

# *SOPAC*

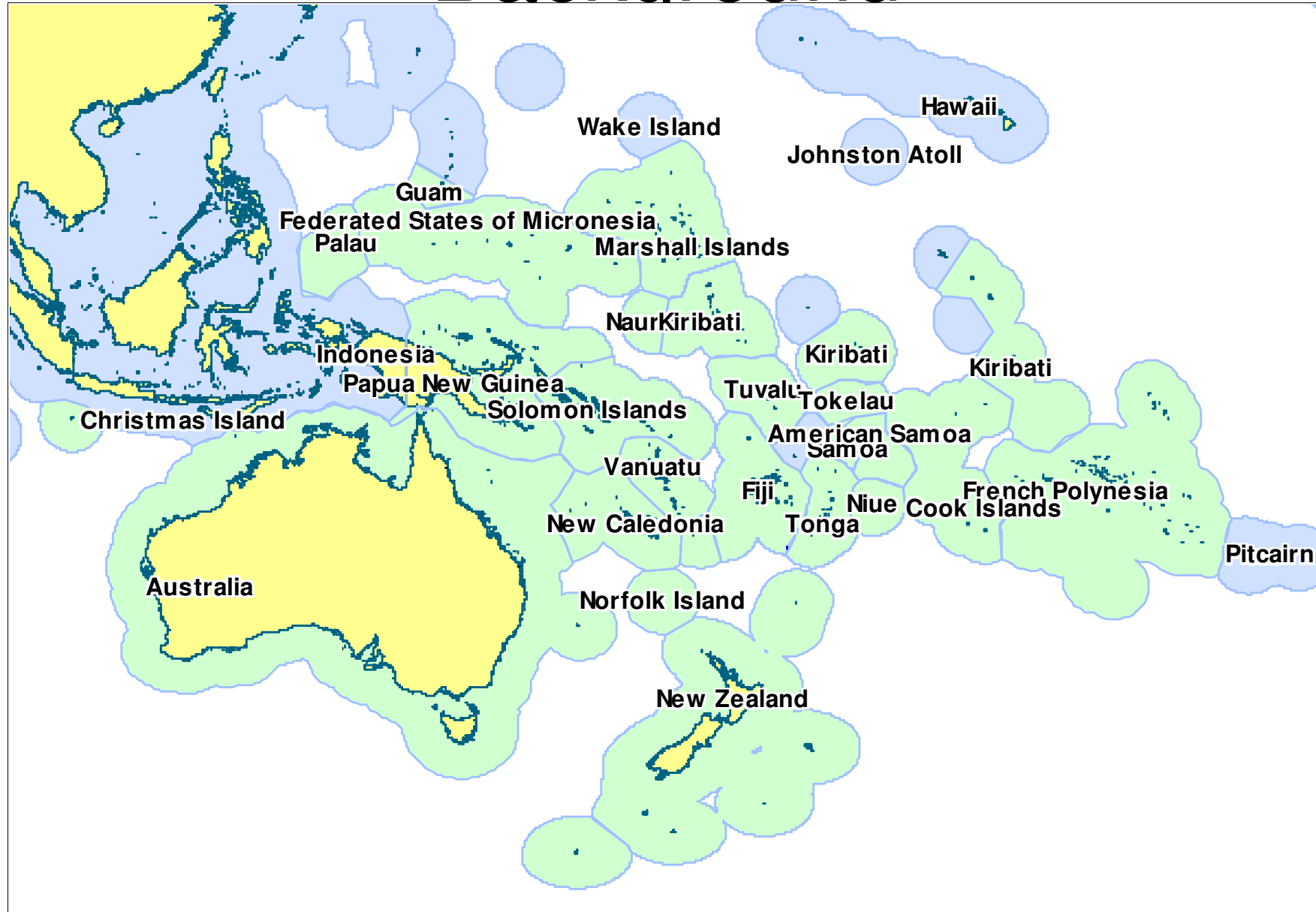
Pacific Islands Applied Geoscience Commission



## **Disaster Risk Reduction and Disaster Management in the Pacific**



# Background





**Setting the Scene**

# DRM Investment into Future

- Disasters are a development issue, affects
  - Economic costs
    - assets and infrastructure
    - basic service delivery – water, health, education
    - opportunity costs
  - Government's capacity to meet National Development Goals
  - Capacity of households to meet their basic needs – water, food and shelter (poverty and hardship)

# DRM Challenges

- Disaster treated as environmental and or humanitarian issue
- Sectoral and piece-meal approaches
- Weak national institutions and governance structures
- Disaster management seen as government/aid donor responsibility  
-> reliance on donor support
- Limited national budget allocated for DRR
- Perverse incentive to wait for disaster management support post disaster

