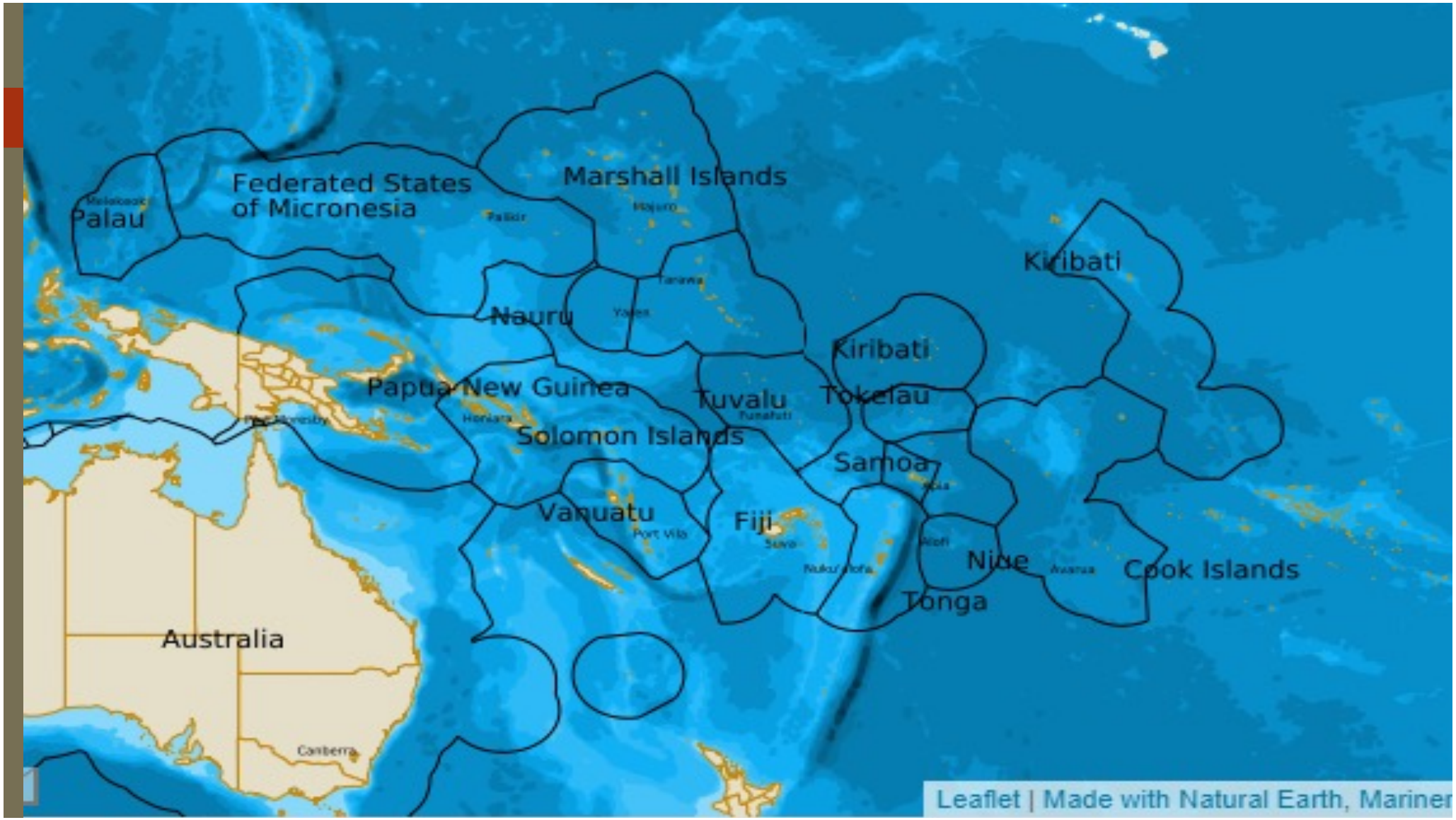
# COOK ISLANDS

ITIC-IOC Hawaii, 7–18 August 2023 Tsunami Early Warning Systems

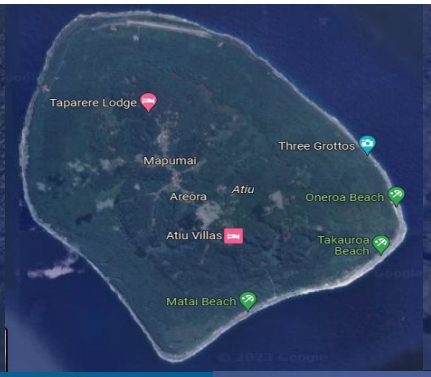
Tauepa Tutakiao-Tupa: Emergency Management CI

Nathan Tisam: Cook Islands Met Service


Palau
Federated States of Micronesia
Marshall Islands
Nauru
Kiribati
Kiribati
Papua New Guinea
Tuvalu
Tokelau
Solomon Islands
Samoa
Vanuatu
Fiji
Niue
Cook Islands
Tonga
Australia
Canberra
Leaflet | Made with Natural Earth, Mariner


Te Tautua Village
Omoka Village
TAUTUA
Penrhyn

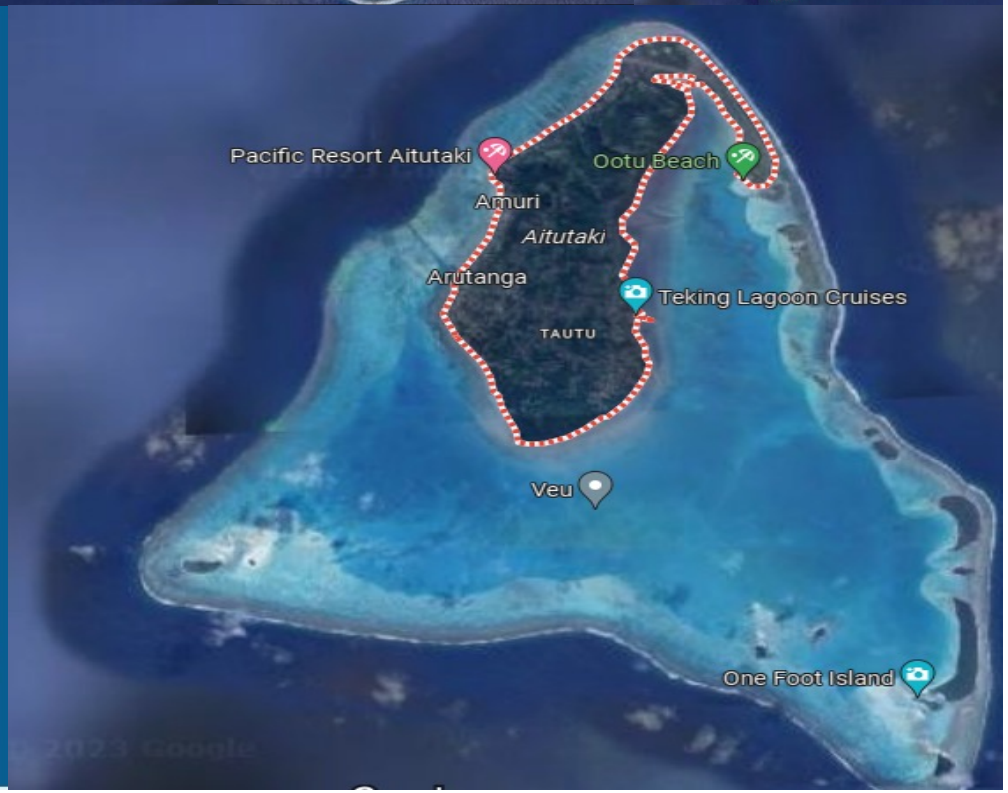

Rakahanga
village
Nivano
RAKAHANGA


Taparere Lodge
Three Grottos
Mapumai
Areora
Atiu
Oneroa Beach
Atiu Villas
Takauroa Beach
Matai Beach


