**TAGI-LAGI PROJECT**

TAGI-LAGI is an urban-landscape solution of PV micro-grid installation inspired by the endemic nature of the Fijian and Marou people, designed to integrate sustainable energy, water conservation, and food production, while fostering community engagement within the territorial spaces and dynamics that connect the territory with an urban landmark. Based on the unique biological characteristics of the Tagimoucia flower, its modular petal-shaped "plug" structures offer aesthetic and functional benefits.

More than just an infrastructure project, it is a proposed cultural and educational symbol. Community members and visitors can interact with the installations, live beneath them, and interact with the landscape by harvesting crops or dancing under their shade, cooling off with their water, contemplating their landscape, and running along their paths. A second layer provides sustainable energy, water conservation, and urban agriculture. The project supports biodiversity and minimal impact on the natural structure of Marou and Viti Levy Island through minimal interventions in their contact with the soil, thus integrating plant life into urban spaces, with vine paths that flow towards the urban canopy. It improves local food security through its irrigation system that feeds crops and people. But more importantly, it provides a resilient and resistant energy source for a population with great potential for future development.

1. **Concept Narrative**

On a remote island in Fiji, an impossible love blossoms. The lovers' tears create a lake on this volcanic island, from which peculiar flowers sprout, unique to this island. This flower corresponds to the Tagimoucia, a vine-like flower that grows through the trees, reaching the canopy to reach the sunlight. The flower is composed of two distinctive layers of petals, the first a striking redness, and the second with delicate white petals inside. The flower is recognized as Fiji's national flower and the inspiration for numerous songs and folk tales. This base inspires the TAGI-LAGI project, a system of solar energy training, water collection, and traditional agriculture. The project consists of a petal structure on top of which solar panels are arranged that conduct rainwater towards a collection tank connected to a system of channels and ponds to preserve alluvial water. In the shaded space generated by the petal, a traditional agriculture system is born on beds where the cultivation of Kava is proposed, a plant from which a classic drink is made that sustains the meetings and liturgies of Fijian culture. TAGI-LAGI simulates the cascading petal design of the Tagimoucia flower and bases its main structure on low-carbon materials. It is composed of laminated wood and small-scale metal elements, covered with a polycarbonate skin on top to prevent water from contact with the wooden structure and, in turn, leverage its impermeability to conduct water. A woven bamboo mat membrane below creates a more friendly connection with the community's natural and traditional environment.

Each petal functions as a plug in the system, connecting to an electrical and water supply network, including a connection with nature through the agriculture developed within its space. The modularity of these petals can be attributed to the ease of construction due to the small number of unique pieces and the proportional dimensions, allowing for simple construction. The longest element is the wooden pole, with a maximum distance of 7 meters from tip to tip. Several plugs connected to the system become collection nodes, allowing 45 of these modules to reach the 75-kWh needed to meet daily energy demands, and the petal surface is sufficient to capture 30 liters of water per month.

1. **Technical Narrative**

The technologies used in TAGI-LAGI consist of three main systems: sunlight harvesting through flexible solar panels, passive water collection through decanting and collection in low-evaporation ponds, and a capillary irrigation system that connects the ponds to the beds. This system raises water to the kava growing bags and other species the community wishes to cultivate in this network.

For sunlight harvesting, flexible solar panels are the most feasible option for developing the petals, due to their low weight, ease of installation, and adaptation to the petal surface. With a surface area of ​​21 square meters per petal, the panels' efficiency is 20%, making it possible to meet the daily demands of the population. The petals have a 15° northward inclination at the top, which corresponds to the inclination required to capture sunlight most efficiently and also allows this slope to facilitate water flow into the infiltration channels. The petal shape contributes to the collection of water as it passes through the water funnel, which is concentrated at the base of the petal, preventing water stagnation and ensuring flow to the ponds and the aqueduct, providing the most efficient way to collect water. The project advocates for the increased use of passive energy. Therefore, the conveyance and treatment of the collected water do not rely on external energy sources such as pumps. Instead, gravity directs the collected water to central containers, which are filtered by decantation, and the system's channels.

This collected water is then channeled by capillary action to the crops of cultivated plants and medicinal herbs making an hydroponic food production system. One petal has 23 square meters of feasible water collection area and captures approximately 77 liters per year during periods of low rainfall, and 100 liters during periods of higher rainfall. Each crop may require two liters per month, and its water is also captured directly during rainfall. Each plug can be connected to several others to create meeting spaces, and the systems are configured to be easily connected between them, making this a system that functions like a climbing plant that connects through water and electricity, just like its vines that connect each plug to the plant.