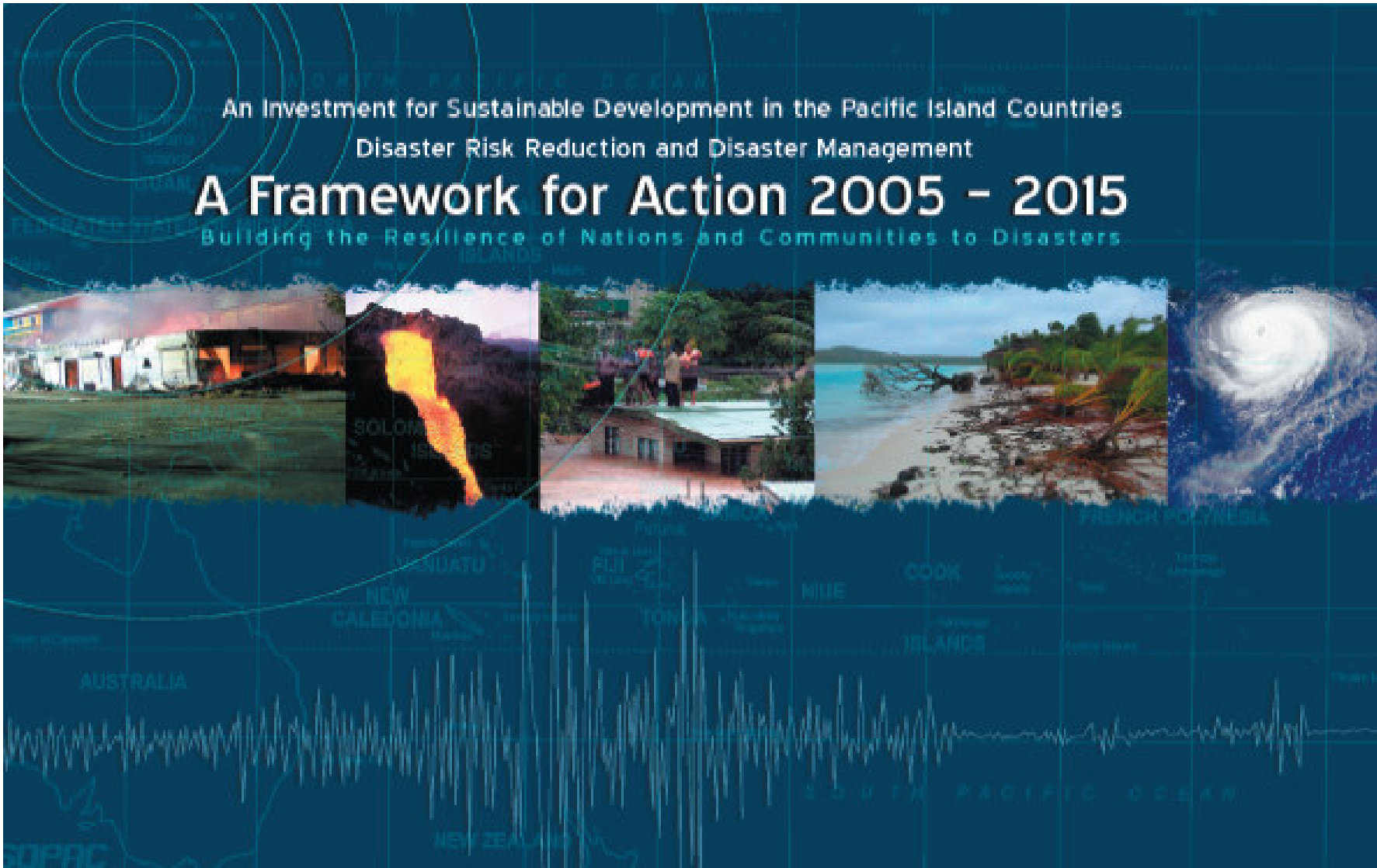
# Setting the Scene

- Ongoing and increasing vulnerability of Pacific Island nations and communities to the impacts of disasters.
- Led to increased national and regional commitments to disaster risk reduction and disaster management on an 'all hazards' basis in support of sustainable development

# Regional and International Commitments wrt DRM

- Yokohama Strategy for a Safer World (1994) and the International Strategy for Disaster Reduction (ISDR).
- Forum Economic Ministers and the Forum Leaders acknowledged disaster as a development issue in 2003
- Hyogo Framework for Action 2005 – 2015
- Regional Framework for Action for DRR and DM 2005 -2015
- Pacific Islands Framework of Action on Climate Change (PIFAC) 2006-2015
- Kalibobo Road Map of the Pacific Plan approved by Forum Leaders in 2005, called for operationalisation of regional frameworks at the national level to assist member countries to develop national capacity for an integrated DRM approach that focuses on
  - preventative measures to minimise risks,
  - preparedness in the event of a hazardous event,
  - effective and timely post disaster response and rehabilitation

# Regional Framework for Action







## Pacific Disaster Risk Management Partnership Network

- Established in February 2006 to assist PICs implement the Pacific DRM Framework for Action
- ~ thirty regional and international organisations.
- committed to assist and support PICs to develop and to implement their DRM National Action Plans (NAP), which will seek to identify and address national DRM priority needs.
- Main objectives are to:
  - Provide regional support for the development and implementation of National Action Plans
  - Establish and sustain a regional network of partners working in disaster risk management to improve regional cooperation, coordination and collaboration.
  - Strengthen the key thematic areas identified in the Pacific Framework for Action
  - Monitor and evaluate national progress against the targets of these national action plans.
  - Reduce duplication of effort and to ensure that assistance is built on the efforts and experiences of each other

# National Action Plan (NAP)

- National adaptation of the Regional Framework for Action
- Whole-of-country approach to ensure commitment at national, local and community or village level
- Identify DRR and DM priorities
- Develop a 3-year implementation programme
  - In line with reporting requirements under the Kalibobo Roadmap of the Pacific Plan
- Develop an national indicative programme with specific activities and costs

# Example from Vanuatu

- **Theme:** Information, Information System and Knowledge Management
- **Strategy:** Understand hazards, vulnerabilities, and communities at risk (hazard-scape) as a basis for disaster risk reduction and disaster management
- **Action:** Conduct hazard and vulnerability assessments, including assessment of potential impacts of particular scale of disaster event on 'at risk' communities, for input to sector planning for disaster risk reduction and disaster management.
- **Result:** Understanding the extent and scale of community vulnerability to hazards, to inform decisions related to DRR&DM.
- **Indicator:** Adaptation and risk reduction measures implemented.



# Samoa - Natural Disasters from 1964 - 2005

No of events*:	11
No of people killed*:	291
Average killed per year*:	7
No of people total affected*:	380,004
Average total affected per year*:	9,268
Economic Damage (US\$ X 1,000)*:	559,088
Economic Damage per year (US\$ X 1,000)*:	13,636

\* Reported

Source of data: "EM-DAT: The OFDA/CRED International Disaster Database  
Université catholique de Louvain, Brussels, Belgium" / Data version: v06.06

# Samoa – Recent Events

<b>Disaster Type</b>	<b>Impacts</b>	<b>Estimated Economic Costs (Reported)</b>
Flood (2001)	~ 5,000 affected	~ USD 4 million [Yeo, 2001]
TC Heta (2004)	trees, crops and coastal infrastructure damaged Power, water, transport and other services disrupted several houses destroyed no fatalities	~ US\$30 million (about 12% of GDP) [World Bank, 2004]
TC Olaf (2005)	power lines on Savai'i Extensive tidal damage coastal areas Faleolo International Airport closed during and after cyclone	Damage USD??

