



Pacific  
Community  
Communauté  
du Pacifique

# TUVALU Coastal Risk Assessment and Early Warning System Workshop

22 May – 2 June 2023 | Funafuti, Tuvalu



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## Acronyms

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<b>CIFDP</b>	Coastal Inundation Forecasting Demonstration Project
<b>COSPPac</b>	Climate and Ocean Support Program in the Pacific
<b>CREWS</b>	Climate Risk Early Warning System
<b>DFAT</b>	Australian Department of Foreign Affairs and Trade
<b>ECIKS</b>	Enhancing Climate Information and Knowledge Services
<b>EIA</b>	Environmental Impact Assessment
<b>EWS</b>	early warning system
<b>GEDSI</b>	Gender equality, disability and social inclusion
<b>GEM</b>	Geoscience, Energy and Maritime Division (SPC)
<b>NDMO</b>	Tuvalu National Disaster Management Office
<b>NMS</b>	National Meteorological Service
<b>OA</b>	ocean acidification
<b>PCA</b>	People-centred approach
<b>PCCOS</b>	Pacific Community Centre for Ocean Science
<b>PICs</b>	Pacific Island countries
<b>RSMC</b>	Regional Specialised Meteorological Centre
<b>SPC</b>	Pacific Community
<b>SPREP</b>	Secretariat of the Pacific Regional Environment Program
<b>SST</b>	Sea surface temperature
<b>SWOT</b>	Strengths, weaknesses, opportunities, threats
<b>TC</b>	Tropical cyclone
<b>TCAP</b>	Tuvalu Coastal Adaptation Project
<b>TK</b>	Traditional knowledge
<b>TMS</b>	Tuvalu Meteorological Service
<b>USP</b>	University of the South Pacific
<b>UNDP</b>	United Nations Development Programme
<b>UNESCO</b>	United Nations Education, Scientific and Cultural Organization
<b>WMO</b>	World Meteorological Organization

## Executive Summary

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This report provides a summary of the shared objectives, activities, outcomes and recommendations following the completion of the **Tuvalu training and stakeholder engagement workshop** conducted in Funafuti from 22 May to 2 June 2023. The workshop was hosted by the Tuvalu Government and the Pacific Community (SPC), combining project delivery from the Climate Risk Early Warning System (CREWS) initiative, and two Green Climate Fund projects: the Tuvalu Coastal Adaptation Project (TCAP) and the Enhancing Climate Information and Knowledge Services (ECIKS) in collaboration with the World Meteorological Organization (WMO), United Nations Development Programme (UNDP) and the United Nations Environment Programme.

The workshop included both technical training and stakeholder engagement and capitalised on linkages between the CREWS, TCAP, and ECIKS projects and the Climate and Oceans Support Program in the Pacific (COSPPac). Integrating the training allowed the team to build upon introductory coastal risk and ocean science concepts for some of Tuvalu's specific coastal hazard and early warning system needs.

Training highlighted areas of interest, continued capacity development, and potential growth for Tuvalu stakeholders. There is significant interest in further developing the oceanographic capacity of the Tuvalu Meteorological Service (TMS) following the delivery of the wave and inundation forecast model. Key discussions at the stakeholder workshop focused on the data and information needs of government and community stakeholders, and opportunities to improve communications between TMS and stakeholders. There is also keen interest in further developing the disaster risk assessment for island communities in Tuvalu.



## Background

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Pacific island countries and territories are vulnerable to a wide range of weather, climate, hydrological, ocean and other related environmental extreme and high impact events, including tropical cyclones and typhoons, strong winds, high waves and seas, earthquakes, volcanic eruptions, drought, coastal inundation (including storm surges, waves, swell and tsunami) and flash floods. In 2015, Tropical Cyclone Pam affected more than half of Tuvalu's population and triggered widespread destruction across the country with damages estimated at USD 10 million, more than 30% of Tuvalu's gross domestic product.

Strengthening early warning capacity is a holistic and efficient climate change adaptation solution with the means to support increased resilience of Pacific Island countries and territories today and for the future. It is a priority under the Sendai Framework (target G) and underscored at the regional level through the Framework for Resilient Development in the Pacific and the Pacific Islands Meteorological Strategy. Early warning is also elevated as a national priority for Tuvalu under Te Kete, Tuvalu's national strategy for sustainable development.

Underscoring the international, regional and national effort are in-country actions seeking a better understanding of ocean science and coastal processes to support increased early warning system (EWS) capacity and risk-informed decision, adaptation planning, climate-smart development, and growing the blue economy.

Under the Green Climate Funded Tuvalu Coastal Adaptation Project (TCAP), SPC is delivering a technical training programme based on a capacity mapping exercise undertaken by UNDP. The training programme aims to strengthen Tuvalu's coastal risk monitoring and assessment capacity, generating greater ownership of the risk products delivered through the project. The first component of this programme, delivered through this workshop, focused on transferring the technical and scientific background knowledge underpinning not only the rest of the programme but also the strengthened ocean prediction and warning services developed through the CREWS initiative.

Under the WMO-led CREWS initiative, SPC, in partnership with the Tuvalu Meteorological Services (TMS), developed an operational, national-scale, high-resolution wave and inundation forecast system. Due to COVID-related travel restrictions, no appropriate training had been conducted. Combining training activities from both projects provided an opportunity to showcase a more holistic delivery addressing all EWS components:

- Risk Knowledge (supported under TCAP)
- Prediction, Detection and Warnings (supported under CREWS)
- Dissemination and Communication (supported under TCAP and CREWS)
- Emergency Response and Preparedness (supported under TCAP and CREWS).

Following the technical training, a three-day EWS stakeholder engagement workshop was conducted to raise awareness of Tuvalu's recent strengthened capacity, but most importantly of the way forward and gaps that could be partly addressed through the new ECIKS project.

The two-week workshop was arranged as follows:

- a four-day geo-ocean science and coastal hazard training workshop
- a one-day wave and inundation forecast training workshop
- a two-day disaster risk assessment training workshop
- a three-day EWS stakeholder engagement.



# Workshop Objectives

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## Technical Training 22 – 30 May 2023

This technical training workshop was delivered through a multi-project approach including the TCAP, the CREWS initiative as well as the ECIKS project.

The objectives were to:

1. strengthen our understanding of global and regional climate drivers and their local effects to support improved monitoring and assessment capacity;
2. familiarise participants with best practices and requirements towards setting up a sound coastal monitoring programme;
3. outline a possible strengthened coastal monitoring programme for Tuvalu; and
4. increase government capacity to undertake disaster risk assessment.

## Stakeholder Engagement: 31 May – 2 June 2023

The stakeholder engagement objectives were to:

1. showcase recent delivery under the TCAP and the CREWS initiative supporting strengthened EWS capacity and disaster resilience;
2. increase awareness on the ECIKS project and refine activities and deliverables based on stakeholder needs; and
3. map synergies with other Tuvalu-led initiatives (e.g. Future Now project).

## Participants

Participants for the technical training were from the TMS, government departments – Environment, Climate Change, Land and Survey, Tourism, Education, Maritime Police – Tuvalu National Disaster Management Office (NDMO), Red Cross, NGOs, projects involved in coastal development and monitoring, and representatives from the ECIKS project and TCAP. The stakeholder session had the same sector representation with community and *Kaupule* (island council) representatives joining the three-day workshop.



Phase 2 of the Climate and Oceans Support Program in the Pacific (COSPPac2) emphasises communicating information to “the last mile” to enable diverse communities to take appropriate action to protect themselves. Thus, under COSPPac2, consideration of gender and social inclusion is recognised as a critical cross-cutting element of any capacity development initiative.

	Technical Training		Stakeholder Engagement	
# Participants	45		44	
Women	17	38%	19	43%
Youth	20	44%	15	34%

The participant lists can be found in Annex 1.

## Technical Training

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The Ocean Science and Coastal Hazards training introduces participants to ocean data tools using a variety of learning tools to meet the needs of diverse groups and maintain participant energy levels and interest.

A combination of introductory lessons in theory, practical case studies, games, demonstrations, videos, online participatory surveys and quizzes, self-directed exercises, and field trips are employed.

Participants' expectations identified at the start of the workshop are listed below.

