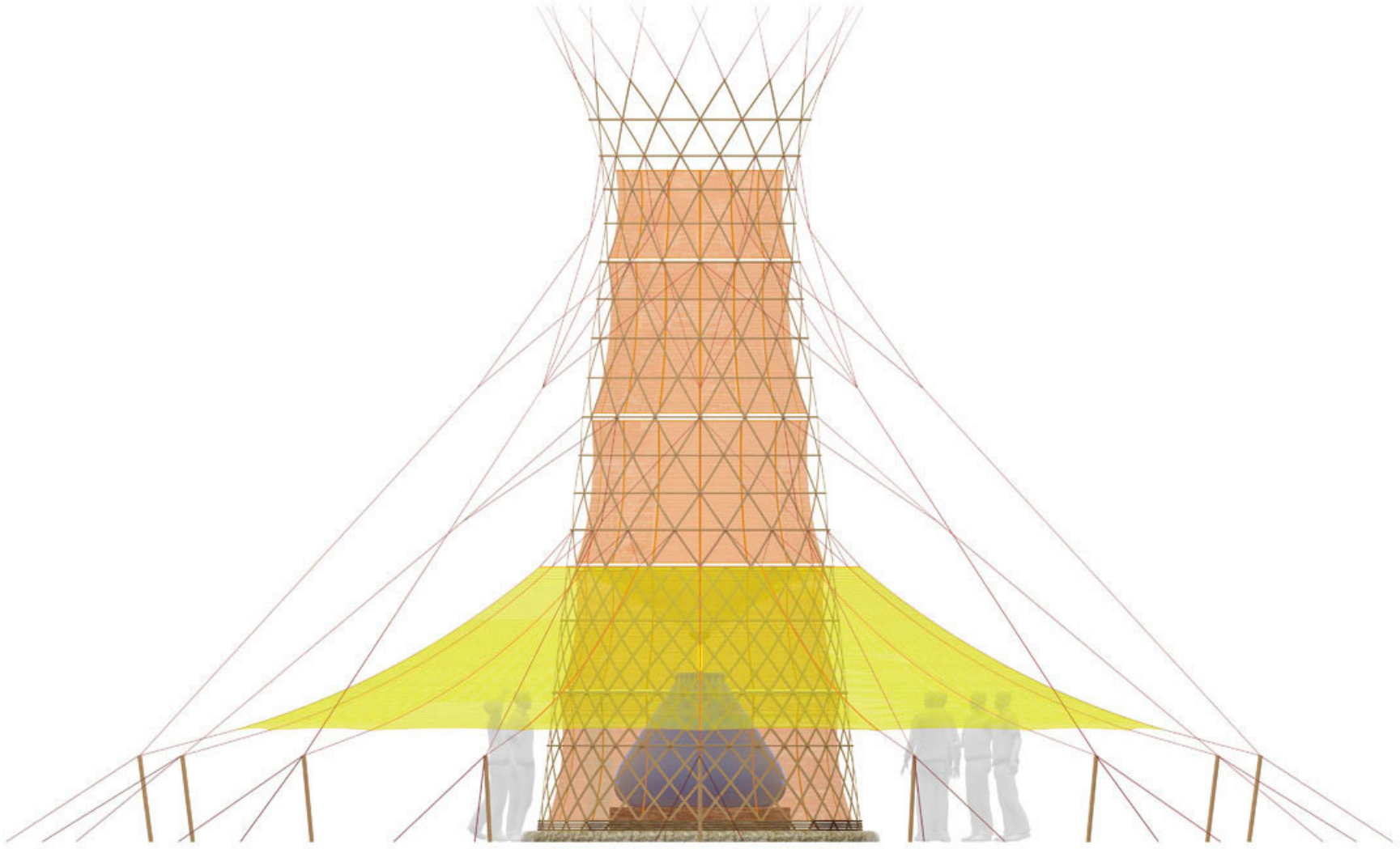
Warka Water

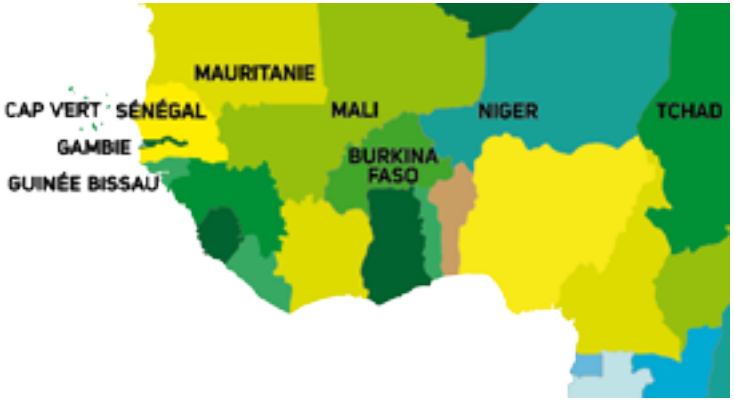



Sahara
Sahel

«Desidero che una realizzazione concreta sia effettuata nella regione del Sahel… e che resti il segno efficace del mio amore per i miei fratelli africani più provati»

