



Optimization of Warka Water Tower

**a water tower that collects water
from the atmosphere**

Table of Contents

01

Introduction

Importance of water

02

What is Warka Water

This idea can solve the problem

03

Method

Measuring water collection

04

Results and Discussions

Compare each version

05

Development

Biomimetics and new version

06

Conclusion

The Future of the Warka Project



01

Introduction

Global water issues

Water is essential

Water is the foundation of life. It is 70% of our body and the basis of our daily life, industry, and other activities.

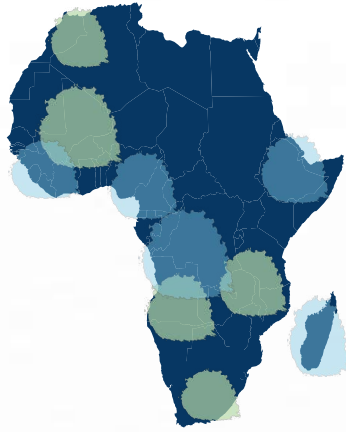


Water problem in Africa



Severe water fetching

their children's education deprived.



water-stressed region

More than 400 million people suffer



Dirty water

Unsanitary and contagious diseases can be deadly.



Oasis of tree

1/4 people suffer from water shortage.

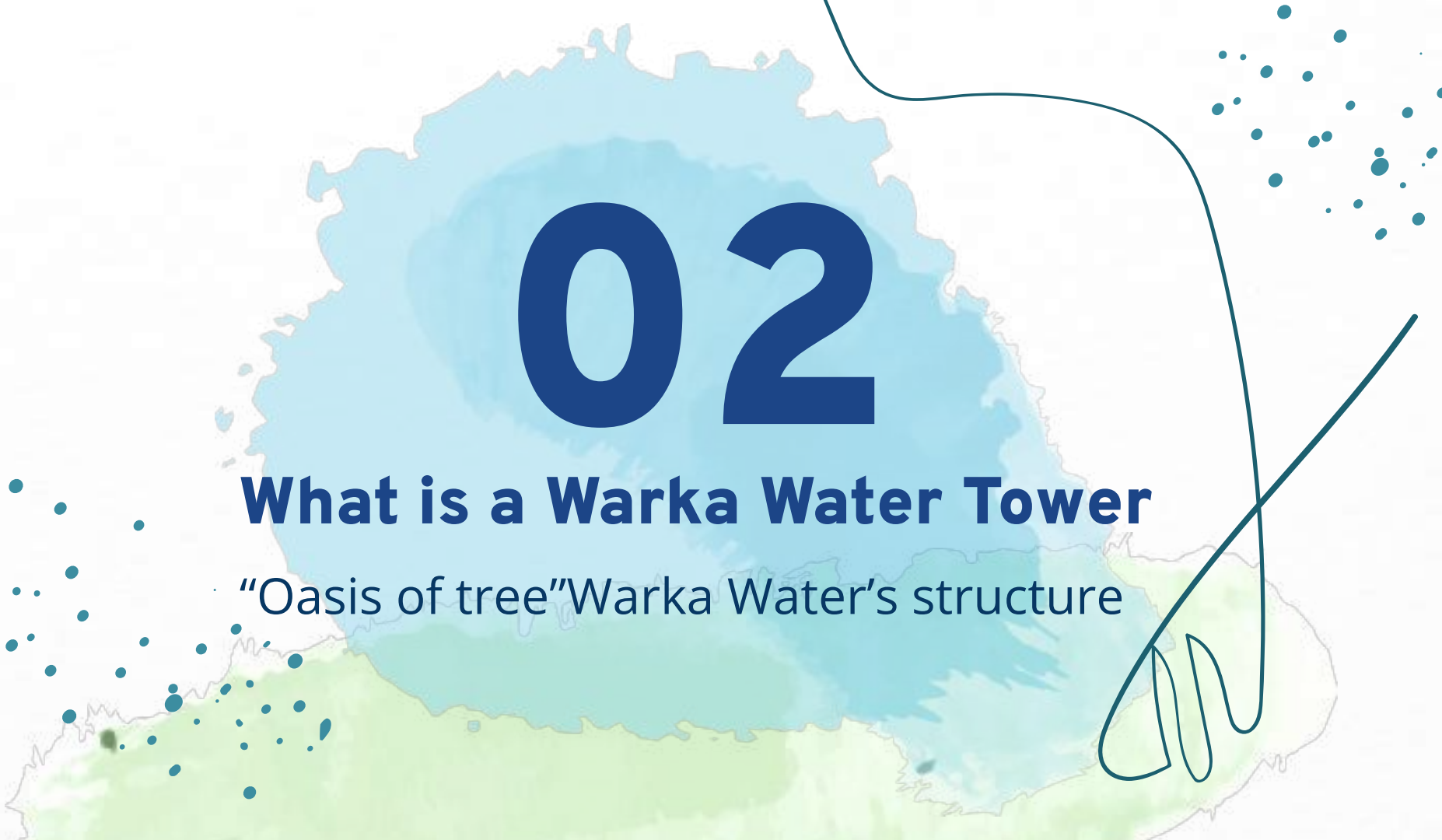
An idea that may provide a solution to this problem.

It is the Warka Water Tower.

