

17 | Tree planting and forest preservation

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

Intro

Trees reduce the volume of the stormwater surface runoff in three steps: First, the leaves, branches and trunks catch and intercept the raindrops. The water then either trickles off into the ground, or it evaporates back into the air. The rate of the interception, infiltration, surface runoff reduction and, therefore, the flood response increase with the forested area in relation to the catchment size. In this regard, the measure is also linked to surface water management (see Category II).

Mangrove forests are a specific type of trees for flood risk mitigation. They are multifunctional ecosystems that mainly occur along sheltered tropical and subtropical coasts. As for flood risk mitigation, mangroves reduce the wind height, incoming waves, and the level of storm surges. In addition, they protect the coastline and control its erosion

Benefits and Risk

Next to mitigating the stormwater flow, trees comprise several other benefits. They reduce heat islands in built environments. Trees also absorb pollutants from the air, the groundwater and the soil, reduce high-frequency noise and, by that, tackle human health issues such as respiratory illnesses or mental distress.

With afforestation representing a form of ecological restoration, forests or single trees also support the local biodiversity. For example, the tree canopies of mangroves serve as bird nesting and resting grounds while fostering coral reefs and seagrass beds. They only can be planted in very specific contexts of natural environment and climate. Because mangroves commonly grow surrounded by half-salty water, the trees depend on adequate sea-surface and air temperature and may be fragilized by repeated flood events and other climatic effects.

Design example

Miyawaki pocket forests for flood risk mitigation

The pocket forests for flood risk mitigation of the organization SUGi describe 4 to 10-meter-wide patches of trees that form a barrier between a waterbody and the infrastructure that needs protection. The SUGi forests implemented around the globe are based on the Japanese Miyawaki forest planting technique, which is a special approach to highly dense forest planting with several layers of vegetation at different heights, combining shrubs, (sub-) trees, and canopy trees. Thanks to their density and strong root system, the pocket forests build a wall-like structure based on vegetation to shield the infrastructure from flooding (SUGi 2022).