- Present on Geopark initiative
- Learn from the workshop
- The availability of data and portal that can assist NGOs and CSOs assist in implementation of projects
- Learn more about the technical area
- Learn more about sea level variability
- Learn about coastal monitoring
- Refresh knowledge on some of the topics to be covered
- Learn more about oceanography of Tuvalu and how the drivers can influence fisheries
- Interested in disaster risk assessment and how it can assist in working with communities
- Learn more about the potential impact of sea level rise on our coastal communities
- How this workshop information/data can improve NDMO's work to respond and assist communities.  
How this information can be integrated in their work
- Participating as a local consultant, that is, not a technical person, looking forward to the presentation being done in laymen's language
- Interested in the Pacific Ocean Portal and how to access and interpret the data
- Interested to learn how the land, ocean and atmosphere interact with each other and climate change is a real issue
- Learn what models and techniques are available to interpret the data that assist in decision-making
- Learn about coastal science and disaster risk assessment.

### Presentations

For the first four days of the workshop, the presentations focused on ocean science and the tools and data available to assist participants with their work on ocean-related activities.

A presentation on **Atoll and Reef Island Geology** led the agenda for Day 1 of the technical training on ocean science. The aim was to introduce participants to atoll geology and formation and why geology is important for coastal management. This was followed by a presentation from the Tuvalu Land and Survey Department on the Funafuti Geopark Initiative, a collaboration between SPC, UNESCO and the Pacific Tourism Organisation, which aims to establish geoparks in the Pacific. The Tuvalu work is led by the Lands and Survey, Tourism, *Kaupule*, and Culture Departments. Other presentations and activities during the ocean science technical training focused on tides, datum, sea level variability, sea surface temperature, coral reefs and lagoon health.





Waves and coastal hazards and coastal monitoring were also subjects covered during the one-week workshop. Understanding how people access information, audience needs and effective communication were part of the Communications presentation, followed by an example provided by the TMS on how they communicate their information to the public.

The aim of these sessions was to introduce participants to the tools, data, information, concepts and case studies on ocean science and related topics.



On the fifth day, the training session was held at the TMS office. This session focused on the delivery of the CREWS project, and in particular the coastal inundation and wave forecast model. TMS staff were briefed by SPC technical experts on the model, and the team had an opportunity to conduct exercises with the graphical user interface (GUI).

The second week of the workshop started off with a two-day **Disaster Risk Assessment Technical Training**. To facilitate this session, a combination of presentation and group exercises was used to provide information and introduce participants to the concepts and simulations.

## Day 1 | Monday 29 May 2023

### Introduction to Disaster Risk Concepts

An overview of Disaster Risk Concepts was introduced to the participants. The presentation slides contained the disaster risk management process and the definitions of hazard, exposure of assets, and vulnerability. Risk was further explained by the likelihood of a hazard occurring and the consequence of the impact if it does occur. The Risk Matrix that had the level of risk correlating to the likelihood and consequence was introduced, followed by slides on acceptable risk and examples of action in response to the risk level.

### Exposure Mapping

The Exposure Mapping was a hands-on activity with participants divided into five groups and provided workshop groups with island maps and tracing paper to carry out their tsunami hazard exposure mapping exercise. Each of the workshop island groups presented back in a mock exercise of presenting their findings to the NDMO director.



### Likelihood Concept

The Likelihood Concept presentation explained the likelihood of a hazard concept and introduced the terminologies of return periods, annual recurrence interval and annual exceedance probabilities, followed by examples of likelihood scales. The participants continued their hands-on activity by rating the likelihood of possible hazards affecting their workshop island and giving a likelihood rating to the list of return periods. The groups then carried out an exercise to rate the likelihood scale for their own island.

### Consequence Scale

The Consequence Scale and the categories listed were explained in this activity. The participants were tasked to decide on their own consequence scale categories. They continued their hands-on activity to count the assets exposed to the coastal inundation maps and then allocate their chosen consequence category to represent the exposed asset.

### Risk Matrix

The participants continued their hands-on activity by determining the risk level of the exposed assets to the inundation hazard.

## Day 2 | Tuesday 30 May 2023

The day began with a recap followed by a group exercise. The groups were given case scenarios and they were asked to present back on what risk product/information is needed and what data is needed to develop this risk product/information for those specific case scenarios.

### Integrating Vulnerability

The first day of the training workshop was mapping the exposure of assets to the hazards without considering the vulnerability of the assets. This session integrated examples of vulnerability data linked to the assets of the workshop island. The groups were tasked with re-evaluating their consequence category to the exposed assets and then determining the overall risk. Feedback was given on whether the risk has changed or remained the same while incorporating the vulnerability of assets.

### Multi-Hazard Risk

The Multi-Hazard Risk session led a discussion on determining the overall risk when there are multiple hazards that affect their island. Discussion took place on determining the risk and the understanding delivered was that there is no right way to determine the overall risk of multi-hazards.

### Risk Assessment Under our Changing Climate

After determining the risk for the present climate, the next exercise was to determine future risk by integrating sea level rise projections in the coastal inundation maps. The groups were tasked with determining the future risk.

# Stakeholder Engagement

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A key component of the workshop was the stakeholder engagement. This facilitated session allowed the hosting Tuvalu Meteorological Service (TMS) to better understand the needs of national ocean stakeholders, and provided a platform to introduce stakeholders to ocean data tools and information that may be useful to them, helped to build bridges between individuals, departments and agencies, and ideally, provided a few takeaway actions for the TMS to follow up on.

This stakeholder engagement workshop was delivered through a multi-project approach including the Tuvalu Coastal Adaptation Project (TCAP), the CREWS initiative and the Enhancing Climate Information and Knowledge Services (ECIKS) project.

The objectives are listed below.

1. Showcase recent delivery under the TCAP and the CREWS initiative supporting strengthened EWS capacity and disaster resilience.
2. Increase awareness of the ECIKS project and refine activities and deliverables based on stakeholder needs.
3. Map synergies with other Tuvalu-led initiatives (e.g. Future Now project).

Notes from participants:

- Know the community needs from each island and relate it to TCAP and ECIKS
- Learn the priorities and how to improve EWS for Tuvalu
- Learn how fisheries can integrate and better facilitate EWS
- Learn the outcomes of the workshop
- Learn about EWS and emergency responses
- See improvements in EWS services
- Put more emphasis on people and contingency plans so people are aware of disasters and how EWS can be used during this crisis
- More interesting presentations from SPC and other presenters
- Learn from stakeholders on gaps and needs
- Learn how to generate maps for disasters
- Learn more about Traditional Knowledge from our community members
- See how to incorporate EWS and make it comprehensible to our community members and how to use it in times of disaster
- Learn more about EWS and how it works and what devices are used
- Take back the learning from this workshop to the community of Nui: Nui was hit badly by Tropical Cyclone Pam and the whole island was inundated
- Learn about the stakeholder feedback on communications.



# Stakeholder Analysis

During the stakeholder engagement workshop, representatives of organisations were asked to provide and present on the following information.

## Data

- What data does your department collect?
- How do you store the data? How is your data shared?
- What data do you currently not collect but would add value to your work?

## Products/Services

- What products does your department develop?
- How do you store your products? How are they shared?
- What products do you currently not develop but would add value to your work?

## Early Warning System

- What disaster risk or hazard information do you need to support decision-making within your department?
- What forecast products do you need to support decision-making within your department?
- How does your work relate to your national (or sectorial) policy/strategy (Te Kete)?