02

What is a Warka Water Tower

“Oasis of tree” Warka Water’s structure



What is Warka Water Tower

Moisture in the air



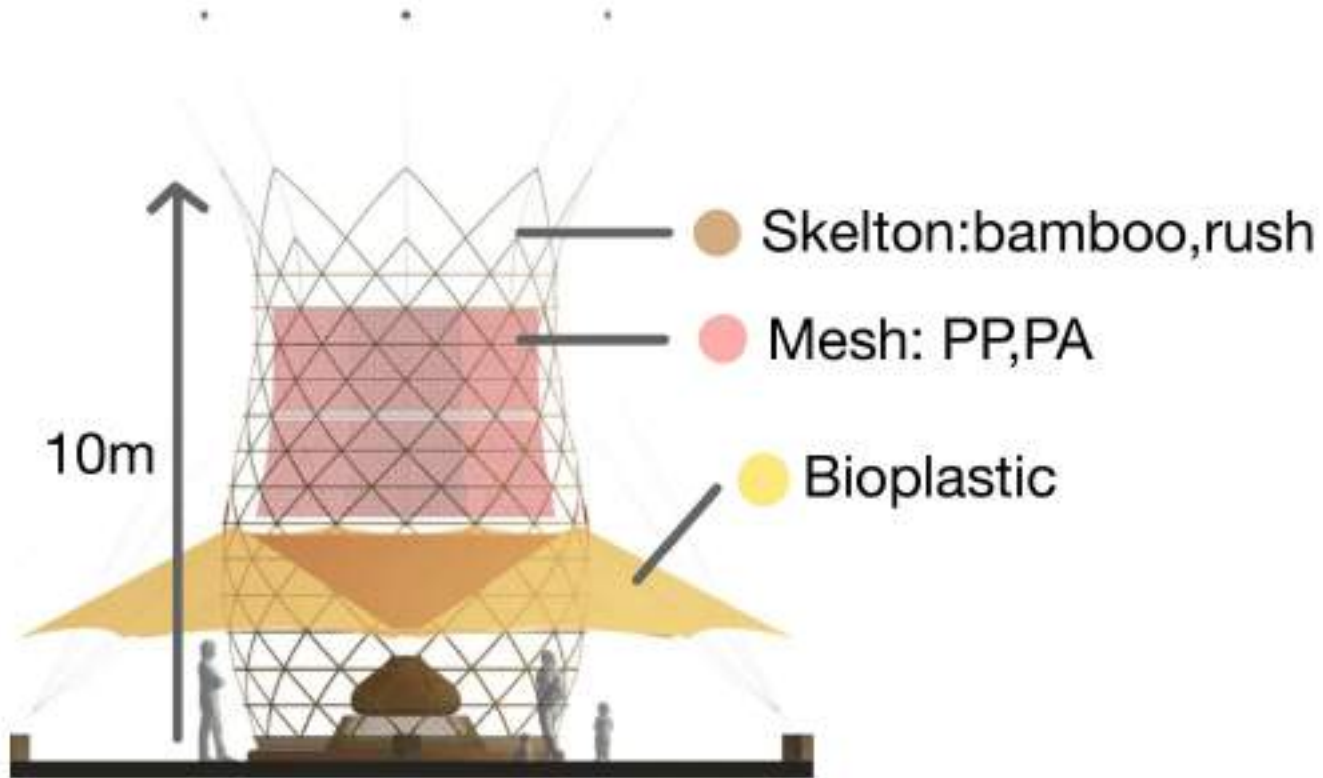
Get drinking water



100L/day running in Africa



Structure



Mechanism

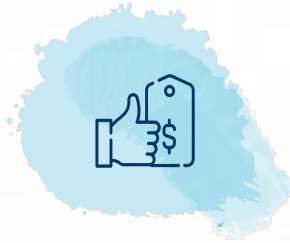


Advantages of Warka Water Tower



Environmental Considerations

No energy
eco -friendly ingredients



Cheaper and easier

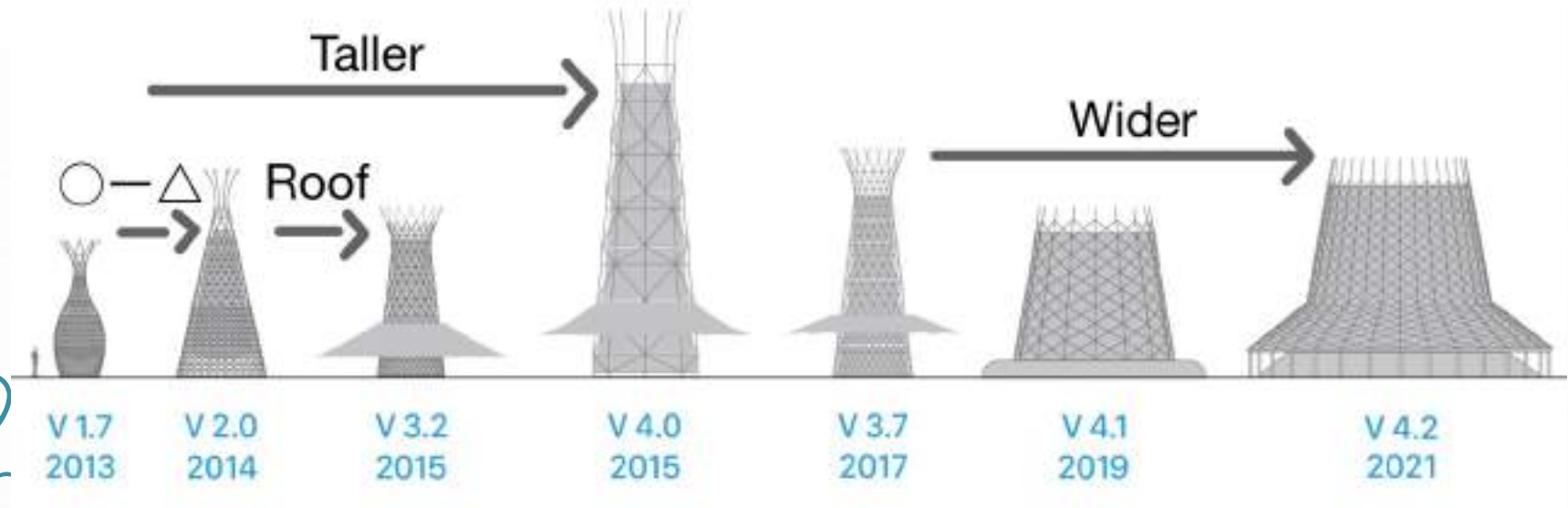
Only installation-collect
water



Achievement of SDGs

Focus on 9 targets

Evolution of Warka Water





Is the amount of water collected related to the change in version?

Hypothesis = "Wide" has a higher water catchment.

V4.1

V4.2

Lowness

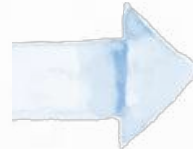
Water vapor flows downward



Match the climate

Is it hard for the wind to blow?

Latest version



Increased water collection



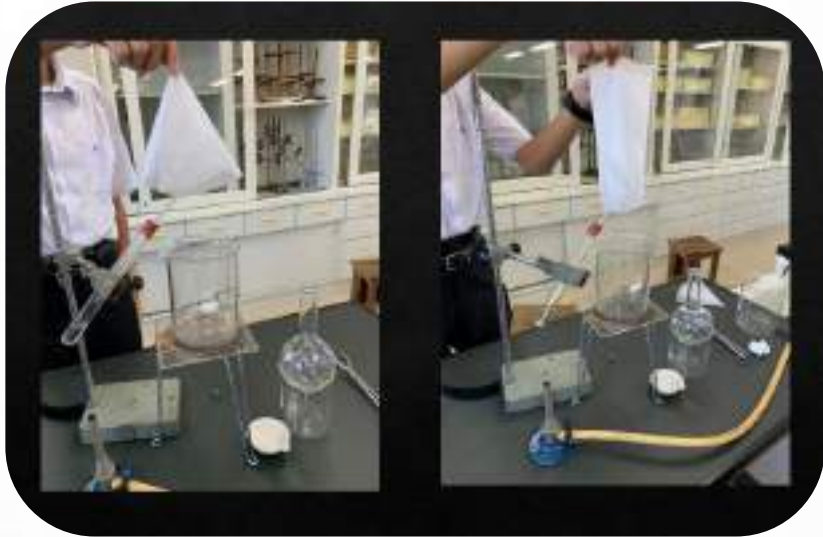
Referenced Studies



Water collection is possible with smaller models

Water does not fall into the tank.

