

## PCCC-JICA Mentoring Service for the Public and Private Collaboration for Climate-Resilient Pacific

### 1. Information of applicants

|                                                                         |                                                                                                                                                                                                  |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of submission                                                      | 6/08/2025                                                                                                                                                                                        |
| Country                                                                 | Samoa                                                                                                                                                                                            |
| Organization                                                            | Join Venture: Synergy Blockchain Pacific & MBS Consult                                                                                                                                           |
| Department/ Division                                                    | Projects                                                                                                                                                                                         |
| Name of contact person                                                  | Vensel Margraff                                                                                                                                                                                  |
| Position in organization                                                | Project Coordinator & Engineer                                                                                                                                                                   |
| Contact information                                                     | E-mail: <a href="mailto:mbsconsulting.info@gmail.com">mbsconsulting.info@gmail.com</a><br>& <a href="mailto:synergyblockchaintf@gmail.com">synergyblockchaintf@gmail.com</a><br>Phone: +762-6045 |
| PCCC training programs or capacity building programs which you attended | <input checked="" type="checkbox"/> Climate change impacts and innovative solutions in the Pacific (Sep 2024)                                                                                    |

### 2. Information of a project under development

|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Project Title                             | Tupu: Blockchain-based system for Transparent Climate Project Financing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2. Themes                                    | <input type="checkbox"/> Energy<br><input checked="" type="checkbox"/> Agriculture and fishery<br><input type="checkbox"/> Tourism<br><input checked="" type="checkbox"/> Water<br><input checked="" type="checkbox"/> Urban resilience                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3. Country(ies)                              | Samoa (pilot). With planned scalability to the wider Pacific.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4. Project objectives and project components | <p><b>Current gap:</b> Large financial lenders such as the World Bank and ADB over the years have implemented stricter criteria for approving climate adaptation and resilience funding in developing Pacific Island Countries and Territories (PICT's).</p> <p>Socio-economic disparities in PICTs are often the result of stringent cultural hierarchies that has led to issues around transparency and the misuse of funds, ultimately deterring funders. This means PICT's struggle to secure adequate financing to enhance the climate resilience of their communities.</p> <p>Moreover, existing financial assessment protocols do not actively track carbon footprint and climate risk. They are typically highly assumptive, formulae-based calculators that practitioners as standalone tools and metrics are only accounted for in retrospect. From a climate risk perspective, these dynamics exacerbate the vulnerability of at-risk communities.</p> <p><b>Main Objective:</b></p> <p><b>Tupu</b> will be a no-code, blockchain-based, end-to-end platform that allows for the design, deployment and active governance of <b>Climate Financing Instruments (CFI)</b>. CFI's enable the transparent tracking of finance flows within climate change projects while also providing backend measures to calculate and predict carbon footprints, climate risk and other pertinent climate</p> |

change indicators.

- A project refers to any climate change adaptation or mitigation initiative with measurable objectives, funding flows, activities, deliverables and stakeholder responsibilities.
- A CFI will be issued for each project and will function as a digital ecosystem, facilitating, hosting, and monitoring transactions among stakeholders at every stage of the climate project life cycle.
- A transaction is an exchange of goods and services for digital currency.

### **Project Components:**

While its core function is as a finance and activity management system, the full digitalization of a project's workflow opens new opportunities for generating real-time climate intelligence, hence components 2 and 3.

#### **1) Core Component: Climate Project Finance & Activity Management**

A blockchain-based ecosystem that hosts and governs the financial and operational management of climate related projects:

- Each project is linked to a **Climate Finance Instrument (CFI)**, which is initialized and designed by a client user (e.g.: LTA, MWTI, SPREP etc.).
- The design interface will be simplified to a click and drag/drop interface. Through this the user can define the CFI scope, deliverables, deadlines, stakeholders and establish project rules. The user may opt to design the CFI from scratch or build upon generic templates, researched and developed by the Synergy team, that are most suitable for their use case.
- Project **stakeholders** (e.g.: contractors, consultants, suppliers etc.) will be invited by clients for registration to the blockchain network under a unique wallet account that acts as their immutable Digital ID.
- Project funds, either sourced **internally** or through **funders** (i.e.: private & public, local & foreign, investors & donors), will be deposited into an escrow hosted by a local bank partner. Actual transactions on Tupu will utilize a 1:1 digital token representation (i.e.: if project budget in escrow is \$100,000, then 100,000 tokens specific to that project will be issued to the client for payment).
- A transaction involves the exchange of an agreed amount of digital token with a deliverable between CFI stakeholders. Transaction may be set up and automated via smart contracts if known beforehand, ensuring transparency across the full project life cycle.
- Deliverables are digital representations and/or proof of a good or service and can vary from 2D/3D BIM model files, PDF of an invoice or an audio transcript.
- **Funders** will also be invited to register with a viewership level account which provides a detailed record of finance flows and analytics dashboard of past, ongoing and predicted activity.
- Clients may also enable **funders only** or **full public** (includes funder & community) viewership into project activities.
- Upon deliverable completion and approval, the digital currency is transferred from the client to the contributor, who can exchange it for fiat from the escrow, which is kept with a local bank partner (such as NBS or SCB).
- Future platform extension plans a backend that will track applicable taxation amounts between organizations, ensuring compliance with local regulations. Automatic taxation and auditing reports will eliminate the need for third-party consultants.

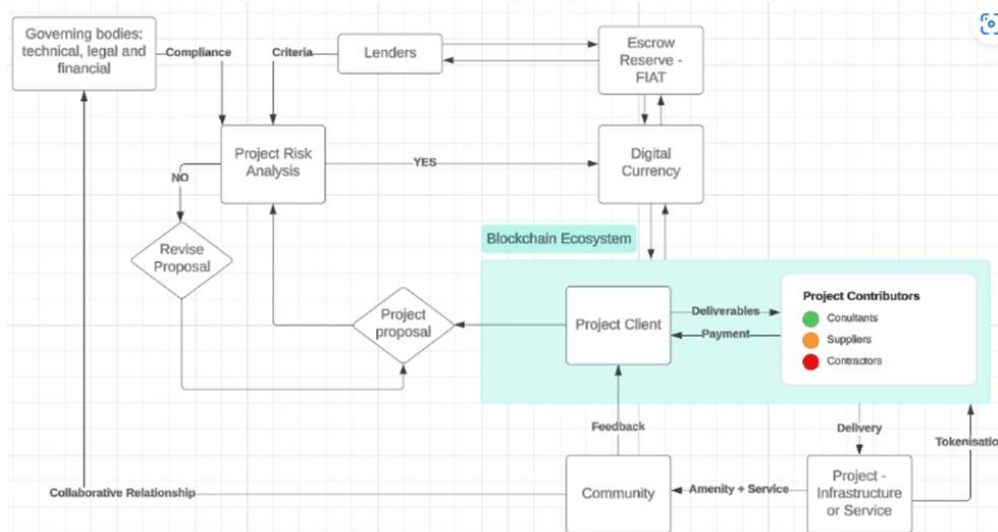


**Figure:** High-level Architecture for a Climate Financial Instrument (DFI)

### Example Use Case:

To demonstrate how the Tupu platform works in practice, consider an adaptation project where water tanks are installed in a remote village. Stakeholders would include:

- **Client:** Village Council
- **Funder:** Ministry of Works
- **Consultant:** MBS Consult
- **Contractor:** Silva Construction
- **Supplier:** Bluebird Ltd

Tupu applies a token-based finance model. This means actual money is not exchanged on the platform but is held securely in escrow at a local banking partner (e.g.: SCB). Digital tokens are minted in a 1:1 ratio to the project budget (e.g.: a \$1000 SAT budget = 1000 tokens issued to the client).

Stakeholders will be invited by clients and sign up to the platform through wallet accounts. After a project deliverable is met, i.e., consultant submits a feasibility study or contractor has built foundation, then evidence of transaction (i.e.: feasibility report word doc or invoice pdf, will be exchanged with the agreed amount of digital token). The recipient may then exchange their token with actual currency later.