Organisation	Data	Services	EWS	Q&A
<b>Department of Environment</b>	<p>Water quality, mercury, invasive species, persistent organic pollutants, importation of refrigerants</p> <p>Projects: Pacific Ridge to Reef (R2R), ocean acidification (OA), Minimata convention (mercury content data collection), ozone-depleting substances (importation of refrigerants)</p> <p>Database under maintenance, hard drives</p> <p>Data shared in specific reports e.g. Tuvalu State of Environment Report 2022. Upload to international portals.</p> <p>Do not collect? - other water quality parameters; and the chemical components of materials for construction, development</p>	<p>Environmental Impact Assessment (EIA) Grievance Redress Mechanism for complaints on major developments (also covered in EIA, mechanism of all complaints from the public or others to give complaints on any development)</p> <p>Monitoring of constructions</p> <p>How is it shared? – Awareness programmes; public outreach</p> <p>Add value? – to increase public awareness of our work</p>	<p>Need support on coastal hazard information/maps for EIAs</p>	<p>State of Environment report is not released every year</p> <p>Monitoring water quality was handed over to the fisheries but at the moment there is no water quality collection after R2R ended</p> <p>Social component of EIA is done by DOE</p> <p>GRM sharing of DOE docs, best to talk internally as cannot give a definite answer</p>
<b>Climate Change Department</b>	<p>Water quality, mercury, invasive species, persistent organic pollutants, importation of refrigerants</p> <p>Projects: R2R, OA, Minimata convention (mercury content data collection), ozone-depleting substances (importation of refrigerants)</p> <p>Database under maintenance, hard drives</p> <p>Data shared in specific reports e.g. Tuvalu State of Environment Report 2022. Upload to international portals.</p> <p>Do not collect? – other water quality parameters; and the chemical components of materials for construction, development</p>	<p>EIA Grievance Redress Mechanism for complaints on major developments (also covered in EIA, mechanism of all complaints from the public or others to make complaints on any development)</p> <p>Monitoring of constructions</p> <p>How is it shared? - awareness programmes; public outreach</p> <p>Add value? – to increase public awareness of our work</p>	<p>Need support on coastal hazard information/maps for EIAs</p>	<p>State of Environment report is not released every year</p> <p>Monitoring water quality was handed over to the fisheries but at the moment there is no water quality collection after R2R ended</p> <p>Social component of EIA is done by DOE</p> <p>GRM sharing of DOE docs, best to talk internally as cannot give a definite answer</p>

Organisation	Data	Services	EWS	Q&A
<b>Land and Survey Department</b>	<p>Geospatial Data saved using Mapserver. Shared through Mapsaver</p> <p>Not collected? – regular aerial imagery updates, lidar updates – yearly, remote sensing</p>	<p>Bathymetry maps</p> <p>International Hydrographic Organization</p> <p>Site maps, Topo maps, geosite maps</p> <p>Stored in Mapserver</p> <p>Shared through internet</p> <p>Not developed? – spatial inundation and sea level rise. Project under the Japan International Cooperation Agency, beach nourishment, working with them on sand movement and inundation (maps were created but once the project ended, everything ended).</p>	<p>Dept. is not on the frontline of EWS preparation</p> <p>Mainly on the aftermath of a tropical cyclone e.g. TC Pam</p> <p>Rapid assessment team was deployed and participated with community members to map shoreline and overtopping of sand from the sea that made it inland</p> <p>Focus on products? Contours, Digital Terrain Model, lidar</p> <p>GNSS Tsunami EWS – core station can be part of the EWS as a service</p>	
<b>Tuvalu Meteorological Service</b>	<p>Not collected: Shop Observation</p> <p>Data stored – Clide Database, Excel, hard copies</p>	<p>Stored – Share folder (climate section)</p> <p>Shared – Gmail, website, Facebook</p> <p>Not developed? – air temperature, three-day forecast</p>		
<b>Tourism</b>	<p>Collect migration data from stats.</p> <p>Data on all sectors, accommodation, rental</p> <p>Stored – Google drive, shared amongst department and interested stakeholders</p> <p>Not collected? Survey on inbound and outbound tourists</p>	<p>Promoting and marketing</p> <p>Digital transformation journey</p> <p>Everyone is on FB and Messenger, interested in tourism stakeholders and shared on these media platforms</p> <p>Not developed? – don't have capacity of outer islands, hoping to expand and engage with <i>Kaupule</i></p>	<p>Digital transformation journey – seems effective</p> <p>Surveys to have baseline on tourism standards. We do not have that yet</p> <p>Strategic marketing and ecotourism</p>	<p>There is no legislation in Tourism. Setting standards that everyone has to comply with. So that will be rolled out in May 2023.</p>

Organisation	Data	Services	EWS	Q&A
<b>Nukufetau Community</b>	<p>Provide computers to outer islands – to build capacity</p> <p>Women organisation</p> <p>Need technology and skills</p> <p>Collection? – no feedback from Nukufetau so the message is reached outside</p>	<p>Bring the outer islands into line with these products</p> <p>Share through media e.g. Facebook</p>	<p>Put signs of disaster so that people are aware of it. Give time for evacuation.</p> <p>Give ample notice time to react to the disaster. Share message of disaster clearly by explaining what it is.</p> <p>How are the outer islands notified of the disaster?</p> <p>Contingency plan is needed for the people in times of disaster so they can overcome it</p> <p>Outer islands have non-communicable disease</p> <p>Better communication</p> <p>Outer islands feel unheard because there is no change or enhancements for the people in the outer islands</p>	<p>Improved internet connectivity in the outer islands, and new airports</p> <p>Traditional knowledge (TK) – different islands with different TK. Knowledge is usually shared within the family.</p>
<b>Nui Community</b>	<p>Representing committee on the island and on the main island</p> <p>Log books – store financial data</p> <p><i>Kaupule</i> – record death and births</p> <p>Youth</p> <p>Women – church, records of pastors entering deaths and births</p> <p>Land records</p> <p>Household data, headcounts</p> <p>Data shared to visiting officers</p> <p>Falafeta – trust fund?</p>	<p>Traditional – handicrafts</p> <p>Women have a market just built – local food market. Produce local food and sell it there. Made for food security during COVID.</p>	<p>Sirens on the island</p> <p>Equipment could have been used for warning or be used after times of disaster if there is a blackout. Others thought Nui was washed out as no response from that island.</p> <p>TK - can tell by looking at the clouds or plants and animals' behaviour</p>	
<b>Nanumea Community</b>	<p>Agrees with other community of Nukufetau and Nui</p>			

Organisation	Data	Services	EWS	Q&A
<b>Youth (Funafuti and outer islands)</b>	<p>No system in place. Rely on <i>Kaupule</i> and other gov.</p> <p>Aggregated data from stats</p> <p>Youth are located in nuclear and extended families</p> <p>Food rationing in times of disaster</p> <p>Ask <i>Kaupule</i> to request data and can be dispersed to us</p> <p>Disability association</p> <p>Look at the movement of youth and vulnerable groups within extended family</p> <p>Group moving to AU or NZ</p> <p>Shared through FB networks</p>	<p>Quality of water – rapid assessment in late 2021, looked at one island and Funafuti, close to 83% drink tap water and not boiled.</p> <p>Access to data / internet access – accessible to youth, 86% of households have mobile phones. Is it reliable or not? Is the information important?</p> <p>Information complexity – best to translate it to Tuvalu. Also to share it through radio but not all households have radio.</p>		<p>TMS staff only located at Nanumea, Nui and Niulakita. Northern group depend on Nanumea, southern group from Niulakita.</p>
<b>Red Cross</b>	<p>Rapid Household Assessment – disaggregated data</p> <p>During COVID – captured community needs and perceptions</p> <p>Volunteer information data</p> <p>Working with health – blood donor information is confidential</p> <p>Work with other agencies/projects – utilise volunteers in outer islands</p> <p>Data from household information – drought and water info</p> <p>Storage? – Excel spreadsheets and hard copies.</p> <p>The International Federation of Red Cross and Red Crescent Societies (IFRC) is organising vulnerability training to take place in Fiji in 2023</p> <p>Sharing? – on social media, or FIRC that uploads the data</p>	<p>Pamphlets and posters on health preparedness</p> <p>Early Action Rainfall Watch data from regional and TMS for more accurate forecasts</p> <p>Disseminate through outreach programmes, social media or awareness programmes that people are involved in</p> <p>Radio programmes also</p> <p>Not developed? – tailored to suit the community level and level of understanding. Open for suggestions on this</p>	<p>Seasonal drought, cloud info, hazard and asset information</p> <p>Seasonal drought outlooks and TC forecast</p>	<p>Collaborate on the volunteer programme – cover multiple agencies e.g. tourism. Volunteer programmes across the nine islands. Work with different agencies, NDMO, and climate change. Data collected is on the volunteers. Also volunteer in the Managing Coastal Aquifers Program (MCAP) for water testing in wells in Vaitupu, Nanumea, Nui. Open to use the volunteers, best to speak to FIRC head.</p> <p>Vulnerability training in FIRC – organising to take place in Fiji sometime this year. Enhancing Building Capacity Assessment (EBCA) toolkit training. For staff and regional society to learn more on EBCA and work with other stakeholders in Tuvalu. Similar to Tuvalu Integrated Vulnerability Assessment Report.</p>