Seabreeze
Mangarei Village
Atai
Taurangi
Takaue
Google


Mangaia Villas
Karanga Village
Oneroa Village
Iriua Village
Mangaia
Anahui Beach
Tamarua Village


Northern Cook Islands
Penrhyn
Rakahanga
Pukapuka
Manihiki
Nassau
Rarotonga
Inhabited Islands
Uninhabited Islands
Suwarrow
Rarotonga
Nikao
Avarua
Matavera
Arorangi
Ngatangiia
Titikaveka
Southern Cook Islands
Palmerston
Aitutaki
Manuae
Rarotonga
Takutea
Mitiaro
Atiu
Mauke
Mangaia


Pacific Resort Aitutaki
Ootu Beach
Amuri
Aitutaki
Arutanga
Teking Lagoon Cruises
TAUTU
Veu
One Foot Island

# History

- First observation done in Oct 1899 on Rarotonga
- Most stations in the Pa Enua commence reporting around WWII
- 1maned Stations(Rarotonga), 10 AWS station on outer islands
- Met Service NZ ran from 1967 till 1992
- Became a WMO Member in 1996

# MoT Umbrella

## Taka o te Rangi

### Aviation

Aviation is an essential lifeline that connects our people to the world and the world to our little nation. It overcomes oceans and borders therefore a transport mode that creates economic growth and also contributes to sustainable development. It provides freedom to travel, access to markets and facilitates the development and exchange of knowledge.

## Taka o te Moana

### Marine

Shipping is the backbone of world trade and international and domestic shipping plays an important role in our lives and our nation's economy. As international shipping services increases so does the volume delivered. With improved shipping service to the Pa Enua, it provides greater access by our people, to basic materials, goods and products thus improving the quality of life for all Cook Islanders.

## Taka o te Mareva


### Meteorological

Meteorological Service is focused on ensuring the safety of lives and promote human well-being. Timely alerts, predictions and other weather and climate information allow people to be more prepared and less vulnerable to extreme weather events. We enable decision makers to minimise risks and exploit opportunities in agriculture, public health, water resources, energy production, aviation, shipping and other sectors.

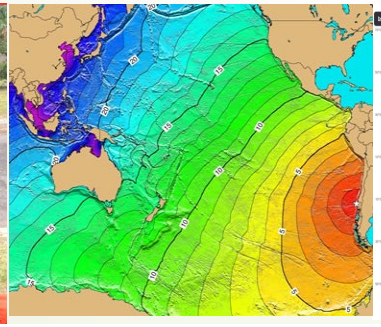
## Taka Taokotaianga

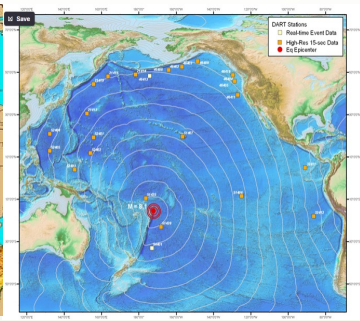
### Corporate

The Corporate Services function of the Ministry is committed to complying with the MFEM Act 1994-95 and Financial Policy and Procedures Manual and provides administrative services and manages the effective implementation of the Sale of Liquor Act and the Motor Vehicle Dealers Act. This function will also be responsible for the development and performance of its work-force.

# Responsibility

- The Cook Islands is one of the countries within the pacific ring of fire vulnerable to tsunamis in the Southwest Pacific. One of the most important responsibilities of the Cook Islands Meteorological Service, CIMS, is to ensure the safety of its people from the natural hazards that threaten their shores. As the authorized agency by the Cook Islands Government to provide early warnings for tsunamis, and as per requirements of the National Tsunami Response Plan for the Cook Islands.






Tsunami
EVACUATION
ROUTE


Tsunami
EVACUATION
ROUTE
STOP


Tsunami
EVACUATION
ROUTE
Raela villas
tikioki


HEAD


VAIPAE-
PAE-O-

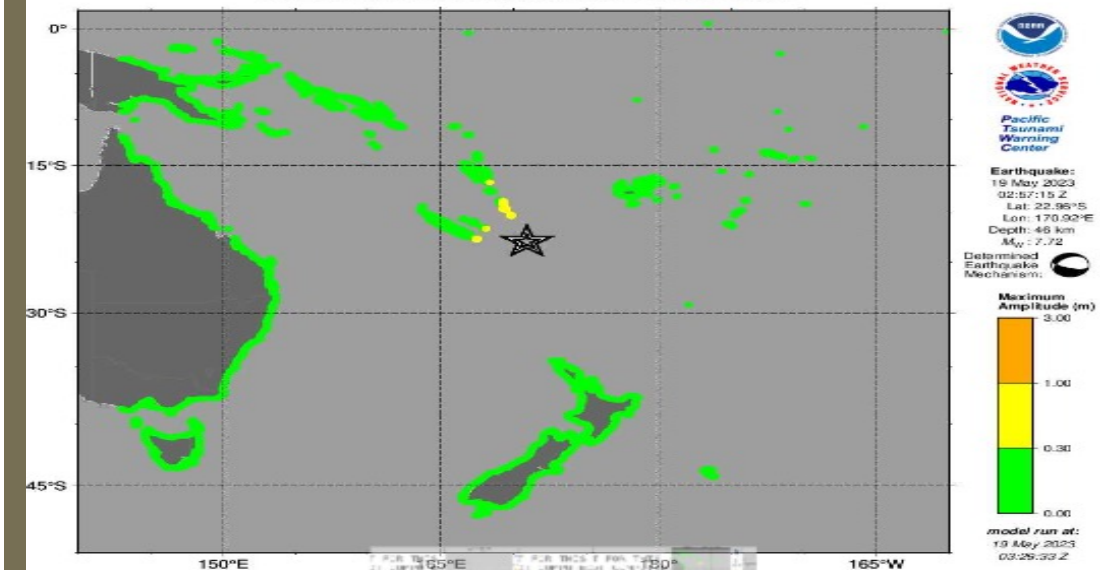
# Communications

- EMWIN
- Telephone
- Email
- AFTN

**PTWC Coastal Tsunami Amplitude Forecast**

Actual amplitudes at the coast may vary from forecast amplitudes due to uncertainties in the forecast and local features. In particular, maximum tsunami amplitudes on atolls and at locations with fringing or barrier reefs will likely be much smaller than the forecast indicates.

This message is issued for information only in support of the UNESCO/IOC Pacific Tsunami Warning and Mitigation System and is meant for national authorities in each country of that system. National authorities will determine the appropriate level of alert for each country and may issue additional or more refined information.




**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE *****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC PACIFIC TSUNAMI WARNING AND MITIGATION SYSTEM AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE *****

THE TSUNAMI FORECAST IS UNCHANGED IN THIS MESSAGE.