An example project workflow is as follows:

- Consultant submits a feasibility report → uploads PDF to platform
- Smart contract validates the deliverable tokens are transferred to consultant's wallet
- Consultant later exchanges tokens for real currency from escrow account
- Same flow occurs for contract (e.g.: after building foundation) or supplier (e.g.: tank delivery)

All stakeholders, including community members and external funders, have real-time visibility into both project progress and financial activity. Hosting finance and deliverables on one platform enables:

- Automatic auditing
- Automatic taxation reporting
- Immutable records of every action, change and payment

Blockchain allows for multi-node governance (e.g.: public sector + community) and prevents hacking. Even client changes (by village councils) are logged immutably and made visible to all. This ensures trust, security and accountability without needing central authority.

## 2) Carbon Footprint Estimation Component

Backend tool that calculates carbon emissions prevented or produced during climate mitigation or adaptation activities:

- Applies the internationally recognized as **IPCC Tier 1 & 2 emission factors** to estimate carbon activity
- Emission data is updated in real time as project progresses
- Components can be directly integrated with existing organizational carbon credit registries providing realistic, real-time correlation with project activities

## 3) Climate Risk Profiling Component

As projects are onboarded and if available, the platform can overlay climate hazard and exposure data to generate a baseline assessment of risk.

- Tupu will measure and account for how an activity will reduce or worsen climate risk, such as seawall installation improving flood exposure or water disconnection in reducing water access.
- This dynamic approach is informed by “**IPCC AR6 Risk Framework**” (*Intergovernmental Panel on Climate Change, Sixth Assessment Report, 2022*). Here, risk is defined as the interaction between **Hazard** (i.e.: cyclone frequency or intensity), **exposure** (e.g.: population or assets at risk) and **vulnerability** e.g.: governance, preparedness)

## 5. Alignment with national and sectoral policies and strategies

Tupu supports the following national and sectoral policies:

- **Samoa Nationally Determined Contributions (NDC's, 2021)**: supports the tracking of Green House Gas (GHG) Emissions
- **Nation Adaptation Program of Action (NAPA)**: Formulated by Least Developed Countries (LDCs) under the UN Framework Convention on Climate Change (UNFCCC). Tupu puts the community first by providing visibility into project activity.
- **Strategy for the Development of Samoa (SDS 2021-2025)**: \$1.3 Trillion USD is invested into climate related initiatives annually, and Tupu provides both private and public investors with assurance that funds are being used efficiently and towards the collective goals
- **National Disaster Management Plan (NDMP)**: its calculation of climate risk through IPCC AR6 standards will support proactive and risk-informed climate finance
- **Framework for Resilience Development Pacific (FRDP 2017-2030)**: strengthens resilience and low carbon development.
- **SPREP Strategy Alignment**: improves access and transparency of climate finance through an evidence-based Measure, Reporting and Verification (MRV) system.

## System Build and Architecture

Considering the existing lack and interconnectivity of suitable data nodes on island, the team has opted to develop a Minimal Viable Product on cloud. Google Cloud Platform (GCP) was selected as it supports global Ethereum node connections.

Tupu software architecture will be supported and delivered across 3 layers:

|                |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Layer 1</b> | Ethereum Network & Google Cloud Platform | <ul style="list-style-type: none"> <li>• <b>Foundation:</b> serves as the foundational layer, providing a secure, decentralized platform with built-in smart contract functionality.</li> <li>• <b>Consensus Mechanism:</b> <i>Proof of Stake</i> (ie: validators only need to spend money once to participate) ensures data integrity and security.</li> <li>• <b>Smart Contracts:</b> Solidity-based smart contracts automate and enforce agreements, creating a transparent and tamper-proof environment for transactions.</li> </ul> |
| <b>Layer 2</b> | Tupu Platform                            | <ul style="list-style-type: none"> <li>• <b>Development:</b> unique google features and distribution algorithms will exist here.</li> <li>• <b>Management:</b> backend authorization, data analytics and security functions of Tupu Platform will be hosted and executed here</li> <li>• <b>Deployment:</b> Project managers or lenders can initiate community projects through here</li> </ul>                                                                                                                                          |
| <b>Layer 3</b> | Climate Financing Instrument (CFI)       | <ul style="list-style-type: none"> <li>• <b>Front end:</b> front facing part of the platform that most stakeholders will interact with</li> <li>• <b>Customized Financial Tools:</b> tools for operation and advice related to climate financing of a community</li> </ul>                                                                                                                                                                                                                                                               |

#### 6. Justification of climate rationale (mitigation and/ or adaptation)

Adaptation projects such as water infrastructure, coastal seawall protection or agricultural resilience can be managed with real time monitoring of project and financial activity, alongside carbon emissions and climate risk metrics as defined by IPCC standards.

