



# **Integrated Marine Coastal and Ecosystem Restoration Program for Climate Resilience in Tonga**

Our project will explore and implement marine Nature Based Solutions for Tonga. Synergies with economic development of marine products for local consumption and export will also be explored as part of the project action.



# All of the Pacific is disproportionately impacted by climate change

Tonga is on the bleeding edge of climate change. Sea level rise, ocean acidification, unpredictable severe weather and other human-influenced factors are disproportionately impacting the South Pacific including the 171 islands of Tonga. This vulnerability makes adaptation, mitigation and resilience an urgent priority for Tonga.

# Live and Learn Tonga Office

- - We are part of Live and Learn Environmental Education Network consisted of 13 offices in the Pacific and Asia
- - Our key thematic areas are as follow:
  - 1. Climate Resilience
  - 2. Environmental Protection, Restoration and Maintenance
  - 3. WASH
  - 4. Disaster Risk Reduction & Response
  - 5. Equality and Inclusion
  - 6. Food Security
  - 7. Shelter Resilience
- Total Staff of 35 in all programs
- [www.livelearntonga.org](http://www.livelearntonga.org)
- <https://www.facebook.com/livelearntonga>

# Problem Statement - Marine Ecosystem Degradation in Tonga

- Tonga's marine ecosystems — including coral reefs, mangroves, seagrass beds, and coastal lagoons — are critical to the country's food security, livelihoods, and climate resilience. However, these ecosystems are under increasing threat from both climate change and human-induced pressures
- Rising sea temperatures and ocean acidification have caused widespread coral bleaching and degradation of reef habitats, reducing fish stocks and biodiversity.
- The frequency and intensity of cyclones and storm surges have also increased, leading to coastal erosion, saltwater intrusion, and the destruction of mangrove areas that naturally protect shorelines and serve as nurseries for fish.
- Unsustainable fishing practices, land-based pollution, and coastal development have further weakened the ecological balance. Sedimentation from poorly managed agriculture and deforestation has smothered coral reefs and degraded water quality.
- Waste and plastic pollution, particularly around densely populated islands such as Tongatapu and Vava'u, continue to impact marine life and community health.
- These cumulative pressures and challenges have eroded the resilience of Tonga's coastal and marine ecosystems, threatening the livelihoods of local communities that depend on fisheries and tourism.
- The decline of these ecosystems undermines the country's adaptive capacity to climate change, as healthy reefs and mangroves are essential for buffering coastal hazards and sustaining biodiversity.
- Without urgent, coordinated action to restore and protect marine ecosystems, Tonga faces increasing risks to food security, economic stability, and the well-being of coastal communities.

# Solution - Survey, Assess, Act



To address this problem, we will focus on 3 restoration activities, reefs, seagrass and mangroves.

We also aim to target current Tongan economic issues with aquaculture activities. These will address food security and widen the export base.

Broodstock and Juvenile clams, seaweeds such as *Asparagopsis taxiformis*, Mozuku and Sea grapes are all being considered.

Once our surveys are completed, we'll be able to identify marine areas that will be suitable for restoration and aquaculture activities

# Intended Program

- **Project Title** –Integrated Marine Coastal and Ecosystem Restoration Program for Climate Resilience in Tonga
- **Impact** – Increase ecological resilience, fish biomass and coastal protection of targeted Tonga reef and lagoon systems while improving livelihoods and adaptive capacity
- **Specific objectives**
  1. Restore and enhance coral cover and reef structural complexity on selected degraded reefs.
  2. Rehabilitate coastal blue carbon habitats (mangrove + seagrass + seaweeds) to reduce erosion and improve nursery habitat for marine species.
  3. Strengthen food Security and Income Generation Initiatives especially for Coastal Communities
  4. Strengthen existing Special Management Areas (SMAs) and community governance so benefits are sustained.
  5. Build local capacity for long-term monitoring, enforcement, eco-tourism and sustainable livelihoods.

# Summary of Project Core Components

## 1. Site selection

Prioritize reefs or coastal areas that are degraded but also have potential for natural recovery (sheltered areas, good connectivity to healthy reefs).

Consider surrounding land-based threats (sedimentation, pollution, erosion).

## 2. Coral Restoration

Coral nurseries: growing fragments or fragments attached to substrate (“coral frames” or “reefs stars”) and then transplanting.

Use resilient species (those demonstrating thermal tolerance, fast growth).

Monitoring coral cover, survival, recruitment over time.

## 3. Mangrove / Seagrass / Wetland Restoration

These areas help buffer coastal erosion, filter runoff, sequester carbon, and provide nursery habitat.

Planting, invasive species control, ensuring hydrological flow.

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## **4. Marine Protected Areas/Special Management Area (SMA)**

Establish or strengthen protection, with community buy-in, enforcement, and legal backing.

Strengthening of the existing SMA and initiate SMA on coastal communities who have yet to establish SMA

## **5. Farming of Clams**

Farming of broodstock and juvenile clams not only for consumption and economic benefits but to give a higher possibility of natural spawning and fertilization rate to restock the reef.

## **6. Community Engagement & Traditional Knowledge**

Involve local fishers, community chiefs, youth, schools from the start.

Use and respect customary rules and traditional marine tenure systems.

Training & capacity building: for restoration techniques, monitoring, enforcement.

## **7. Education & Awareness**

Workshops, schools, awareness campaigns.

Eco-tourism components (e.g. guided tours, interpretive centres) can raise awareness and generate income.

## **8. Monitoring & Adaptive Management**

Baseline surveys, long-term monitoring (coral cover, fish biomass, species diversity, etc.).

Adaptive approaches: adjusting methods if failure or low survival

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## **9. Farming of Seaweeds; Mozuku, Asparagopsis taxiformis, seagrapes**

Contribute to food security and income generation for coastal communities

Serve as nursery to forage fisheries, helping to rejuvenate fish stocks

Remove excess nutrients from runoff and absorbs methane (up to 90% by asparagopsis) and carbon dioxide from the ocean which contribute to the reduction of greenhouse gas emission

## **10. Funding & Partnerships**

- Possible donors: GEF, UNDP, IUCN, GCF, regional bodies (SPREP etc.), foreign aid agencies.
- Partnerships with universities / marine research institutions.
- Private sector / tourism industry involvement.

## **11. Policy / Governance Support**

Support policies that reduce land-based pollution, regulate fishing (size limits / gear restrictions).

Ensure legal backing for marine reserve designations, protection enforcement.

A coastal landscape with a sandy beach, sparse vegetation, and a cloudy sky. The foreground is dominated by light-colored sand with scattered dark rocks and small green plants. In the middle ground, there's a line of more dense greenery and a few palm trees. The background shows a calm sea meeting a grey, overcast sky. The text is overlaid on the top half of the image.

# Western side of Tongatapu, 6 islands in the Lulunga district in Haapai, and Tufuvai in Eua

Many of our coastline projects will seek to remediate damage done by the eruption of the Hunga-Tonga-Hunga Ha'apai eruption and tsunami in 2022. Multiple Tongan coastal areas were severely impacted by this event. Significant numbers of coastal trees needed to build the natural resilience of Tonga shorelines.