PRELIMINARY EARTHQUAKE PARAMETERS
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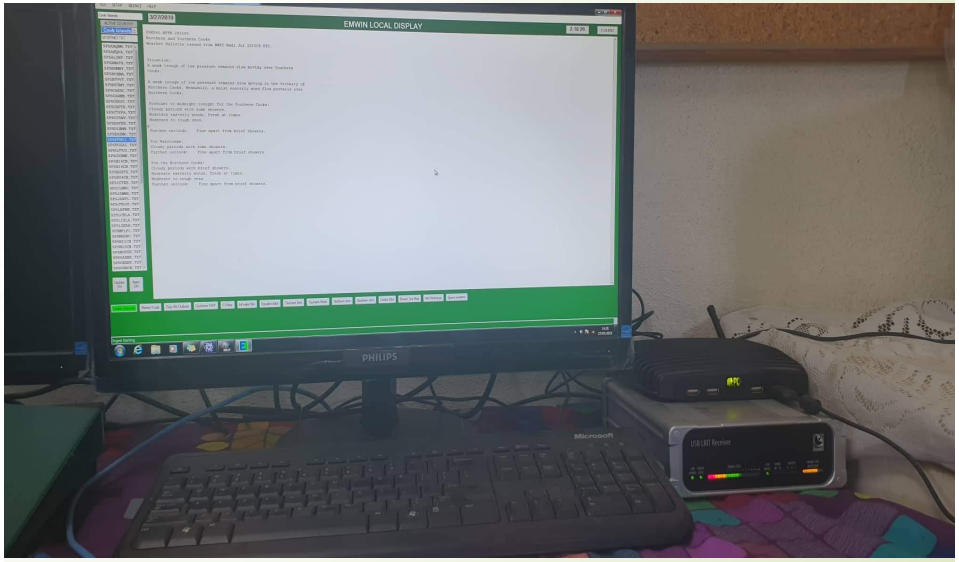
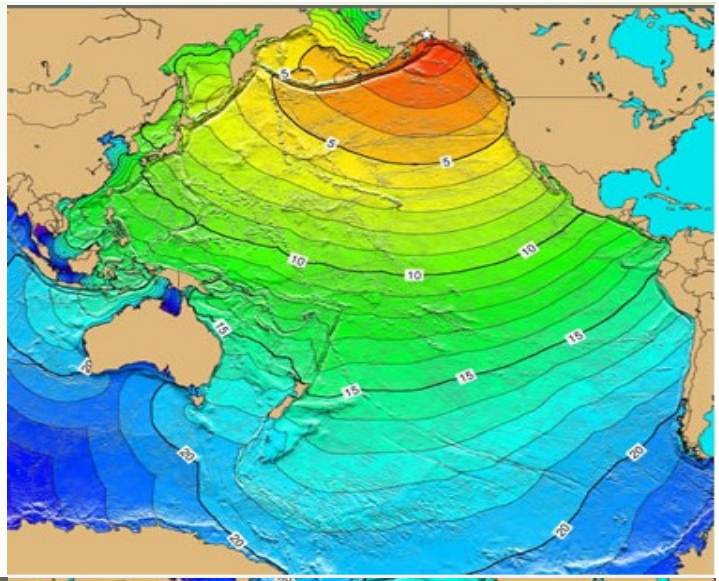
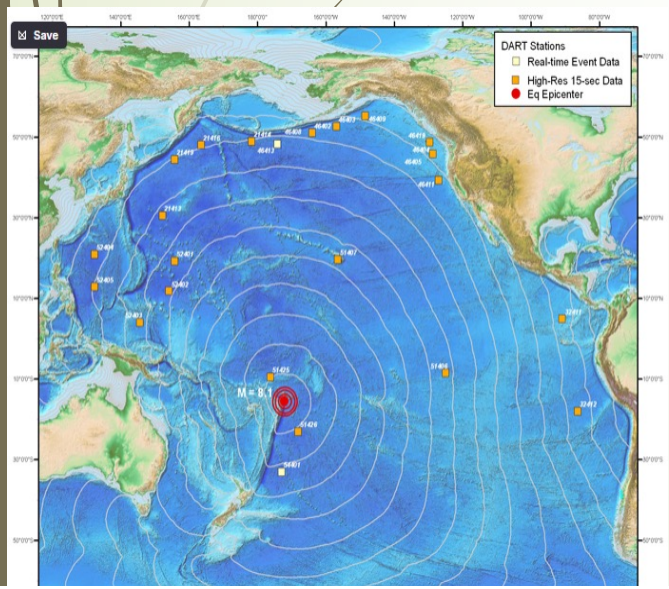
* MAGNITUDE 7.7
* ORIGIN TIME 0257 UTC MAY 19 2023
* COORDINATES 23.2 SOUTH 170.7 EAST
* DEPTH 10 KM / 6 MILES
* LOCATION SOUTHEAST OF LOYALTY ISLANDS