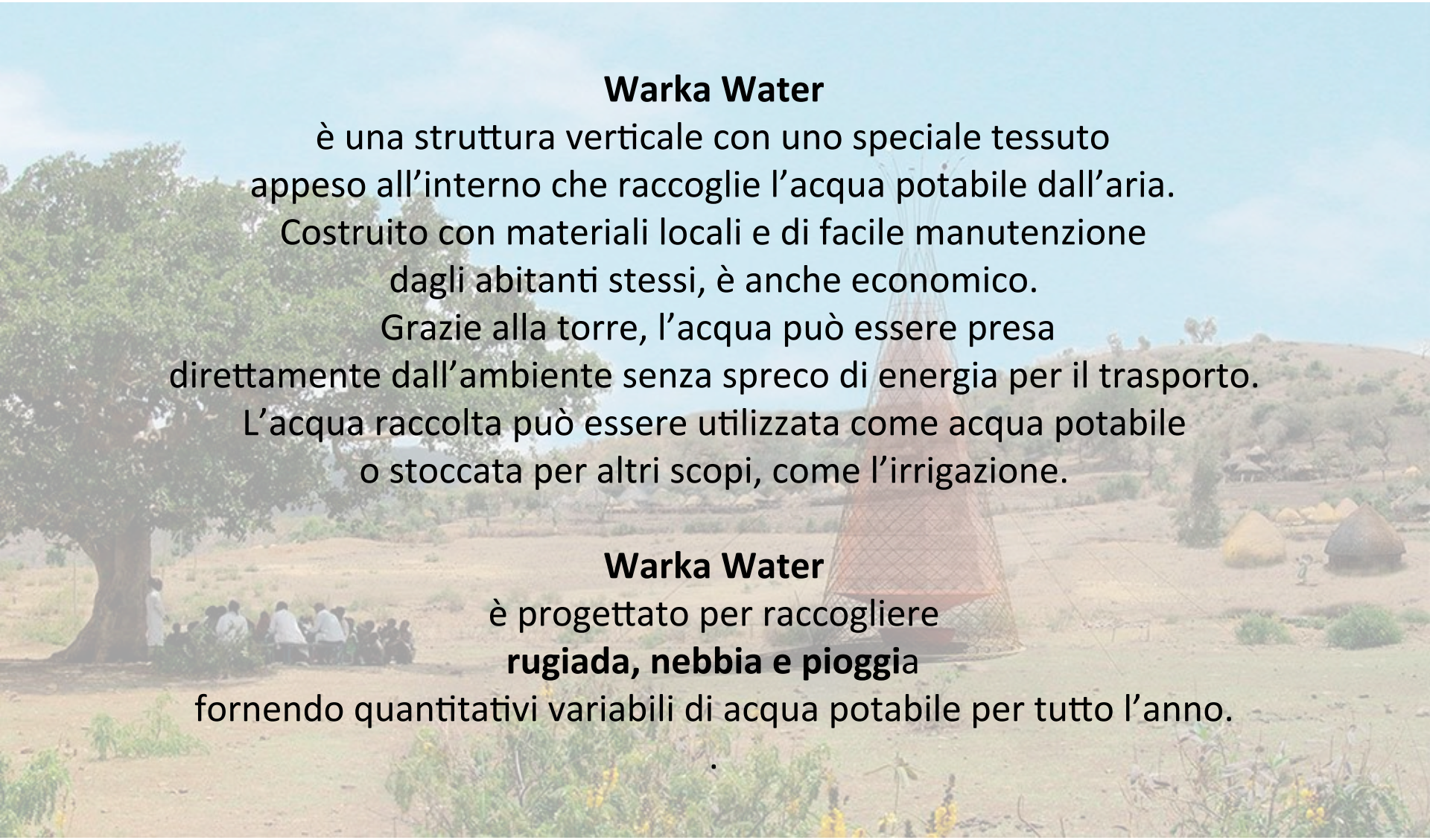
Papa Giovanni Paolo II, 1981

FONDATION JEAN-PAUL II POUR LE SAHEL



Warka Water

Esteticamente ispirato dalla tradizione artigianale etiope dei cesti intrecciati,
Warka Water è una soluzione sostenibile per depurare l'acqua



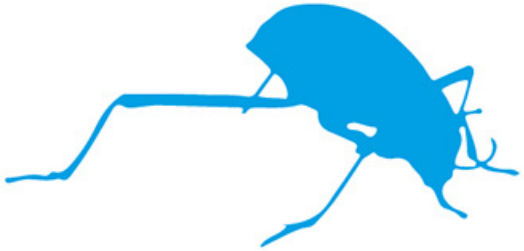
Warka Water
è una struttura verticale con uno speciale tessuto
appeso all'interno che raccoglie l'acqua potabile dall'aria.
Costruito con materiali locali e di facile manutenzione
dagli abitanti stessi, è anche economico.
Grazie alla torre, l'acqua può essere presa
direttamente dall'ambiente senza spreco di energia per il trasporto.
L'acqua raccolta può essere utilizzata come acqua potabile
o stoccata per altri scopi, come l'irrigazione.

Warka Water
è progettato per raccogliere
rugiada, nebbia e pioggia
fornendo quantitativi variabili di acqua potabile per tutto l'anno.
.

Warka Water

Design: Architecture and Vision
Obiettivi: raccolta di acqua dal cielo
Costruzione: 6 giorni, 6 persone (senza strumenti elettrici)
Assemblamento: 3 ore, 6 persone
Struttura: telaio reticolare modulare in fibre naturali
Peso: 80 kg
Materiali: bambù, cavi, telo
Dimensioni: altezza 13 m – base Ø 5 m, compresi i cavi di fissaggio Ø 12 m
Costo: una torre circa 1000 $
Manutenzione: facilmente riparabile