Referenced Studies



Collecting water from steam is possible



Focus on fog



03

Experimental Method

Measurement of water collection and dryness of towers

Experimental Flow



01

Creation of tower



02

**Water collection
and drying**



03

**Measurement and
analysis**

01 Creation of Tower

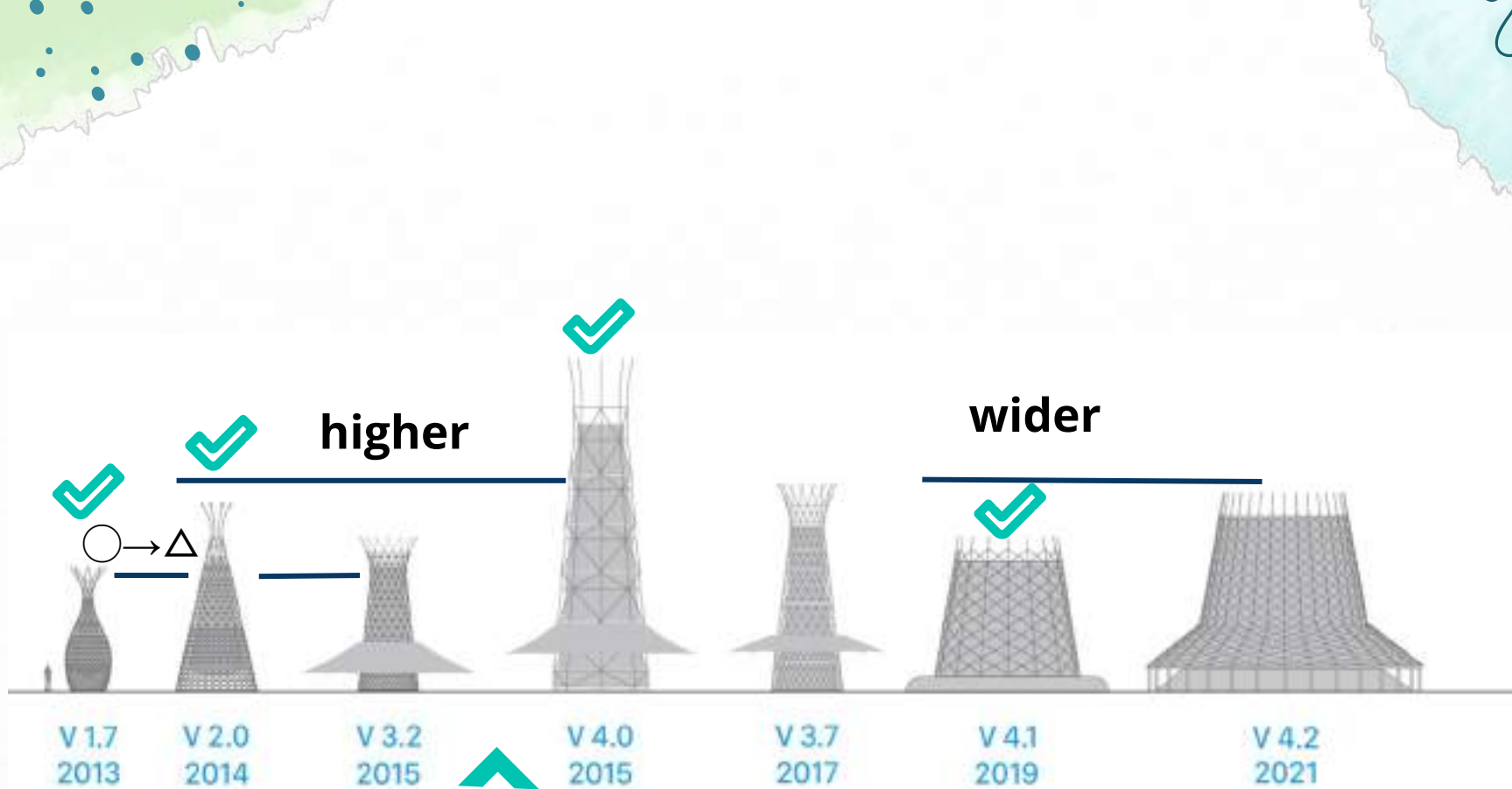


4Dframe

Educational production
model kit



Creation of each version



The roofs were built.

Four versions of creating tower

We produced Typical versions

2013
V1.7

2014
V2.0

2015
V4.0

2019
V4.1



02 Experiment of collecting water



Four models to a small room.