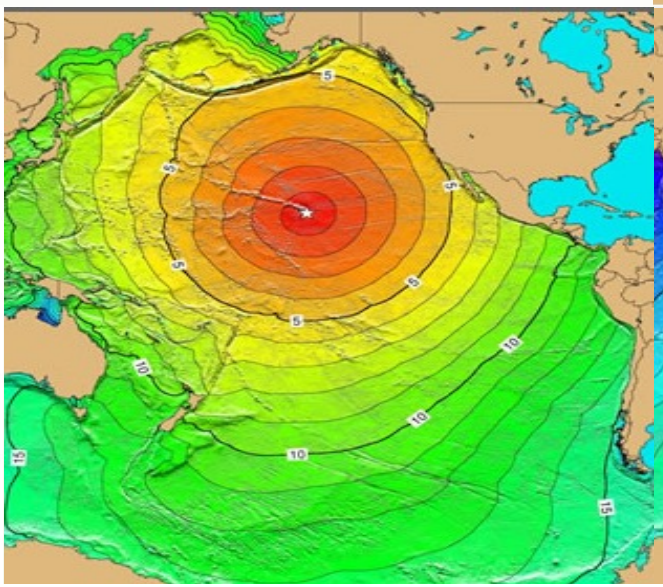


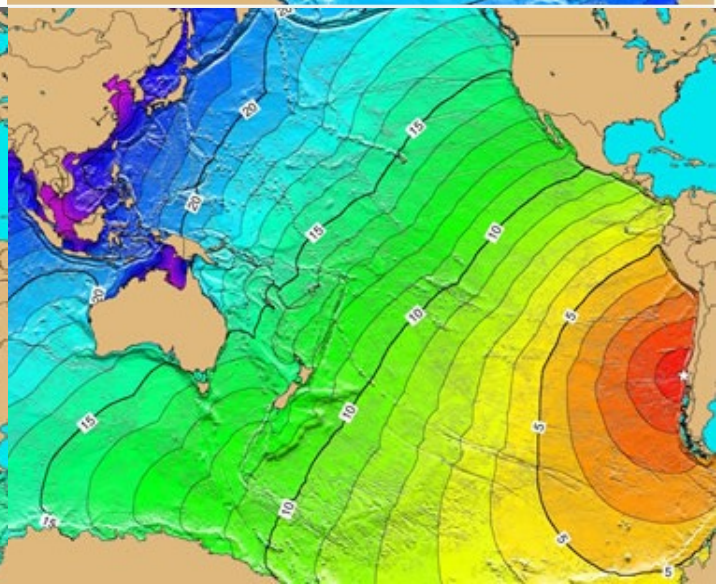
# Distant/Local threats

- Local source Tonga trench 3hr ETA
- Distant source over 6hrs



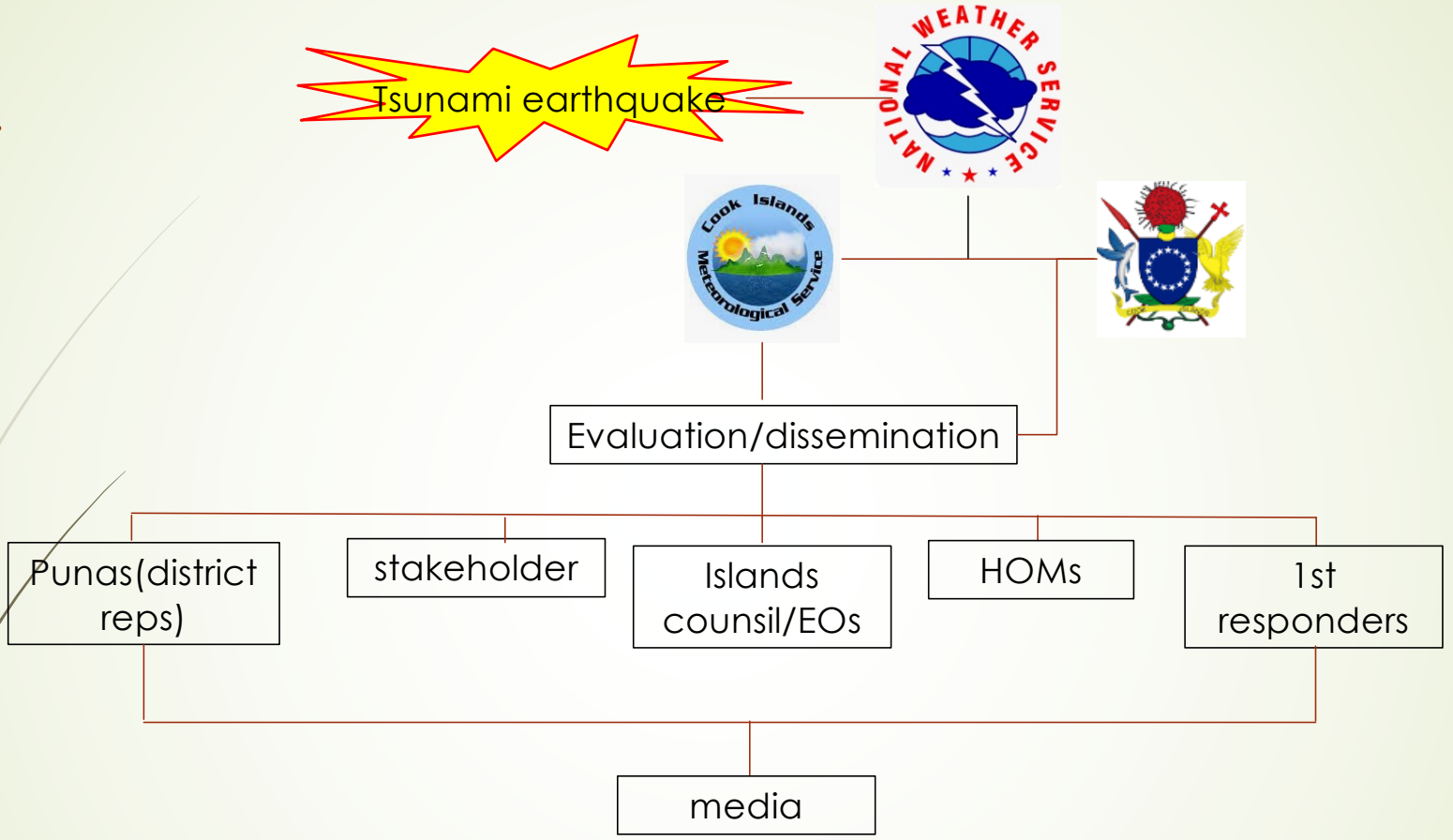




# Tsunami Bulletins

- **PTWC BULLETINS**
- PTWC notifies the CIMS, EMCI and CIAA of the issuance of various Tsunami Bulletins and subsequent bulletin cancellations. The agreed means of communicating these bulletins are via AFTN, Email, EMWIN (for text products only), and Internet (PTWC Website access). The types of bulletins issued are as follows:-
- 
- 1. PTWC Tsunami Information Statement
- 2. PTWC Tsunami Threat Message
- 3. PTWC Tsunami Threat Message with Regional Maps & Products
- 4. PTWC Monthly Scheduled Communication Test


Tsunami earthquake
Evaluation/dissemination
Punas(district reps)
stakeholder
Islands counsil/EOs
HOMs
1st responders
media

TSUNAMI WARNING AND ADVISORY TEMPLATES FOR THE COOK ISLANDS

**01 CIMS TSUNAMI INFORMATION BULLETIN (issued for Earthquake/Tsunami that poses No Threat**

Tsunami Information Bulletin for the Cook Islands issued by CITWC at (Local Date &Time)

* * * *This is for information only and DOES NOT REQUIRE ANY ACTION* * * *

An earthquake has occurred in (country and region) at (CI local time).

This event does not pose any significant tsunami threat to the Cook Islands

There will be no further bulletins issued on this system unless the situation changes.

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**04 CIMS TSUNAMI WARNING**(used for Earthquake >M7.8 that poses Tsunami Threat within 6 hours. This Includes sudden Earthquake in the Tonga Trench that could reach CI in 1.5 to 2.0 hours)

Tsunami Warning Bulletin Number 1for the Cook Islands issued by CITWC at (Local Date&Time)

* * * *This is a Tsunami Warning and requires immediate action* * * *

A strong Earthquake has occurred in (location, region) with the following parameters

Eg PRELIMINARY EARTHQUAKE PARAMETERS

| | |
|---|---|
| * MAGNITUDE | 8.1 |
| * ORIGIN TIME | 1844 UTC NOV 24 2016 |
| * COORDINATES | 11.9 NORTH 88.9 WEST |
| * DEPTH | 33 KM / 20 MILES |
| * LOCATION | OFF THE COAST OF CENTRAL AMERICA |

A tsunami has been generated and first waves exceeding one meter are expected to arrive into Cook Island waters around (insert local time from Tsunami Arrival Time(s) in PTWC bulletin)
OR

It is not yet confirmed if a tsunami has been generated but based on the strength of this event, it is very likely that significant tsunami waves possibly exceeding one meter in height could arrive into Cook Island waters within the next one and a half to two hours

**02 CIMS TSUNAMI ADVISORY (to be issued for Earthquake with potential Tsunami threat and more than 6 hours arrival time into CI Waters.**

Tsunami Advisory Bulletin Number1 for the Cook Islands issued by CITWC at ( CI Local Date &Time)

An earthquake has occurred in (location, region) with the following parameters

Eg.PRELIMINARY EARTHQUAKE PARAMETERS

| | |
|---|---|
| * MAGNITUDE | 7.0 |
| * ORIGIN TIME | 1844 UTC NOV 24 2016 |
| * COORDINATES | 11.9 NORTH 88.9 WEST |
| * DEPTH | 33 KM / 20 MILES |
| * LOCATION | OFF THE COAST OF CENTRAL AMERICA |

There is no immediate tsunami threat to the Cook Islands.

The system is being monitored and people are advised to **be on standby and ready to move to higher ground or inland** incase a tsunami warning follows.

**O3 CIMS ADVISORY CANCELLATION** (Only used if no follow warning is issued)

Tsunami Advisory Cancellation Message for the Cook Islands issued by CITWC at ( CI Local Date &Time)

The TSUNAMI ADVISORY for the event off the coast of Central Americais now CANCELLED.

This system no longer poses any threat to the Cook Islands.

This will be the final message issued on this event unless the situation changes.

**05 CIMS WARNING CANCELLATION MESSAGE** (used when threat has passed or threat no longer exists)

Tsunami WarningCancellation Message for the Cook Islands issued by CITWC at (Local Date&Time)

The TSUNAMI WARNING FOR THE COOK ISLANDS IS NOWCANCELLED.

