TECHNICAL SHEETS

VALUING RAINWATER IN YOUR PROJECTS

INTRODUCTION

Where water resources are often limited and irregular, rainwater harvesting is an essential practice for agriculture. In the face of increasing challenges caused by climate change and rainfall variability, efficient water management becomes imperative to ensure food sovereignty and the sustainable development of communities. By collecting, storing, and efficiently managing rainwater, this approach not only helps preserving water resources but also strengthens the resilience of local communities by providing a more reliable source of water for domestic or agricultural use, even during the dry season.

The following sheets were developed as part of the PartageÖ project, a knowledge-sharing initiative led by the International Rainwater Harvesting Alliance (IRHA) in collaboration with partners from the Plateforme souveraineté alimentaire (PSA) of members of the Fédération genevoise de coopération (FGC). These sheets are the result of discussions and exchanges of best practices that took place during a rainwater management awareness workshop held in Senegal in April 2024, organized by IRHA and PSA.

This educational kit offers international development actors methodologies and practical solutions to optimize this resource and integrate it into their project strategies in the field.

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AGROFORESTRY

FACT SHEET 1

Objectives

- → Create dense, diverse, and productive biotopes.
- → Diversify crops and therefore diversify income and resilience against pests, diseases, and climate variations.
- → Retain soil.
- → Enrich soil with nutrients and organic matter.
- → Improve water infiltration and storage in soil.
- → Create a humid microclimate through evapotranspiration.
- → Restore ecosystems.

Approach

- → Tree size and foliage reduce the impact of hot, dry wind on the soil and favor ambient humidity.
- → Mulching with leaves and crop residues left on the ground slows water runoff, reduces soil drying, and protects against surface compaction from heavy rains.
- → Roots anchor the soil, reduce erosion, and favor water infiltration. During the dry season, the roots draw deep-stored groundwater to the surface.
- → Tree shade reduces soil temperature and water evaporation.
- → Trees provide food and shelter for animals.
- → The decomposition of fallen plant residues forms humus, increasing soil fertility and water retention capacity.
- → The plant density creates synergistic relationships that improve resistance to pests and diseases, water use, solar energy, and soil nutrients.

Concept

Agroforestry is an agricultural practice that combines tree or shrub cultivation with crops and/or livestock on the same plot of land. This approach is based on the creation of diversified and interconnected ecosystems, where trees, crops, and animals cooperate for mutual benefits.

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BOCAGE

FACT SHEET 2

Objectives

- → Structure the landscape and create ecological corridors.
- → Increase the territory's capacity to retain and infiltrate rainwater.
- → Stabilize soils and reduce erosion and soil leaching.
- → Create a microclimate (shade, humidity, wind protection).
- → Develop habitats and refuges for wildlife.
- → Provide forest, fruit, and fodder resources.
- → Promote biodiversity in the territory.

Concept

Bocage is a landscape management technique involving the creation of vegetative hedges, groves, and terraces to protect soils, regulate water, and promote biodiversity.

Method

- → Select tree, shrub, and herbaceous species adapted to the local climate, favoring those with multiple uses (human and animal food, firewood, medicine, etc.).
- → Prepare the site by removing weeds, debris, and leveling terraces.
- → Plant hedges along the contours of the land, while groves are established in selected areas to maximize ecological and socio-economic benefits.
- → Maintain the plantations to ensure their survival and growth. Irrigate if needed during the dry season, prune, and protect from livestock.

