# Concept Narrative

The project is a two-level modular building system organized in the shape of a flower, fully based on **local materials** and **self-sustaining technologies**.
Each "petal" of the structure contains two functional levels:

The **upper level** accommodates **semi-open bivouac shelters**,

The **lower level**, raised on stilts, houses **covered-open community spaces**.

The flower shape is not only a symbolic aesthetic gesture, but also a **spatial and functional principle** that allows for **circular rainwater harvesting and energy-efficient operation**.

At the heart of the installation lies a **central energy and water core**, which not only serves the functional needs of the surrounding petals but also acts as a **visual and sculptural centerpiece**.
The surrounding zones can be **used flexibly** – as shaded learning areas, open kitchens, workshops, or social gathering spaces arranged like a ring around the core.

Guests sleeping in the **upper-level bivouac shelters** experience direct contact with the surrounding environment – sleeping in a ventilated, semi-open tropical space that remains safe and covered.
The **lower-level petal spaces** invite locals and visitors to cook, learn, share stories, or collaborate in workshops.
The spatial organization is designed to **strengthen the connection between people and nature**, and between community members themselves.

**Produced Energy:**

* Lighting for bivouac shelters
* Electricity for community areas
* Water pumping
* Device charging

**Co-benefits:**

The installation works as a **circular system**: harvesting, distributing, and utilizing both water and energy.

The **local community is involved** in all phases: construction, material sourcing, knowledge sharing, and long-term maintenance.

The **flower form** represents both a **structural logic and a symbolic social structure**, where each petal embodies an equal role – communal or individual.

**Structural System:**

* **Ground screw foundation** → lightweight, fast to install, low environmental impact
* **Bamboo structural frame** → natural and flexible, stabilized with diagonal bracing or steel reinforcements to withstand cyclonic winds
* **Trapezoidal sheet roofing** → durable, lightweight, weather-resistant (rain, UV, wind)

**Material Use:**

* **Structure:** bamboo main frame with cross-bracing using stainless steel connectors; vertical bamboo or timber posts; horizontal bamboo or wood beams; rafters or light trusses
* **Roof:** galvanized trapezoidal sheet metal (partially combined with translucent polycarbonate if needed)
* **Flooring:** raised bamboo or timber walking surfaces, protected below with geotextile moisture barrier
* **Decorative elements:** woven palm leaves, natural textiles

**Rainwater and Solar Energy Integration:**

* **Roof slope orientation:** Each petal is gently sloped toward the central core, allowing water to flow via runoff points and small channels to the center.
* A central **rainwater collector** and tank (e.g., an IBC container or a locally built earthen cistern) gathers and stores the water.

**Solar panels:**

Standard photovoltaic panels are installed on top of the trapezoidal metal roofing.

The energy generated supports lighting, electricity for community use, water pumping, cooking, and device charging.

# Technical Narrative

Our design integrates **two core sustainable technologies**:

**Solar Energy System**:

We use **standard photovoltaic panels** mounted on trapezoidal metal roofs. This technology was chosen for its **proven reliability**, **accessibility**, and ease of maintenance in remote island environments.

**Rainwater Harvesting System**:

Each roof surface is slightly sloped inward, allowing rainwater to **naturally flow into a centralized gutter system**. Water is funneled into a **central storage unit**—either an IBC container or a locally built earth cistern.

These systems were selected because they require **minimal mechanical components**, are **modular and replicable**, and **adapt well to the tropical island climate** of Fiji.

**Energy**The complete system includes 75 flower modules, each generating approximately 1.0 kW of peak solar capacity.
Assuming a solar yield of approximately 1,300 kWh per kW per year in Fiji’s climate, the total annual energy production is → 75 kW × 1,300 kWh = ~97,500 kWh/year.

**Rainwater collection**

The 75 flower modules collectively offer an estimated 3,600 m² of roof surface for rainwater harvesting. Based on average rainfall in the Yasawa Islands (2,500 mm/year), the system can collect up to → 3,600 m² × 2.5 m = 9,000 m³/year = 9 million liters/year. This rainwater is directed to central storage tanks and distributed across the site for non-potable uses, such as washing, irrigation, and possibly filtered consumption.

**Inputs**:

* **Solar radiation** (sunlight)
* **Rainfall** (natural precipitation)

**Outputs**:

* **Electrical energy** used for:
	+ Accommodation and community space lighting
	+ Charging devices (phones, laptops, tools)
	+ Operating water pumps and small appliances
* **Stored water** used for:
	+ Washing, irrigation, cooking, cleaning
	+ Possibly filtration for drinking (optional upgrade)

The system is designed to operate **autonomously**, without reliance on external utilities, and is resilient to **climate variability and infrastructure limitations**.