The Tsunami threat from the (Name of Source .e.gCentral America)event has now LARGELY PASSED/NO LONGER EXISTS

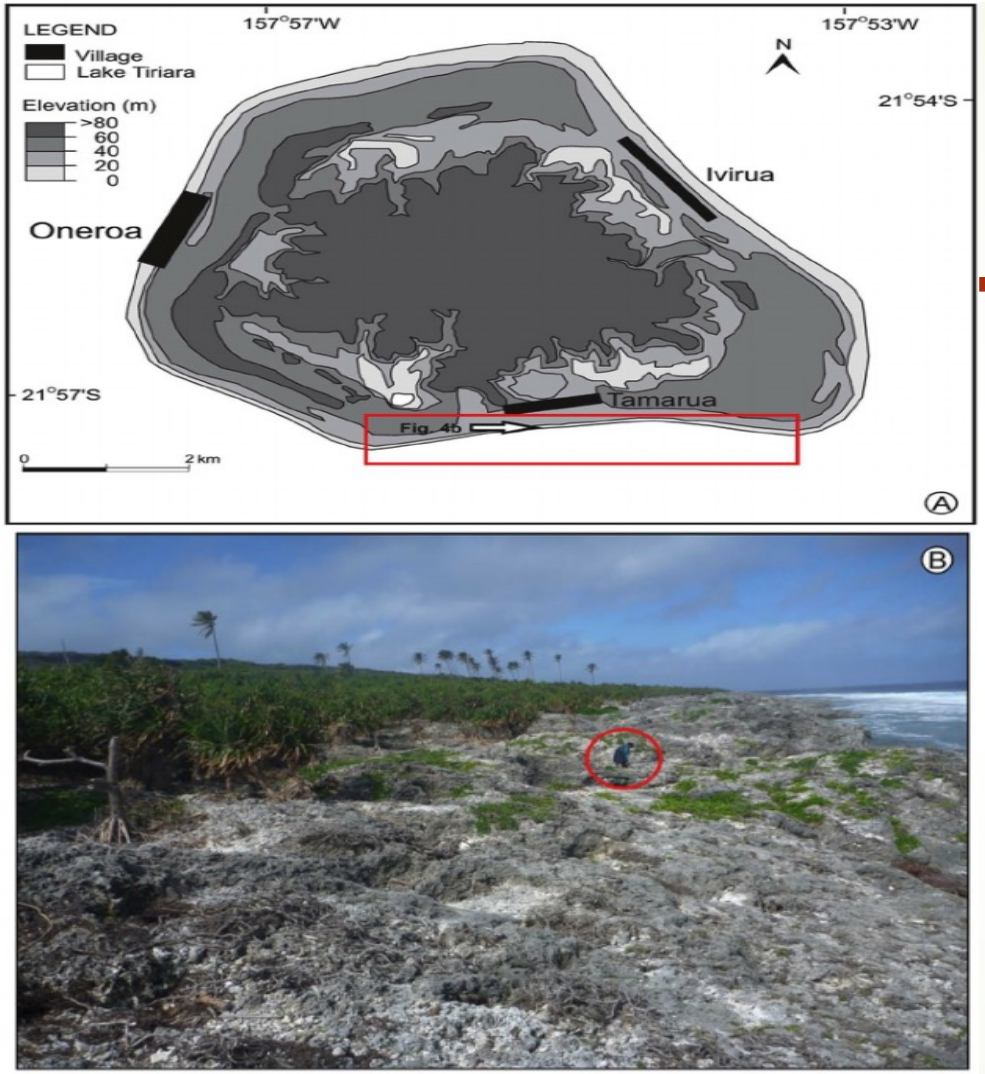
HOWEVER, SOME COASTS MAY STILL EXPERIENCE STRONG CURRENTS AND SMALL SEA LEVEL CHANGES FOR SEVERAL HOURS.

People should therefore exercise precaution when visiting local coastal waters of the Cook Islands.

This is the final message issued on this system unless the situation changes.


Speed 4x
Wave coming in

# Marine Lanslide




Mangaia, Cook Islands. (a) Plan view showing the ABLS on the south coast of the island (red box). (b) Photograph of 2010 tsunami- inundated area looking east (see arrow in (a)) with red circle indicating a person for scale (after Goff, 2011) (colour figure available online).

- A 2010 event on Mangaia, Cook Islands, is indicative of the importance of ABLS as well as the need for a better understanding of atoll-related tsunami hazards. The south coast of Mangaia has a cliffed and arcuate shape (Figure 4) that previous researchers identified as a site of probable large submarine slope failures (Summerhayes, 1967; Wood and Hay, 1970). The tsunamigenic implications of this instability, however, were only recently established. On 13 April 2010, a local tsunami with a maximum inun- dation of 100 m inland and a runup of 12 m a.s.l. struck the uninhabited south coast (Goff, 2011). This event was most likely caused by a small submarine slope failure associated with the geomorphologically distinct ABLS (Figure 4a). The tsunami went unreported and unrecognised at the time, but subsequent research revealed that it was only the most recent of an unknown number of previous inundations, with personal accounts from fishermen recalling at least two similar events over the past 20 years (Goff, 2011). Further work has also identified a series of similar events on the adjacent islands of Mauke and Atiu (J Goff, unpublished data, 2011), none of which is as yet documented in any historical tsunami database.



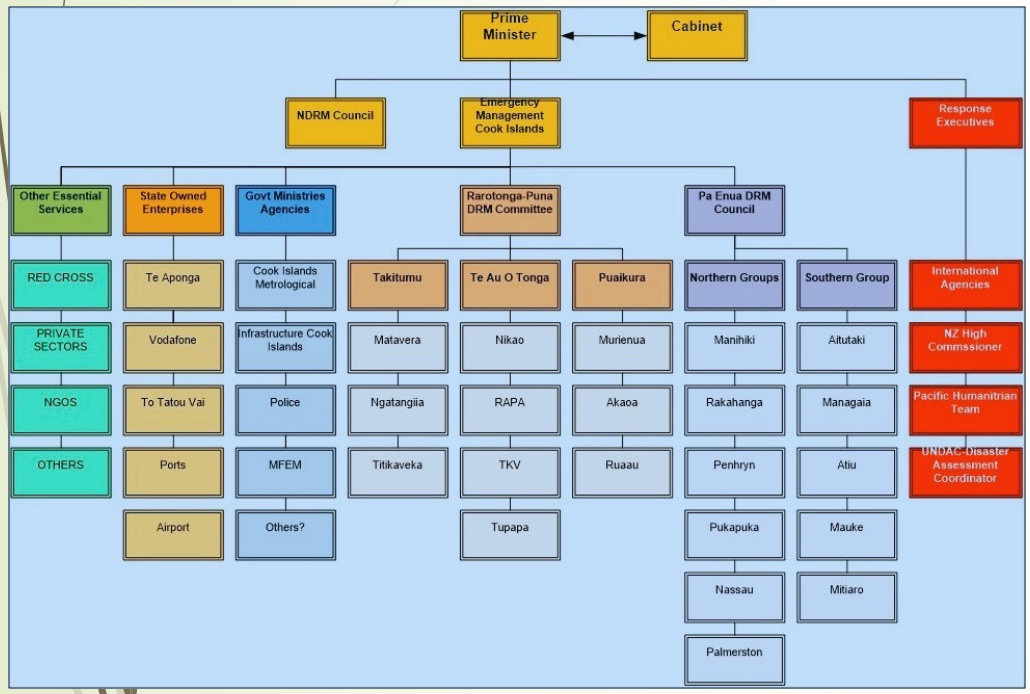
## WHAT IS COMMUNITY BASED EMERGENCY MANAGEMENT

Community based emergency management is a collaborative planning and engagement approach, designed to support communities and organizations in developing a safer, more resilient and sustainable future.

