The collected water is usually used to irrigate gardens, flush toilets, fill pools or ponds, laundry, and if purified, it can be used for human consumption. There are simple rainwater collection systems which refer to non-pressurized systems (rain barrels), where the pipes collect water from the rain through gutters and delivers it into a tank (commonly referred to 'dry systems'). On the other hand, 'wet systems' are often pressurized so that the long runs of pipes do not retain stagnant water. They are designed when the pipes cannot be easily installed to run directly into the tanks. For instance, if the tanks are located away from the collection surface or if there are a series of tanks to serve buildings, pipes coming from the gutter go underground and then up through a riser into the tank.

## Why should you install a greywater recovery system in your hotel?

A RWCS limits significantly the demand of potable (fresh) water, reducing significantly fixed costs related to water tariffs.



Source: <https://www.dreamstime.com/rainwater-harvesting-system-isometric-diagram-rainwater-harvesting-system-isometric-diagram-vector-illustration-scheme-hose-image170058717>

## What are the socio-economic advantages ?

€ Reduces (fixed) water costs

Helps climate change adaptation

Which **impactful changes** can RWCS bring to your business model transformation?



Production model

It has a major impact



Competitively

Not concerned



Revenue model

Not concerned

## What are the main environmental advantages of installing a rainwater collection system?



Alleviates water stress



Reduces treatable urban runoff volume



Reduces wastewater disposal



Prevents flooding by reducing stormwater runoff

Rain water collection systems are feasible and viable options in reducing potable water consumption during any type of season and helps reducing the adverse effects of floods during heavy rain fall, limiting the volume of surface runoff water.

## What are the benefits of installing a rainwater collection system?

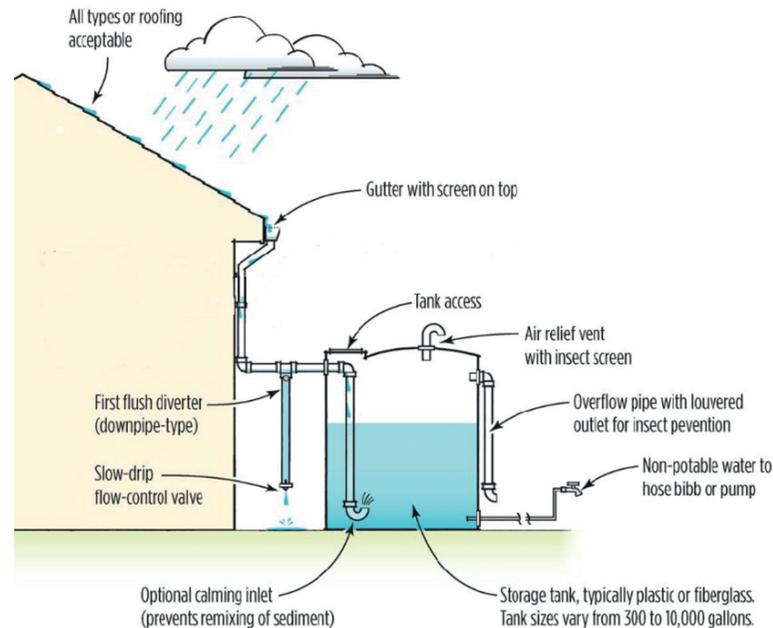
### ENVIRONMENTAL BENEFITS

RWCS has several significant environmental benefits, such as saving of high-quality freshwater resources coming from a municipal supply. Therefore, it is considered an important alternative water source in the tourism industry:

- ▶ particularly in **semi-arid, touristic areas**, saving of rainwater during the wet period can help overcome periods of water scarcity.
- ▶ allows hotels to substantially **reduce the pressure on (scarce) water resources**, by avoiding overexploitation of aquifers or own wells.

RWCS in hotels **reduces (fresh) water consumption** from municipal supply. It also contributes significantly to **energy savings and carbon dioxide emission reduction** from reduced consumption (especially in buildings).

### RAINWATER COLLECTION SYSTEM SCHEME



Source: <https://www.watercache.com/rainwater/residential>

- ▶ **RWCS is considered a viable option to reduce water consumption**

### ECONOMIC BENEFITS

RWCS is considered by many hotels as a viable option, since it implies several economic benefits.

- ▶ In Spain, the costs have been calculated as **cheap as 1.86 €/m<sup>3</sup>**, significantly lower than desalinated water.
- ▶ It is quite **recommended in dense urban areas**, since it will reduce energy consumption (especially in tall hotel buildings).
- ▶ In Mediterranean conditions it appears to be economically advantageous if carried out at appropriate scale in order to enable economies of scale and considering the expected evolution of water prices<sup>1</sup>.

### SOCIAL BENEFITS

- ▶ RWCS can help **cope with interruption of water supply** in intermittent water supply system regimes.
- ▶ It is **self-sufficient** and is therefore socially accepted.
- ▶ It is a local solution that **generates local jobs**.
- ▶ Installing RWCS promotes a **'greener' image** of the hotel, increasing guests looking for more sustainable options. Also, by installing this system the hotel can get an environmental certification and be more competitive.