# Flood Modelling and Mapping

## Flood hydrology

- Records of annual maximum flow
  - >100 years Rainfall intensity data
- Model as peak flow ( $\text{m}^3/\text{s}$ )

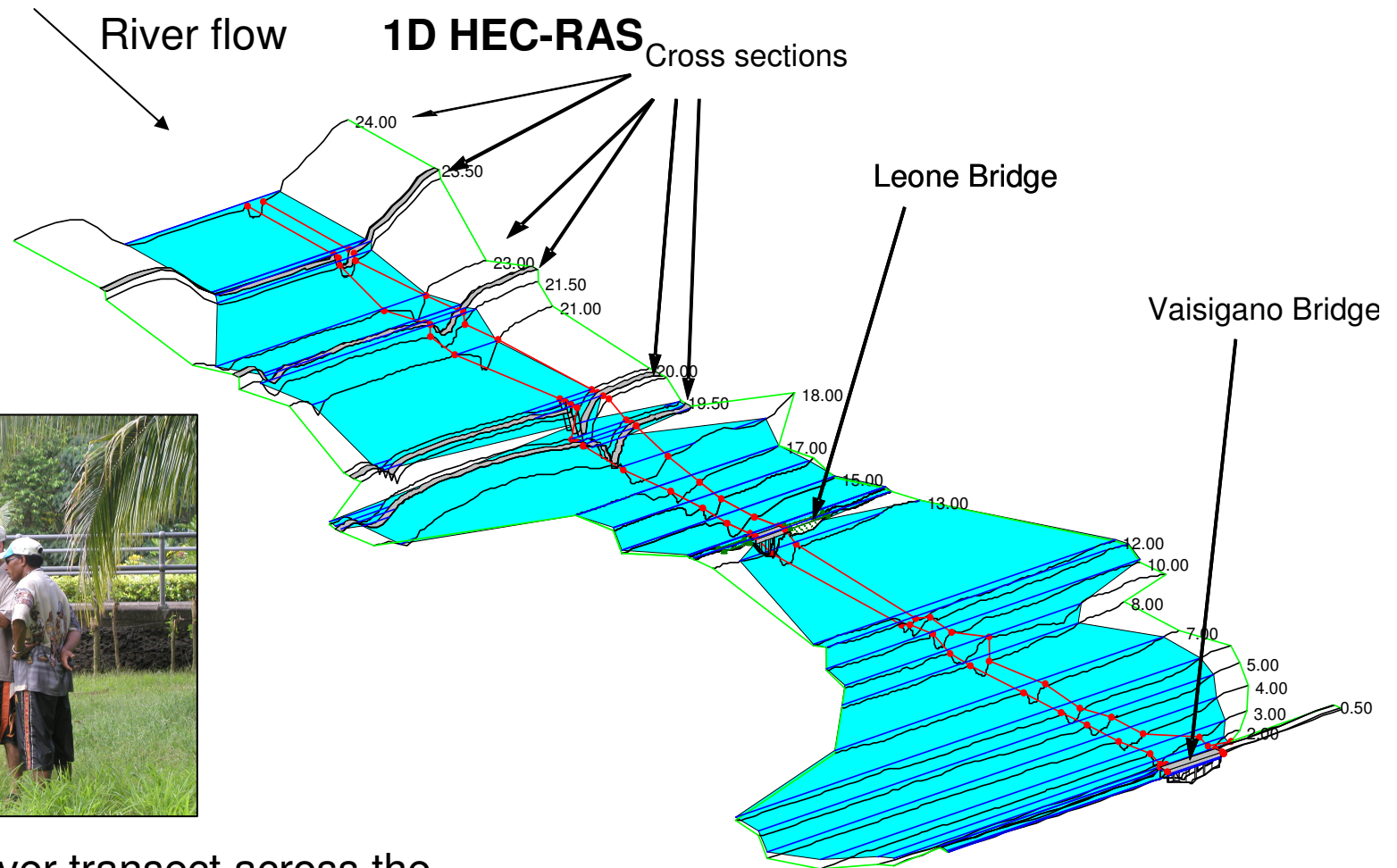
## Flood modeling

- 1-D model – cross sections