Organisation	Data	Services	EWS	Q&A
Red Cross (continued)	Not collected? – access to everything, challenge how to use the data and present it to the communities for best practices in EWS or to avert disasters. Interested in vulnerability data. Red Cross has upcoming training this year and interested in the type of data that can be shared. If data is at a household level in terms of financial stability that can withstand data. TK to assist vulnerable communities.			
NDMO	<p>Tuvalu Logistic Capacity Assessment (TLCA) and support from Red Cross and assisted in conducting TLCA. Capacity of relevant key stakeholders, before, during or after a disaster. These are the stocktakes in relief items.</p> <p>Disaggregation of the data that we collect specifically on the different hazards. Most likely hazards, TC tracks, damage assessments, number of people affected, number of dwellings damaged during TC. Number of people with livelihood affected. Gender and social welfare staff join in times of this assessment.</p> <p>Collect data on food security, number of damaged crops and livestock and fisheries.</p> <p>Work with Central Statistic Division (Census), as they notify agencies to submit questionnaires if you want to be included in the census. Wish to improve census survey. No information on disaster risk.</p>	<p>Damage Impact Assessment</p> <p>Situation reports</p> <p>Recovery plans</p> <p>Develop? – a reporting system to store and report data</p>	<p>Disaster and Hazard Risk information</p> <p>Risk Mapping and infographics</p> <p>Response infographics</p> <p>Number of people covered – is the information disseminated to the outer islands and is it effectively understood?</p> <p>Forecast – Tsunami inundation, assist in evacuation</p> <p>Build the capacity of the communities</p> <p>Develop long term recovery plans in times of disaster and mainstream the plans in all the government agencies. And how to implement these plans.</p> <p>Strengthen our role in times of disasters</p> <p>Strengthen intergovernmental agency relationships</p>	

Organisation	Data	Services	EWS	Q&A
NDMO (continued)	<p>Economic loss and the declaration of emergency, and seek financial assistance in relation to the loss and damage.</p> <p>Storage? – global platform that surveys are submitted to addressing different targets.</p> <p>Challenge – in validating data before submitting it to the platform. Need stakeholders to validate before submitting it.</p> <p>Data stored in Excel files within computers.</p> <p>Not collected? – inclusion of inundation and damage assessment. Work with TMS for the inundation infographics. Also what is the intangible loss in cultural sites and heritage when damaged by disasters? What is the right tool to assess the intangible loss?</p> <p>Private assets – gov. has to commit to compensate for the losses but the losses are not defined yet so the communities come to claim for the loss of all property. Ongoing challenge in NDMO in conducting community outreach problems.</p> <p>Psychological issues are not collected. Work with gender and social welfare, and churches. How to alleviate the struggles of the people.</p> <p>How to build back better after a disaster situation.</p> <p>Communicable diseases e.g. during drought. Unable to justify that an outbreak may be linked to the drought or disaster. Work with the health sector and include in possible future assessments.</p>			



## Projects

	Group 1	Group 2	Group 3	Group 4	Group 5
<b>Step 1: Purpose and Scope</b>	<b>Water Quality</b> – identify clean and polluted sites Scope: Coastal marine areas (along populated locations). Control: conservation area Temporal: 5 years (quarterly monitoring) Parameters: temperature; salinity; pH; oxygen; turbidity; total dissolved solids; nutrients (chlorophyll)	<b>Water Quality</b> – monitor the purification of water salinity Temporal scale: Quarterly Spatial scale: Tuvalu water	<b>Coral Health</b> – assess health of coral reefs to detect and monitor potential threats to inform decision-makers to develop effective long-term strategies Scope: focus on selected coral reef sites and ecosystems in Tuvalu waters	<b>Coastal inundation</b> – identify areas that are prone to inundation Validate inundation models Scope: Monthly (spring tide) Location: all Tuvalu atolls, coastline, barrow pits, swamps	To monitor the impacts and effectiveness of reclaimed land and dredging activities in Fongafale, Funafuti
<b>Step 2: Outcomes and Objectives</b>	To identify and clean highly polluted coastal marine areas (including level of clean and pollution) To correlate water quality data with community settlements (piggeries) To work closely with <i>Kaupule</i> and stakeholders	Designed to measure environmental health of the water body Measure the impacts of the water quality To control land use activities that lead to run-off Water pollution (ships/littering)	Enhance resilience of coral reefs i.e. identifying trends, stress and effective management interventions Integration of modern and traditional knowledge of coastal management Stakeholder engagement and empowerment Awareness and education		To identify the benefits and drawbacks the reclaimed land has for the people of Fongafale How dredging and reclaimed land affects the natural sediment process Assess its impact on coastal ecosystems To provide information for future long-term adaptation plans and projects

	Group 1	Group 2	Group 3	Group 4	Group 5
<b>Step 3: Data Collection and Indicators</b>	<p>Water quality along coastal marine areas</p> <p>Measure temperature, pH, oxygen level, turbidity, total dissolved solids</p> <p>Quality of water from different hotspots, populated areas</p>	<p>Water quality</p> <p>OA, pH, conductivity, turbidity, oxygen</p>	<p>What to measure – OA, sea surface temperature (SST), salinity, coral growth</p> <p>Indicators – pH, degree heating (sea temperature), coverage, current</p>	<p>Topographic beach profile (shoreline change).</p> <p>Water level (sea level/ inundation level monitoring tool)</p>	<p>Dredging – water quality; quantity and quality of sand</p> <p>Land reclamation – land area reclaimed; marine habitat (loss); freshwater development (ground water)</p> <p>Coastal erosion – shoreline; coastal vegetation</p>
<b>Step 4: Resources and Skills</b>	<p>Water quality test kits and solutions. Transport (boats, bikes, car). Fuel. Laboratory. Computers.</p> <p>Skills: capacity training – operational and maintenance</p> <p>Awareness training – communicating data to communities</p>	<p>Satellite images</p> <p>Wave buoy</p> <p>Lidar</p>	<p>Human resources</p> <p>Qualified and experienced personnel with expertise in coral reef ecology</p> <p>Financial resources</p> <p>Field equipment</p> <p>Scuba diving equipment</p> <p>Underwater camera</p> <p>GPS devices</p> <p>Laboratory facilities</p> <p>Analysis of water quality and coral health</p> <p>Stakeholder collaboration and partnership</p>	<p>Drone, surveyor, communities, satellite imagery, inundation forecast tool, lidar</p>	<p>Technical support</p> <p>Funding</p> <p>Software</p> <p>Geospatial skills</p> <p>NGO databases</p> <p>Technology (lidar)</p>
<b>Step 5: Data Analysis</b>	<p>Laboratory analysis</p> <p>MS Excel software – extract data, graphics</p> <p>Set up software application – land data for analysis</p>	<p>OA: Lab analysis – acidity parameters – water samples</p> <p>Water quality – wave buoy analysis – nitrogen, oxygen, turbidity etc.</p>	<p>Lab analysis of OA</p> <p>Regular monitoring of coral reefs to see changes over time</p> <p>GIS – evaluate the impacts of coral developments</p>	<p>Using forecast inundation tool</p> <p>Using tide gauge data</p> <p>Use the tide calendar</p>	<p>Turbidity – lab analysis (sand in water) – water samples</p> <p>Shoreline changes – GIS/satellite imagery – satellite images</p>

	Group 1	Group 2	Group 3	Group 4	Group 5
<b>Step 6: Data Management</b>	Portals – server Authorised personnel access	Analyse, save and archive data into the database	Establish a centralised database or repository to store all collected data  Implement a robust monitoring program to regularly collect updated data on coral health indicators and environmental parameters	Archive data Back up the system	Database
<b>Step 7: Data Products and Communication</b>	Available info for the public – clean and healthy coastal marine areas; hotspots (highly polluted areas linked to pollution (piggeries) and populated coastal areas (main settlement))  Inform the public!  Billboards, posters, disseminate info on the radio and social media platforms, work with relevant stakeholders e.g. health (outbreak) and <i>Kaupule</i>  Radio – awareness programmes (island communities)	Enter data info into Excel to provide graphs  Showing the trend line (increase/decrease) of the impacts of the water quality  Provide information about how to maintain environmental health of water body	Foster collaboration and data sharing among relevant stakeholders, including government agencies, institutions, local communities and NGOs	Inundation information – radio, social media  Awareness programme	Reports Infographics

## Media Coverage

Coverage of the workshop was via the [Tuvalu Met Service Facebook page](#) and a news report by [Tuvalu TV](#).