Humidify for 50 minutes



Weigh the tower

02 Experiment of drying



Pour water on the tower



Leave for five minutes



Weigh the tower

03 Measurement and analysis

**Compare by
weight**

after the measurement
- before

**the amount
of water**

Compare by quantity
per unit area

**The amount
of drying**

Compare by quantity
per unit area

04

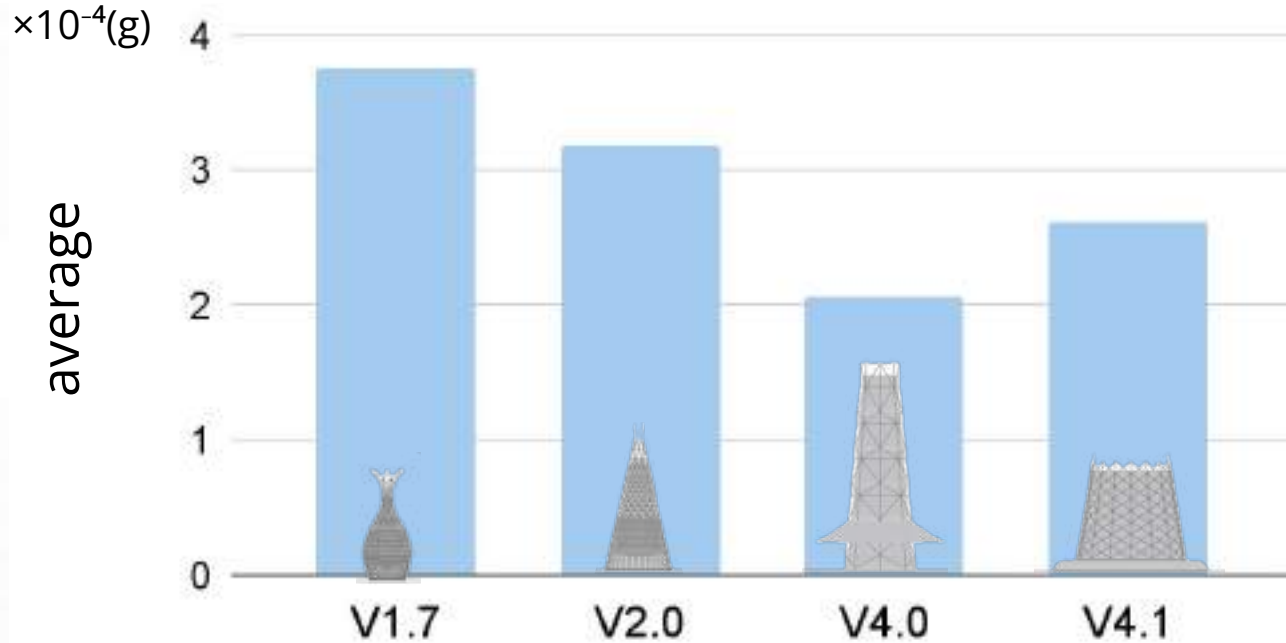