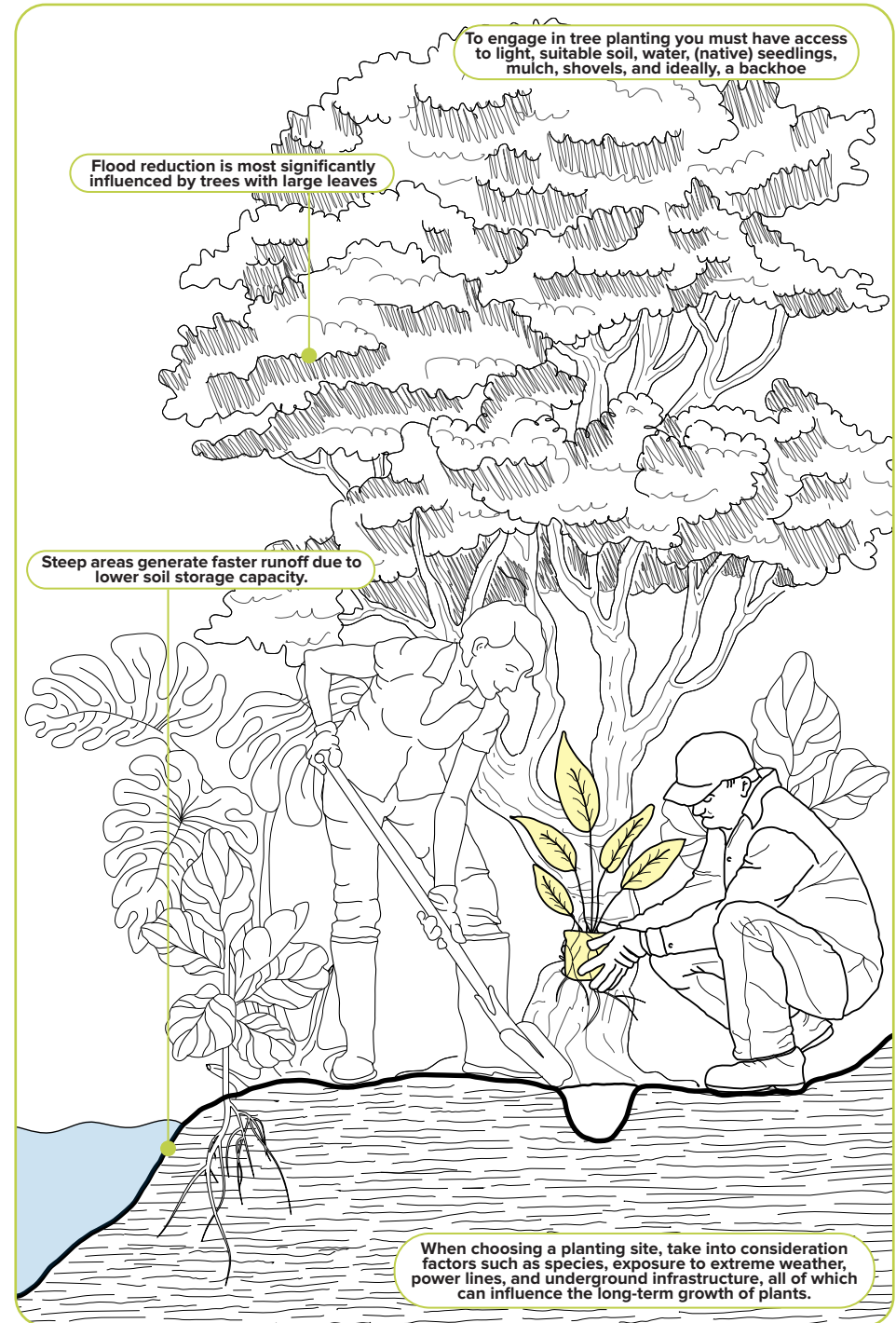




Fig. 17 and 18: Example of a Miyawaki forest built by the SUGi team in Buea, Cameroon, before and 2.5 years after the tree planting. SUGi 2022.

SUGi (2022)
Revive waterways and biodiversity in Cameroon.
Available online at
<https://www.sugiproject.com/projects/bulu>, updated on 9/29/2023:07:54.

UN Environment Programme (2020)
Celebrating International Mangrove Day:
spare a thought for our coastal ecosystems.
Available online at
<https://www.unep.org/news-and-stories/story/celebrating-international-mangrove-day-spare-thought-our-coastal-ecosystems>.

Watson, Julia (2020)
Lo-TEK. Design by Radical Indigenism.
Acadja Aquaculture of the Tofinu, Benin, p. 351-367.

Overview of Criteria

Type of Intervention:

Nature-based.

Scale of Intervention:

Supra-settlement.

Materials:

Soil, Water, Native seedlings, Mulch, Shovels, Backhoe.

Environmental Impact:

Forests, particularly mangroves, act as carbon sinks and serve carbon sequestration and nutrient cycling above and below the ground. However, this function comes with the risk of high carbon release in case of loss or deforestation of trees, especially mangroves.

Targeted Natural Hazard:

Pluvial Flood, Coastal/Riverine Flood.

Targeted Vulnerable Assets:

Land Cover.

Strategy Type:

Reduce Hazard Magnitude.

Implementation Time:

Short (1 day - 1 month).

Effect Duration:

Long-term (>10 years).

Investment Costs:

Low

Maintenance Costs (yearly):

Low (<10% investment costs)

Next to training local personnel, the maintenance (and its cost) includes the watering, pruning, thinning, debris removal, and disease inspection.



Flood Risk in Humanitarian Settlements: Compendium of Mitigation Measures

Spatial Development and Urban Policy, SPUR

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Cite as

Rohling, Brunna; 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

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