### 1. **\*Concept Description\***

Our proposal envisions the creation of a communal space on the islands of Fiji, consisting of traditionally thatched wooden huts. These huts are arranged in a way that defines a central, shared area, fostering social interaction and cultural exchange. The design is rooted in local architectural traditions and building techniques, reinforcing the spirit of the place and cultural continuity.

The roof serves not only as protection but also features a centrally inward-sloping design that collects rainwater, which is funneled into a pipe and directed into the ground. The collected water can then be channeled toward the village for reuse in agricultural or domestic purposes. Some huts have alternative roof structures—not for rainwater collection, but equipped with chimneys for smoke ventilation to support traditional cooking. These cooking huts allow community members to prepare wood-fired traditional meals, respecting local customs.

The communal space between the huts is covered with coconut fiber mats, offering a soft, natural surface for outdoor gatherings, dancing during festivals, or everyday relaxation. Coconut fiber is not only practical but also culturally relevant and environmentally friendly.

Solar panels are installed on the rooftops. In areas beneath the panels, the thatch is omitted—the panels are mounted above the wooden base using spacers, ensuring proper ventilation, reducing the risk of overheating, and maximizing energy generation. Overall, the concept emphasizes sustainability, local identity, and community participation.

### 2. **\*Technical Overview\***

 The design integrates several technologies that serve sustainability and resilience. The rainwater collection system operates on gravity: sloped thatched roofs channel the water into a central funnel, which then leads it through a pipe into the ground. The harvested water can be stored or directed to the village for agricultural or domestic use.

Another key technology is the utilization of solar energy. Photovoltaic panels are installed on the roofs of the huts, generating electricity for lighting and small appliances. The panels are elevated with spacers to ensure airflow and reduce heat buildup, and the thatch is omitted beneath the panels, using only the wooden planks as a base—saving material and improving ventilation.

System output may vary: each hut can collect approximately 500–700 liters of rainwater per month during the rainy season. Solar panels can produce up to 1.5 kWh of electricity per day per hut, depending on panel capacity and weather conditions. Each hut operates independently, providing decentralized and resilient water and energy infrastructure.

Material selection is based on local availability, cultural relevance, and environmental impact. Materials such as coconut fiber, bamboo, and wood are locally sourced and biodegradable, helping reduce the carbon footprint and support the local economy.

### 3. **\*Prototyping and Implementation Strategy\***

The team will begin the prototyping phase by constructing two full-scale huts in collaboration with local builders and craftsmen. This will allow real-world testing of the water collection system, smoke ventilation, and solar integration. Materials such as wood, coconut fiber, and thatch will be sourced locally, ensuring cost-effectiveness and sustainability.

In the initial phase, two huts will be built—one for rainwater harvesting and one for cooking. Community members will be trained through workshops and on-site demonstrations in construction and maintenance. Feedback collected during the pilot phase will help refine the system.

Community collaboration is key. Through regular consultations, idea collection, and incorporation of feedback, the final design will be not only technically viable but socially accepted and tailored to local needs.

### 4. **\*Operation and Maintenance\***

To ensure long-term sustainability, the system is optimized for low maintenance. The gravity-based rainwater collection system uses few mechanical parts, reducing the chance of failure. Filters can be placed at the ends of the pipes to prevent debris from entering.

The wooden structures and thatched roofs of the huts require regular inspection, especially after storms or heavy rain.

The local community will be provided with all necessary guides and tools to maintain the system and structures. During construction, community members can observe and learn the process, making repairs easier if any damage occurs later.

Community participation is essential. Training will be available to both men and women, ensuring inclusivity. A maintenance fund could be established to cover replacement parts and repairs, possibly supported through micro-contributions or village council funding.

### 5. \*Environmental Impact Assessment\*

The system is designed with minimal environmental disruption. The huts are built on stilts or raised platforms to reduce soil compaction and preserve natural drainage. Materials—bamboo, wood, and coconut fiber—are renewable and locally available, avoiding deforestation and the emissions associated with long-distance transport.

Rainwater harvesting reduces pressure on local water resources and minimizes runoff-related erosion. The decentralized solar energy system decreases reliance on diesel generators and reduces greenhouse gas emissions.

Potential risks include roof leakage, which could damage the soil if unmanaged. This can be mitigated through regular maintenance and planting water-absorbing vegetation around the huts.

In the event of storms or flooding, the lightweight, modular nature of the huts allows for quick disassembly or repair. The entire system offers a response to the challenges of climate change while supporting ecological balance.