Mitigation is supported through proactive assessment of emissions avoided or released using tier 1 and 2 emission factors. The platforms design establishes a foundational, logic driven MRV system and positions it as a future carbon credit verification tool.

By embedding climate logic into every financial and project step, Tupu ensures both adaptation and mitigation impacts each project are measurable, reportable and trusted by both funders and the communities they serve.

#### 7. Draft theory of change [OPTIONAL]

Visibility into project enhances fiduciary oversight, builds funder confidence, and strengthens readiness for accessing climate finance and future carbon markets.

We aim to start small, launching a minimum viable product (MVP) through a pilot project in Vailima and Tuaeufu. The team have existing connections as residents and matai of these village councils. Both have expressed interest in water tank installations to improve water security. Hosting a small-scale, community-driven adaptation project will allow us to test and demonstrate the platform's core functions. The MVP will focus on basic functionality with simple UI:

- Client and stakeholder registration
- Funder view-only access
- Contractor submission of invoices in exchange for tokens based on deliverables pre-defined by clients

From there, we will continue improving the system iteratively, expanding its features and applications over time.

8. Describe how the project promotes collaboration between public and private sector, and describe the name of the private company/ state-owned enterprise or another private sector actor that are/ can be involved in project financing or implementation.

The project will be led by Synergy Blockchain Pacific, who specialise in blockchain development, and MBS Consult, who is the engagement and environmental engineering partner, in collaboration with public stakeholders. Active engagement with the public sector will be crucial, not just for defining national climate priorities but also for helping build the supporting digital infrastructure. Tupu will be developed with the community at its core:

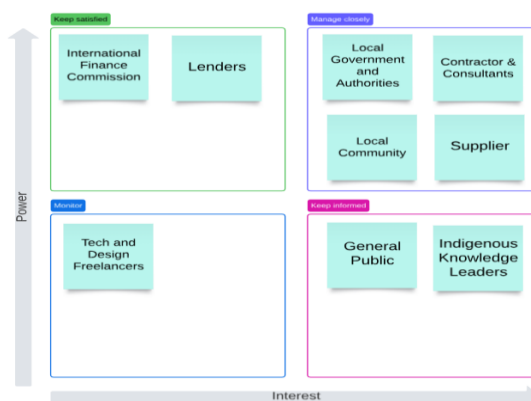


**Figure:** Stakeholder Power/ Interest Matrix

The initial MVP will be developed on Google Cloud Platform. MBS Consult already has an existing relationship with Google NZ, having pitched a concept on transparent disaster relief financing in the Pacific during a previous engagement. Google Cloud was selected for its ease of use, affordability, and intuitive tools for building cloud-based applications. Its strong security protocols and built-in Ethereum node access also make it an ideal option. Eventually, once a scalable product is refined, we aim to host the platform on local servers within public sector ministries in Samoa. Having at least 10 servers across implementing agencies such as SPREP, MNRE, MWTI, village councils, banks, and others will ensure decentralization, platform security, and shared ownership.

Public sector support includes ongoing engagement with the Ministry of Natural Resources and Environment (MNRE), whose feedback will be vital for aligning with climate policy and designing the national climate finance system. The Ministry of Women, Community and Social Development (MWCSD) will also play a key role in engaging village councils and local communities, where this system will have the most impact. Additional advisory from the Ministry of Finance and the Disaster Management Office will help validate and refine the design. We're also keen to work closely with small-scale village projects, which are ideal for piloting and improving the MVP.

Looking ahead, we believe Tupu can go beyond climate change. Every sector and industry in Samoa and the Pacific faces issues with transparency and fund misuse. Our mission is to start with climate change finance and then grow the platform into a flexible tool that brings integrity and visibility across all sectors.

