U (Re)

Inspired by the Emperor Penguin’ Strategies

1.35°C↑

How much the earth has warmed above pre-industrial levels from 1850-1900.

2023 was the warmest year since global records began in 1850, by a wide margin.

THE UNENDING DROUGHT

U (Re) bases itself in Ethiopia where seasonal rains that farmers depend upon have failed for the fourth consecutive season when the April-May rains, fall short.

FOOD SHORTAGE

Agriculture is almost entirely dependent on rainfall for maintenance of crops.

SICKNESS AND DISEASE

Travelling long distances to procure water that is often riddled with disease.

EDUCATION

The lack of water is forcing children to prioritize bringing water for the family over attending school.

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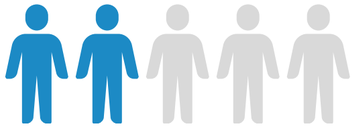

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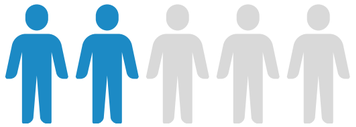

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people of the country’s population does not have **access to clean water**

59.8

million people do not have access to clean water **close to home**

To improve accessibility and usability of water supply in remote areas for hydration

Opportunity Space

The idea of the water that exists “between us”.

A coordinated and cooperative unit that share resources.

Utility isn’t of secondary nature. It means survival.

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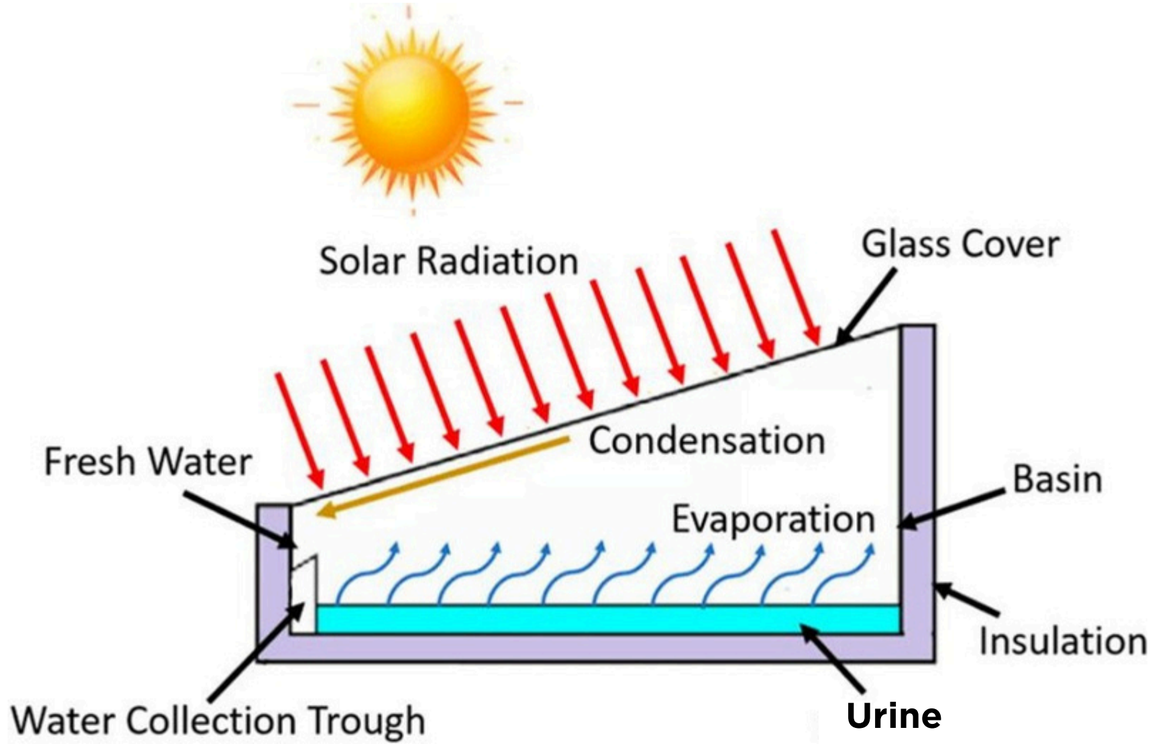
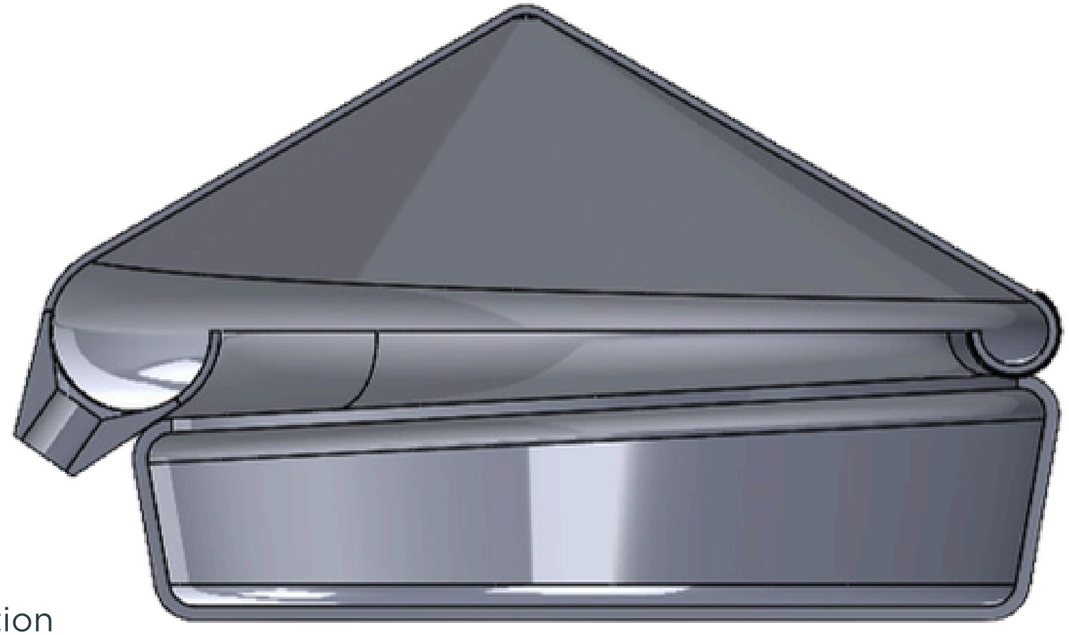
Opportunity Space