Results and Discussion

Comparison of water collection and Drying rates



The water collection

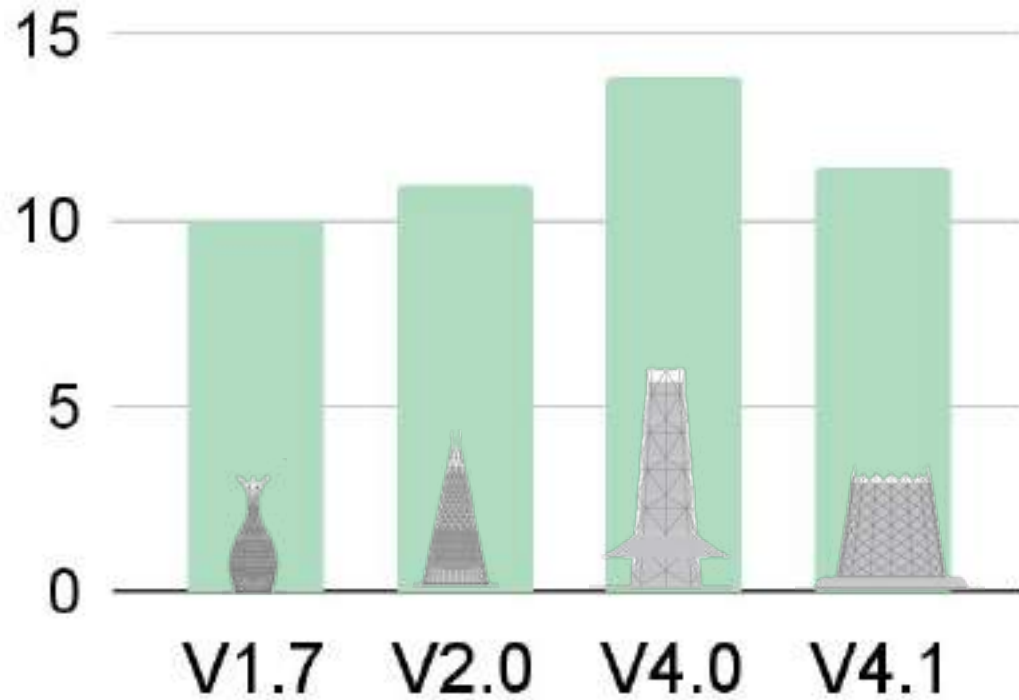
The water collection



Amount of dryness

Amount of dryness
 $\times 10^{-4}(\text{g})$

average



Discussion

Density

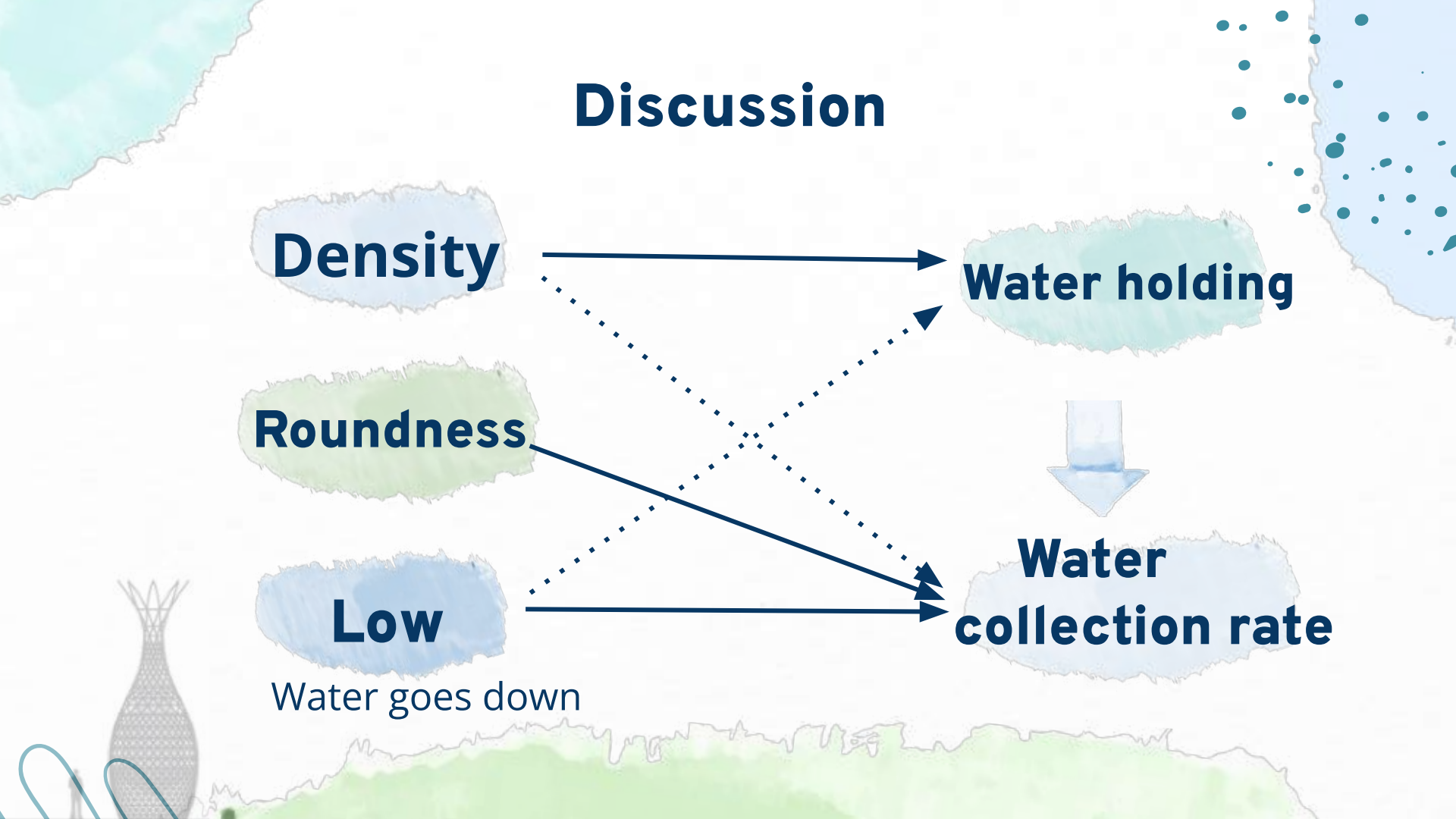
Water holding

Roundness

Low

Water collection rate

Water goes down





Is V1.7 really superior?