## Floodplain mapping

- Flood depths and flood hazard map

# Model of the Vaisigano



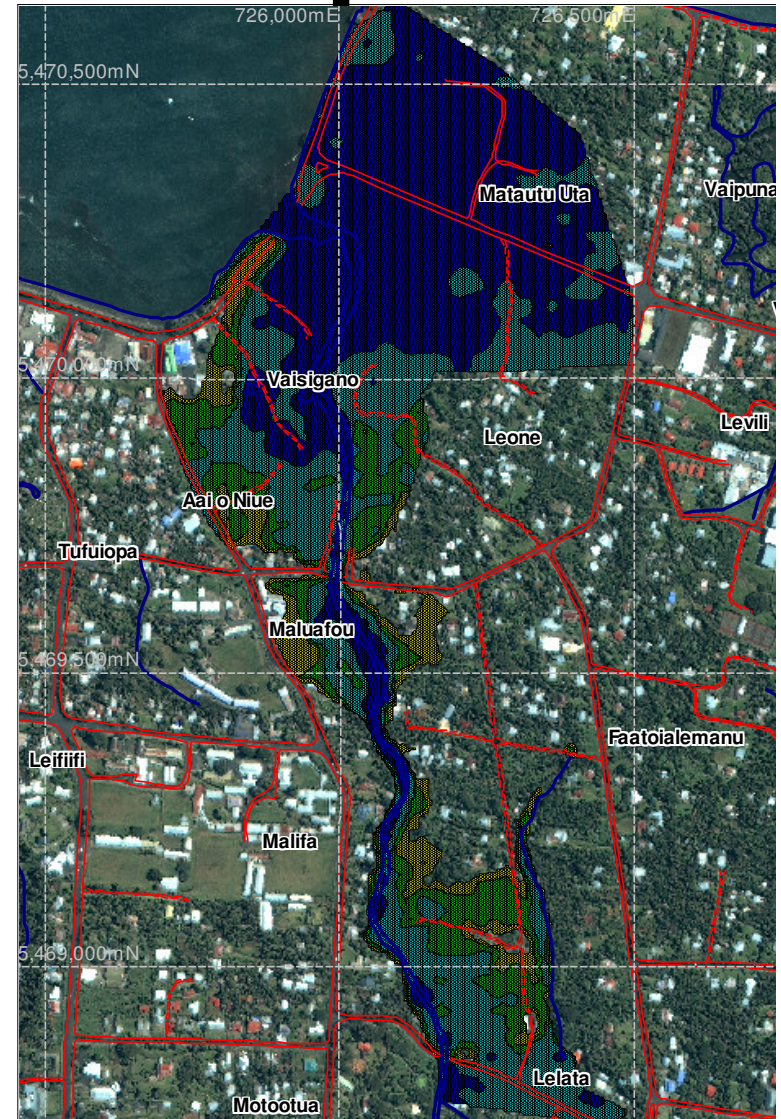
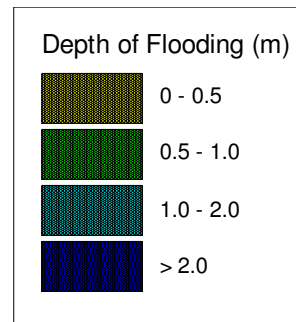
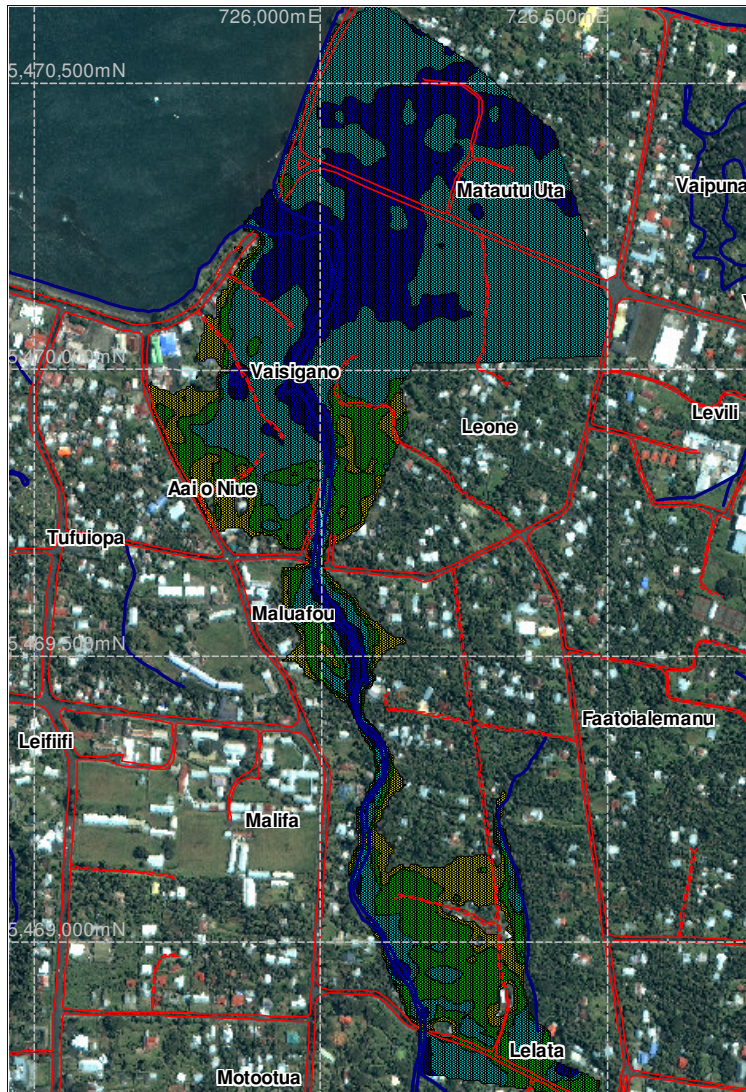
River transect across the floodplain using RTK GPS