1. **Prototyping and Pilot Implementation Statement**

The clustering pattern of the flower provides a highly scalable module, the first step in implementing TAGI-LAGI is to test the energy generated by the flexible photovoltaic panels to ensure the necessary daily energy production, or even in the future in different environments. After these initial conditions are guaranteed, the weight calculations of the elements that make up a plug can begin, for analyzing the load capacity of the petal beams and the buttress that receives the overturning force to the sides. Based on the results, the next step would be to plan the construction of a module to test the prototype. The suggested steps are as follows: assembly of the footings and foundation cubes, driving of the posts and then the buttress, assembly of the joists, installation of the mat with its suspension bolts, installation of the polycarbonate on top and the rubber seals to prevent water leaks inside the petal. The installation of the panels will correspond to the panel specifications, where the steps for their installation are outlined. Each plug requires prior work, including a gravel and sand trench for water filtration, as well as the excavation of the aqueduct connection channels.

With the prototype already built, it is recommended to analyze its performance for a period of three months at different times of the year, each corresponding to different stages of solar irradiation efficiency and rainfall collection. With the data obtained, it will be possible to evaluate the feasibility of the prototype and propose the implementation of measures to enhance its performance.

Next, a pilot program will be implemented in the village of Marou, with several TAGI-LAGI plugs, transforming it into an urban laboratory where real-time data on energy generation, water collection, and agricultural productivity will be collected. It is recommended to simulate and propose progressive growth in response to population increases in the areas adjacent to the intervention plot. The vine concept works to preview the system's growth as networks into which new production elements can be plugged. Community participation will be essential at every stage, as they will contribute to the production of their agricultural products, the construction of the prototype, and will provide guidance for the implementation of possible uses in the spaces generated under TAGI-LAGI, ensuring that residents actively participate in the design, construction, and operation of the systems.

The knowledge gained from the pilot phase will help refine the model, paving the way for its large-scale implementation in new areas where this system can be adapted to diverse communities. Each can make new uses of the spaces, cultivate the species they deem appropriate, and distribute water and energy freely because TAGI-LAGI is not a restrictive device in its variations. Additionally, partnerships will be established with local organizations, government agencies, and institutions focused on sustainability to secure funding, technical support, and knowledge sharing. The goal is to develop a replicable model that can be adapted to different environmental and cultural contexts.

1. **Operations and Maintenance Statement**

To ensure the long-term functionality of TAGI-LAGI, a low-cost operations and maintenance framework with low technical requirements of specialized labor is required. The modular design minimizes maintenance needs by making parts interchangeable and easy to handle, but periodic inspections and servicing will be essential for optimal performance of the more technical elements, such as the panel's electrical connections and water pipes. A small amount of training is required for residents to create local maintenance teams to perform routine checks on the panels, water filtration systems, and passive irrigation networks.

The panels will be cleaned by simply wiping the photovoltaic surface with soapy water. A ladder will be installed at the top of the pole so a person can climb and clean the panels periodically. In the event of possible failures due to unforeseen events, residents could handle repairs with basic workshops in the community to acquire the skills necessary to manage and maintain TAGI-LAGI units. These programs will include workshops on solar energy, water conservation, and sustainable agriculture, fostering a culture of self-sufficiency and environmental responsibility.

To enhance durability, materials used in construction will be sourced locally whenever possible, and if specific elements need to be replaced, contact will be maintained with suppliers and entities that provide the necessary installation accessories, ensuring resilience to Fiji's climatic conditions. A digital monitoring system will be implemented to track energy production and water usage, enabling proactive maintenance and data-driven decision-making.

1. **Environmental Impact Assessment**

TAGI-LAGI offers a sustainable approach that minimizes environmental impact by using materials with low carbon emissions during production. The production of clean energy that also delivers shaded spaces for community gathering or cultural activities is a positive impact that the project has on the natural and social environment. Many of these materials are small, flexible, and easy to transport, or can even be produced on-site, like the bamboo mats. The adoption of flexible solar panels reduces dependence on fossil fuels, mitigating greenhouse gas emissions and promoting a transition to renewable energy sources, as their manufacturing components are less polluting than rigid ones. This, along with the easy transport of several sheets, makes installation and storage easier. Unlike conventional solar panels, these are produced using fewer toxic materials. Although they are still hard to dispose of, their environmental footprint is still reduced. The rainwater harvesting and passive irrigation system contributes to water conservation efforts by minimizing reliance on groundwater sources and reducing runoff pollution. The use of filtration channels and passive irrigation eliminates the need for electrical pumping systems to keep water flowing, reducing the consumption of energy produced for the local population. By integrating urban agriculture, TAGI-LAGI enhances local biodiversity through vertical farming to preserve existing crops by strengthening local´s relationship with the natural environment, generating potential future agricultural uses throughout the land surrounding the plug, while reducing the carbon footprint associated with food transportation.

The modular system ensures minimal land disturbance, allowing installations to easily integrate into existing landscapes without the need for extensive infrastructure development. Furthermore, the artistic and cultural significance of the design fosters community appreciation for sustainable practices, encouraging greater environmental awareness. By balancing technological innovation with the use of natural resources that preserve ecological relationships, TAGI-LAGI is presented as a model for future sustainable developments in obtaining clean energy that function as productive and culturally significant spaces, demonstrating that solutions inspired by nature beyond its appearance but the search for a relationship of systems based and connected to it, can promote environmental resilience and community well-being in Fiji, in Marou, and future populations.