Tuvalu Meteorological Service  
May 24 · 🌐

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This week, staff from the Tuvalu Meteorological Service join other government departments and civil society organisations in Funafuti to participate and engage in a technical training on climate and ocean science and coastal hazard assessment and monitoring.

The week-long training also provides scientific background on atoll formation and atoll geomorphology.

Facilitated by technical experts from the Pacific Community (SPC), the training also provides participants with awareness and understanding of ocean dynamics and the tools available to access ocean data and apply it to their respective work related to oceans.

The training is supported by the Tuvalu Coastal Adaptation Project (TCAP), the Climate Risk Early Warning System (CREWS) initiative and the Enhancing Climate Information and Knowledge Services project.

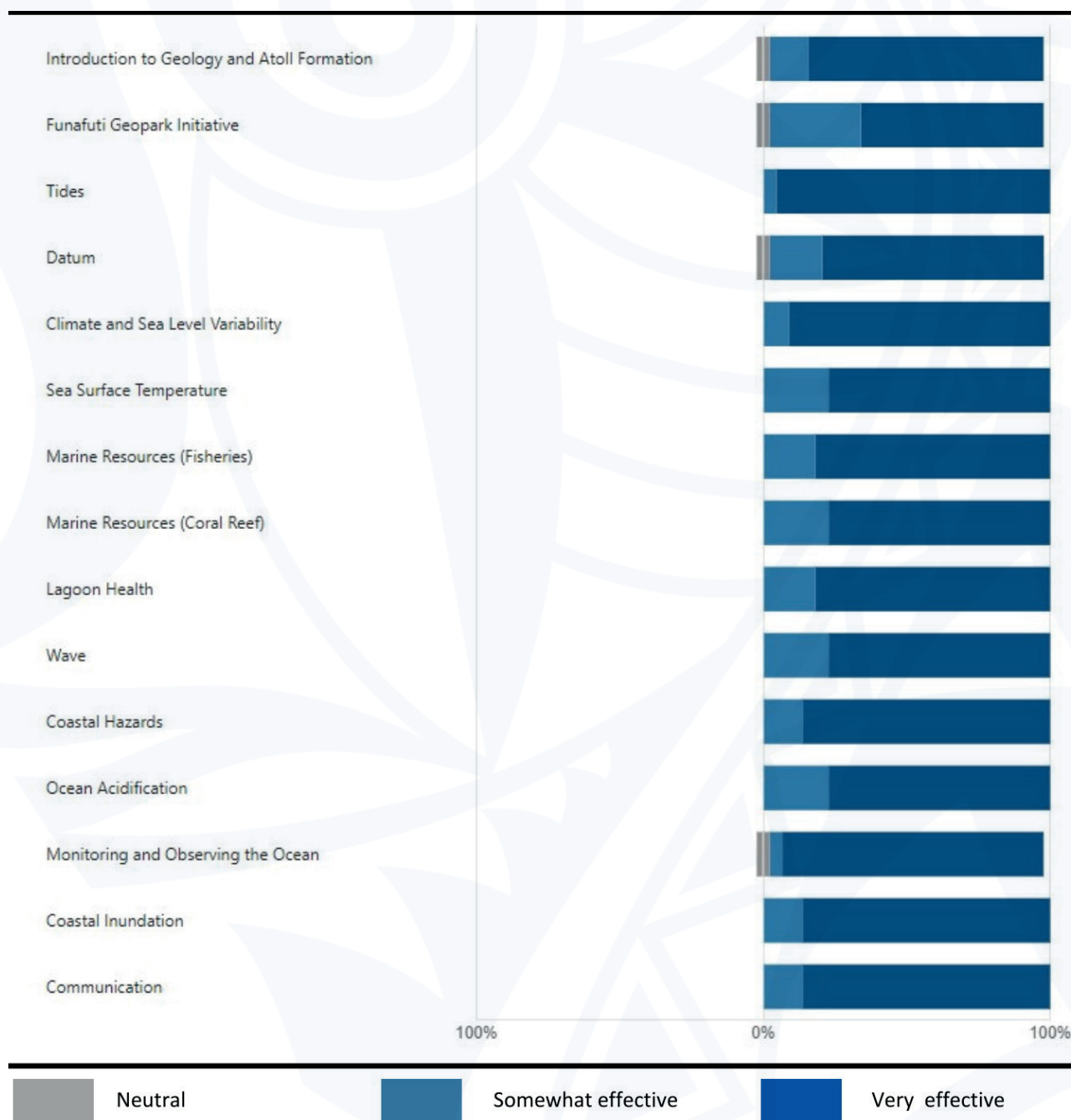
Next week a technical training on disaster risk assessment will be facilitated by the team from SPC followed by a stakeholder engagement session.



## Workshop Evaluation

Following each session, participants were provided with evaluation forms to complete which included (i) ocean science (ii) disaster risk assessment and (iii) stakeholder engagement.

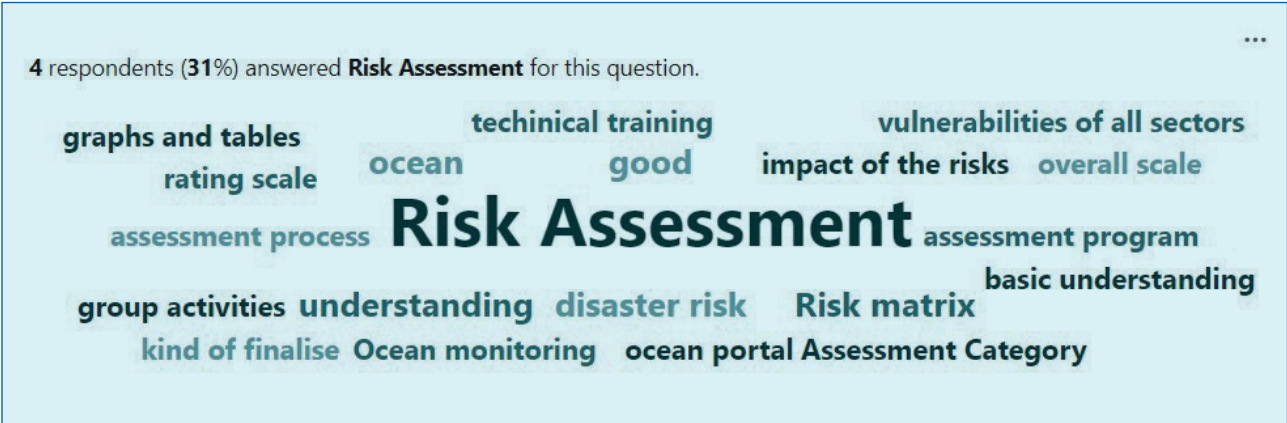
For the ocean science presentations, the participants found them to be very effective and identified key areas or subjects that they would like further information on.



Evaluation Form Responses: Technical Training – Ocean Science.