Design Intervention

U (re) is a public restroom ecosystem, designed to collect filtered, drinkable water in areas with extremely low water availability. Rooted in community participation, our solution utilizes one of the only reliable sources of water in the area: Humans; and more specifically, urine.

Design Intervention





- A solar still system
- Using the natural resource of sun’s energy to evaporate water from urine
- Water condenses as droplets on the lid

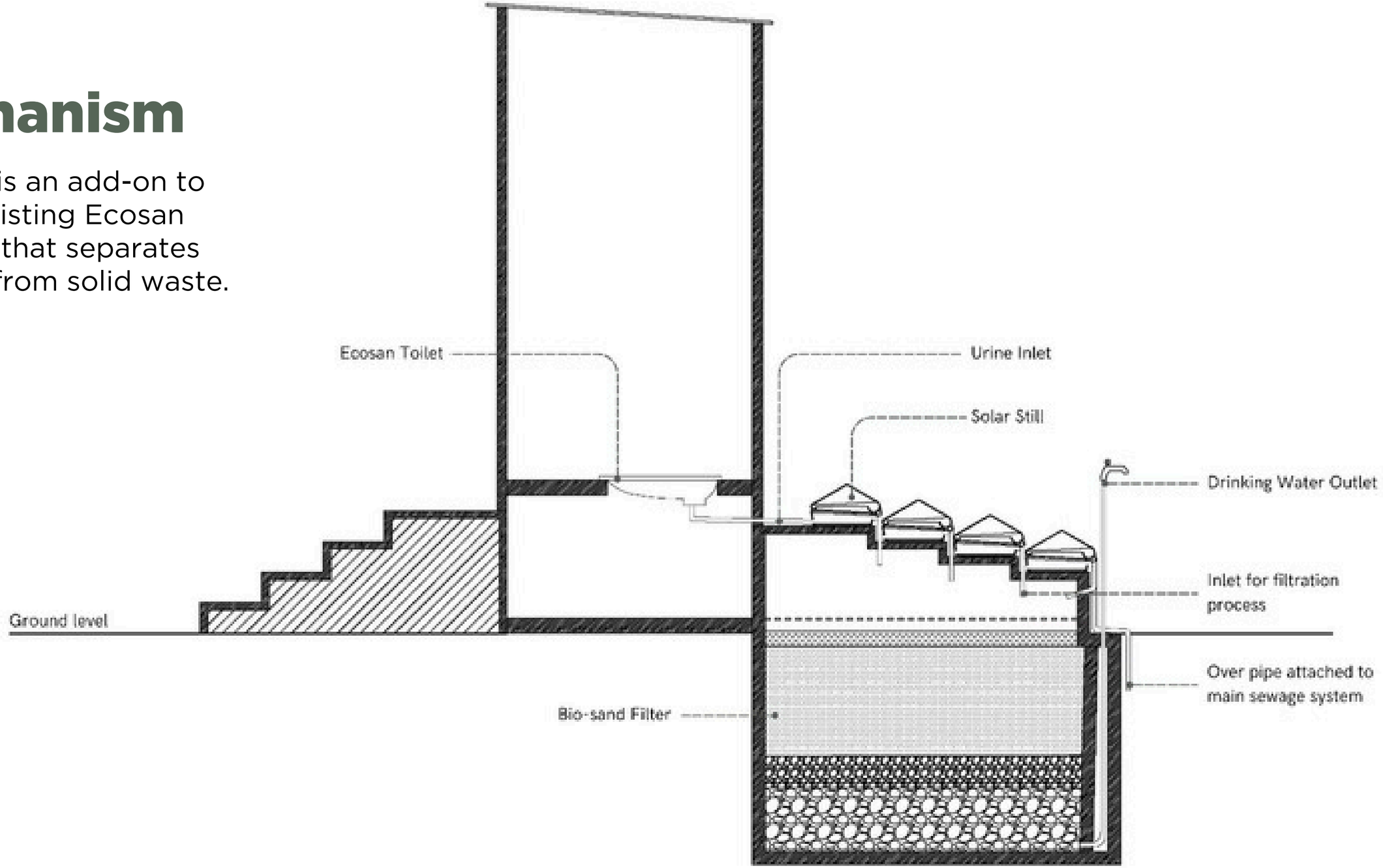
U (re) cone

- 1 foot diameter
