09 Rainwater harvesting and retention basins

Environmental impact	3/3
Risk protection	2/3
Durability	2/3
Affordability	3/3

Intro

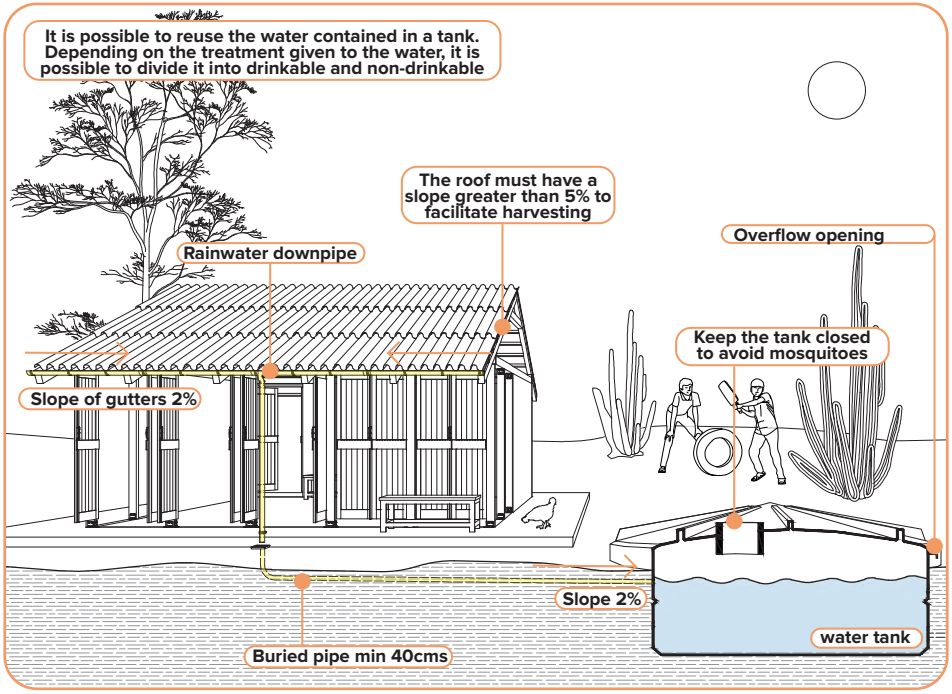
Rainwater harvesting (RWH) describes the process of collecting and storing rainwater. The practice enables the storage of stormwater runoff from rooftops, courtyards, greenhouses, reservoirs, retention ponds or other built infrastructure. This is also the first element of most drainage systems. Water can be directly channeled to drains in the ground or harvested for further use. There are several possibilities to harvest rainwater such as by using water tanks, rain barrels, and cisterns. Cisterns can be as simple as large containers located on rooftops for rainwater storage. Commonly, the harvested water comes into use for irrigation, firefighting, toilets, sinks, showers, or laundry making. RWH is particularly useful in the context of humanitarian settlements, in rural areas, bothin (semi-) arid or tropical climatic conditions.

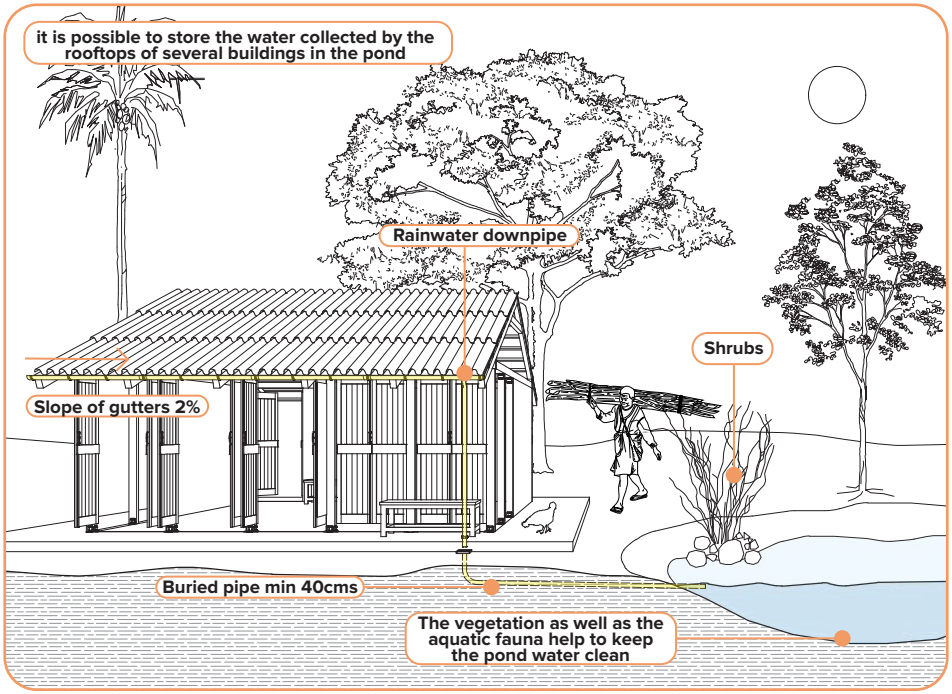
Retention basins *(also: wet ponds)* are a special type of rainwater harvesting and/or infiltration basins *(see Measure [08])*. They show a permanent water level which, during heavy rain events, can store further amounts of stormwater runoff while improving the water quality based on natural processes. Mostly, the collected water in wet ponds is used for irrigation or watering livestock.