Output of model/CS  
= water depth, velocity

1 in 20 year

# Flood Depth Maps

1 in 100 year

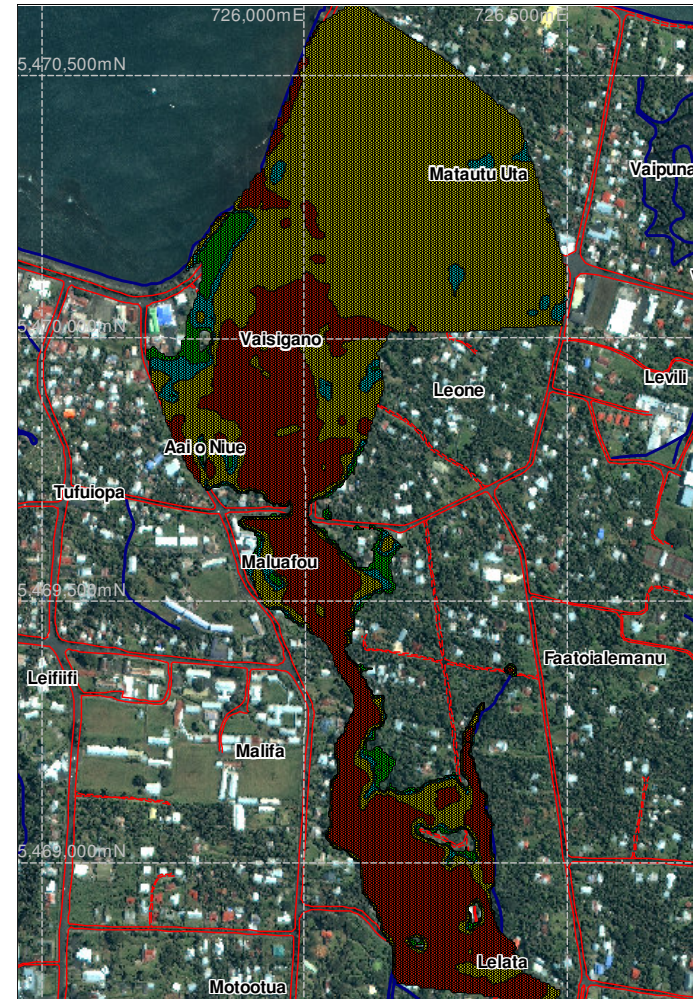
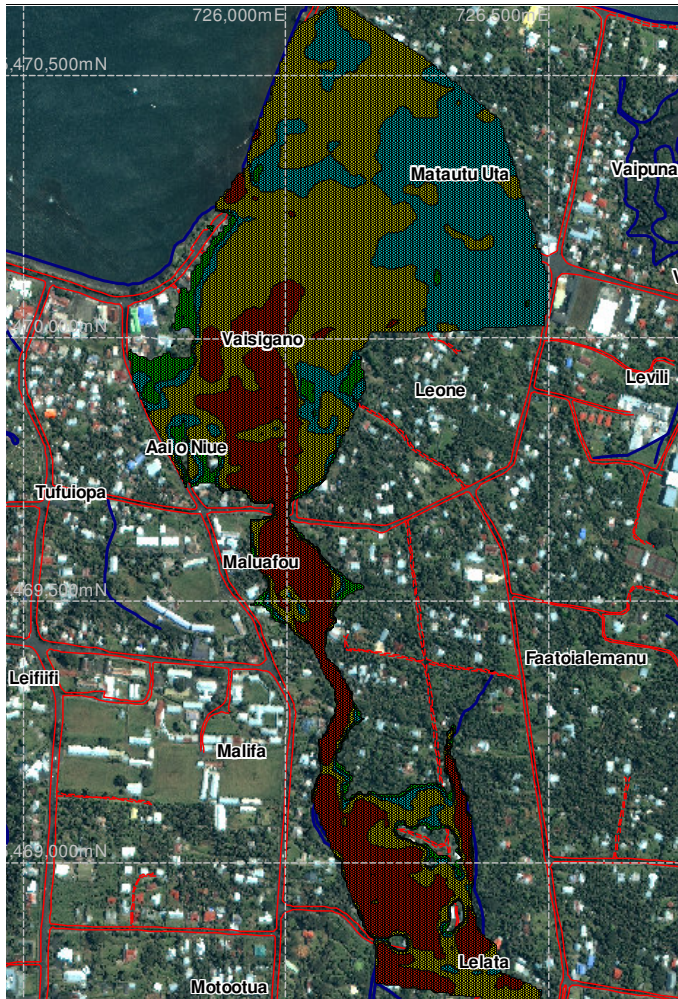




# Flood Hazard Maps

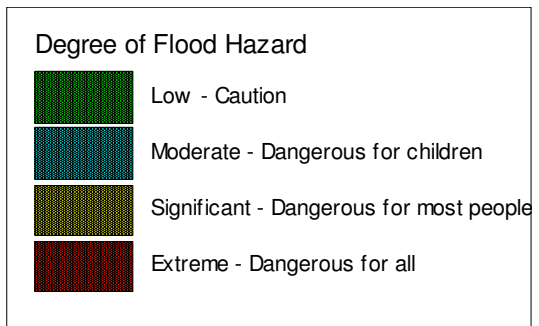
1 in 20 years

1 in 100 years



Vertical Mapper  
Create TIN:  
Flood depth (d)  
Flood velocity (v)

Grid Tools  
 $H = d \times v$

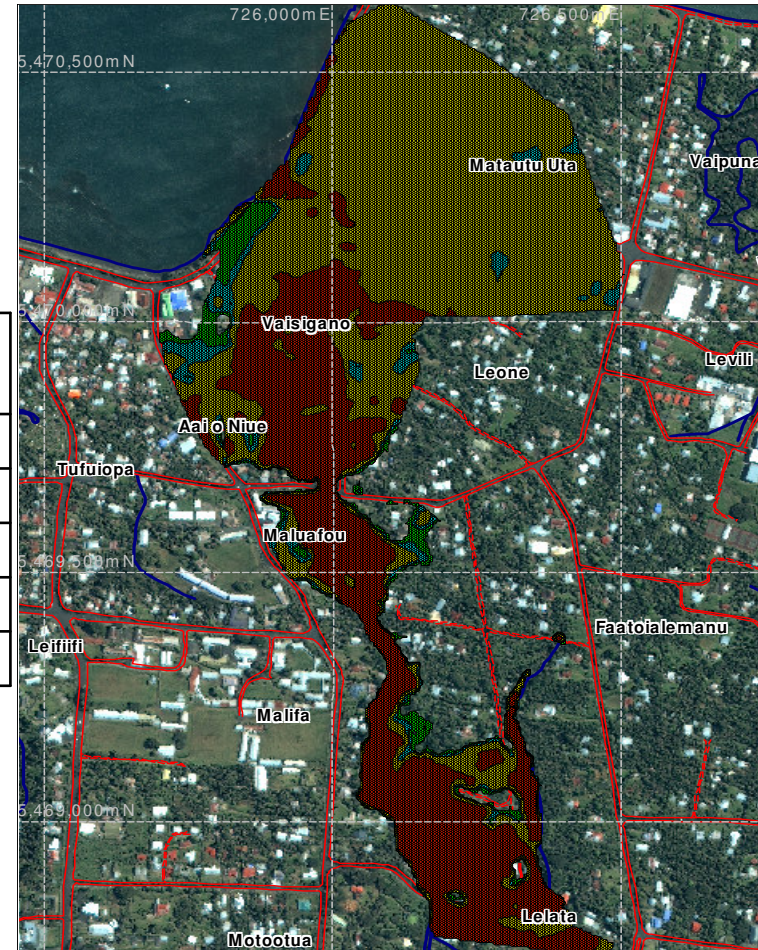


# Assessing Flood Risks

- Estimate impacts to people and infrastructure

Return period	People @ risk (Census)	Buildings @ risk (Pacific Cities)
1 in 2	1139	244
1 in 5	1382	296
1 in 20	1536	329
1 in 50	1596	342
1 in 100	1634	350