# "WHAT IS COMMUNITY BASED EMERGENCY MANAGEMENT"

Community based emergency management supports communities and organisations to work together and plan for emergencies by understanding:

- The people who live, work in and visit the community
- The assets, values and support systems of these people, including what they see as important
- Local priorities including the likely emergency scenarios that may affect the community
- What can be done, including what is already in place, what is considered acceptable and what can be improved
- The goals and actions to be completed by organizations, communities and organisations together, and by community members themselves, and
- Different ways of learning and working together before, during and after times of need.




## EMERGENCY MANAGEMENT COOK ISLANDS

Emergency Management Cook Islands (EMCI) is a division of the

Prime Minister's Office responsible for disaster management in the Cook Islands. The division is headed by Director Mr John Strickland

Currently Emergency Management in the Cook Islands is response focused and related to natural disasters like cyclones.

The new NDRM policy and proposed DRM Act 2023 will be focused on community based emergency management

# NATIONAL DISASTER RISK MANAGEMENT PLAN 2023

**Policy Vision:**

The NDRM Policy vision is to create a 'Safe, Resilient and Sustainable Cook Islands'

**Policy Goal:**

The policy goal is to strengthen its disaster risk management institutional arrangement to respond efficiently to national disasters by engaging, enabling, and empowering all sectors to address all hazards across all levels of disaster risk management from prevention, mitigation and preparedness to response, recovery and

## POLICY PRIORITY AREA 3
## MULTI HAZARD APPROACH

A Multi -Hazard Approach identifies and prioritizes a number of hazards

that could occur in the Cook Islands and identifies the lead government agency responsible for the hazard both in its risk reduction and disaster management.

The list of hazards are detailed as meteorological and hydrological hazards, biological hazards, geohazards, environmental hazards and

technical Hazards.

A table has been prepared on the next slide which identifies the hazard , level of risk and lead agency

# Policy Priority Area 3 Multi Hazard Approach

| HAZARD TYPE | RISK LEVEL | LEADING AGENCY | SUPPORT AGENCY/S |
|---|---|---|---|
| CYCLONE | High | EMCI | Each leading Agency is required under the Policy to develop a Disaster Management Plan for the responsible hazard<br><br>The DRM Plan will identify supportive agencies that can assist the leading agency during response or recovery to an emergency or a disaster |
| EPIDEMICS/PANDEMICS | High | Te Marae Ora (TMO) | |
| DROUGHT | High | To Tatou Vai (TTV) | |
| TSUNAMI | High | EMCI | |
| FLOODING | High | ICI | |
| FOOD SECURITY | High | Ministry of Agriculture | |
| INVASIVE SPECIES | High | Ministry of Agriculture | |
| PESTS/FRUIT FLY | High | Ministry of Agriculture | |
| CLIMATE CHANGE | High | Climate Change | |
| SEA SURGE | Medium | EMCI | |
| HAZARDOUS MATERIALS | Medium | Internal Affairs | |
| MARINE RESOURCES DISASTER | Medium | Ministry of Marine Resources | |
| EROSION | Medium | National Environment Services | |

# Policy Priority Area 4 All Agency Approach

| ORGANIZATION | MANDATE | RESPONSIBILITY |
|---|---|---|
| ARONGA MANA | House of Arikis Act 1966 | To advise the government on traditional matters, customs, and matters relative to the welfare of the people of the Cook Islands. |
| AIRPORT AUTHORITY | Airport Authority Act 1985<br>Civil Aviation Act 1990 | Responsible for any airport-related emergency or disaster. |
| COOK ISLANDS METEOROLOGICAL SERVICES | Meteorological Services Act 1995-96 | Disseminate Early Warning and maintains automated weather systems across the Pa Enua. |
| COOK ISLANDS INVESTMENT CORPORATION | Cook Islands Investment Corporation 1998 | Responsible for all government properties, including safety shelters |
| COOK ISLANDS CIVIL SOCIETY ORGANIZATION INC (CICSO) | Cook Islands Civil Society Organization 2012 | Bring together existing civil societies to liaise with government, international institutions and funding agencies, including conducting training and planning for its members. |
| EMERGENCY MANAGEMENT COOK ISLANDS | DRM Act 2007 | Coordinates National emergencies and Disasters and ensures all agencies have DRM plans to respond to all hazards |
| INFRASTRUCTURE COOK ISLANDS | Building Control Act 1991<br>Building Controls and Standards Act 2019 | Ensure all infrastructure like roads, bridges and infrastructure development include future climate-proofing, resilience, and better design principles. |
| MINISTRY OF AGRICULTURE | Agriculture Act 2021 | Address food security and livelihood needs of communities before, during and after disasters. Conducted rapid food security assessment during a disaster to provide an early recovery strategy. |
| MINISTRY OF EDUCATION | Education Act 2012 | Develop and implement DRM awareness and curriculum in schools, from primary to college and ensure the safety of its students. |
| MINISTRY OF FINANCE AND ECONOMIC MANAGEMENT | MFEM Act 1995-1996 | Provide the financial instruments and strategies for disaster risk management at all levels, from prevention, mitigation, and preparedness to response, recovery and reconstruction. |
| MINISTRY OF FOREIGN AFFAIRS AND IMMIGRATION | Cook Islands Immigration Act 2021 | Contact foreign government and international agencies when the government requests assistance in a national emergency or disaster. |
| MINISTRY OF INTERNAL AFFAIRS | Welfare Amendment Act 2014 | Responsible for vulnerability groups, which include gender, elderly, disability and children. |
| MINISTRY OF MARINE RESOURCES | Marine Resources Act 2005 | Protect the marine resources in the Cook Islands and ensure the sustainable development of living and non-living marine resources. |

POLICY PRIORITY
AREA 7
SCIENCE,
TECHNOLOGY &
TRADITIONAL
KNOWLEDGE

# Video clip of traditional knowledge documentary

# POLICY PRIORITY AREA 6
# ENGAGEMENT, ENABLEMENT, EMPOWERMENT




# Multi-hazard system

- Multi-hazard System: There is currently a project (Green Climate Fund??) to design a multi-hazard system with agreed alert levels and colour coding for the public. The importance of consistent messaging for different hazards was discussed. The project comes with funding for comms and is aiming to target agriculture, tourism, health and possibly two other sectors yet to be decided upon.