9. History of stakeholder consultation and communication with the relevant ministries including climate change focal point agency

Previous engagements span from grassroots pilots to high-level regulatory dialogue, ensuring alignment with national strategies and community needs:

- **Samoa Land Registry Consultations (via Synergy Pacific):** Ongoing since 2016. Explored land ownership tokenization to support secure tenure and simplify court settlements.
- **New Zealand Based Client - Iwi (via Synergy Pacific):** NDA signed so cannot disclose Iwi name. Consultations on DAO models to manage community funds fairly. Aim to address elite capture and promote grassroots equity.
- **UNCDF Climate Risk Associate Rep:** Conversation focused on financial literacy and inclusion. Highlighted gaps in mobile phone and bank account access critical for future digital finance rollouts.
- **Legal (Tuarangi Professor):** Advice on DAO structure, land tokenization, and dispute risk mitigation. Ensures legal robustness of proposed models.
- **CBS (Central Bank):** Letter of engagement issued. EOI to develop a crypto-access framework with reserve oversight. Supports local wealth-building and aligns with Trade Facilitation 2009 strategy.
- **Google NZ Internship Presentation:** Completed a 2-month internship focused on conceptualizing and pitching Google Ledger, a cloud-based application designed to make disaster relief funding and resource flows transparent and accountable. The project integrated remote sensing data with smart contracts to ensure resources reached the correct locations. Had access to Google's advanced experts and analytics tools and received valuable technical and strategic guidance on implementation.
- **UNDP + MNRE (Tuaefu Biogas):** Joint pilot project delivered to 5 families. Showcased biogas and fertilizer benefits. UNDP site visits complete; expansion to 20 more units underway.

#### 10. Targeted climate financial sources if any (e.g. GCF, Adaptation Fund, bilateral donors, multilateral development banks)

The project's goals and ambitions align with several climate finance sources currently available, and through the SPREP team's mentoring support we can access these for the benefit of Pacific communities:

- The **GCF Readiness and Preparatory Support Programme**, which prioritizes community-scale systems, will greatly support our MVP.
- **Adaptation Fund Small Grants Programme** could support early pilot implementation. While bilateral donors are often difficult to engage, we believe the governance and transparency focus of our platform will be of strong interest, and we hope SPREP's mentoring can help open those doors.
- In addition, we are exploring digital and climate innovation grants with the World Bank, **Asian Development Bank**, and the **Pacific Resilience Program (PREP)**.

#### 11. Human or financial support currently receiving for project formulation and implementation

The core team comprises professionals in engineering, and software development. Tupu draws from their previous work experience and the network of Synergy Pacific and MBS Consult. CV's attached separately:

- **Anthony Williams** brings 10+ of blockchain development experience and a strong track record in proposal writing. He holds close ties with local partners including the Central

Bank of Samoa and has supported initiatives with CBS and UNDP over the years. He will lead the blockchain development component.

**Github Portfolio:** <https://github.com/Hamobcdev>

- **Vensel Margraff** holds a Bachelor of Civil and Environmental Engineering with Honours from the University of Auckland and brings over 4+ years of experience across public, private sector and research, specialising in transport, digital BIM design, GIS, and disaster resilience. He will lead the engineering and overall project delivery.
- **Petric Mamea** is a final year Computer Science student at AUT. He has experience in front-end design and data scripting and will support full stack development and system programming.
- **Pere Tuma'ai** brings 5+ years of experience in land transport projects with a strong focus on social and environmental safeguards. He has led community engagement efforts and will support the project as the engagement and environmental lead.

## 12. Description of institutional set-up for project formation

Synergy Blockchain Pacific will lead platform development and MBS Consult the engineering and environmental components.

The platform is intended to transition away from cloud hosting and be migrated onto local servers distributed across multiple ministries and institutions. The more servers that host the system, the more secure and resilient it becomes. We are aiming for 10+ nodes hosted across MOF, MNRE, SPREP, and selected village councils where digital infrastructure already exists. This ensures not only decentralized control but system reliability during disaster events and reduces reliance on foreign cloud storage.