- Benefit-Cost Analysis

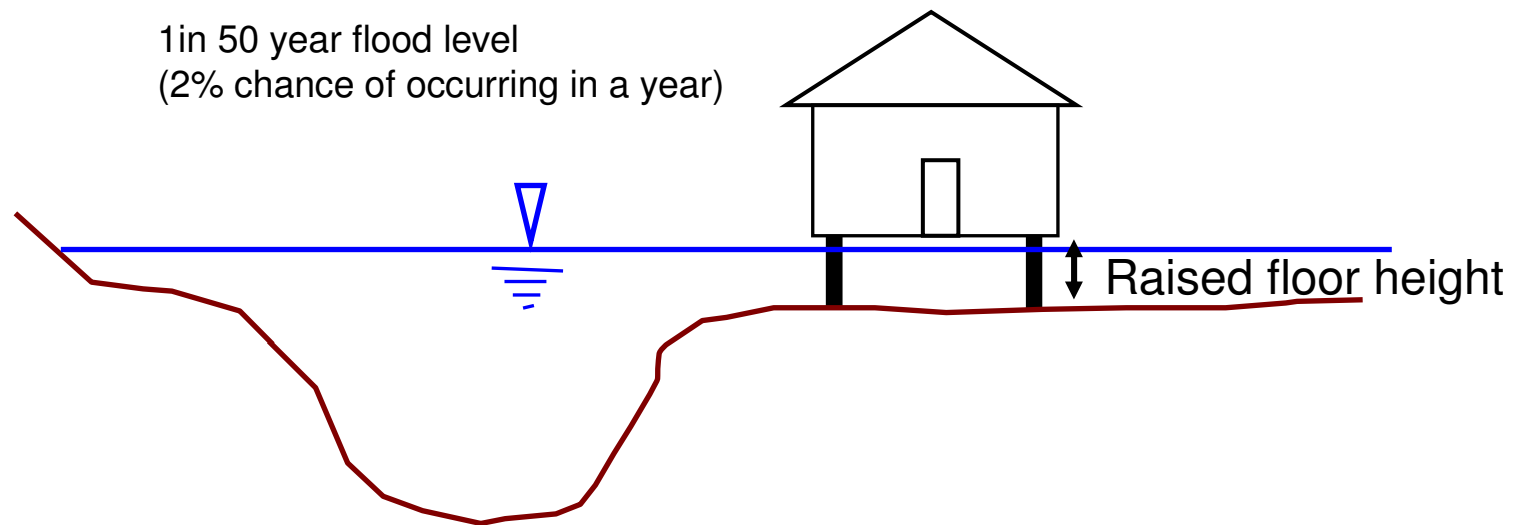


# Assessing Mitigation Options

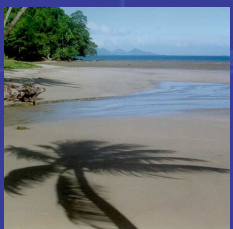
- **Structural :**
  - Flood walls and embankments.
  - By-pass channel.
  - Upstream flood storage.
  - Increasing channel conveyance.
  - Flood proofing of houses
  - Improving channel maintenance.
  - Pumping.
- **Non-Structural**
  - Floodplain zoning & Development control
  - Flood forecasting and warning
  - Flood insurance
  - Flood preparedness and response plans
  - Public Awareness
  - Land use change

# Flood proofing of buildings

- design and construction of buildings.
- Raised floor levels above a flood with a specified return period.



# Economic Pay-off for Investing in Selected Flood Management Measures



Flood measure	Minimum	Maximum
Floodwalls	0.11	0.64
Diversion channel	0.01	0.09
Improved forecasting system	1.72	1.92
Elevated floor heights:		
Existing homes	0.53	8.07
New homes	2.22	44.38

E.g. Estimated for every tala invested in constructing homes with raised floor heights, a minimum WST\$2.22 and a maximum of WST\$44 is avoided in future flood damages