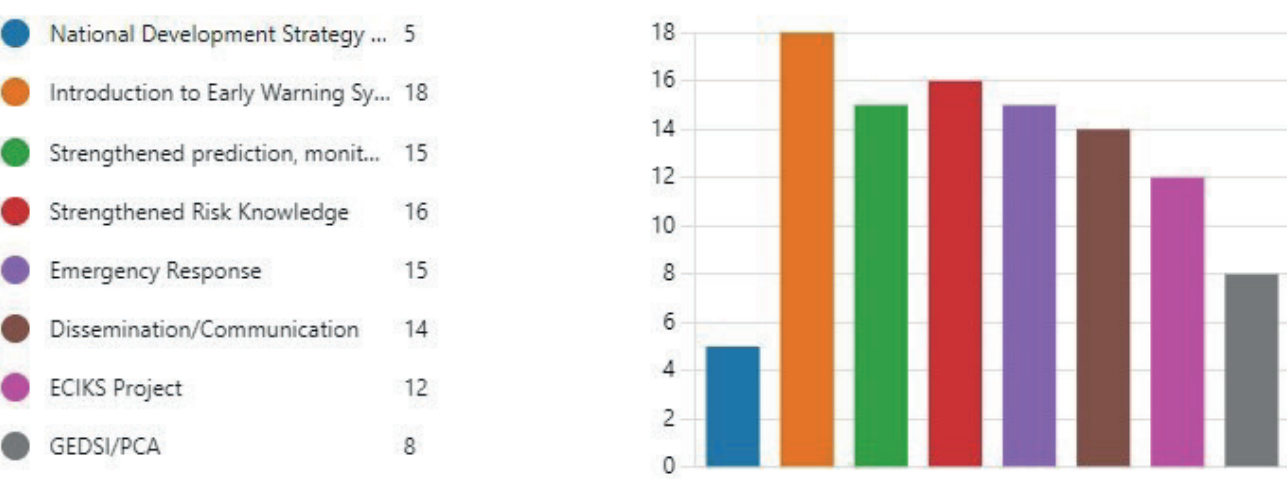


For the technical training on disaster risk assessment, participants found the presentations and learning activities very effective.



Technical Training – Disaster Risk Assessment Evaluation Form Responses to the question, ‘What information provided at this training would you need further elaboration on?’

For the stakeholder engagement, the presentation and discussion on the topic ‘Introduction to Early Warning Systems’ received a very favourable response, followed closely by related technical presentations. There were several requests for further information on the presentations which include, among others, impact-based forecasting and strengthened prediction, monitoring and warning services.



Evaluation Form Responses: EWS Stakeholder Engagement.

Detailed information on the evaluation responses is available as *Annex 3: Workshop Feedback*.

## Key Outcomes

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Following from the feedback and discussions from the technical training and stakeholder sessions, the recommendations suggested are shown below.

- Produce more information and activities so as to have detailed understanding and application of impact-based forecasting and ocean prediction and monitoring/warning services.
- Look at ways to incorporate early warning systems in communication outreach at community level so the information can be used in times of disaster.
- Consider a people-centred approach when developing contingency plans so people are aware of disasters and how EWS can be used during times of natural disasters.
- Devise follow-up training on disaster risk assessment and case studies in Tuvalu that can be shown as examples.
- Increase collaboration between government departments and NDMO in terms of data sharing to enable more effective communication to stakeholders in communities.
- Follow through on information sharing from the technical training sessions and stakeholder engagement by national counterparts using their networks at island and community levels.



## Annex 1: Participants List

Technical Training – Coastal Science and Disaster Risk Assessment (22 – 26 May)					
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## Annex 2: Agenda

### Tuvalu Coastal Science and Disaster Risk Assessment Workshop Technical Training 22 – 26 May 2023

Venue: Dr Sir Tomasi Puapua Convention Centre, Funafuti

#### Day 1: Monday 22 May 2023

Time	Session	Objective	Presenter / Facilitator
9.00 – 9.30	Registration		Ashweeta Sharma
9.30 – 10.00	Workshop Opening: - Prayer - Opening remarks - Outline of the week  Group Photo		Merana Kitone
<b>10.00 – 10.30 Morning Break</b>			
10.30 – 11.00	Introductions and objectives setting	Identify participant objectives, needs assessment  Outline purpose and sessions covered by the training	Merana Kitone
11.00 – 12.30	Introduction to Geology and Geoparks	Learn about atoll geology as a critical baseline to understanding coastal hazards and supporting adaptation, and how a geopark could be a useful tool for Tuvalu	Gary Lee / Sapolu Tetoa
<b>12.30 – 1.30 Midday Break</b>			
1.30 – 3.00	Tides	Understand different types of tides and using/interpreting tide calendars	Zulfikar Begg
<b>3.00 – 3.30 Afternoon Tea</b>			
3.30 – 4.00	Datum	Understand datum and its importance	Herve Damlamian
4.00 – 4.30	Wrap-up	Look back, look forward, questions, suggestions	Merana Kitone / Zulfikar Begg

## Day 2: Tuesday 23 May 2023

Time	Session	Objective	Presenter / Facilitator
9.00 – 9.15	Ice breaker and recap	Review yesterday's work, outline the day ahead	Merana Kitone
9.15 – 10.30	Climate and sea level variability	Learn about the factors that influence changes in sea level, including ENSO, and become familiar with tools for monitoring sea level (RTDD and Ocean Portal)	Moritz Wandres
<b>10.30 – 11.00 Morning Break</b>			
11.00 – 12.00	Sea surface temperature	Learn about how and why we measure SST	Judith Giblin
<b>12.00 – 1.00 Midday Break</b>			
1.00 – 2.00	Marine resources Fisheries	The link between SST and fishing	Zulfikar Begg
2.00 – 3.00	Marine resources Coral reef	Understanding coral reef health and monitoring coral bleaching	Judith Giblin
<b>3.00 – 3.30 Afternoon Tea</b>			
3.30 – 4.15	Lagoon health	Learn about the oxygen cycle and drivers to decreasing lagoon health	Herve Damlamian
4.15 – 4.30	Wrap-up		Merana Kitone

## Day 3: Wednesday 24 May 2023

Time	Session	Objective	Presenter/Facilitator
9.00 – 9.15	Ice breaker and recap	Review yesterday's work, outline the day ahead	Zulfikar Begg
9.15 – 10.30	Waves	Understanding of wave generation and transformation, regional and national wave climate	Moritz Wandres
<b>10.30 – 11.00 Morning Break</b>			
11.00 – 1.00	Coastal hazards	Understanding processes driving coastal inundation	Moritz Wandres
<b>1.00 – 2.00 Midday Break</b>			
2.00 – 3.30	Coastal hazards	Understanding processes driving shoreline change	Herve Damlamian
<b>3.30 – 3.45 Afternoon Tea</b>			
3.45 – 4.15	Coastal hazards in Tuvalu	Present and discuss recent coastal hazard products delivered under TCAP	Moritz Wandres / Herve Damlamian
4.15 – 4.30	Wrap-up		Zulfikar Begg



## Day 4: Thursday 25 May

Time	Session	Objective	Presenter / Facilitator
9.00 – 9.15	Ice breaker and recap	Review yesterday's work, outline the day ahead	
9.15 – 10.00	Monitoring and observing the oceans	Understand the different systems and technologies we use to monitor and observe the oceans	Zulfikar Begg
<b>10.00 – 10.30 Morning Break</b>			
10.30 – 12.30	Coastal monitoring programme	Understanding the processes and requirements towards establishing a monitoring programme	Cristina Izaguirre
<b>12.30 – 1.30 Midday Break</b>			
1.30 – 3.00	Designing a possible monitoring programme for Tuvalu	Group exercise	
<b>3.00 – 3.30 Afternoon Tea</b>			
3.30 – 4.15	Designing a possible monitoring programme for Tuvalu	Group exercise	
4.15 – 4.30	Wrap-up		
5.30	Cocktail		

## Day 5: Friday 26 May (For Tuvalu Meteorological Service only)

Time	Session	Objective	Presenter / Facilitator
9.00 – 9.15	Ice breaker and recap	Review yesterday's work, outline the day ahead	
9.15 – 10.00	CREWS Project overview		Herve
<b>10.00 – 10.30 Morning Break/Group Photo</b>			
10.30 – 12.15	Overview of coastal inundation and wave forecast model	Gaining familiarity with operational products	Moritz
<b>12.15 – 1.15 Midday Break</b>			
1.30 – 3.00	Hands-on exercises with the GUI		Moritz / Anuj
<b>3.00 – 3.30 Afternoon Tea</b>			
3.30 – 4.00	Hands-on exercises with the GUI		Moritz / Anuj
4.00 – 4.15	Next steps		Herve / Moritz