# Prototyping and Pilot Implementation Statement

The prototyping and implementation process will begin with the construction of a **single full-scale flower module**, functioning as a **pilot unit** for testing materials, construction techniques, and spatial relationships. This prototype will include:

* One **bivouac accommodation petal** on the upper level
* One **communal petal** on the lower level
* Fully functional **rainwater harvesting and solar energy systems**
* Integration of **local materials** (bamboo, woven palm, earth plasters) and lightweight construction methods

This pilot will allow us to **evaluate structural stability**, **optimize detailing**, and fine-tune the **energy–water balance** before deploying all 75 modules.

The success of the project depends on **close collaboration with the local community**. From the very beginning, the prototyping process will be co-developed with:

* **Local craftspeople and builders**, sharing knowledge on bamboo joinery, earth construction, and woven palm techniques
* **Youth and students**, who can participate in training workshops focused on sustainable architecture and renewable technologies
* **Community elders**, who can provide cultural guidance and ensure the spaces reflect local traditions and needs

This participatory process ensures that the project is **not just built for the community, but with them**, encouraging long-term ownership, stewardship, and adaptability.

Once the prototype is refined and validated, a **phased roll-out** of the remaining flower modules will follow. This staged approach allows for:

* Flexible adaptation to environmental and social feedback
* Local workforce capacity-building
* Ongoing community involvement and feedback integration

This model ensures that the final network of 75 modules will be **technically resilient**, **culturally embedded**, and **environmentally responsive**.

# Operations and Maintenance Statement

The modular design and use of **low-tech, durable systems** ensures that day-to-day operation and maintenance can be **handled locally**, with minimal external intervention.

Each flower module operates **independently** in terms of energy and water but is **interconnected through shared systems** at the center of the site.
Daily use includes:

* **Solar energy distribution** to bivouac and communal petals
* **Collected rainwater** used for basic washing, irrigation, or filtration
* **Community access to shaded gathering areas, workshops, and shared resources**

The central “island” – containing inverters, batteries, and water storage – functions as the **technical and symbolic heart** of the site.

The design prioritizes **resilient, easy-to-maintain materials**:

* **Bamboo structures** are treated with natural preservatives and designed for periodic inspection and replacement of segments
* **Metal roofing and solar panels** require regular cleaning and tightening of fixings (monthly basis, especially post-cyclone)
* **Rainwater systems** (gutters and tanks) include simple mesh filters and can be cleaned with basic tools

Maintenance activities are **documented in simple guides**, with visuals and color-coded steps, and can be carried out by trained local stewards.

A **local maintenance cooperative or community-led task group** will be established to:

* Monitor system performance
* Coordinate cleaning and minor repairs
* Replace damaged components as needed
* Engage in training of new stewards and visitors

Workshops during the implementation phase will ensure the transfer of technical knowledge, creating a **self-reliant ecosystem** for operations and long-term care.

# Environmental Impact Assessment

The design has been carefully developed to minimize its impact on the natural ecosystem of Marou village and its surrounding environment. All decisions regarding form, material, and technology aim to **respect the land, climate, and cultural context**.

### ****Low Impact Construction****

* The use of **screw pile (ground screw) foundations** eliminates the need for heavy excavation or concrete, preserving the soil structure and minimizing land disturbance
* The structures are made primarily from **bamboo and other local, regenerative materials**, reducing the project’s embodied carbon footprint and avoiding long-distance transport
* All modules are **elevated** to allow airflow beneath and **prevent waterlogging**, erosion, or damage to native vegetation

### ****Resilience to Climate Change****

* The lightweight, elevated design is **cyclone-resilient** and adapted to rising water levels and high rainfall
* The modular flower layout ensures that if one unit is damaged, it does not compromise the entire system

### ****Rainwater and Drainage****

* The inward-sloping roofs enable **controlled rainwater collection**, reducing surface runoff and erosion
* Overflow drainage systems can be integrated with **planted swales or soak pits**, enhancing natural percolation and minimizing sediment impact

### ****Waste Management and Material Reuse****

* Construction off-cuts (bamboo, palm, timber) can be reused in **fencing, furnishings, or shading structures**
* No synthetic foams, VOC-based paints, or toxic preservatives are used, ensuring **safe biodegradability** of worn-out materials

### ****Ecosystem Awareness and Mitigation****

* Before construction begins, a **local site study** will identify key flora and fauna to avoid disrupting sensitive zones.
* Where possible, modules are placed around **existing trees or features**, not replacing them
* The project team will coordinate with **local environmental stakeholders** to ensure alignment with conservation goals

In summary, the installation is not just environmentally low-impact — it is a **celebration of ecological harmony**, showcasing how renewable systems and vernacular materials can coexist with nature in a respectful, regenerative way.