03 Geotextile tubes and containers

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Intro

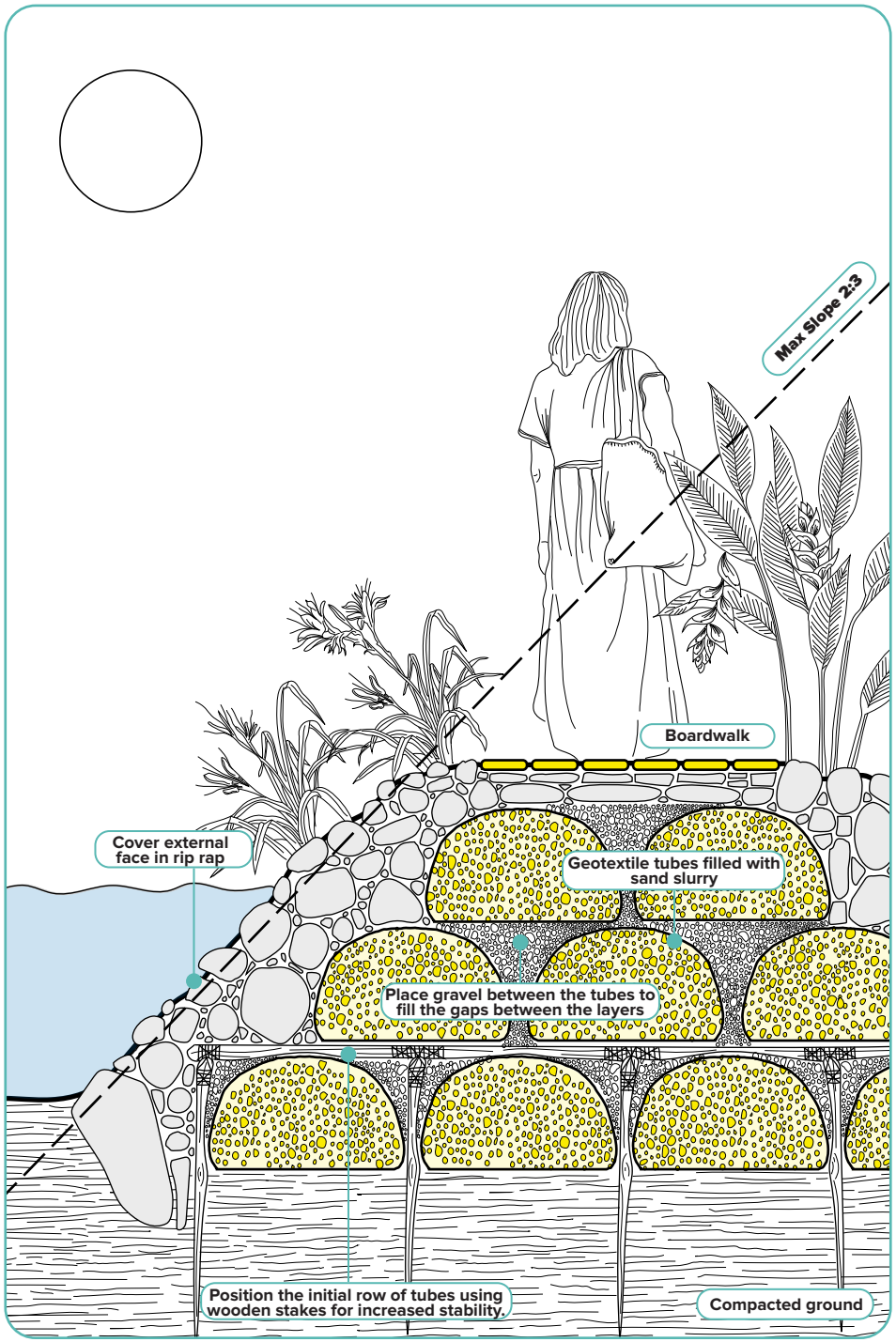
Geotextile tubes and containers can function as a special form of dike or support other structures like seawalls, dunes, and breakwaters. The flexible containers are filled with solids from the local site. The local filling materials usually comprise of a sand and water slurry that is then filled into the container by a pump, dredger, or funnel. Once the geotextiles are filled with the slurry, the water dissipates through the flexible and synthetic fabrics. The sand then prevails as the tube's main composition.

Benefits and Risk

Geotextile bags and tubes protect dunes, coasts, and riverbanks from erosion and flooding. In addition, they act as water filters or dewatering systems. The fabrics are highly permeable, tensile, durable, and can resist "abrasion, ultraviolet light, oxidation, acid, alkali, bio-decomposition and immersion corrosion in seawater" *(ACE Geosynthetics 2020).* The use of local sources *(including less transportation and costs)* makes the concept of geotextile containers an eco-friendly, easy-to-apply and cost-effective alternative to, e.g., flood protection with concrete.

Good practice

Geotextile containers in Ada Foah, Ghana
The application of geotextile tubes and containers took place in the town Ada Foah on the southeast coast of Ghana. The shoreline of Ada Foah is prone to serious erosion, reaching up to 50 meters of beach loss and resulting in the damage of settlements. To install the geotextiles, the sand has been dredged from the adjacent Volta River, which also supports the mitigation of floods because it decreases the river roughness and lessens the risk of flooding. Applying the highly permeable geotextile containers has helped to mitigate erosion and extreme weather events, including floods. Moreover, the geotextiles foster the restoration of sand dunes *(ACE Geosynthetics 2020).*



Overview of Criteria

Type of intervention:
Hybrid.

Scale of Intervention:
Shelter-Plot-Block, Settlement, Supra-settlement.

Materials:
Sand, Water, Geotextiles;
For implementation: Pump, dredger, funnel.

Environmental Impact:
The measure has an insignificant environmental impact due to local fill materials and no/limited transportation for the import of materials. CO2 Emissions (kg/T): 2.4

Targeted Natural Hazard:
Pluvial Flood, Coastal / Riverine Flood.

Targeted Vulnerable Assets:
Buildings, Land Cover.

Strategy Type:
Reduce Hazard Magnitude.

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

Effect Duration:
Medium-term (1 year to 10 years), Long-term (>10 years).
A geotextile tube lasts for around 5 - 15 years. Longer durability is possible.

Investment Costs:
Low, Medium
The costs are low compared to other fixed flood protection systems such as dams or revetments. Example (U.S. Context):$600 to $750 per meter of geotextile tube..

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

ACE Geosynthetics (2020)
ACETube - Hydraulic structures. Geotextile Bags, Tubes and Containers. Available online at https://www.geoace.com/products/Geotextile-Bags%2C-Tubes-and-Containers/ACETube%C2%AE-_-hydraulic-structures.

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Flood Risk in Humanitarian Settlements: Compendium of Mitigation Measures

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