# Risk Assessment Workshop

Day 1: Monday 29 May 2023

Time	Session	Objective	Presenter / Facilitator
9.00 – 9.30	Welcome and recap.	Review last week's learning on coastal hazards and outline objective and content of the risk assessment training	Herve
9.30 – 10.00	Disaster risk and related concepts	Introduce risk-related concepts that will be further unveiled over the 2-day hands-on training	Judith
<b>10.00 – 10.30 Morning Break</b>			
10.30 – 12.30	Exposure mapping	Understand exposure mapping and inherent data requirements	
<b>12.30 – 1.30 Midday Break</b>			
1.30 – 2.00	Hazard likelihood concept	Understand likelihood and how to establish our own likelihood scale for tailored risk assessment	Herve
2.00 – 3.00	Establishing and using consequence scale into risk assessment	Understand consequences and how to establish our own consequence scale for tailored risk assessment	
<b>3.00 – 3.15 Afternoon Tea</b>			
3.15 – 4.20	Developing risk products	Participants will map the inundation risk for a community in Tuvalu	
4.20 – 4.30	Wrap-up		

## Day 2: Tuesday 30 May

Time	Session	Objective	Presenter / Facilitator
9.00 – 9.15	Recap	Review yesterday's learning and outline today's objective	
9.15 – 9.45	Data requirement	Discuss data requirement to support risk-informed decision	
9.45 – 10.15	Introducing vulnerability mapping into the risk analysis	Integrate vulnerability data into the risk assessment	
<b>10.15 – 10.30 Morning Break</b>			
10.30 – 12.30	Multi-hazard risk assessment	Integrate multiple hazards into risk assessment	
<b>12.30 – 1.30 Midday Break</b>			
1.30 – 3.00	Risk assessment under our changing climate	Assess how risk will change in the future	
<b>3.00 – 3.15 Afternoon Tea</b>			
3.15 – 4.00	Risk assessment needs	Participants will map the inundation risk for a community in Tuvalu	
4.20 – 4.30	Wrap-up	Group discussion on stakeholder needs and data gap	

# Tuvalu Early Warning Workshop

## Stakeholder Engagement

31 May – 2 June 2023

Venue: Dr Sir Tomasi Puapua Convention Centre, Funafuti

### Day 1: Wednesday 31 May

Time	Session	Objective	Activities	Presenter
9.00 – 9.30	Registration			SPC
9.30 – 10.00	Workshop Opening: - Prayer - Tuvalu Govt remarks - UNDP remarks - SPC remarks Group photo	Official opening programme		Susan Tupulaga
<b>10.00 – 10.30 Morning Tea</b>				
10.30 – 11.15	Introductions and Objectives Setting	Identify participant objectives, needs assessment  Outline purpose of the workshop and sessions covered	Ask participants to introduce themselves and say what they hope to get out of the week	SPC
11.15 – 11.45	National development strategy (Te Kete)	To better understand the national development strategy	Presentation from the Ministry of Finance	Ministry of Finance
11.45 – 12.30	Introduction to early warning systems (EWS)	"What is EWS", and how does it fit within Tuvalu's development strategy?	Presentation from SPC	SPC
<b>12.30 – 1.30 Lunch</b>				
1.30 – 2.00	Strengthened prediction, monitoring and warning services	Create awareness of the new forecast products and tools provided by TMS	Presentation from the TMS	TMS
2.00 – 3.00	Strengthened Risk Knowledge	To learn about the Tuvalu Coastal Adaptation Project (TCAP) and its outputs to strengthen Risk Knowledge	Presentation from SPC / TCAP	SPC / TCAP
3.00 – 3.45	Emergency response	To increase awareness of emergency response in Tuvalu, role of NDMO and functions of Red Cross	Presentation from the NDMO and Red Cross	NDMO, Tuvalu Red Cross
3.45 – 4.30	Dissemination/ Communication.	Communicating from Tuvalu Met Services and the role of media to reach the last mile	Presentation from the TMS and Tuvalu Media Corp	TMS / NDMO (Tuvalu Media Corp.)
<b>4.30 Wrap-up and Afternoon Tea</b>				

## Day 2: Thursday 1 June

Time	Session	Objective	Activities	Presenter
9.00 – 9.30	Ice breaker and recap	Review yesterday's work, outline the day ahead	- Icebreaker – Glossary activity - identify new words and their meanings - Wall of questions	
9.30 – 10.00	Tuvalu Stakeholder Needs mapping: (5 min slideshow from each sector) - Met Services - Fisheries - Environment	To improve understanding of the various needs, gaps, and requirements of relevant ocean stakeholders in Tuvalu	Each sector will be required to fill out a slideshow template to be presented during the workshop	
<b>10.00 – 10.30 Morning Tea</b>				
10.30 – 12.30	- Land and Surveys - Climate Change - Local Government - Agriculture - Tourism - Education	To improve understanding of the various needs, gaps, and requirements of relevant ocean stakeholders in Tuvalu	Each sector/agency will be required to fill out a slideshow template to be presented during the workshop	
<b>12.30 – 1.30 Lunch</b>				
1.30 – 4.00	- Marine and Ports Services - Maritime Police - National Disaster Management Office - Tuvalu Red Cross - Fishing Club - Local shipping agency - Community groups (Falekaupule) - Women Group - Youth Group Etc.	To improve understanding of the various needs, gaps, and requirements of relevant ocean stakeholders in Tuvalu	Each sector will be required to fill out a slideshow template to be presented during the workshop	
<b>4.00 – 4.30 Afternoon Tea</b>				

## Day 3: Friday 2 June

Time	Session	Objective	Activities	Presenter
9.00 – 9.30	Recap			
9.30 – 10.15	ECIKS Project	Introduction to the Enhancing Climate Information and Knowledge Services (ECIKS) Project for Tuvalu	Presentation from ECIKS and SPC	ECIKS PMU (Suzanne / Faoliu) and SPC
<b>10.15 – 10.45 Morning Tea</b>				
10.45 – 11.00	Gender Equality, Disability and Social Inclusion (GEDSI) / people-centred approach (PCA)	Understand the GEDSI framework under the ECIKS Project	Presentation from Department of Gender Affairs and SPC	Department of Gender Affairs / SPC
11.00 – 12.30	Group work	Identify ways relevant stakeholders can support and add value to ECIKS delivery and how they can benefit from ECIKS	Participants are divided into groups and discuss supporting ECIKS activities and identifying outputs that could support respective services	
<b>12.30 – 1.30 Lunch</b>				
1.30 – 3.30	Group work	Prioritise needs identified through stakeholder presentations	Participants will prioritise needs identified using sticky pads	
3.30 – 4.00	Way forward	Co-designing ECIKS activities and discussing way forward	Reflections from the workshop	SPC
<b>4.00 – 4.30 Afternoon Tea</b>				
5.30	Evening function			

## Annex 3: Workshop Feedback

Coastal Science Workshop								
	Gender	Age Group	Presentation Content and Delivery	Training Manual / Materials	Learnt Something New (improved knowledge)	Venue	Catering	Comments
1	Female	31-40	Very Effective	Extremely effective	Coastal Monitoring	Very good	Very good	
2	Male	18-30	Very effective	Extremely effective	Ocean and Climate Science, Coastal Hazards, Coastal Monitoring	Very good	Very good	Thanks
3	Male	31-40	Very effective	Extremely effective	Coastal monitoring	Very good	Very good	
4	Male	18-30	Very effective	Extremely effective	Ocean and Climate Science, Coastal Hazards, Coastal Monitoring	Good	Good	
5	Male	18-30	Very effective	Extremely effective	Coastal monitoring	Very good	Very good	
6	Male	18-30	Very effective	Extremely effective	Coastal monitoring	Very good	Very good	
7	Male	51+	Very effective	Very effective	Ocean and Climate Science, Coastal Hazards, Coastal Monitoring	Very good	Very good	Thank you very much
8	Male	51+	Very effective	Extremely effective	Ocean and Climate Science, Coastal Hazards, Coastal Monitoring	Very good	Very good	Looking forward to the next training
9	Male	18-30	Very effective	Extremely effective	Ocean and Climate Science, Coastal Hazards, Coastal Monitoring	Very good	Good	
10	Female	18-30	Very effective	Not so effective	Ocean and Climate Science	Very good	Very good	
11	Female	31-40	Very effective	Very effective	Ocean and Climate Science, Coastal Hazards, Coastal Monitoring	Very good	Good	
12	Female	18-30	Effective	Effective	Coastal Monitoring	Very good	Good	Informative and productive. Most interested about coastal monitoring and developing one for Tuvalu.
13	Male	18-30	Extremely effective	Very effective	Coastal Hazards, Coastal Monitoring	Very good	Very good	Very informative training
14	Male	18-30	Extremely effective	Very effective	Coastal Monitoring	Very good	Very good	