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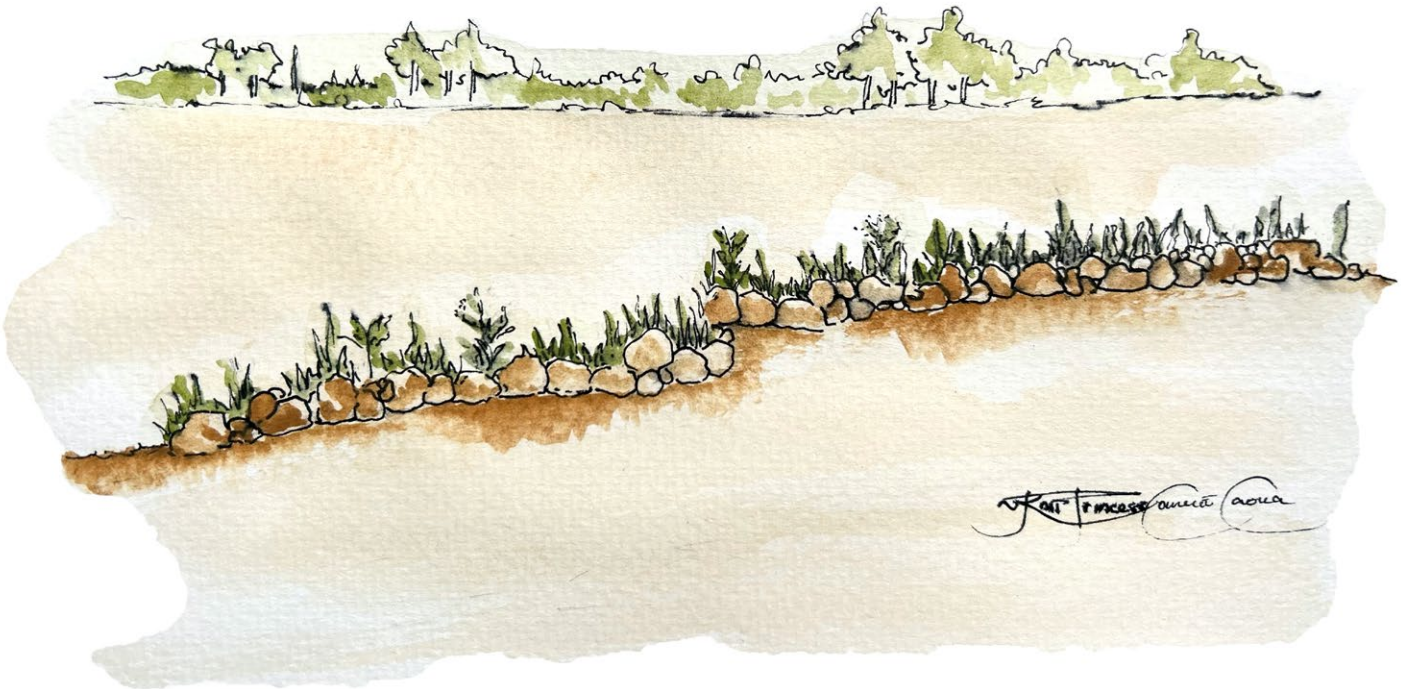
VEGETATED STONE BUNDS

FACT SHEET 3



Objectives

- → **Dissipate runoff water.**
- → **Increase rainwater infiltration.**
- → **Reduce water erosion.**
- → **Conserve and improve soil fertility.**

Concept

A stone bund is a row of stones aligned along the contour lines of a field. These stones are placed to slow down rainwater runoff, allowing it to infiltrate the soil. When vegetated, plants inserted between the stones enhance their effectiveness.

Method

- → Determine contour lines using a level.
- → Open an anchor trench 10 to 15 cm deep and 15 to 20 cm wide, and place a line of large stones.
- → Reinforce the lower side with a second line of smaller stones, and consolidate the stone bund by bringing back the soil from the trench.
- → Vegetate the bund by planting herbaceous or shrub species (e.g., Andropogon sp, Vetiveria zizanioides, Acacia nilotica).
- → Apply well-decomposed manure or compost at a minimum dose of 2.5 tons/ha/year.
- → Always work the soil perpendicular to the slope to slow water runoff.
- → Plan for special treatment of tracks and spillways for bunds longer than 100m.
- → Maintain the bund by repositioning displaced stones and replanting shrubs.

Compared to a non-terraced field:

- → Runoff is reduced by 23%.
- → Soil loss decreases by 61%.
- → Soil moisture upstream of the stone bunds increases by 343%.