# Wave Impacts of TC Heta 2004 at Alofi, Niue

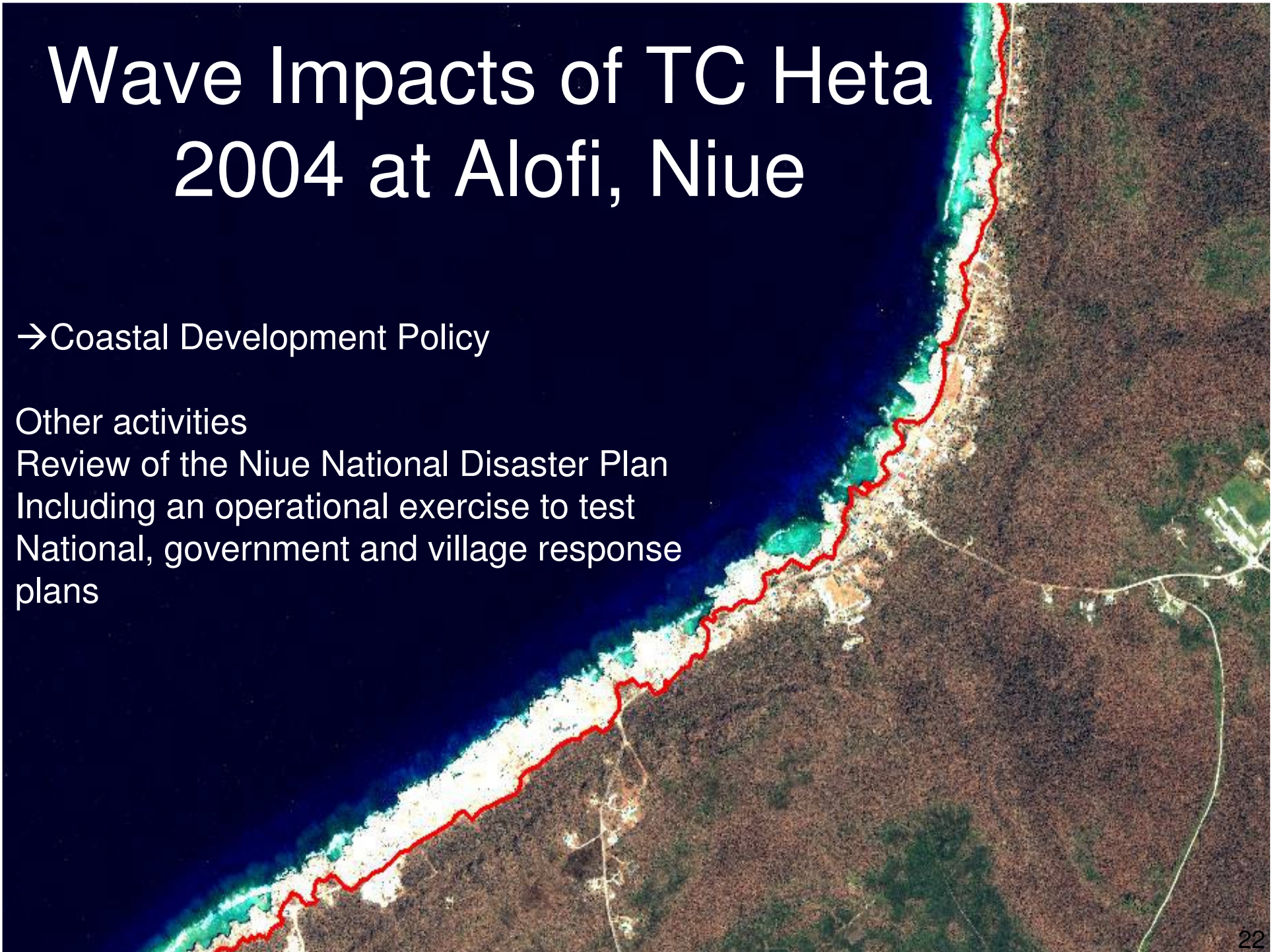
→ Coastal Development Policy

Other activities

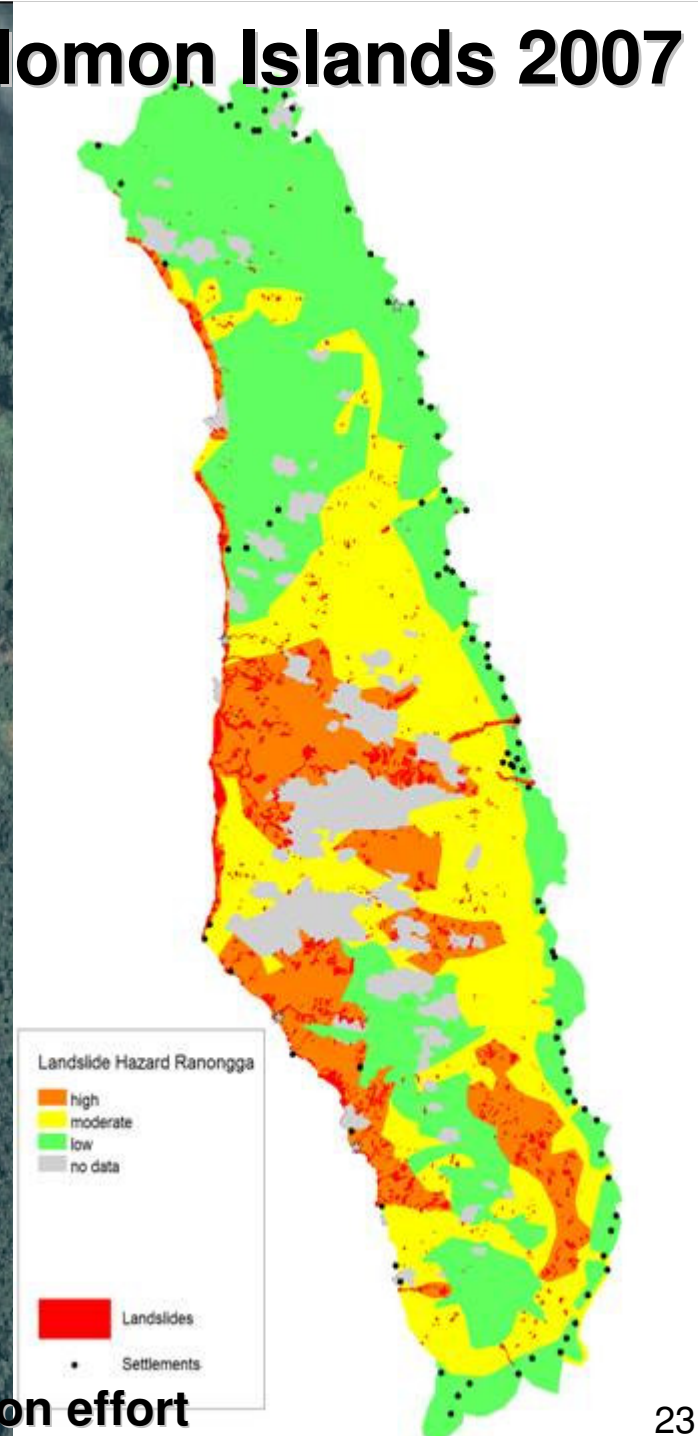
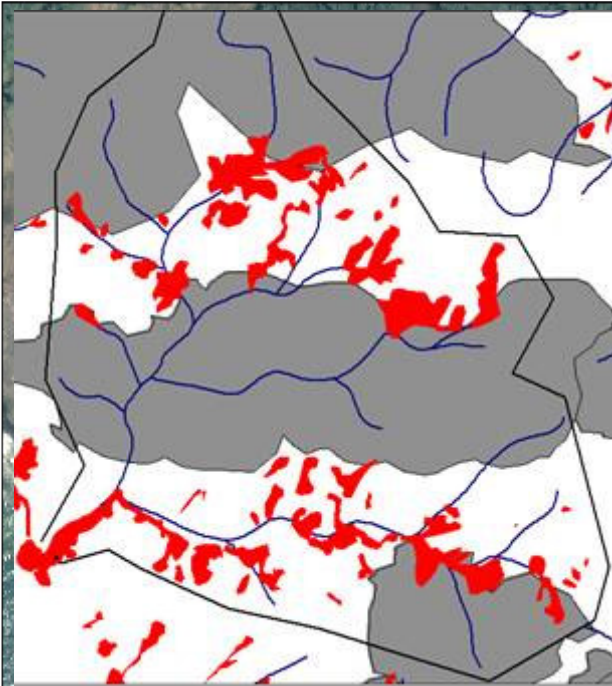
Review of the Niue National Disaster Plan