Coastal Science Workshop (continued)								
	Gender	Age Group	Presentation Content and Delivery	Training Manual / Materials	Learnt Something New (improved knowledge)	Venue	Catering	Comments
15	Female	18-30	Extremely effective	Effective	Coastal Hazards, Coastal Monitoring	Very good	Very good	
16	Male	31-40	Extremely effective	Very effective	Ocean and Climate Science	Very good	Very good	
17	Male	31-40	Extremely effective	Very effective	Ocean and Climate Science	Very good	Very good	A word of thanks to everyone for the great presentations and discussions. I found things very educational and would like to have a copy of your presentations for teaching purpose.
18	Male	41-50	Extremely effective	Very effective	Coastal Monitoring	Very good	Very good	
19	Female	18-30	Extremely effective	Effective	Ocean and Climate Science, Coastal Monitoring	Very good	Very good	
20	Female	18-30	Very effective	Effective	Ocean and Climate Science, Coastal Monitoring	Very good	Very good	
21	Male	31-40	Very effective	Very effective	Coastal Hazards, Coastal Monitoring	Very good	Very good	
22	Male	41-50	Very effective	Very effective	Ocean and Climate Science, Coastal Hazards	Very good	Good	More practical training (coastal science, hazards etc). More scenarios around the Pacific.



Disaster Risk Assessment							
	Gender	Age Group	Training - Relevance	Presentation Content and Delivery	Learning Activities	Presentations (further info needed)	Comments
1	Female	31-40	Strongly agree	Very effective	Very effective	It's all about technical training and was really useful to build up my knowledge	More time needed
2	Male	31-40	Strongly agree	Very effective	Very effective	It would be good to have all the vulnerabilities of all sectors in each island. Then it would be interesting to see if we overlay that with our assets and compare the risks from the past, the current and future scenarios.	Good to have a follow up training with more hands-on exercises to see if we actually grasp the concept of risk assessments. Or maybe if there are any projects in the pipeline to use that as an example or exercise and see how we do the risk assessment and then compare with the work of the consultant doing the same work.
3	Male	18-30	Strongly agree	Very effective	Very effective	Risk Assessment	Technical training to be delivered at national level by stakeholder or departments that participated in the technical training. In this way the knowledge gain will be maintained and, most importantly, stakeholders can and will apply the skills gained to the real world or to your line of work.
4	Male	31-40	Strongly agree	Very effective	Very effective	Great group activities and for the rating scale for Risk matrix and others. I think we should kind of finalise or come up with an overall scale but I think depending on the country how they have been affected by e.g. tropical cyclone.	Great training, a lot has been learned
5	Female	18-30	Strongly agree	Very effective	Very effective	Risk matrix to be shared so that we can use it for our community work	Enjoyable and informative
6	Female	31-40	Strongly agree	Very effective	Very effective	Coastal and disaster risk assessment program	Thank you for the very interesting training especially topics that have activities to do in groups

Disaster Risk Assessment (continued)							
	Gender	Age Group	Training - Relevance	Presentation Content and Delivery	Learning Activities	Presentations (further info needed)	Comments
7	Female	18-30		Very effective	Very effective	Everything was pretty clear. It was good to have a basic understanding of the risk assessment process.	The training was very relevant to the work we carry out. It would be good to carry out a similar training for communities through us and other stakeholders.
8	Female	18-30	Agree	Very effective	Very effective		
9	Male	18-30	Agree	Effective	Very effective	The interpretation of graphs and tables available on the online ocean portal	Overall, the facilitators were easy to communicate with as they were very approachable.
10	Male	18-30	Strongly agree	Very effective	Very effective	Disaster Risk Assessment Category	
11	Male	18-30	Strongly agree	Very effective	Very effective	Ocean monitoring and warning system	
12	Male	31-40	Agree	Effective	Very effective		More activities will be great.
13	Male	51+	Strongly agree	Very effective	Very effective	Everything is needed to further our understanding of the impact of the risks before it actually occurs.	Need to have further workshops and I would suggest to have more people participate in future trainings.

EWS Stakeholder Engagement							
	Gender	Age Group	Workshop Objectives (met expectations)	Learning Activities	Most Useful Presentation/s	Presentations (further info needed)	Comments
1	Male	18-30	Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; ECIKS Project; GEDSI/PCA.	Impact based forecasting  Prediction/Monitoring Warning Services	Recommend to have this training with all government agencies engaged in DRR and EWS again in the near future.
2	Male	51+	Maybe	Somewhat effective	Introduction to Early Warning Systems	Te Kete	Need more support from you because more awareness is needed.
3	Male	51+	Yes	Very effective	Strengthened Risk Knowledge  Dissemination  Communication	Training on strengthened risk knowledge	
4	Female	31-40	Yes	Very effective	Introduction to Early Warning Systems. Strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication; ECIKS Project; GEDSI/PCA.	Red Cross database  DMO database	Great training. Too bad we didn't receive invitation in time for us to be here since Day 1.
5	Female	18-30	Yes	Very effective	Introduction to Early Warning Systems (EWS); Emergency Response; ECIKS Project.	EViews Project  SPC risk and vulnerability assessment	Learned a lot from stakeholder and SPC technical team input and contribution – excellent content.
6	Female	18-30	Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication; ECIKS Project; GEDSI/PCA.		Great content relevant to our work in DRR
7	Male	18-30	Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response.	Early Warning System  Field practical work in the future (coastal monitoring)	

EWS Stakeholder Engagement (continued)							
	Gender	Age Group	Workshop Objectives (met expectations)	Learning Activities	Most Useful Presentation/s	Presentations (further info needed)	Comments
8	Female	18-30	Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened Risk Knowledge; Emergency Response; ECIKS Project; GEDSI/PCA.	National development strategy	The workshop was very effective. I learnt new things from the workshop.
9	Female	31-40	Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication; ECIKS Project.	Strengthened risk knowledge and information on emergency response	Thank you for the interesting workshop.
10	Male	31-40	Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication.	Te Kete	
11	Female	31-40	Yes	Very effective	Strengthened prediction, monitoring and warning services; Dissemination/Communication.	Projects provided and some are not yet implemented	
12	Male		Yes	Very effective	Introduction to Early Warning Systems (EWS); ECIKS Project.	Projects provided and some are not yet implemented	The next workshop I suggest if this could reach to the communities in the outer islands to learn more of the people vulnerable to risk and early warning systems.
13	Male		Yes	Very effective	National Development Strategy (Te Kete); introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication.	All the presentations listed	Looking forward to another training to provide more ideas and gain more knowledge.

EWS Stakeholder Engagement (continued)							
	Gender	Age Group	Workshop Objectives (met expectations)	Learning Activities	Most Useful Presentation/s	Presentations (further info needed)	Comments
14	Male		Yes	Very effective	National Development Strategy (Te Kete); Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication.	Strengthened prediction, monitoring and warning service	
15	Male		Yes	Very effective	National Development Strategy (Te Kete); Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication.		Hope to see you guys soon
16	Male		Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication; ECIKS Project.	Strengthened prediction, monitoring and warning system	Very informative presentations
17	Male		Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication; ECIKS Project.	National Development Strategy ECIKS Project GEDSI/PCA	
18	Female		Yes	Very effective	National Development Strategy (Te Kete); Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/Communication.		

EWS Stakeholder Engagement (continued)							
	Gender	Age Group	Workshop Objectives (met expectations)	Learning Activities	Most Useful Presentation/s	Presentations (further info needed)	Comments
19	Female		Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/ Communication.		Thanks SPC team for your contribution. Thanks for all the presentations.
20	Male		Yes	Very effective	Introduction to Early Warning Systems (EWS); strengthened prediction, monitoring and warning services; strengthened Risk Knowledge; Emergency Response; Dissemination/ Communication.		





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