

**Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI)** is a joint initiative of SPC-GeoScience Division (SPC-GSD), World Bank, and the Asian Development Bank with the financial support of the Government of Japan, the Global Facility for Disaster Reduction and Recovery (GFDRR) and the ACP-EU Natural Disaster Risk Reduction Programme, and technical support from AIR Worldwide, New Zealand GNS Science, Geoscience Australia, Pacific Disaster Center (PDC), OpenGeo and GFDRR Labs.

The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) aims to provide the Pacific Island Countries (PICs) with disaster risk modeling and assessment tools. It also aims to engage in a dialogue with the PICs on integrated financial solutions for the reduction of their financial vulnerability to natural disasters and to climate change. The initiative is part of the broader agenda on disaster risk management and climate change adaptation in the Pacific region.

The Pacific Disaster Risk Assessment and Financing Initiative provides 15 countries with disaster risk assessment tools to help them better understand, model, and assess their exposure to natural disasters. It builds on close collaborations between the Secretariat of the Pacific Community through its Applied Geoscience & Technology Division (SPC/SOPAC), WB and ADB, with technical inputs from GNS Science, Geoscience Australia, and AIR Worldwide.

## PCRAFI: Overview

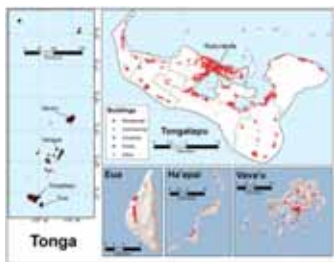
- First state-of-the-art quantitative and probabilistic assessment of major perils in the Pacific
- Regional exposure database – one of the most comprehensive globally
- Covering entire landmass of 15 island countries
- Open access to risk information



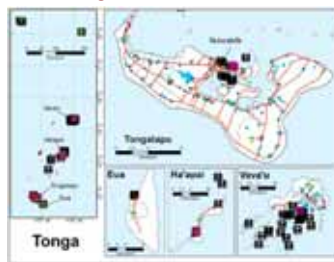
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## PCRAFI Data

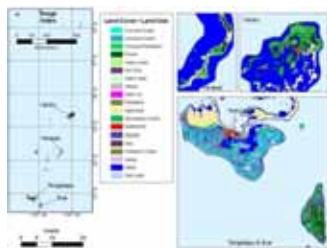
Data on 3.5 million buildings



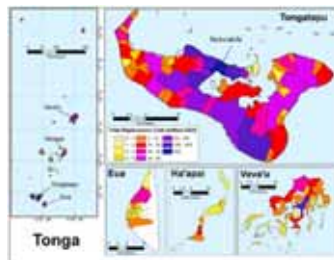
Infrastructure types- airports, bridges, dams, bus stations, communications, dams, docks, ports, power plants/substations, water storage and treatment facilities



LULC data on agriculture



Total replacement costs



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### Project Outputs: PacRIS

- PacRIS – Free/open Information system platform designed to provide the Pacific countries and institutions with disaster risk data.
- Collection of data on hazard exposures.
- Collection of data on buildings (including their locations, structural characteristics, footprints and valuation), major infrastructure, and cash crops.
- Information on loss estimation.
- Significant time and resources collecting data - including field surveys, accumulation and interpretation of satellite imagery.
- Allows for easy collaboration and sharing of layers and maps.
- Portal - <http://pcrafi.spc.int>

### PCRAFI: Applications

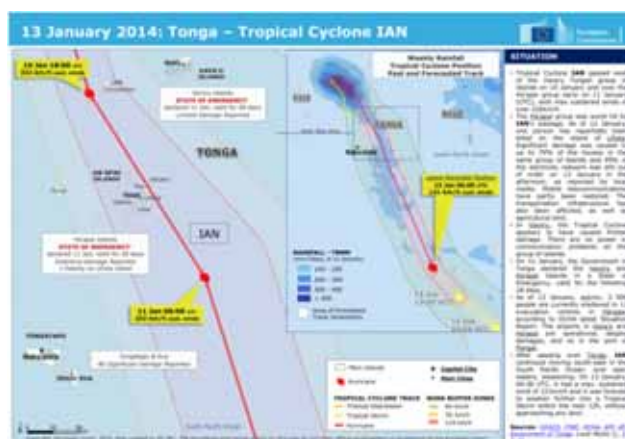


## Rapid\_DIET Objectives

- Current target is use in immediate post-disaster response and preparation to help disaster managers have quick access to the data they need, in one place, right after an event. However, can be extended to other applications.
- Intended for Use as PART of the decision making process the help optimize resource allocation during response. Not meant as a replacement for other disaster response activity.
- The target is for use by disaster managers, and not insurance.
- Use in rapid sensitivity analysis.