Inspiration



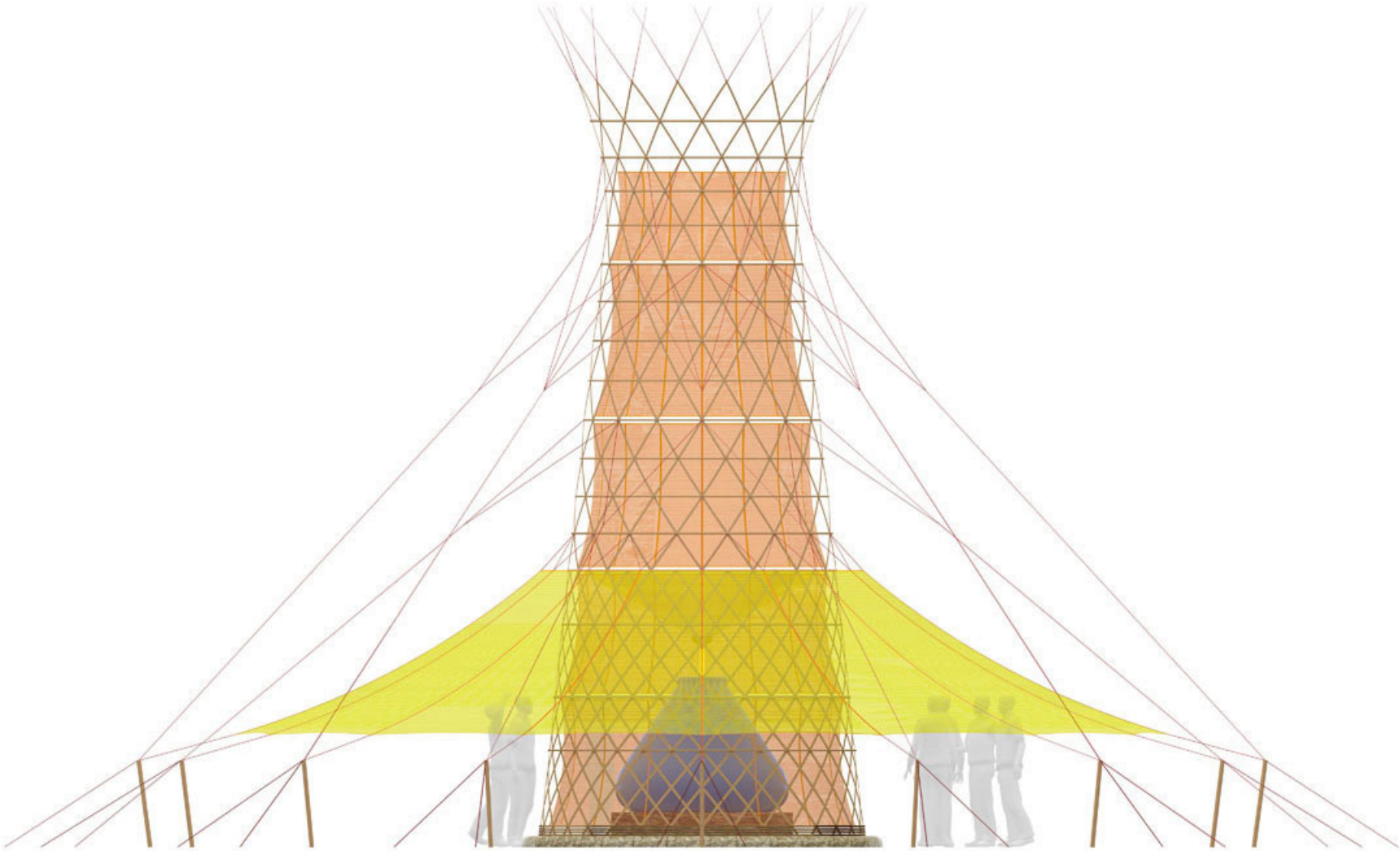
BIOMIMECRY

LOCAL TRADITIONS

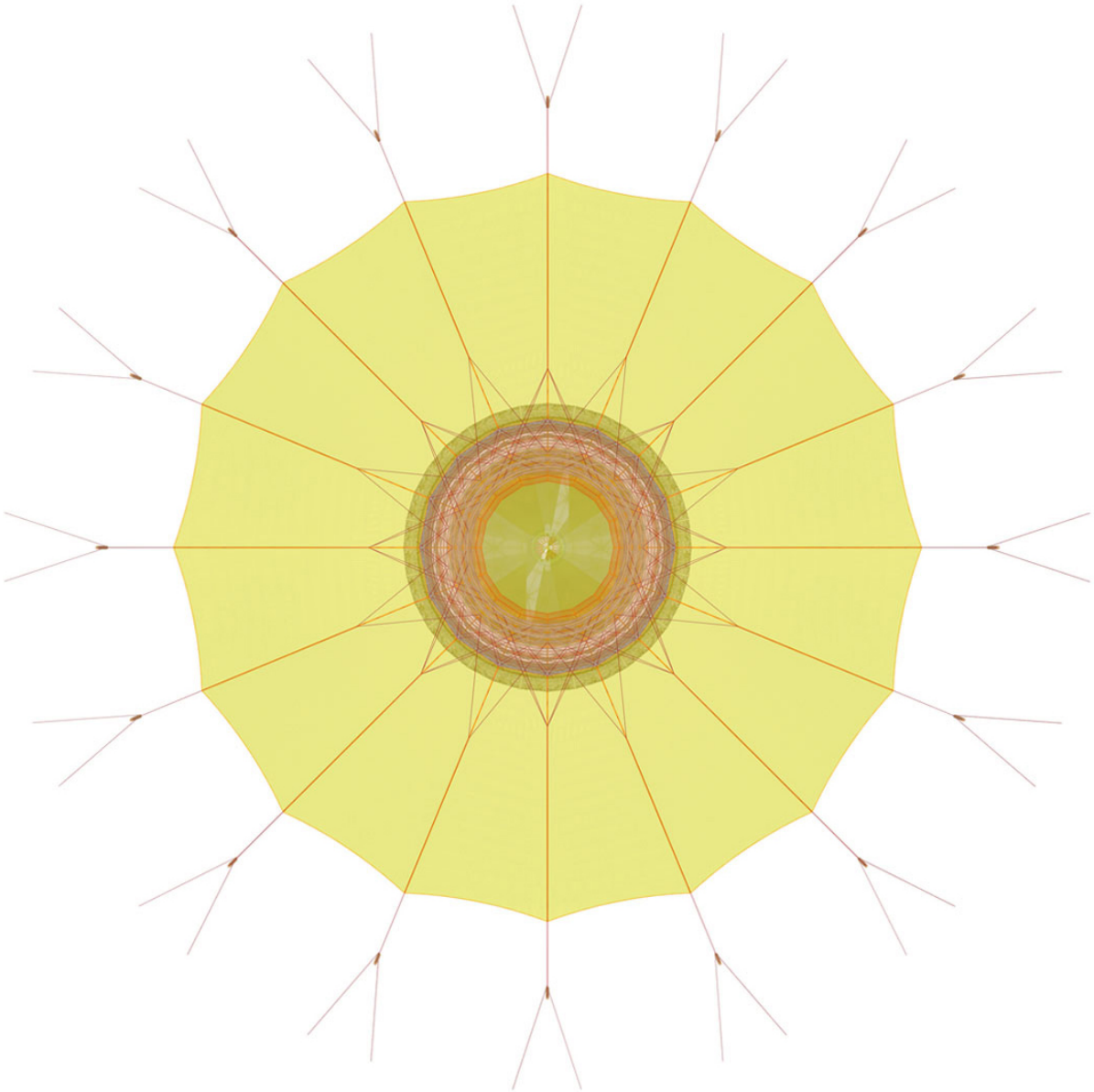
WARKA TREE

The Warka's water harvesting technique and construction system are inspired by several sources. Many plants and animals have developed unique micro- and nano-scale structural features on their surfaces that enable them to collect water from the air and survive in hostile environments. By studying the Namib beetle's shell, lotus flower leaves, spider web threads and the integrated fog collection system in cactus, we are identifying specific materials and coatings that can enhance dew condensation and water flow and storage capabilities of the mesh. The termite hives have influenced the design of Warka's outer shell, its airflow, shape and geometry. We also looked at local cultures and vernacular architecture, incorporating traditional Ethiopian basket-weaving techniques in Warka's design.

