

CONCEPT NOTE

3D DYNAMIC MODEL – TUVALU (Funafuti and Nanumea)

Background

The Pacific Community's Committee of the Representatives of Governments and Administrations and the 13th Conference of the Pacific Community will be held in Tuvalu in 2023. Tuvalu is one of four countries globally that is made up of only low-lying coral based atoll islands and as such the country faces an existential threat as a result of climate change and increasing disaster risk.

To support genuine engagement and visualisation of SPC's state-of-the-art scientific modelling and to better engage and inform Pacific Leaders on how data can support more accurate and effective decision making, two 3D models of Tuvalu's Funafuti and Nanumea Islands will be developed to present to Members at the upcoming CRGA and Conference in 2023.

These models will encompass static and dynamic data sets of existing modelling and showcase the innovative power of earth and ocean observation data to better inform decision-makers in the Pacific region.

Climate Change is the single greatest threat facing Pacific communities who endure increasing rates of sea-level rise, storm-driven extreme water levels, marine heatwaves, and ocean acidification. The ocean and Pacific Island Countries and Territories are one Blue Pacific Continent which is inextricably linked to the rich and diverse cultures, communities, and societies of the region.

The Blue Pacific spans 42million km² accounting for 30 per cent of the world's exclusive economic zones (EEZ)and marine resources. Roughly one-third of all islands in the Pacific region are low-lying reef islands and half of the entire population of the Pacific live within walking distance of the coast.

This reality exposes communities, homes, infrastructure, food systems, and drinking water sources to climate and ocean related risks such as inundation, storm surges, and sea-level rise. Warming oceans, bigger waves, and higher sea levels: the existential threat of climate change on Pacific communities.

"We are actually imagining a worst-case scenario where we are forced to relocate or our lands are submerged,"

Foreign Minister Simon Kofe, Tuvalu

Understanding the science and predicted impact of climate change on Pacific nations is therefore critical to inform effective adaptation strategies including the development of risk informed planning, resilient infrastructure, and the protection of the deeply rooted indigenous cultures across the region.

SPC has developed detailed visualised modelling utilising various datasets for national decision makers in areas of water security (groundwater), wave inundation, sea-level rise impacts on communities, asset and infrastructure modelling, food security mapping (including coconut

mapping), digital elevation data (DEM), and risk modelling. This data layered together provides holistic based understanding to support effective decision making.

In addition, SPC leads the establishment of [Digital Earth Pacific](#) which supports the development of an operational earth and ocean observation system that takes decades of freely available data and bring it together in a sensible way within the Pacific context. It will allow Member States to make more informed decisions based on good information to overcome the challenges we face such as climate change, food security and disasters.

These models all build upon each other to form holistic based modelling that provides solutions that will help us understand the changes in our environment to support adaptation planning, to increase productivity of agricultural investments and to understand potential impacts by changes in weather.

This work all contributes towards best-practice approaches to visualisation of data to increase understanding to better inform decision making at all levels. Recent studies globally have also shown that visual data greatly informs decision making allowing a wider audience to interact and engage with the scientific information to develop robust local based solutions and greater ownership

Rationale: data visualisation and storytelling

Recent studies have found that senior decision-makers within “data driven organisations are three times more likely to report significant improvements in decision making compared to other firms that leverage data less”.¹

However, research has also found that while companies invest in visualisation and data tools much of it can be ‘low quality and uninterpretable, and sometimes even when the data is healthy, there’s simply far too much of it to quantify and interpret into real insights and business results’.²

Both of these realities are at the core of this concept note to develop 3D modelling for two of Tuvalu’s atoll islands (Funafuti and Nanumea) that combine visual, analysed and layered data sets that provide a holistic overarching understanding of critical issues and opportunities and promote local based solutions.

These include understanding the current reclamation work underway and its expected benefit towards reducing impact from coastal inundation including sea-level rise. By overlaying asset layers (e.g. water and food security asset and infrastructure), the 3D model acts as a knowledge brokering tool to help communicate through augmented reality the current and future risk on atoll communities and in turn supports risk informed decision for short, medium and long term development strategy.

This approach combined with accurate modelling and storytelling is proven to build trust and support increased engagement with different learners including visual, auditory and experience based learners.³ Storytelling brings the data to life in ways that decision-makers at every level can connect and increase knowledge or better inform decisions and for this reason the approach of combining science with storytelling is embedded in this concept.

¹ Price Waterhouse Coopers (2023) study of more than 1,000 senior executives [here](#)

² Harvard Business Review [here](#)

³ Harvard Business Review Storytelling [here](#) “roughly 40 percent will be predominantly visual learners who learn best from videos, diagrams, or illustrations. Another 40 percent will be auditory, learning best through lectures and discussions. The remaining 20 percent are kinesthetic learners, who learn best by doing, experiencing, or feeling.”

Modelling

Based off the recent learnings of the development of an atoll model for the Republic of the Marshall Islands, two models will be developed in Tuvalu looking at integrated based programs and data sets and how this information builds upon each other in meaningful ways to create holistic and informed decision-making tools.

Tuvalu is a global leader in climate adaptation actions to protect their communities from the already disastrous impacts of a changing climate. As such, one model will explore how climate adaptation models change the risk faced by communities to risks such as inundation and storm surges and the second model will explore impacts on food security, water security and inundation risk to communities in a sensible and actionable manner.

Data sets to be potentially modelled and included in the elevated projection modelling include:

Funafuti Island	Nanumea Island
<ul style="list-style-type: none"> • Inundation modelling • Historical coastline changes • LiDAR datasets • Asset and infrastructure understanding (schools, health centres, runway and airport facilities, and public utilities potentially) • Adaptation / reclamation data showing interventions and changes in ocean activities as a result of interventions • Sea-level rise modelling • Food security datasets • Potentially – national statistical datasets 	<ul style="list-style-type: none"> • Inundation modelling • Historical coastline changes • LiDAR datasets • Asset and infrastructure understanding (schools, health centres, runway and airport facilities, and public utilities potentially) • Water security (groundwater) and drought modelling • Sea-level rise modelling • Food security datasets • Potentially – national statistical datasets

The purpose is to develop adaptive models that can be both dynamic and static based data that informs the use of science informed decision making in critical areas of risk management, disaster reduction, water management and broader planning based on future predicted scenarios.

The selected vendors will be competent with 3D modelling and spatial augmented reality in line with best practice and able to deliver within the timeframe required by mid-late September

The physical model will be used at SPC's CRGA and Conference to showcase integrated based work and the power of Digital Earth Pacific in tangible and meaningful ways based on worldclass science.

Requirements

- DEM modelling as noted above, technical design capabilities to print, deliver and design the 3D model.
- Spatially augmented reality with physical modelling design is the underpinning technical approach required from vendors by mid-late September for one model and November for the other.

- An example of what this could potentially look like is noted below (vendor dependent and data dependent).