Including an operational exercise to test

National, government and village response  
plans

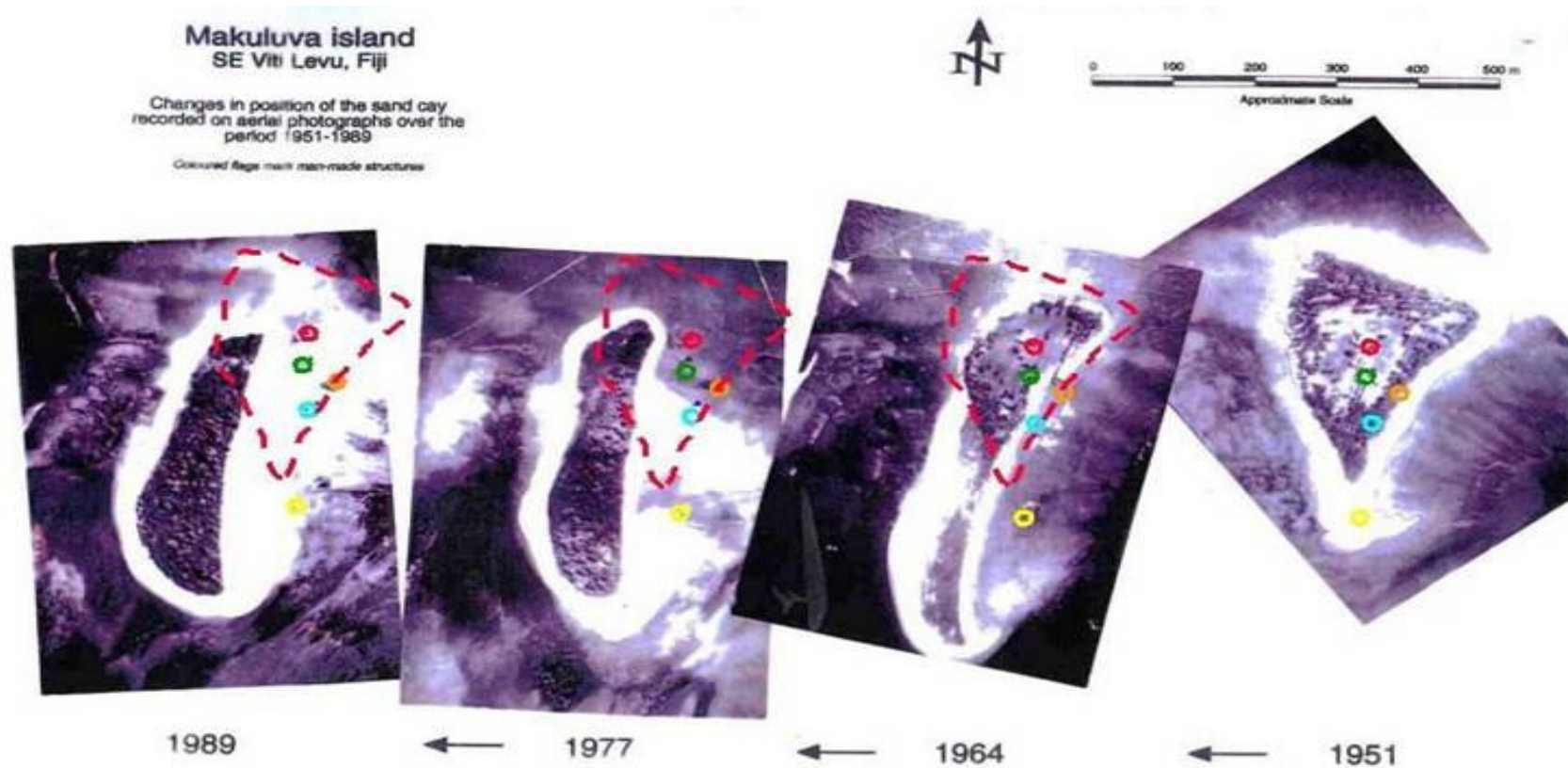


# Landslides Solomon Islands 2007



**Hazard and vulnerability mapping to support Earthquake and Tsunami - Recovery and Rehabilitation effort**

# Monitoring Coastal Changes



G G Shorten 1995

Development planning  
Feasibility of structural coastal protection,  
constructing permanent structures near coast



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## **Regional DRM Resources**

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# Resources

- TA for post disaster assessments
- TA for hazard mapping/risk assessment
- Support of NAP process
- GIS, GPS and remote sensing training
- High-resolution satellite imagery
- Educational resource materials
- Pacific Disaster Net  
[www.pacificdisaster.net](http://www.pacificdisaster.net)
- MapServers
- Pacific DRM Training Programme (TAF/OFD)