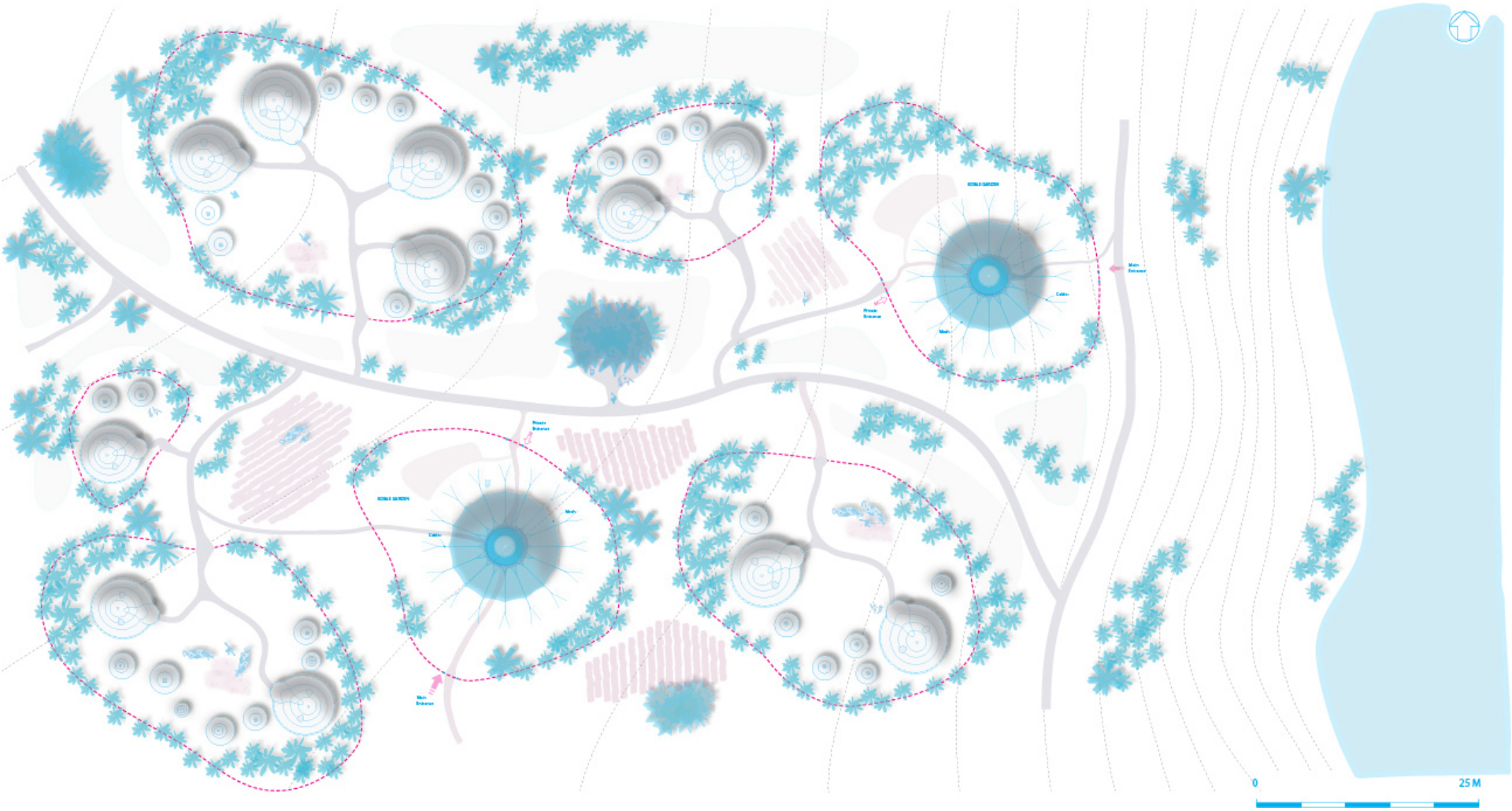
Front View



Top View



Master Plan



Characteristics

Below are the key details of Warka Water 3.2 :

Daily water collection: 13 to 26 gallons (50 to 100 L), annual average.

Water tank storage: 800 gallons (3000 L).

Construction: 10 days, 10 people (by hand, no electrical power machinery required).

Assembly: 2 hours, 10 people.

Weight: 176 pounds (80 kg).

Materials: Bamboo, hemp, metal pins, bio-plastic.

Dimensions: Height 31ft (9.5 m) – Footprint Ø 12 ft (3,7 m).

Surface Area: Mesh 323 sq ft (30 sq. m)

Collector 87 sq ft (8.1 sq. m), Canopy Ø 32 ft (10 m).