Benefits and Risk

Next to stormwater flood mitigation, RWH provides benefits such as food security and the conservation of local water resources. The idea of circular design stresses water reuse (and thus the use of greywater) for landscape irrigation, topsoil treatment, or toilet flushes. By reusing greywater there is less strain on freshwater supplies, septic tanks, and the overall use of chemicals. In contrast, the reused water may support land fertility by making use of nutrients that would have been most likely wasted.

Depending on the treatment of the harvested water, possible usages may be different *(e.g., if chlorinated, it is useful for cleaning and sometimes can be even drinkable but is less adequate for irrigation)*. If greywater is reused for irrigation, they first need to be filtrated to remove soap and other pollutants. When installing such systems, it is important to properly inform the users about the possible usages of the water, and the uses to avoid.





Good practice

Filtered RWH In Mexico City, Mexico.
In Mexico City, the non-profit organization Isla Urbana developed RWH systems for informal urban settlements. After examining the areas that are most prone to water scarcity and capable of rainwater catchment, the organization implemented around 20'000 systems for rainwater collection and treatment across the city. After harvesting the precipitation on the rooftops, the water is cleansed with chlorine for the use of bathing and cleaning. The solution not only reacts to the issue of water scarcity but reduces the waste of stormwater and its possible damages through flooding and sewage system overspill *(Mseleku 2021).*

Unfiltred / graywater RWH in Guirhora Kello, Burkina Faso.
The British NGO Water Aid works together with national and local governments to support marginalized communities with safe water and sanitation facilities. That is also the case in the village Guirhora Kello in Burkina Faso, where rainwater runoff from the roofs of public buildings has been collected in storage tanks based on the ground. In this case, the stored water is not filtered and, thus, used as greywater for services such as washing, toilets, or planting.
(Mseleku 2021).

Overview of Criteria

Type of Intervention:
Engineered, Hybrid

Scale of Intervention:
Shelter/Block.

Materials:
Clay, Concrete, Filter Systems, Cistern container

Environmental Impact:
RWH can have a positive impact on the natural environment since it helps with the conservation of local water resources, especially in times of water scarcity. In addition, RWH minimizes the need for complex water infrastructures such as piping systems. As a result, the overall environmental strains due to dams or treatment plants are reduced. The areas where greywater comes into use, should be carefully considered to avoid negative environmental impacts.

Targeted Natural Hazard:
Pluvial Flood.

Targeted Vulnerable Assets:
Buildings.

Strategy Type:
Reduce Asset Vulnerability.

Implementation Time:
Short (1 day - 1 month).

Effect Duration:
Long-term (>10 years).
Water tanks usually last between 10 and 20 years.

Investment Costs:
Low, medium.

Maintenance Costs (yearly):
Low (<10% investment costs).

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Flood Risk in Humanitarian Settlements: Compendium of Mitigation Measures

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Cite as
Rohling, Bruna; Kostenwein, David; Gairing, Mona; Al-Mahdawi, Ammar; Schmid, Emilie; Bardou, Eric; Kaufmann, David (2023) Flood Risk in Humanitarian Settlements: Compendium of Mitigation Measures. Zürich: ETH Zürich, UNHCR. DOI: 10.3929/ethz-b-000645680

ETH zürich

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Spatial Development and Urban Policy

GENEVA TECHNICAL HUB

Co-convened by
UNHCR
The UN Refugee Agency

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