## KEY ISSUES TO BE CONSIDERED

- 1 Technical experts needed
- 2 Constant maintenance of pipes and tanks
- 3 Design of the system should be compatible with the terrain and suitable for the selected type of application
- 4 Identify the economic feasibility based on the size and type
- 5 Water quality needs should be defined according to selected type of application



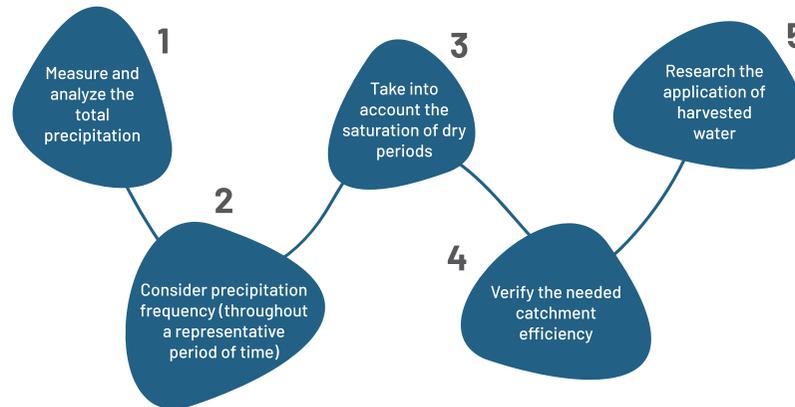
## TECHNICAL ADVICE

In a RWCS, the rain is collected from a certain surface area and then brought into one or more points. At these points, in order to deal with high peak flows in short time periods, the hydraulic capacity of the collection system has to be sufficient to deal with. The total surface area that can be used as 'catchment surface' is determined by the size and the hydraulic infiltration capacity of the RWCS. Dependant on the quality of the water collected an additional filter or screen may be required to treat (further) the water. Once the hydraulic infiltration capacity and catchment area are both known, the design of flow paths of the collection system can be developed. Depending on what part of the rainfall will go into the RWCS, the total hydraulic design can be integrated into the urban area. For instance, it can include an intermediate storage of rainwater, e.g. on a water square of the hydraulic design. This creates an hydraulic design that decouples the catchment flow capacity from the infiltration capacity (Nasif et al., 2016).

## How to implement a greywater recycling system?



## KEY FACTORS TO BE IDENTIFIED FOR A SUCCESSFUL IMPLEMENTATION



## KEY STEPS FOR INSTALLATION

- 1 Determine rainwater harvesting potential
- 2 Determine the layout and location of the tank & pipelines
- 3 Setting up the storage collection system
- 4 Decide features in the collection system
- 5 Install the pipes and tank



## POINTS OF ATTENTION

### Challenges to widespread adoption

- ▶ The use of the harvested water is a key factor, because it is necessary to empty the storage facilities before the next extreme rain event to avoid stagnation in the tank.
- ▶ The study carried out by Domènech, L. en Sauri, D. (2011) shows long payback times (up to 60 years) as main cause of the high capital costs. Subsidies may therefore encourage the use of RWCS systems.
- ▶ These systems are considered by many hotels an efficient environmental and economic option. However, not all strategies are considered cost-efficient. Thus, it is necessary to choose the appropriate scale for rainwater infrastructures in order to make them economically feasible.
- ▶ There are several considerations when building a RWCS, such as the size.

## Recommended literature



### FOR MORE INFORMATION REFER TO THESE DOCUMENTS

**Domènech, L., Saurí, D. (2011)** A comparative appraisal of the use of rainwater harvesting in single and multi-family buildings of the Metropolitan Area of Barcelona (Spain): social experience, drinking water savings and economic costs. *Journal of Cleaner Production* 19(6-7), 598-608.

**Farreny, R., Gabarrell, X., & Rieradevall, J. (2011).** Cost-efficiency of rainwater harvesting strategies in dense Mediterranean neighbourhoods. *Resources, Conservation and Recycling*, 55(7), 686-694.

**Husna<sup>1</sup>, A. Z., Antaryama, I. G. N., & Nastiti, S.** OPTIMIZING RAINWATER HARVESTING SYSTEM FOR HOTEL DESIGN AT HUMID TROPICAL CLIMATE.

**Nasif, M. S., Kumar, A. G. A., & Roslan, R. (2016).** An effective optimization of rainwater harvesting system in hotel and hospital buildings.

**Rovira, C., Sánchez, M., & Rovira, M. D. (2020).** Is Rainwater Harvesting a Solution for Water Access in Latin America and the Caribbean? An Economic Analysis for Underserved Households in El Salvador. *Nota Quality Management.* *International Journal of Remote Sensing*, 34(21), 7534-7544.

**Wyngaard, A. T., & De Lange, R. (2013).** The effectiveness of implementing eco initiatives to recycle water and food waste in selected Cape Town hotels. *International Journal of Hospitality Management*, 34, 309-316.



### DISCUSS AND TEST PROJECTS, TOOLS AND NETWORKS

#### Examples of RWCS application

**The study of Domènech, L. and Saurí, D. (2011)** shows two complementary strategies that were used by the municipality of Sant Cugat del Vallès (Catalonia) to stimulate the installation of rainwater harvesting systems: local regulations and partial subsidies.

Rooftop rainwater harvesting has been installed in Sant Cugat del Vallès and the study revealed that it could potentially meet about 16% of the total domestic water demand of the town. This percentage falls on the range of the water saving potential calculated in other studies. In Jordan, the estimated water saving potential of rainwater harvesting ranged from 0.27% to 19.7% depending on the governorate considered (Abdulla and Al-Shareef, 2009). In south-eastern Brazil, the estimated potential for potable water savings was on average 41%, ranging from 12% to 79% depending on the city studied (Ghisi et al., 2007).

The municipality of Bratislava has an incentive scheme for installing RWCS. For more information: [https://www.covenantofmayors.eu/index.php?option=com\\_attachments&task=download&id=247](https://www.covenantofmayors.eu/index.php?option=com_attachments&task=download&id=247).