## 13. Expected schedule for project formulation and implementation

- **August - October 2025:** finalize platform architecture informed by community consultations, partner feedback, and a detailed review of official reports and relevant literature.
- **November - December 2025:** pilot launched in the villages of Tuaeifu and Vailima. This will include basic functions. Feedback will be used to strengthen usability and system reliability. Social media will also be applied to promote awareness of blockchain and build local trust. Pilots will focus on small-scale infrastructure activities below \$50,000 in value, such as water tank installations or footpath restoration.
- **January - March 2026:** Carbon tracking and climate risk calculation functions will be introduced and tested on new projects. Includes the development of tailored dashboards displaying environmental and resilience metrics.
- **April – June 2026:** additional functions will be developed such as automated auditing in line with know-your-customer and anti-money laundering laws, as well as taxation and reporting features. These additions will enable the platform to manage larger-scale projects over \$50,000 for government and regional agencies. During this phase, the platform will also be refined and integrated with national reporting and monitoring systems.
- **July - September 2026:** work will begin on a full project proposal for submission to the Green Climate Fund and Asian Development Bank. This phase will also involve planning for wider expansion, adapting the system for use in other sectors and across more

communities. The vision is to position Tupu as the preferred platform for managing public and donor-funded projects across the Pacific.

- **Post September 2026:** the focus will shift to scaling and multi-country deployment, deepening regional partnerships and positioning Tupu as a key digital governance tool for transparency and resilience across the region.

14. References for existing feasibility studies, and projects/experience on which the proposal is based, etc.

Past project experience includes:

- **Google Ledger business case** developed in 2024. It aimed to make disaster relief resourcing more transparent through a governance system built on Hyperledger. The system was informed by post-disaster reports from tsunami events in Samoa and Tonga, identifying common gaps in resource flow and coordination.
- The idea was later refined and proposed as the Tupu platform during the **University of Auckland Velocity Innovation Challenge in later 2024**, expanding the same logic to cover infrastructure project financing and community-led governance.
- A **research study** by Margraff and Alcantara analyzed **tsunami resilience in Tonga** following the 2022 Hunga Ha'apai eruption and tsunami. The study highlighted significant socio-economic disparities in post-disaster response, along with high social vulnerability and low-impact project delivery. These insights have helped shape how equity and resilience are measured within the platform.
- **Synergy Blockchain Pacific** has developed multiple systems around tokenization and payment flows through its broader portfolio of work. Collaborations with the Central Bank of Samoa, iwi organizations in New Zealand, lawyers, and UNDP have contributed key building blocks to the platform's conception and technical design.

**Company website:**

[https://hamobcdev.github.io/synergyblockchainpacific/?fbclid=IwY2xjawL\\_515leHRuA2FlbQIxMA BicmlkETFUTE56RVd5eDZ3d05WMnpwAR61XZ-OBk6YCV2AKf82G4GyaUhhov5vFz1uMfbg3Fi1IDDwxBv\\_y93DYgCYzQ\\_aem\\_cTWCfKkcJAb-GOfKkvPrKQ](https://hamobcdev.github.io/synergyblockchainpacific/?fbclid=IwY2xjawL_515leHRuA2FlbQIxMA BicmlkETFUTE56RVd5eDZ3d05WMnpwAR61XZ-OBk6YCV2AKf82G4GyaUhhov5vFz1uMfbg3Fi1IDDwxBv_y93DYgCYzQ_aem_cTWCfKkcJAb-GOfKkvPrKQ)

- **PhD research** currently being conducted by Vensel Margraff focuses on assessing **tsunami resilience** using agent-based modelling. The research integrates community assessments and focuses on understanding how specific interventions can improve resilience in coastal villages.
- Through **Caritas Samoa's DRM programs**, and in his role as an engineering consultant on EWASH and DRR projects, Vensel has seen first-hand the need for better systems to manage finance and resource flows into community-led projects. NGOs often face challenges accessing funding due to reputational issues, lack of trust, and inefficient manual processes that hinder delivery, particularly in rural areas.
- Finally, **SPREP and PCRAFI data**, alongside official reports and tools, have been instrumental in shaping this proposal. These sources help identify climate-specific vulnerabilities the platform is designed to address and provide reliable data for metric development and monitoring.

15. Other related projects being implemented, under formulation, or under the approval process, if any.

- The Samoa national ID system currently under development will include digital ID features that will streamline onboarding and verification processes, supporting platforms like Tupu.
- Resilience mapping work by the University of Auckland (2024–ongoing) is informing backend logic for Tupu’s risk and resilience scoring.
- A regional study on blockchain for climate and disaster finance is planned for 2026, with Tupu positioned as a pilot platform.
- Future collaboration with SPREP and ADB is being explored to scale digital resilience pilots regionally under SPREP’s innovation strategy.