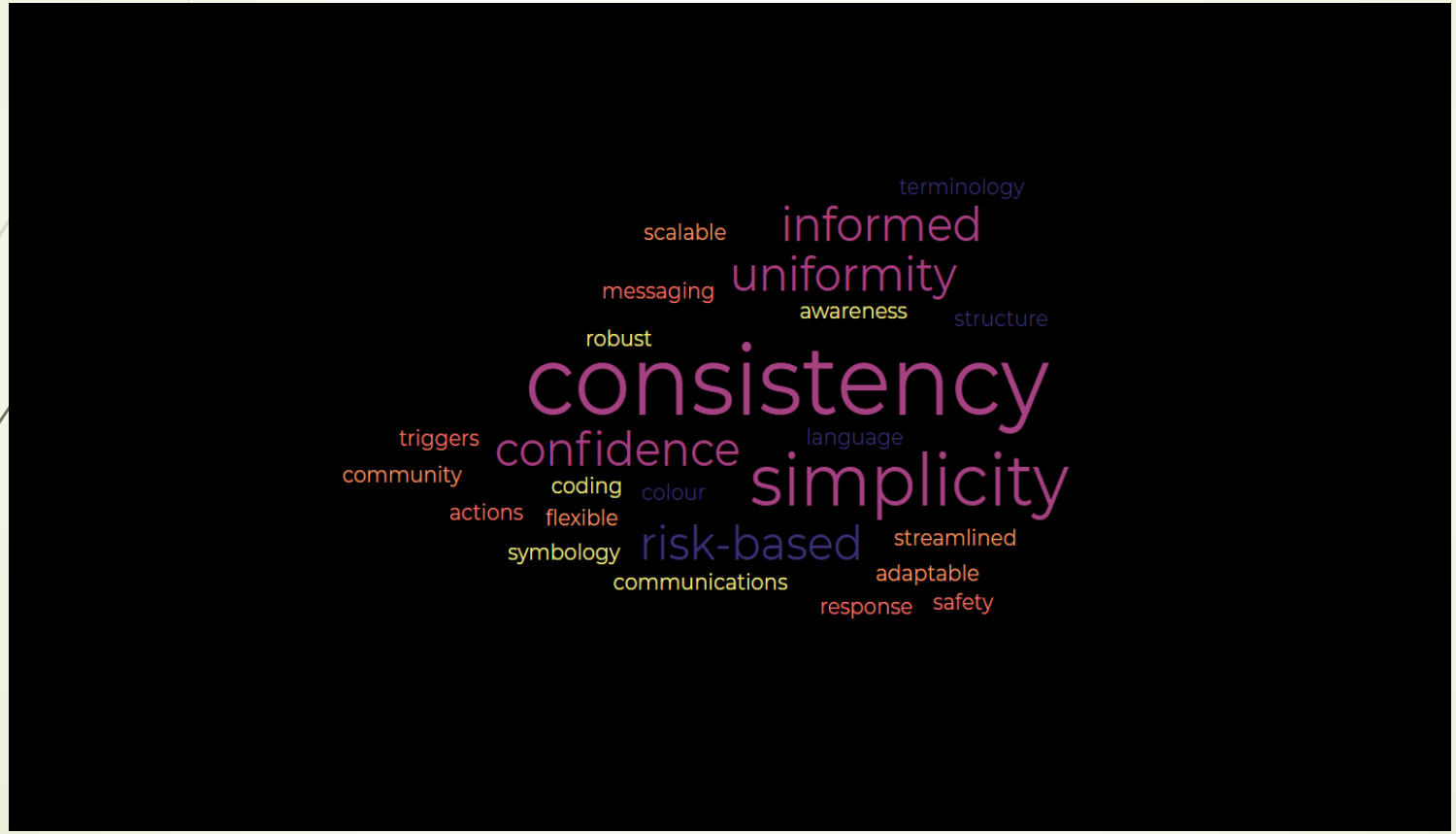
# Current warning systems

| Tropical Cyclone | | Wind | Flooding | Coastal Inundation | Drought Pa Enua | | Drought Rarotonga | | Tsunami | |
|---|---|---|---|---|---|---|---|---|---|---|
| Alert | gale-force within 24–48 hours | Meteorological warning (strong wind, gale wind, hurricane wind)<br><br>Unstructured<br><br>No Actions | Meteorological warning (heavy rainfall)<br><br>Unstructured<br><br>No Actions | Marine/ Meteorological warning (heavy damaging swell, coastal flooding)<br><br>Unstructured<br><br>No Actions | Normal | | Level 0 Normal | | Info. | Monitor |
| Warning | gale-force or stronger within 24 hours | | | | Water Watch | Awareness | Level 1 Water Advisory | Awareness | Watch | Be prepared |
| | | | | | Water Warning | Reduce consumption Prepare desal | Level 2 Water Warning | Actions and restrictions | Advisory | Evacuate beaches/ harbours |
| | | | | | Severe Drought | Action desal | Level 3 Phase 1 Emergency | Actions, restrictions, bans, alt. sources | Warning | Evacuate coastal zone |
| | | | | | Emergency | Alternative sources and treatment | Level 3 Phase 2 Disaster | Actions, restrictions, bans, external sources | | |

# What should our ideal framework achieve?

- Having a clearly informed community
- Streamlined workflow for EMCI and CIMS
- Relevance to Pa Enua as well as Rarotonga
- Be scalable, adaptable, flexible –
  - We know that things will change
  - Easy to add in new hazards, new inputs
- Easily translated into different mediums - communicated in multiple platforms
- Confidence in the system
  - By people who issue the warnings
  - By the people who receive the warnings
- Understandable- different languages, simplicity of language
- Gives directions for action, achieves responses
- Achieves timely responses

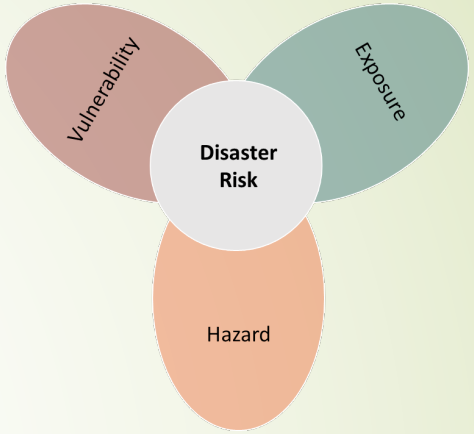
# Keywords


terminology
scalable
informed
uniformity
messaging
awareness
structure
robust
consistency
triggers
confidence
language
community
simplicity
coding
colour
actions
flexible
risk-based
streamlined
symbology
adaptable
communications
response
safety

# What are the key components?

- Clearly established levels:
  - Risk-based structure
  - Colour coded levels
- Defined key 'ingredients' of good messaging that feed into a message template
- Clear messaging plan:
  - Links to SOPs for comms.
  - Fixed action statements for different levels/triggers
- Incorporates time-based movements associated with different hazards
- Clearly defined triggers - our teams know where we are in a process
- Message contains all required messaging
- Clear symbology
- Involves consultation and improvements - feedback system
- Systematic communication procedures

| | | Impact/Consequence | | | |
|---|---|---|---|---|---|
| | | 1 (Minor) | 2 (Moderate) | 3 (Major) | 4 (Maximum) |
| | | • Unsafe conditions<br>• Minor disruptions<br>• Minimal asset damaged<br>• No economic loss | • Very unsafe conditions<br>• Major disruptions<br>• Some damage to assets<br>• Minor economic losses | • Damage to assets<br>• People injured<br>• Economic losses | • Damage to critical infrastructure<br>• Damage to many assets/houses<br>• People \die<br>• Major economic losses |
| **Likelihood** | | **Risk Rating** | | | |
| Almost Certain | >75% | Medium | Moderate | High | Extreme High |
| Likely | 30-75% | Low | Medium | Moderate | High |
| Possible | 10-30% | Very Low | Low | Medium | Moderate |
| Unlikely | <10% | Extremely Low | Very Low | Low | Medium |



| | | Impact/Consequence | | | |
|---|---|---|---|---|---|
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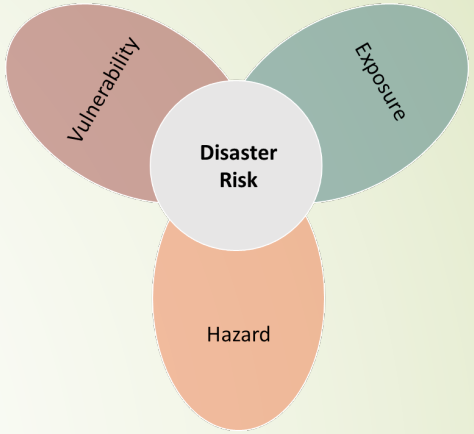
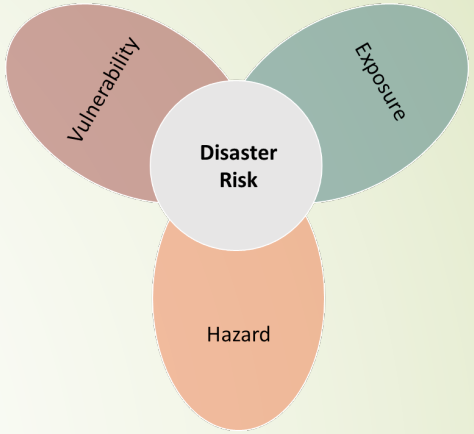