- 30 degrees slope
- UV resistant polycarbonate

Design Intervention

Mechanism

- U(re) is an add-on to the existing Ecosan Toilet that separates urine from solid waste.

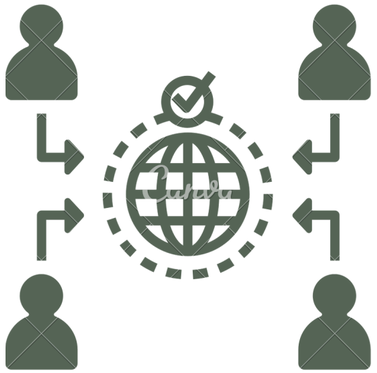


8.8 litres
cone capacity

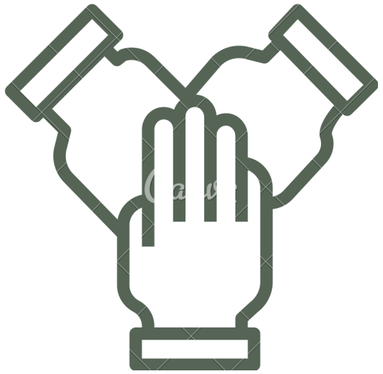
2 litres
drinking water per day per cone

20 litres
total drinking water per day

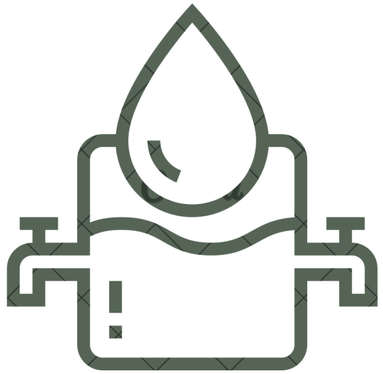
Design Intervention



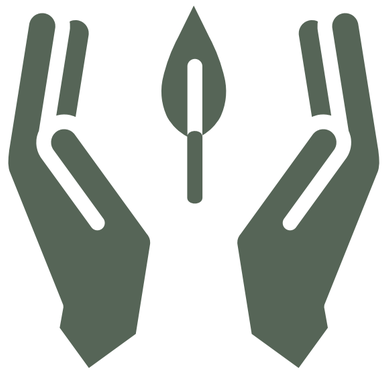
Creating a point of **access** for everyone in the community