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DEEP BED

FACT SHEET 4

Objectives

- → **Collect runoff between the ridges.**
- → **Enable year-round vegetable gardening on the ridges.**
- → **Use trenches for rice cultivation.**
- → **Create humid micro-environments around crops.**

Method

→ Use a pickaxe to break the compact, hard layer underground, allowing roots, water, and air to penetrate deeply into the soil, reducing or completely stopping erosion. This leads to the development of deep, healthy organic soil.

→ Create deep beds to minimize water runoff and maximize retention.

→ Create ridges along contour lines at regular intervals down the slope. Each ridge is accompanied by a trench, with the ridge made from the excavated soil. If the slope is inclined, the trench is located upstream of the ridge, serving as a water barrier after heavy rains. The ends of the trench are closed to prevent water escape and encourage infiltration.

Concept

Use the topography to allow water to remain in the cavities and alternate ridges with small enclosed trenches.

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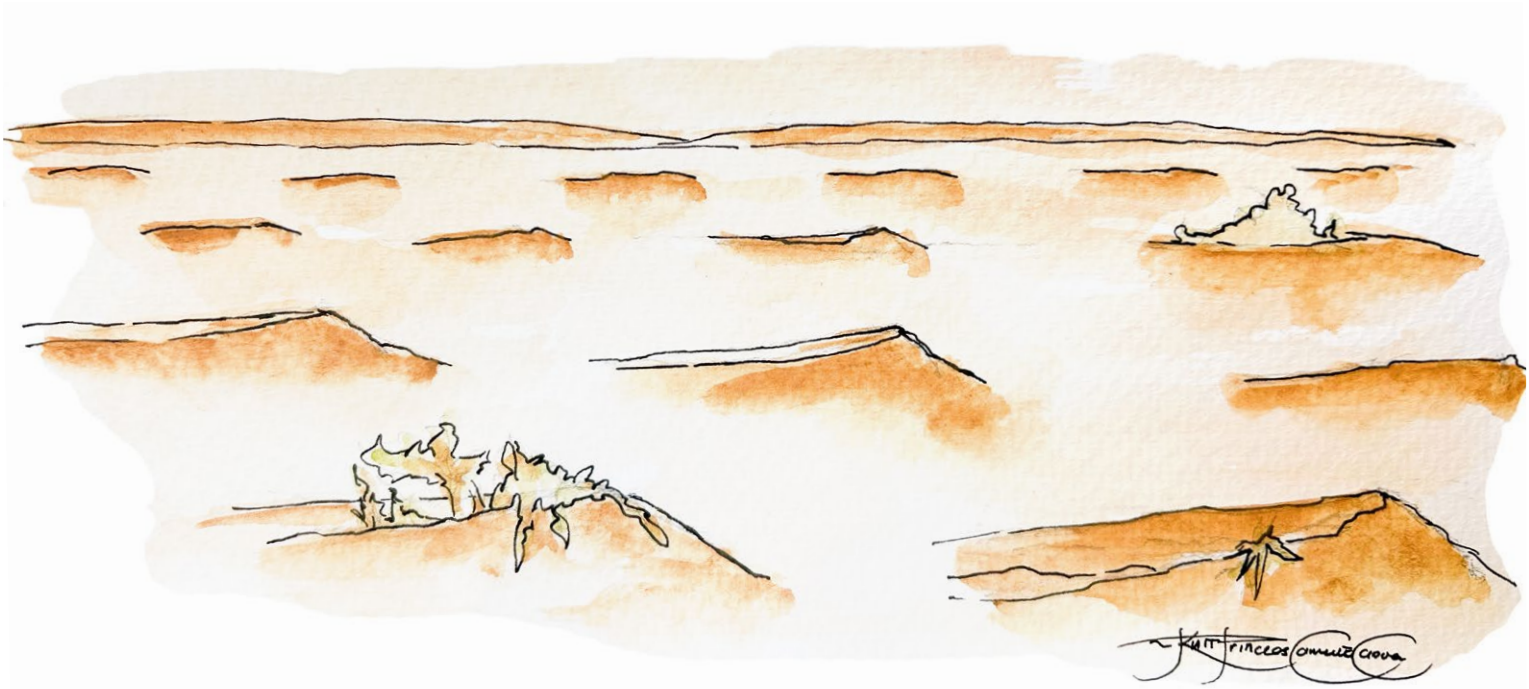
HALF-MOON