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## Rapid\_DIET Inputs



- Sustained wind speeds at appropriate locations along cyclone's path.
- Distance of track from division.
- Direction of island from storm
- Threshold to define how to aggregate populations.
- Central pressure at appropriate locations

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## Rapid\_DIET Inputs

Tonga Cyclone Rapid Impact Estimation Input

**TONGA CYCLONE RAPID IMPACT ESTIMATION TOOL**

DIVISION	SUSTAINED WIND SPEED(MPH)	NEAREST DISTANCE FROM EYE (MILES)	DIRECTION OF ISLAND FROM STORM
Tongatapu	180	113.56	East
Vava'u	120	41.01	East
Ha'apai	180	14.00	East
Eua	180	113.56	East
Niue	0	27.06	East

POPULATION EXPOSED TO BUILDINGS/2010 USES: 120

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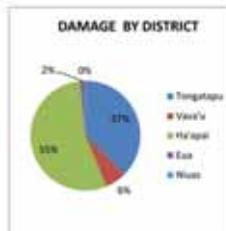
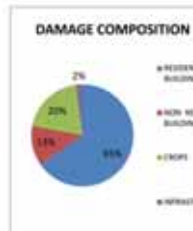
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## Rapid\_DIET Outputs

DAMAGE TO BUILDINGS

DISTRICT	TOTAL VALUATION OF BUILDINGS/2010 USES	VALUE OF DAMAGE TO BUILDINGS/2010 USES	PERCENTAGE BUILDING DAMAGE IN DISTRICT (%)	TOTAL VALUE OF AGRICULTURE DAMAGE (2010 USD)	VALUE OF INFRASTRUCTURE DAMAGE (2010 USD)	TOTAL DAMAGE
Tongatapu	2,055,994,593	12,320,219	1%	7,683,900.00	64,843.65	20,068,962.32
Vava'u	343,496,811	2,231,033	1%	1,362,030.00	20,287.60	3,613,348.03
Ha'apai	53,123,889	27,281,749	51%	1,096,250.00	916,212.50	29,334,211.48
Eua	30,833,349	38,006	0%	739,292.00	138.00	777,437.77
Niue	21,760,095	0.004	0%	79,973.00	0.00	88,445.60
<b>TOTAL</b>	<b>2,525,196,456.37</b>	<b>41,884,049.45</b>		<b>10,760,525.00</b>	<b>1,041,030.75</b>	<b>53,685,585.21</b>

\* Uncertainty increased by closeness of storm center to district



	TOTAL VALUATION OF BUILDINGS/2010 USES	VALUE OF DAMAGE (2010 USD)	PERCENTAGE DAMAGE (%)
<b>RESIDENTIAL</b>			
RESIDENTIAL	1,627,102,221.75	81,024,950.77	5%
<b>NON RESIDENTIAL</b>			
COMMERCIAL	476,940,291.87	8,830,976.21	1%
INDUSTRIAL	41,235,264.77	180,000.00	0%
PUBLIC INFRASTRUCTURE SERVICES	6,669,060.27	31,279.44	1%
PUBLIC EDUCATION	180,171,618.86	1,096,232.90	1%
HEALTH SERVICES	1,000,000.00	0.00	0%
OTHER SERVICES	21,760,094.26	103,507.44	1%
PUBLIC OTHER	664,941,013.86	2,290,000.00	1%
OTHER	81,711,001.61	298,073.60	1%
INFRASTRUCTURE	888,951,238.62	6,810,000.00	1%
<b>TOTAL</b>	<b>2,525,196,456.37</b>	<b>41,884,049.45</b>	

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## Rapid\_DIET Outputs

DEMOGRAPHICS OF POPULATION EXPOSED BASED ON INPUT THRESHOLD

	Total exposed population (2011) aged 0-4 (2011 census)	Exposed population aged 0-4 (2011 census)	Number of females in exposed region	Number of households in exposed region	Number of female-headed households in exposed region
Tongatapu	75,400	9,940	4,183	17,581	12,809
Vava'u	-	-	-	-	-
Ha'apai	8,616	831	406	3,212	2,386
Eua	-	-	-	-	-
Niue	-	-	-	-	-

DRINKING WATER SOURCES IN EXPOSED REGIONS BASED ON INPUT THRESHOLD

	Own Cement	Neighbour	Bottled Water	Boiled Water	Piped Water Supply	Other
Tongatapu	8,181	3,433	636	81	819	30
Vava'u	-	-	-	-	-	-
Ha'apai	1,127	122	1	2	6	2
Eua	-	-	-	-	-	-
Niue	-	-	-	-	-	-