Key Factors

water collection

Ease of construction

**Warka
Tower**

durability

functionality

Agricultural applications, shade... etc

Element Comparison

Water
collection
efficiency

Catchment
actual
value

water
retention
capacity

durability

Ease of
construction

functionality

V1.7

1st

50L

1st

△

○

△

v2.0

2nd

93L

2nd

○

◎

○

V4.0

4th

265L

4th

×

×

×

v4.1

3rd

175L

3rd

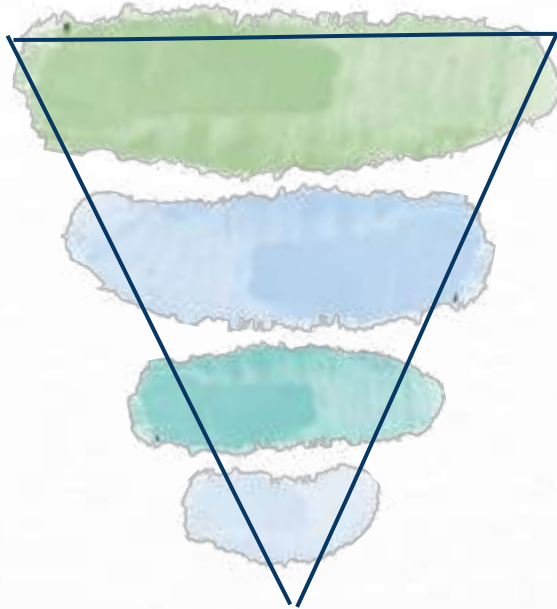
○

○

◎

*Actual water collection volume: Water collection volume of each version when the water collection volume of V1.7 is set to 50 L

Element Priority



01

Water collection performance

Enough for life

02

functionality

Agricultural applications, shade... etc

03

durability

Not blown away by wind or rain

04

Ease of construction

Hassle of installation and removal



05

Advancement

Biomimetics and New version proposal

Proposing new version



Practical tower



Spiral shell



Damask rose

New version model



Shell-shaped



Rose-shaped

Advantages of the spiral shell structure



Regulated ventilation

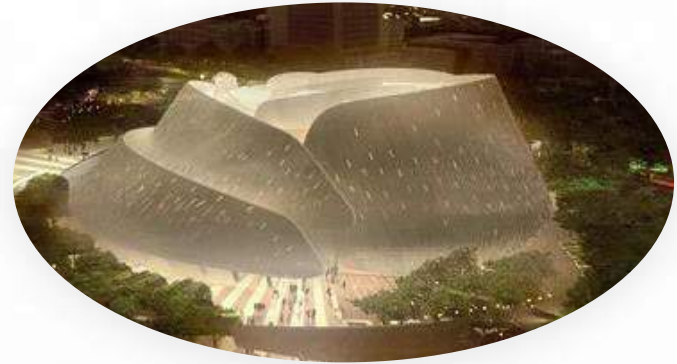
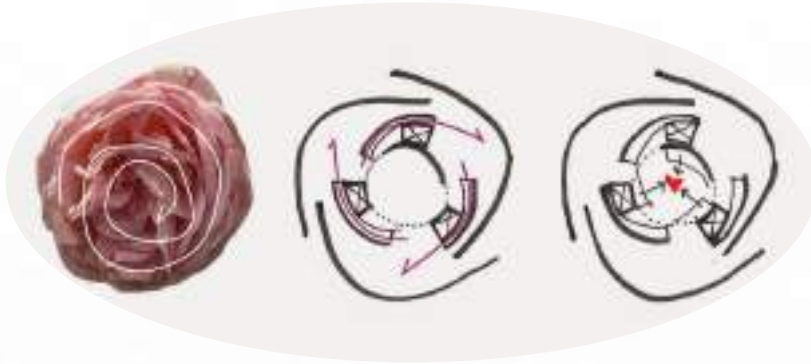
Enter through the opening.
Air circulates in a spiral
pattern