FACT SHEET 5



Objectives

- → **Control runoff and protect soil from water erosion.**
- → **Increase soil moisture by retaining rainwater in depressions.**
- → **Improve soil fertility and coverage.**
- → **Optimize available water resources.**

Concept

Half-moons are traditional soil conservation techniques used in Sahelian regions to improve water retention and soil fertility. By digging small circular basins and filling them with organic matter, half-moons help trap rainwater and protect crops from evaporation, favoring plant growth in semi-arid conditions.

Method

- → Till the soil to create shallow semi-circular basins (2 to 3 meters in diameter and 30 to 50 cm deep). These basins are arranged in rows, with spaces between them to allow water to pass through. They can be arranged in a staggered manner to maximize the slowing of water runoff.
- → Once the basins are dug, enrich the soil with organic matter (compost, manure or crop residues).
- → Sow crops along the edge of the basins, where moisture concentration is higher.
- → When it rains, the half-moons act as water traps, capturing and retaining rainwater in the basins. This allows plants to tap into this water reserve during dry periods, reducing their dependence on irregular rainfall.
- → By concentrating water and nutrients in the planting areas, half-moons favor crop growth even in semi-arid conditions. Additionally, half-moons help protect plants from wind and water erosion.

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BLUE SCHOOL

FACT SHEET 6

Objectives

→ **Contribute to improving access to drinking water and hygiene conditions in schools.**

→ **Promote environmental education and raise awareness among children and the community about the link between water and environmental preservation.**

Concept

Blue Schools, a concept developed by the IRHA, has been successfully tested since 2005 in more than 14 countries. It involves securing water resources at the school level. In this regard, the roofs of school buildings become collection surfaces to capture rainwater, store it, and make it available to students. The Blue School goes beyond the strict concept of WASH* and offers an integrated program of education and awareness-raising about the environment. It sustainably improves sanitary and educational conditions in schools by highlighting rainwater management.

*WASH - Water, Sanitation, and Hygiene (WASH)

Approche

→ Rainwater collection infrastructure from the roofs of school buildings: collection, storage, retention, infiltration.

→ Participatory management committee including parents, authorities, staff, and students.

→ Visual and playful awareness-raising for students about "Water, Sanitation, and Hygiene" practices as well as the water cycle, agroecology, and waste valorization and recycling.

→ Establishment of a school garden where students practice land and water management through vegetable gardening, composting, biopesticides, and other environmental practices in the schoolyard and its surroundings.

→ Long-term educational awareness through murals on topics covered in class (water cycle, etc.).

→ Reforestation campaign in the school and its surroundings.

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RETENTION POND

FACT SHEET 7

Objectives

- → **Increase water availability for ecosystems and livestock.**
- → **Allow for groundwater recharge.**
- → **Create a biodiversity reserve.**
- → **Create a resilient microclimate.**
- → **Ensure watering and feeding of livestock.**
- → **Encourage subsistence vegetable farming.**

Concept

Development of a natural water retention facility located in a depression area to increase storage potential after the rainy season. This water is primarily intended for livestock watering and subsistence vegetable farming. Located near villages, it helps prolong and secure water resources for several months during the dry season.

Method

- → Identification of sites.
- → Establishment of a management committee.
- → Securing land rights for the site with the authorities.
- → Evaluation of potential environmental and social impacts (acceptance).
- → Feasibility study.
- → Implementation of environmental and social mitigation measures.
- → Carrying out topsoil stripping, deepening, and sieving of the clay layer.
- → Stabilization of banks using soil conservation techniques (fascines, etc.).
- → Community monitoring, maintenance, and rehabilitation of the facility.
- → Raising community awareness about the project's approach and the role of the retention pond in the ecosystem.