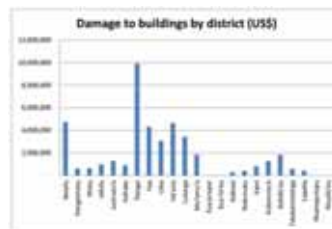
NON-DRINKING WATER SOURCES IN EXPOSED REGIONS BASED ON INPUT THRESHOLD

	Piped Water Supply	Cement Or Other Tank	Own Well	Other
Tongatapu	11,796	839	103	98
Vava'u	-	-	-	-
Ha'apai	812	201	44	4
Eua	-	-	-	-
Niue	-	-	-	-

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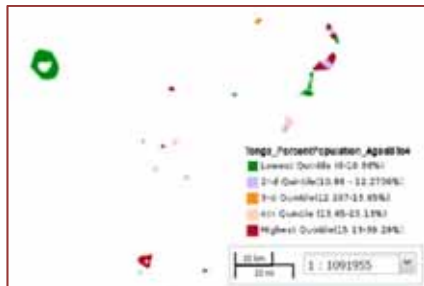
## Rapid\_DIET Outputs

District	District	Building Damage (US\$)	Infrastructure (US\$)	Agriculture Damage (US\$)
Nuku	Vava'u	4,711,133.80	83,052.76	128,000.00
Pangaimotu	Vava'u	427,204.25	3,625.90	83,430.00
Motu	Vava'u	411,674.89	8,171.50	117,808.00
Mafu	Vava'u	996,259.20	8,517.50	381,534.00
Lomaha'u	Vava'u	1,305,176.75	6,888.30	41,168.00
Hihifo	Vava'u	905,128.53	7,371.60	213,375.00
Fangai	Ha'apai	9,818,754.80	856,714.30	245,371.00
Foa	Ha'apai	4,333,639.70	20,546.00	141,571.00
Uta	Ha'apai	3,074,811.22	13,298.00	236,934.00
Ha'ano	Ha'apai	4,832,353.33	25,988.00	-
Lalunga	Ha'apai	3,430,044.47	26,672.00	242,749.00
Mu'omua	Ha'apai	1,834,143.43	12,994.00	184,422.00
Eua proper	Eua	21,488.00	238.00	641,736.00
Eua Fitiu	Eua	16,159.76	-	91,681.00
Afeka	Tongatapu	314,096.29	2,392.00	568,468.00
Mukunuku	Tongatapu	425,720.19	93.60	865,654.00
Vaiti	Tongatapu	818,344.78	180.00	1,931,300.00
Wakamoa's	Tongatapu	1,286,336.83	302.40	681,028.00
Kakafua	Tongatapu	1,841,595.02	13,631.80	176,673.00
Takakamanga	Tongatapu	600,759.36	137.25	1,311,480.00
Lapaha	Tongatapu	428,832.15	108.00	1,315,020.00
Nukunono	Niue	1,414.34	3.00	64,818.00
Nuukunono	Niue	1,449.26	6.00	72,384.00
<b>Total</b>		<b>42,279,881.19</b>	<b>1,095,832.11</b>	<b>10,400,939.00</b>

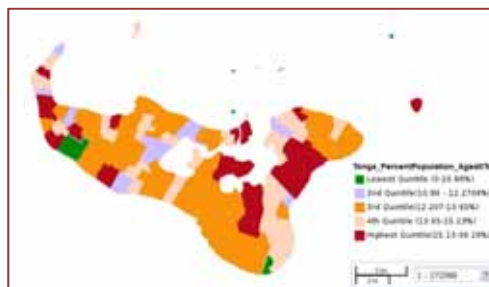


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## Rapid\_DIET Outputs-Layers/Maps



- Report at a village level.
- Total damages and percentage damage by village
- Exposed number of females.
- Exposed number (and percentage ) of female headed households.
- Exposed number (and percentage ) of children.
- Exposed number ( and percentage) of elderly.
- Source of drinking and non-drinking water at village water based on census.
- Can overlay any of the above with number of households, as well as other layers in PacRIS such as infrastructure, building use, etc.



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## What's Next?

- Estimates of fatalities
- Estimates of drinking and non-drinking water needs per week
- Data on farming dependent households and regions
- Potential for inclusion of sectoral damages

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**Meitaki  
Faafetai lava  
Tankiu tumas  
Malo 'Aupito  
Komol tata  
Tankiu tru  
Vinaka Vaka Levu**

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