Strong and durable construction

Light but strong shell
construction

Damask Rose



Internal Use

Improved V4.1

Utilizes internal dead space

Comfortable space

Sunlight adjustment

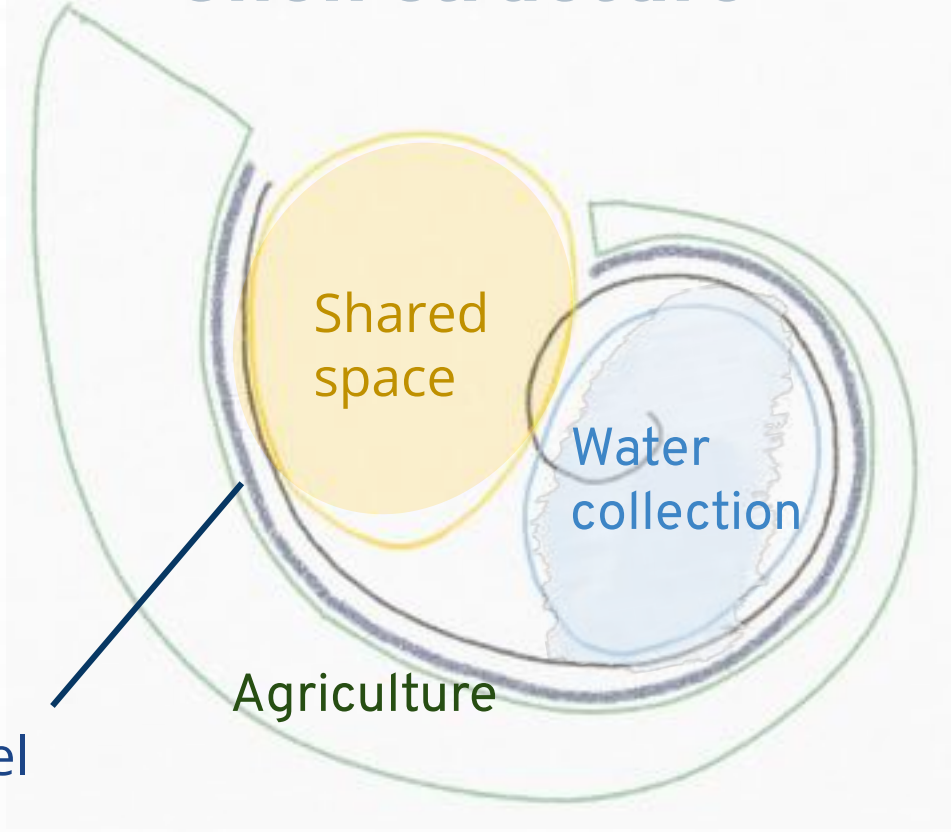
Shade Natural ventilation system



Suggestions for use



Shell structure



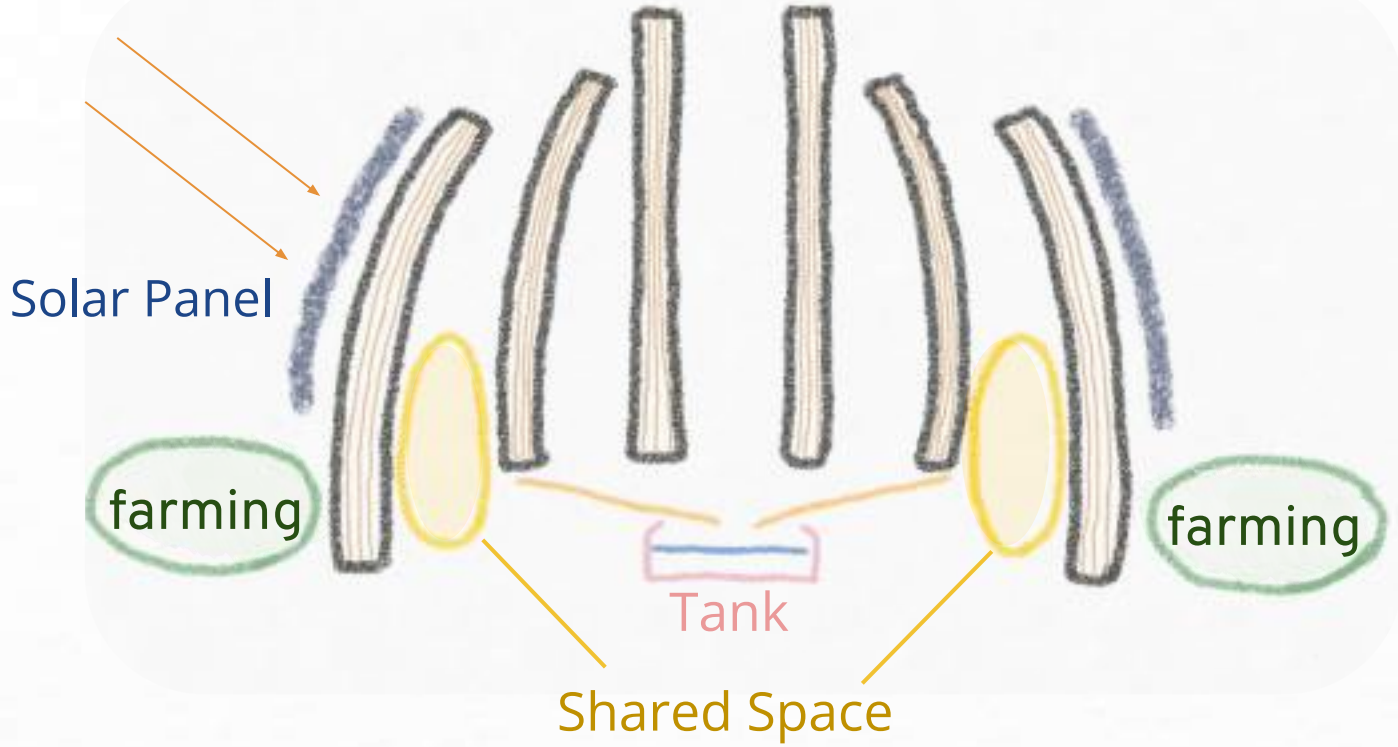
Solar Panel

Agriculture

Water collection

Shared space

Damask Rose



A stylized world map with a blue and green color scheme. The number '06' is prominently displayed in the center in a dark blue font. Below it, the word 'Conclusion' is written in a smaller, dark blue font. The map is surrounded by decorative elements, including a dark blue line that curves around the right side and several clusters of small dark blue dots scattered across the background.