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GABIONS

FACT SHEET 8

Objectives

- → **Stabilize soils along slopes, gullies, and areas prone to erosion, reducing the loss of fertile soils.**
- → **Slow down runoff and promote infiltration.**
- → **Rehabilitate gullies through the filtering dam process.**

Concept

Gabions are deployed to stabilize soils, control erosion, and collect rainwater. These structures, made of rigid or flexible wire mesh filled with stones, help stabilize the soil and act as filtering dams. They retain sediments while remaining semi-permeable to runoff.

Method

To rehabilitate a gully using a wire mesh gabion:

- → Dig notches 30 to 50 cm deep and as wide as the gabion into the sides of the gully.
- → In the space created, extend a stainless steel wire mesh across the entire width of the gully.
- → Place rocks in the middle of the mesh to form a pile 40-50 cm high.
- → Close the mesh around the rocks and tie the two sides together with stainless steel wire to form a cylinder (sausage shape).
- → Seal the two ends of the gabion, which are embedded in the sides of the gully, with well-packed earth. This is the rock facing of the gabion.
- → If necessary, install one or two stakes along the gabion to reinforce its anchoring in the gully.
- → After a rainy season, it may be necessary to raise the gabion to continue the rehabilitation process of the gully (accumulation of sediments upstream of the structure). For this, add a height of gabion slightly upstream of the original gabion.
- → Use a series of small structures spaced every 5 meters to have an extended impact.

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RAIN IN THE CITY

FACT SHEET 9

Objectives

- → **Better manage runoff and reduce downstream flood risks.**
- → **Use rainwater as a resource rather than as waste to be disposed of.**
- → **Optimize the association between water, soil, trees, and vegetation.**
- → **Accept rainwater in public and private spaces.**
- → **Encourage the reintroduction of cooling islands.**
- → **Promote the recharge of groundwater.**

Concept

The management of rainwater in cities aims to make the city transparent to rainwater by allowing it to dissipate through evaporation, evapotranspiration, or infiltration into the soil where it falls. This involves moving away from a purely pipe and drainage approach to promote the implementation of green infrastructures while maximizing the infiltration of rainwater into the soil.

Approche

- → Manage rainwater locally by infiltrating gutter runoff on-site through rain gardens, swales, and infiltration wells.
- → De-seal surfaces such as concrete and asphalt by replacing them with permeable surfaces: porous paving, gravel, or grassed paving that allow rainwater to infiltrate into the soil.
- → Slow down flows through dense soil cover and non-directive water pathways.
- → Manage peak storm flows through buffer storage volumes: swales, porous pavements, Stockholm pits, green roofs, etc.
- → Recreate a humid and temperate microclimate through greening spaces and the presence of urban water bodies.

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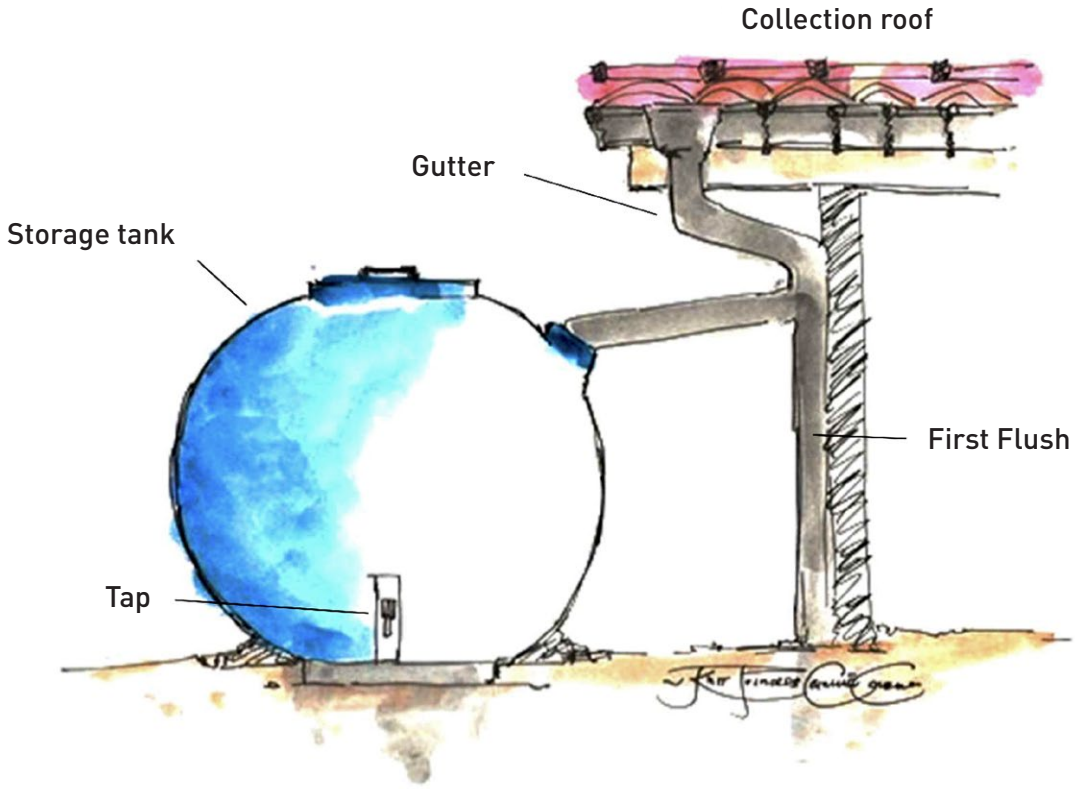
RAINWATER HARVESTING SYSTEM