Cost : ~ $1,000 (production in Ethiopia).

Maintenance : easy to be maintained, cleaned and repaired.

Materials

BAMBOO

MESH

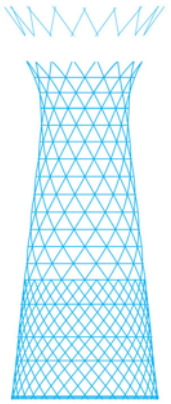
POLYESTER ROPES

NATURAL FIBER ROPES

Materials

Warka is realised with local and biodegradable materials such as bamboo, fiber ropes and bio-plastic.

Components



ANTENNA

A group of antennas attached to the structure with silver kites attached to their tip reflect light keeping the birds away.

STRUCTURE

The triangulated split bamboo frame provides both robustness and structural strength keeping the overall tower light weight and stable.

CANOPY

The canopy provides shade creating a gathering place for the community.

ROPES

A triangulated network of polyester ropes is used to add stability to the tall, freestanding structure.

MESH

A permeable mesh allows air to pass through the material, capturing water droplets which roll down by gravity.

COLLECTOR

Water droplets falling from the Mesh by the force of gravity are cached by the Collector and channelled to the Water Tank. It also works as dew condensor.

FUNNEL

The water passes from the collector through the filtration system of a Funnel and into the Water Tank.

WATER TANK

A 800 gallon (3000 L) tank is used to contain the the harvested water.

BASE

Blocks of stone are used

Packaging

Tools

LOCAL TOOLS

BAMBOO SPLITTER

CALIPER

DRILL

HAMMER

SEWING MACHINE

NOSE PLIER

SCISSORS

PLIER

SAW

TAPE MEASURE

WW is designed to be easily built and maintained without the need of scaffolding or electrical equipments. We are working in collaboration with the local community integrating traditional tools and construction technique.

Fog Harvesting

Fog harvesting isn't a brand-new idea but go back to thousands of years ago in arid regions. During wet conditions, water droplets collect on the mesh, flow downwards by gravity and drip into the Collector. The water is then channeled to the storage tank located at the center of the Warka Water base.

The systems also require no power to run. New filters and net repairs are the basic maintenance requirements. Drawbacks generally come from dust and debris that blow into the nets and spill into the water as it collects.

Environmental Impact

Long-Term Results

The Warka Water project is currently in development with first test pilots scheduled to launch in the first quarter of 2015. We believe that installing the Warka tower in remote villages can lead to numerous impactful initiatives: – Education: Women and children can engage in productive activities such as care, education and crafts that can lead to self-sufficiency – Economy: Manufacturing the Warka tower locally and sourcing indigenous materials can create jobs and boost the local economy – Society: The Warka tower's canopy creates a gathering place for the community – Agriculture: Water produced by the Warka tower can be used for irrigation and farming – Environment: the water management training program can introduce the principles of permaculture – Technology: Future developments include a shared internet connection point for rural villages, which can connect the isolated communities and bring valuable real-time information (e.g., weather forecast, market prices of crops)

Innovative Methodologies

Warka Water is designed for autonomous distribution and scaling. The tower can be easily built and maintained by the local communities using simple tools. The tower can be also maintained without using special parts or heavy machinery. With training and guidance, the locals can easily build and maintain the Warka tower. This local know-how can then be transferred to surrounding communities, with villagers helping install other towers in the area and creating an economy based on the assembly and maintenance of the towers. This can expedite the scaling of Warka Water in the region. Following the prototype development and testing phases, we intend to start manufacturing the Warka on a large scale, which can bring the material's cost down to $1000 per tower significantly less than other water relief options available.

Integration

As part of the Warka Water project, we will also plant a new Warka tree next to each Warka tower. The growth of the sapling will be supported by the water generated by the Warka towers as well as the dedicated team from the local community that maintains the tower. With time, the new tree will not only counterbalance the negative effects of increasing deforestation, but also will help create a better environment for the Warka tower to function. The humidity created by the tree will facilitate the water production of Warka Water.