06

Conclusion

Conclusion



Version Evolution

- Evolution has nothing to do with water catchment.
- Water catchment-×
Convenience-○



Water collection correlates with dry volume

「Density」「Rotundity」「Lowness」

「water collection○」⇔「water holding○」



Comprehensiveness Wide

- Wide, with excellent functionality
- Easy to build and collapse-resistant



What we think is best

- Focus on Comprehensiveness
- Improved v4.1. Dead space can be collected by utilizing the interior.

The Future of the Warka Project



References

Warka Official warka Water Inc (2022) Warka Water <https://warkawater.org> 2023年2月2日

● **Arabic-Portuguese Studies** FELIPE TROVATTI GRECCO, MARISA BIALI CORÁ, JEFERSON ROSA SOARES, ROBERTO WIDERSKI (2016) COLETOR DE ORVALHO WARKAWATER: SUA APLICABILIDADE E EXPLORAÇÃO DE UMA FONTE DE ÁGUA ALTERNATIVA

● **Hyogo Prefectural Himeji Nishi High School: Possibility of Resolving Water Shortage through Plants**

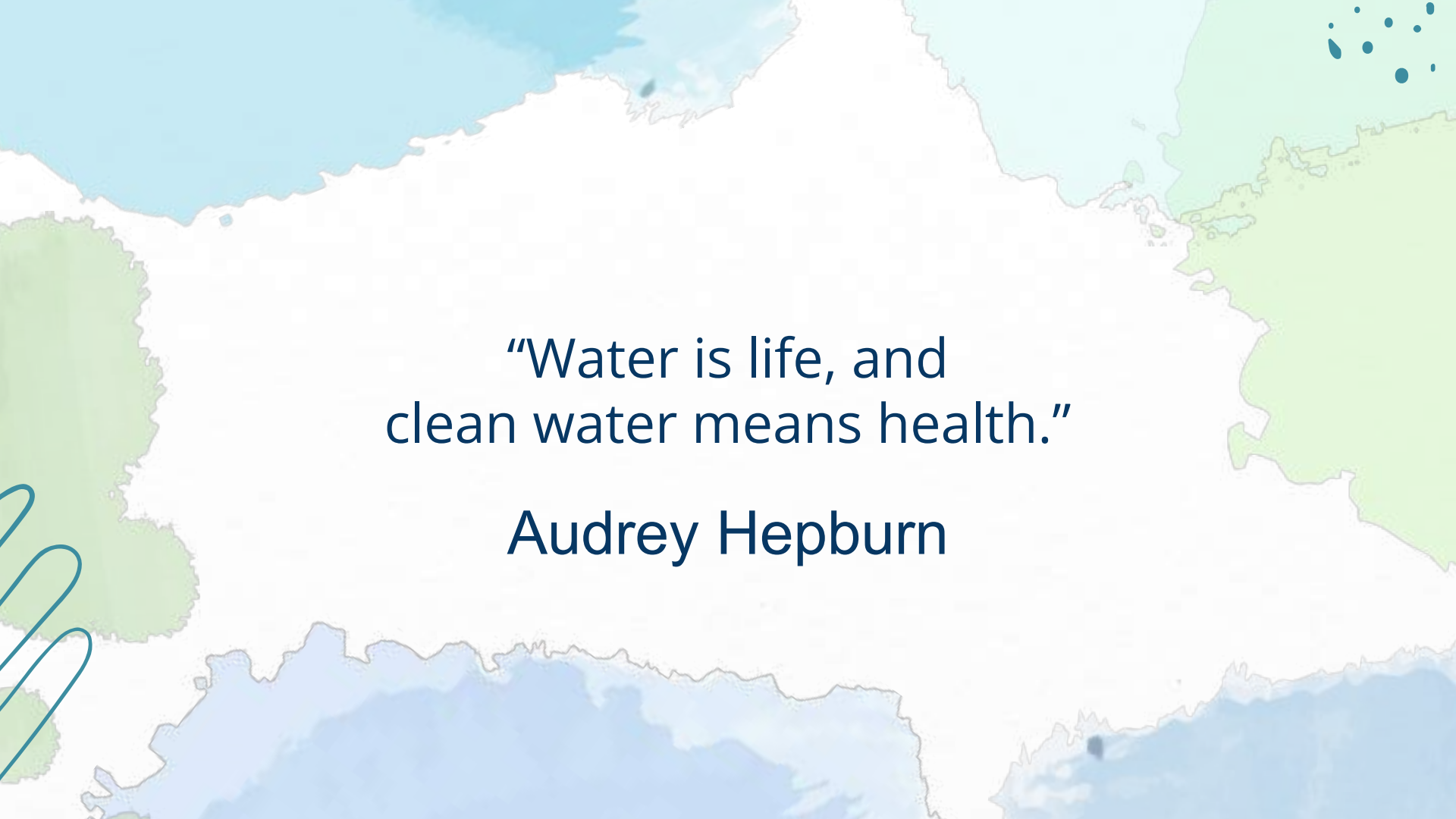
http://www2.hyogo-c.ed.jp/weblog2/himenisi-hs/wp-content/uploads/2021/05/plant_ja.pdf

● **Biomimicry Damask Rose**

<http://www.arch2o.com/massar-childrens-discovery-centre-henning-larsen/>

● **Biomimicry Shells**

<https://www.tentsxpert.com/glamping-tents/shell-shaped-glamping-tent.html>

A stylized world map with continents in light green and oceans in light blue. The map is centered on the Atlantic Ocean. In the top right corner, there are several small, dark blue dots of varying sizes. In the bottom left corner, there are several overlapping, light blue, teardrop-shaped outlines.

“Water is life, and
clean water means health.”

Audrey Hepburn