FACT SHEET 10



Objectives

- → **Strengthen water sovereignty, meaning the ability of populations to manage their own water resources.**
- → **Facilitate access to enough quality water directly at the household level.**
- → **Store harvested rainwater during the wet season for use during dry periods.**
- → **Preserve the freshness of the water and prevent algae growth through a thick, opaque ferrocement wall.**

Concept

Rainwater harvesting from roofs provides access to water close to homes. Rainwater that runs off the roof is captured and directed through a system of gutters to storage structures.

Method

- → Build a ferrocement tank close to a collection roof connected to it by a network of gutters.
- → Install a first-flush diversion system. The first rains, which are unsuitable for consumption but can be used for other needs, clean the air of volatile pollutants as well as the collection surfaces and gutters of impurities accumulated since the last rain.
- → Set up a filtration system for residues at the entrance of the tank (grill + fabric).
- → Place the tap 30 cm from the bottom of the tank to avoid capturing impurities and ensure quality water. The tank is designed to allow sedimentation (downward) and flotation (upward) of impurities in the stored water.
- → Regularly clean the roof to remove debris, leaves, and other residues.
- → Completely drain and clean the inside of the tank every two years.
- → Paint the surface and seal microcracks to preserve the tank's waterproofing.

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TERRACES

FACT SHEET 11

Objectives

- → **Control erosion by reducing the speed of water runoff on slopes.**
- → **Help retain rainwater, thus promoting its infiltration into the soil. This contributes to water conservation and the recharge of groundwater aquifers.**
- → **Stabilize the soil by reducing the effective slope. This limits landslides and helps maintain soil integrity, which is particularly important in erosion-prone areas.**

Method

- → Conduct a site analysis to understand the topography, natural drainage, and soil type.
- → Design the terraces considering the slope of the land, the direction of water runoff, and the site-specific needs for soil conservation and water management.
- → Prepare the site by removing debris, rocks, and any other obstacles. Leveling work may also be necessary to create flat or slightly sloped surfaces for the terraces.
- → Create retaining walls or slopes if needed to hold the soil. These structures can be made from materials such as stones, concrete blocks, or wood.
- → Use appropriate plants to stabilize the soil and improve biodiversity. Grasses and ferns are often used to stabilize slopes and reduce erosion.
- → Regularly maintain to ensure the long-term effectiveness of the method. This may include managing plants, controlling erosion, and possibly repairing retaining structures.

Concept

These are sloping terraces associated with a ditch, along contour lines or according to a gentle lateral slope. The excess soil excavated from the trench is dumped upstream to form a slope, often stabilized by planting forage grasses.

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