Business as usual

| Likelihood | | Impact/Consequence | | | |
|---|---|---|---|---|---|
| | | 1 (Minor) | 2 (Moderate) | 3 (Major) | 4 (Maximum) |
| | | • Unsafe conditions<br>• Minor disruptions<br>• Minimal asset damaged<br>• No economic loss | • Very unsafe conditions<br>• Major disruptions<br>• Some damage to assets<br>• Minor economic losses | • Damage to assets<br>• People injured<br>• Economic losses | • Damage to critical infrastructure<br>• Damage to many assets/houses<br>• People \die<br>• Major economic losses |
| | | **Risk Rating** | | | |
| Almost Certain | >75% | Medium | Moderate | High | Extreme High |
| Likely | 30-75% | Low | Medium | Moderate | High |
| Possible | 10-30% | Very Low | Low | Medium | Moderate |
| Unlikely | <10% | Extremely Low | Very Low | Low | Medium |




Be aware

| | | Impact/Consequence | | | |
|---|---|---|---|---|---|
| | | 1 (Minor) | 2 (Moderate) | 3 (Major) | 4 (Maximum) |
| | | • Unsafe conditions<br>• Minor disruptions<br>• Minimal asset damaged<br>• No economic loss | • Very unsafe conditions<br>• Major disruptions<br>• Some damage to assets<br>• Minor economic losses | • Damage to assets<br>• People injured<br>• Economic losses | • Damage to critical infrastructure<br>• Damage to many assets/houses<br>• People \die<br>• Major economic losses |
| **Likelihood** | | **Risk Rating** | | | |
| Almost Certain | >75% | Medium | Moderate | High | Extreme High |
| Likely | 30-75% | Low | Medium | Moderate | High |
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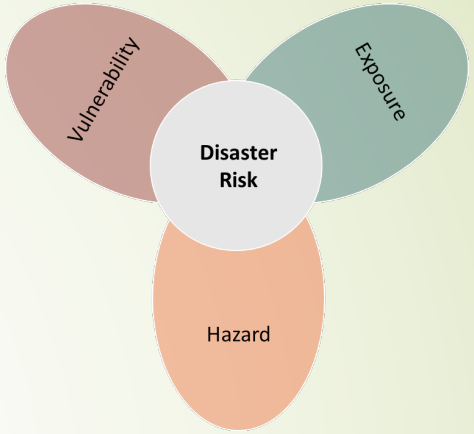


Be prepared

| | | Impact/Consequence | | | |
|---|---|---|---|---|---|
| | | 1 (Minor) | 2 (Moderate) | 3 (Major) | 4 (Maximum) |
| | | • Unsafe conditions<br>• Minor disruptions<br>• Minimal asset damaged<br>• No economic loss | • Very unsafe conditions<br>• Major disruptions<br>• Some damage to assets<br>• Minor economic losses | • Damage to assets<br>• People injured<br>• Economic losses | • Damage to critical infrastructure<br>• Damage to many assets/houses<br>• People \die<br>• Major economic losses |
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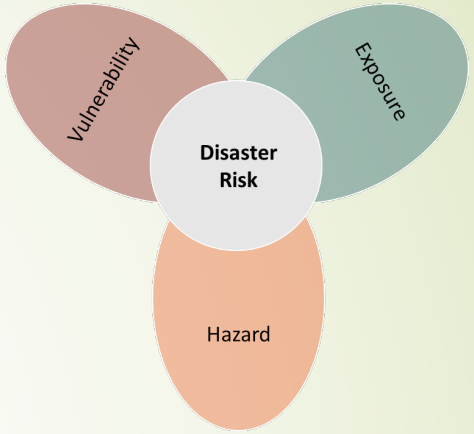


Act now

| | | Impact/Consequence | | | |
|---|---|---|---|---|---|
| | | 1 (Minor) | 2 (Moderate) | 3 (Major) | 4 (Maximum) |
| | | • Unsafe conditions<br>• Minor disruptions<br>• Minimal asset damaged<br>• No economic loss | • Very unsafe conditions<br>• Major disruptions<br>• Some damage to assets<br>• Minor economic losses | • Damage to assets<br>• People injured<br>• Economic losses | • Damage to critical infrastructure<br>• Damage to many assets/houses<br>• People \die<br>• Major economic losses |
| **Likelihood** | | **Risk Rating** | | | |
| Almost Certain | >75% | Medium | Moderate | High | Extreme Risk |
| Likely | 30-75% | Low | Medium | Moderate | High |
| Possible | 10-30% | Very Low | Low | Medium | Moderate |
| Unlikely | <10% | Extremely Low | Very Low | Low | Medium |

| **Multi Hazard Warning** | | |
|---|---|---|
| Info. | Monitor | Low Risk |
| Watch | Be aware | Medium Risk |
| Warning | Be prepared | Moderate Risk |
| Emergency | Act now | High Risk |

| Tropical Cyclone | | Wind | Flooding | Coastal Inundation | Drought Pa Enua | | Drought Rarotonga | | Tsunami | |
|---|---|---|---|---|---|---|---|---|---|---|
| Alert | gale-force within 24–48 hours | Meteorological warning (strong wind, gale wind, hurricane wind)<br><br>Unstructured<br><br>No Actions | Meteorological warning (heavy rainfall)<br><br>Unstructured<br><br>No Actions | Marine/ Meteorological warning (heavy damaging swell, coastal flooding)<br><br>Unstructured<br><br>No Actions | Normal | | Level 0 Normal | | Info. | Monitor |
| Warning | gale-force or stronger within 24 hours | | | | Water Watch | Awareness | Level 1 Water Advisory | Awareness | Watch | Be prepared |
| | | | | | Water Warning | Reduce consumption Prepare desal | Level 2 Water Warning | Actions and restrictions | Advisory | Evacuate beaches/ harbours |
| | | | | | Severe Drought | Action desal | Level 3 Phase 1 Emergency | Actions, restrictions, bans, alt. sources | Warning | Evacuate coastal zone |
| | | | | | Emergency | Alternative sources and treatment | Level 3 Phase 2 Disaster | Actions, restrictions, bans, external sources | | |

| Multi Hazard Warning | |
|---|---|
| Info. | Monitor |
| Watch | Be aware |
| Warning | Be prepared |
| Emergency | Act now |

# Frame work purpose

| | |
|---|---|
| Establishing Triggers and Action Statements for Priority Hazards | • Warning System Framework has **defined triggers** and **response actions** for priority hazards |
| Operational Observing and Monitoring for Triggers | • Operational process and confidence for detecting hazardous conditions across all high-priority hazards |
| Guidance for Warning Messages | • Guidance and clear understanding for the composition and communication of warning messages |

# Challenges

- Competency
- Communication
- Funding
- Awareness


MEITAKI MA'ATA
THANK YOU