An ecosystem solution that works on the principle of **community collaboration**



A space for **collection** and storage of water as an important resource

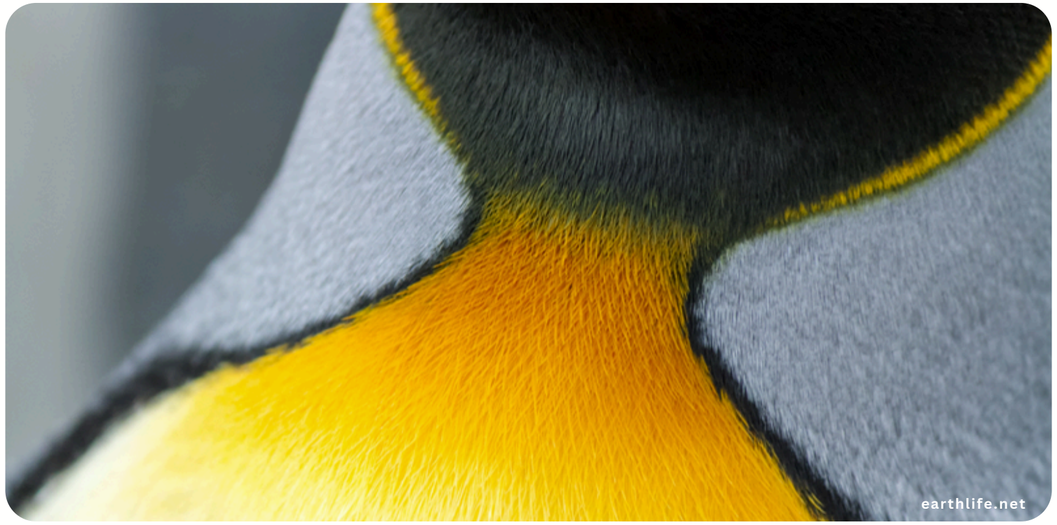


A practice that can **sustain** the community for long-term

Emperor Penguins are the world’s largest penguins. They are the only ones to lay eggs and raise chicks almost exclusively on pack ice in the harsh Antarctic winter where temperatures are as low as -40 degrees Celsius.

WATERPROOF FABRICS

- The birds emerge from the sea and instantly dry
- Water that is forced away helps them warm up rapidly
- Superhydrophobic effect to create fabrics for human use
- The microstructures are responsible for repelling water



INSULATED PIPES

- An insulating cover can be used to keep pipes above the freezing point
- Upper parts of the vanes of the feathers create overlapping tiles
- The layers of the feathers and blubber were mimicked.

Biomimetic Inspiration

The Huddle

- **Austral Winters:** Temperatures reach as low as -45°C and 50m/s winds
- **Kleptothermy:** Ambient temperatures increase up to **37.5 °C**
- Birds have **equal access** to warmth of the huddles
- **Phase transition temperature:** Huddling in response to changing weather patterns (−48.2°C)
- **Small steps** every 30-60s
  - Highest packing density
  - Forward movement
  - Reorganization

Analogous to Condensed Matter Physics

Biomimetic Inspiration

Abstracted Design Principle

Self organization of entities through coordinated movement facilitates retention of a resource, as well as periodic but equal distribution of that resource

Biomimetic Inspiration

U (re)

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RESOURCE

The penguins are retaining heat, we want our solution to store, and collect water for the community.

COORDINATED MOVEMENT

We see the penguin's continuous movement pattern as inspiration for the functioning of our system

ENTITIES

We equate the penguins with the people of the community and how they can self organize to create a a self-sustaining practice.

Rooted in Life's Principles

- **Decentralization** of a resource
- Community-based solution based on **cooperative relationships**
- **Modularity** and repetition
- **Recycling** waste to a resource

Target SDGs

Targets: **3.9**: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
3.d: Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

Targets: **6.4**: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.
6.b: Support and strengthen the participation of local communities in improving water and sanitation management.

Targets: **13.1**: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.
13.b: Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities.