Pacific Catastrophe Risk Assessment and Financing Initiative

Better Information for Smarter Investments

THE WORLD BANK ASIAN DEVELOPMENT BANK AIR GNS SCIENCE TE PŪ AO GFDRR Global Facility for Disaster Reduction and Recovery

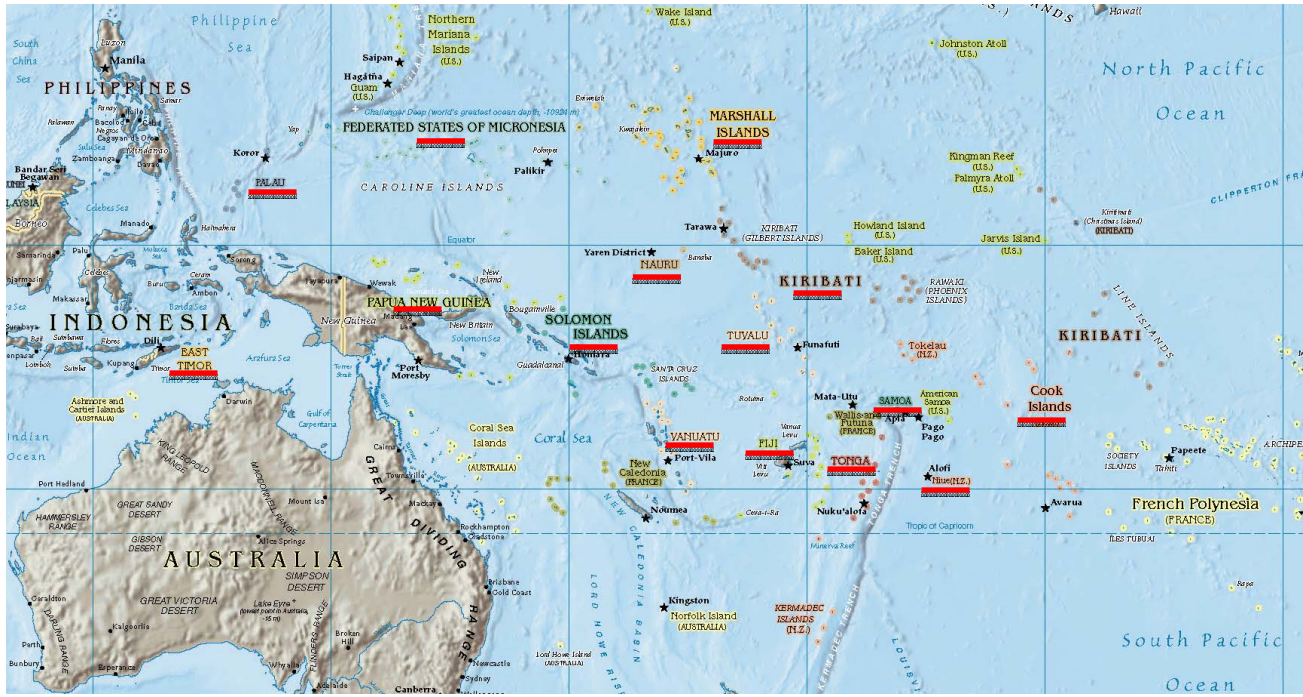
Main Outputs

Pacific disaster risk assessment

- Probabilistic assessment of major perils
- Pacific Risk Information System
- Risk based framework to direct resources of countries and development partners

Pacific disaster risk financing solutions

- Fiscal risk exposure
- Financial disaster risk management
- Regional risk pooling

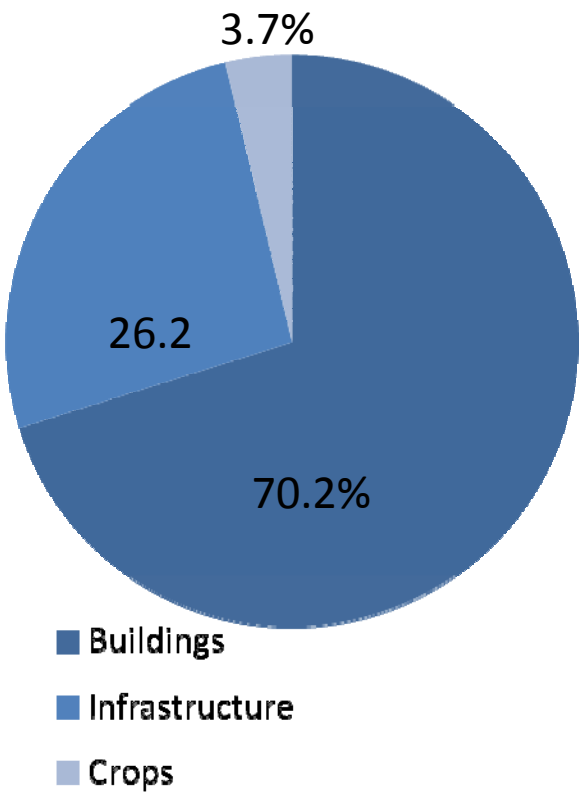


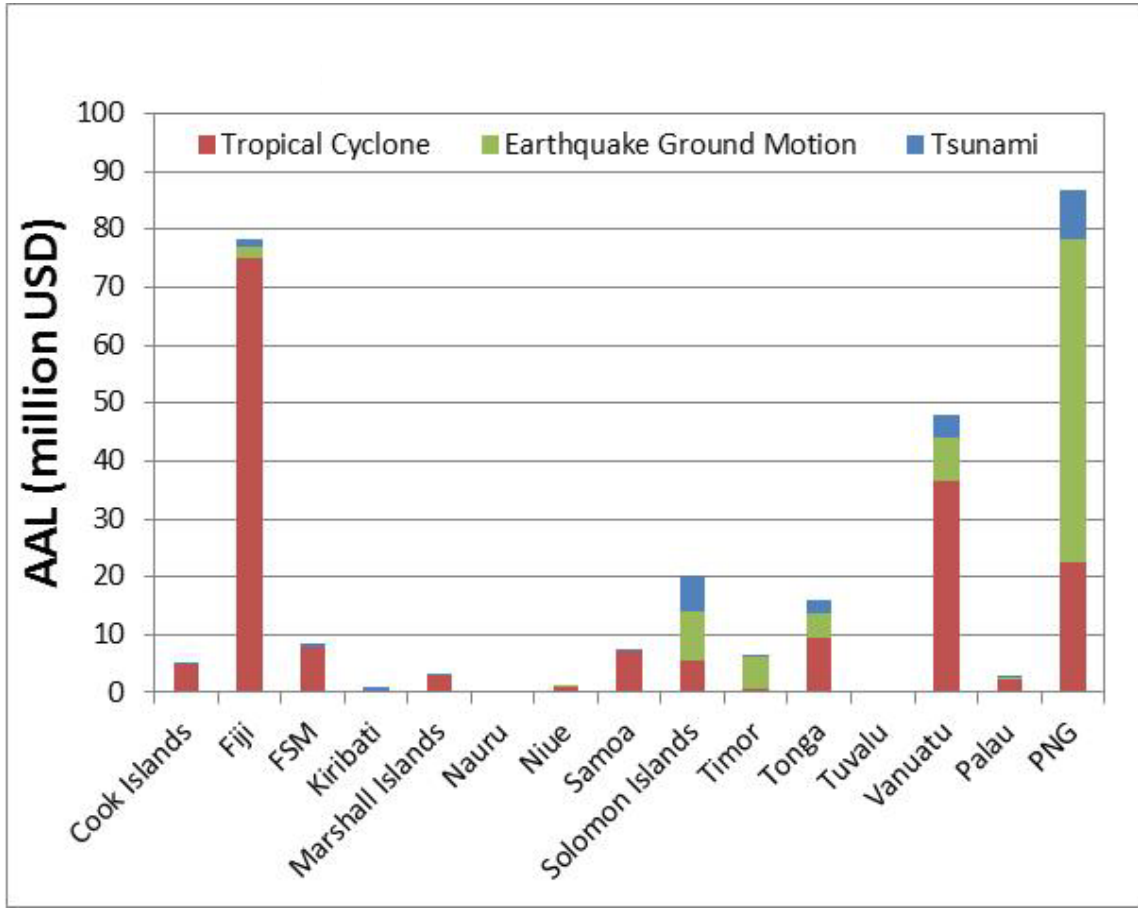
Impact of Disasters on Pacific Islands' Economies

US$284 million lost every year because of disasters

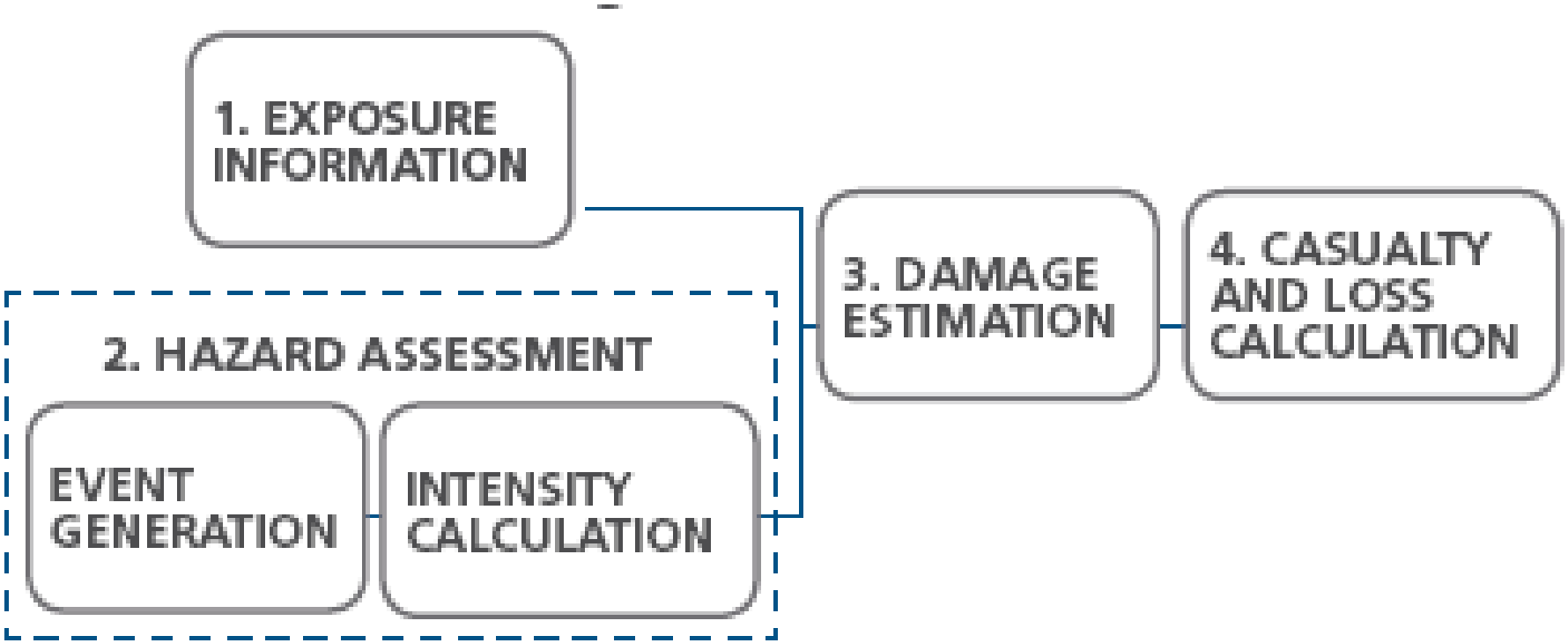
Average Annual Loss = US$ 284 million

US$ 178 million from tropical cyclone and
US$ 106 million from earthquakes & tsunami



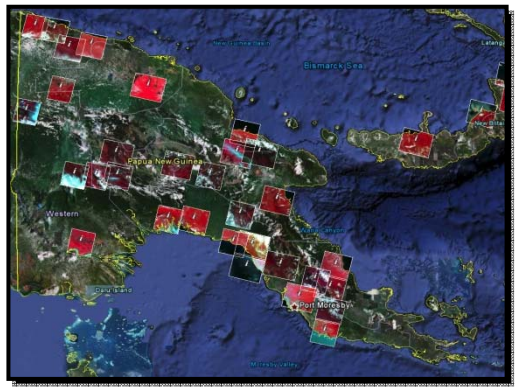


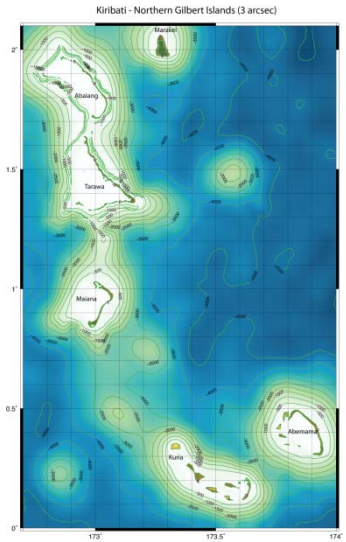
Risk Modeling Framework

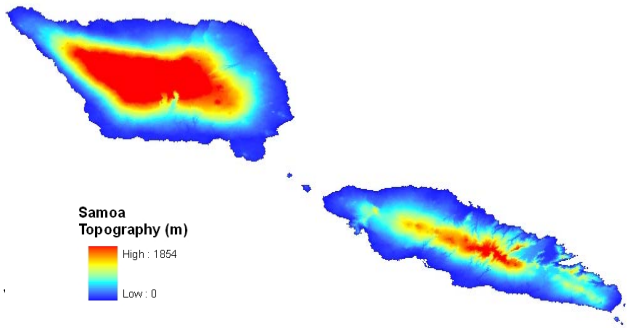


Major effort in assembling, processing and organising one of the largest collection of geo-referenced datasets in the region

- Satellite imagery
- Administrative Boundaries
- Population Census Data
- Agricultural Census Data
- Surface Geology Maps
- Topographic maps
- Surface soil maps
- Bathymetry maps
- Infrastructure maps (e.g., roads, bridges, Utilities, etc.,
- Geodetic and Fault Data
- Hundreds of references

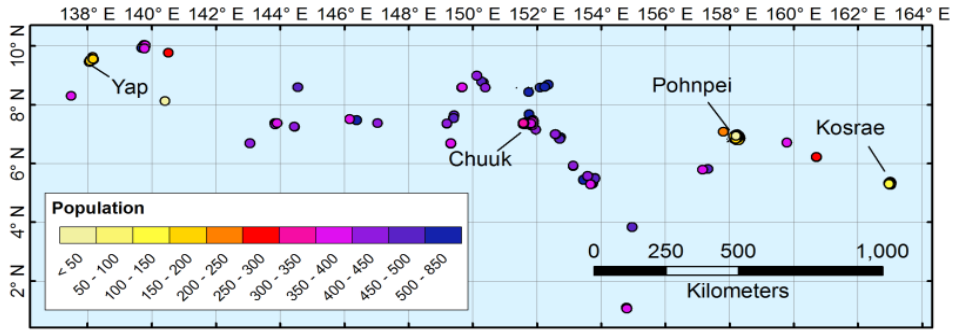


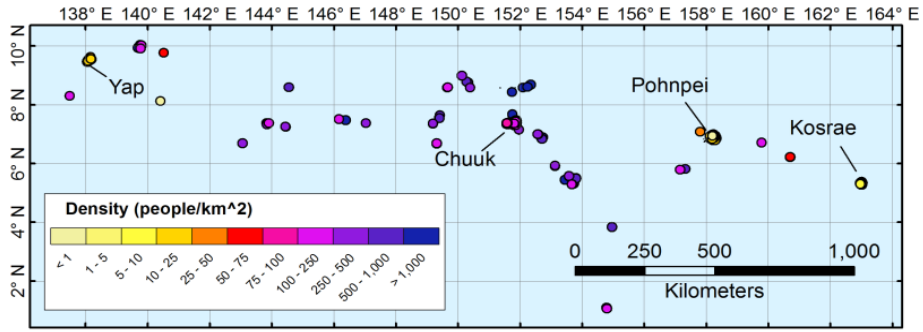


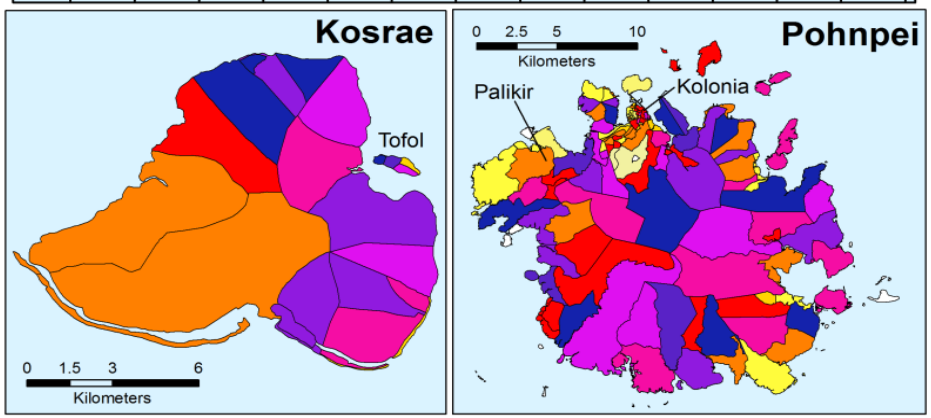


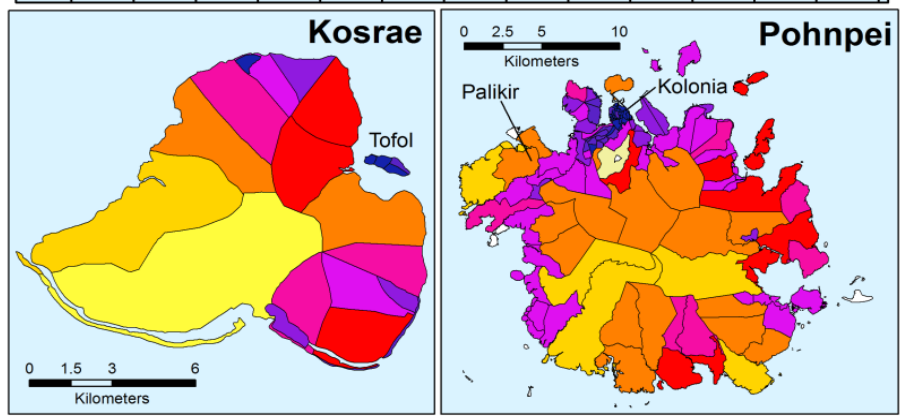
Elements at Risk: People

1 0 Census





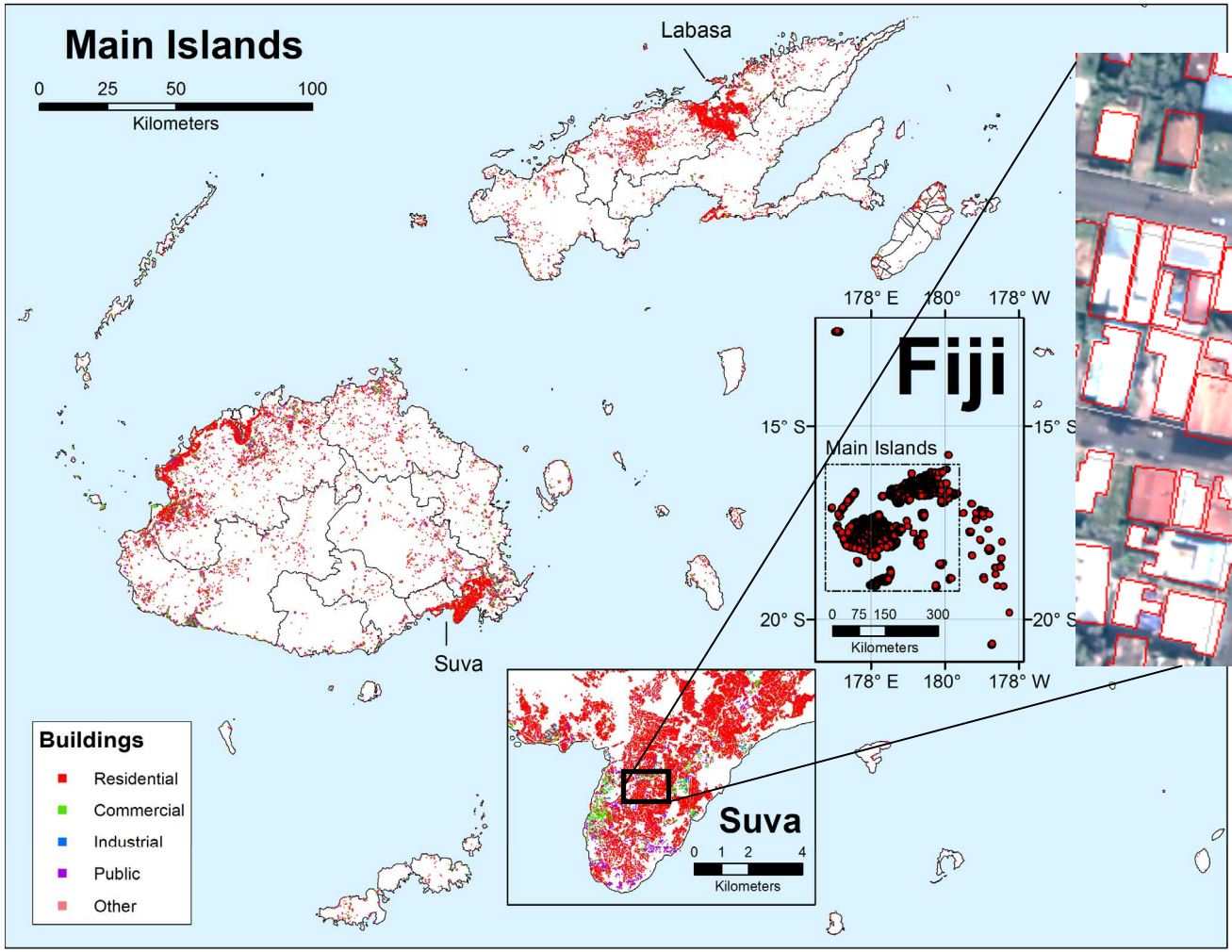


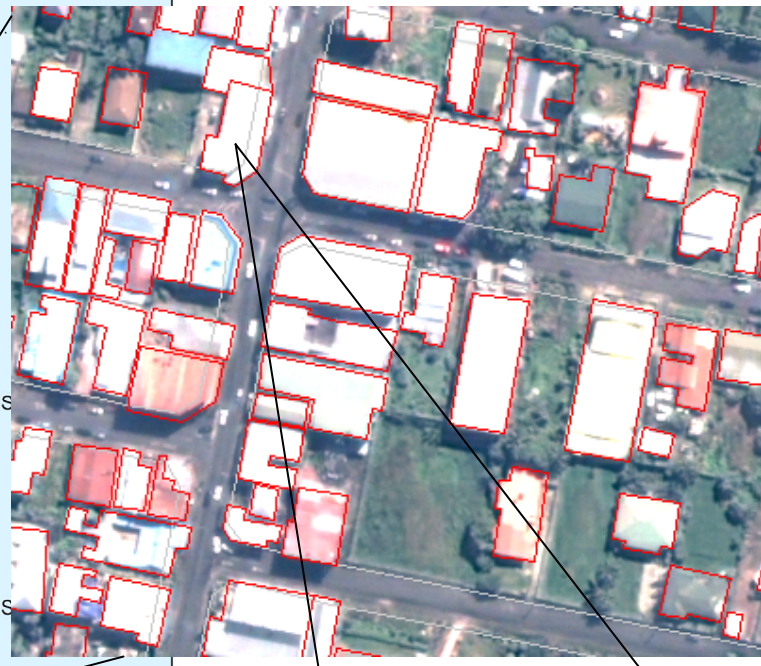


Federated States of Micronesia

Federated States of Micronesia

Elements at Risk: Buildings





Collected in the field using template

Extensive inventory of buildings in 15 countries

Country	Region	Level 1	Level 2	Level 3	Level 4	Ancillary	Total
TL	SE Asia	-	96,539	-	300,791	1,355	398,685
FJ	Melanesia	18,622	79,545	8,214	158,436	1,323	266,140
PG		11,821	122,674	24,398	2,228,935	5,451	2,393,279
SB		12,268	23,150	381	131,574	1,739	169,112
VU		10,661	21,883	-	66,782	1,420	100,746
FM	Micronesia	1,008	15,802	-	15,158	20	31,988
KI		746	12,137	2,139	12,562	5	27,589
MH		-	7,684	151	5,031	28	12,894
NR		-	2,745	-	-	10	2,755
PW		1,283	4,206	-	84	146	5,719
CK	Polynesia	5,044	4,889	100	357	212	10,602
NU		-	1,105	-	-	3	1,108
TO		10,082	17,622	-	6,957	90	34,751
TV		956	1,258	-	804	-	3,018
WS		6,517	42,221	-	-	93	48,831
All	**All**	**79,008**	**453,460**	**35,383**	**2,927,471**	**11,895**	**3,507,217**

Photographed and/or digitized

Extracted from satellite imagery

Extracted from existing datasets

Building Construction Classes


FJ-SV-104107


FJ-ND-005091


FJ-SV-100451


FJ-SV-100167


FJ-SV-108964


FJ-SV-103911


FJ-SV-102738

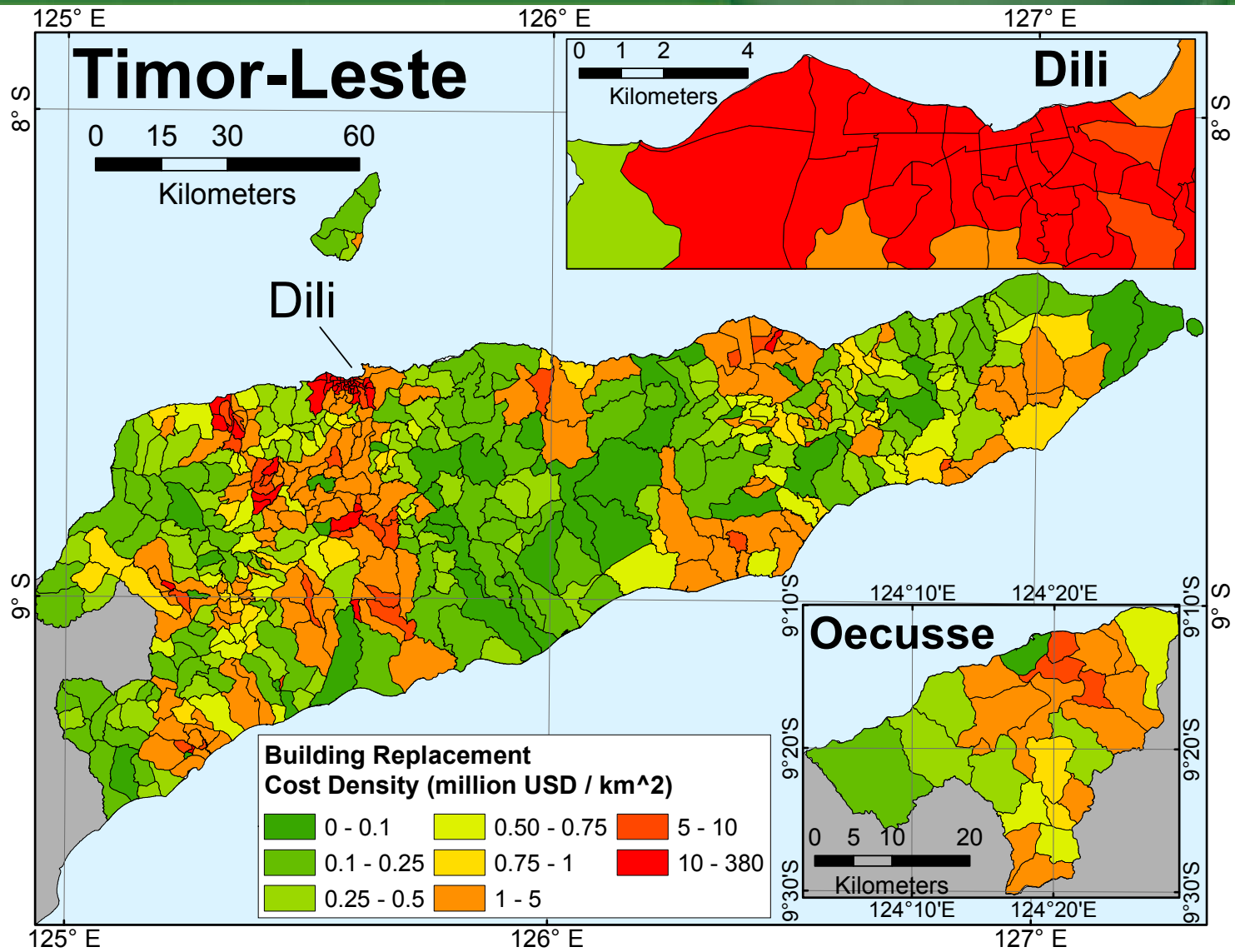

FJ-ND-020060

Construction Type	CK	FJ	FM	KI	MH	NU	NR	PG
Total Count	**10,602**	**266,140**	**31,988**	**27,589**	**12,894**	**1,108**	**2,755**	**2,393,**
Single Story Timber Frame	28.6%	47.4%	41.7%	12.9%	36.2%	49.8%	26.1%	16.9%
Multi-Story Timber Frame with Closed-Under	1.2%	1.0%	1.2%	1.3%	2.2%	0.9%	0.4%	1.9%
Multi-Story Timber Frame with Open-Under	0.5%	0.6%	0.2%	0.1%	2.7%	0.0%	0.2%	2.3%
Single Story Masonry/Concrete	45.5%	23.1%	35.4%	26.5%	27.5%	31.6%	51.0%	1.7%
Multi-Story Masonry/Concrete	3.6%	12.9%	7.8%	1.8%	8.0%	0.6%	2.7%	0.4%
Single Story Combination Masonry/Concrete & Timber Frame	4.8%	1.3%	0.5%	1.1%	5.5%	13.8%	5.3%	0.6%
Multi-Story Combination Masonry/Concrete & Timber	1.4%	0.6%	0.3%	1.9%	4.5%	0.6%	0.8%	1.0%

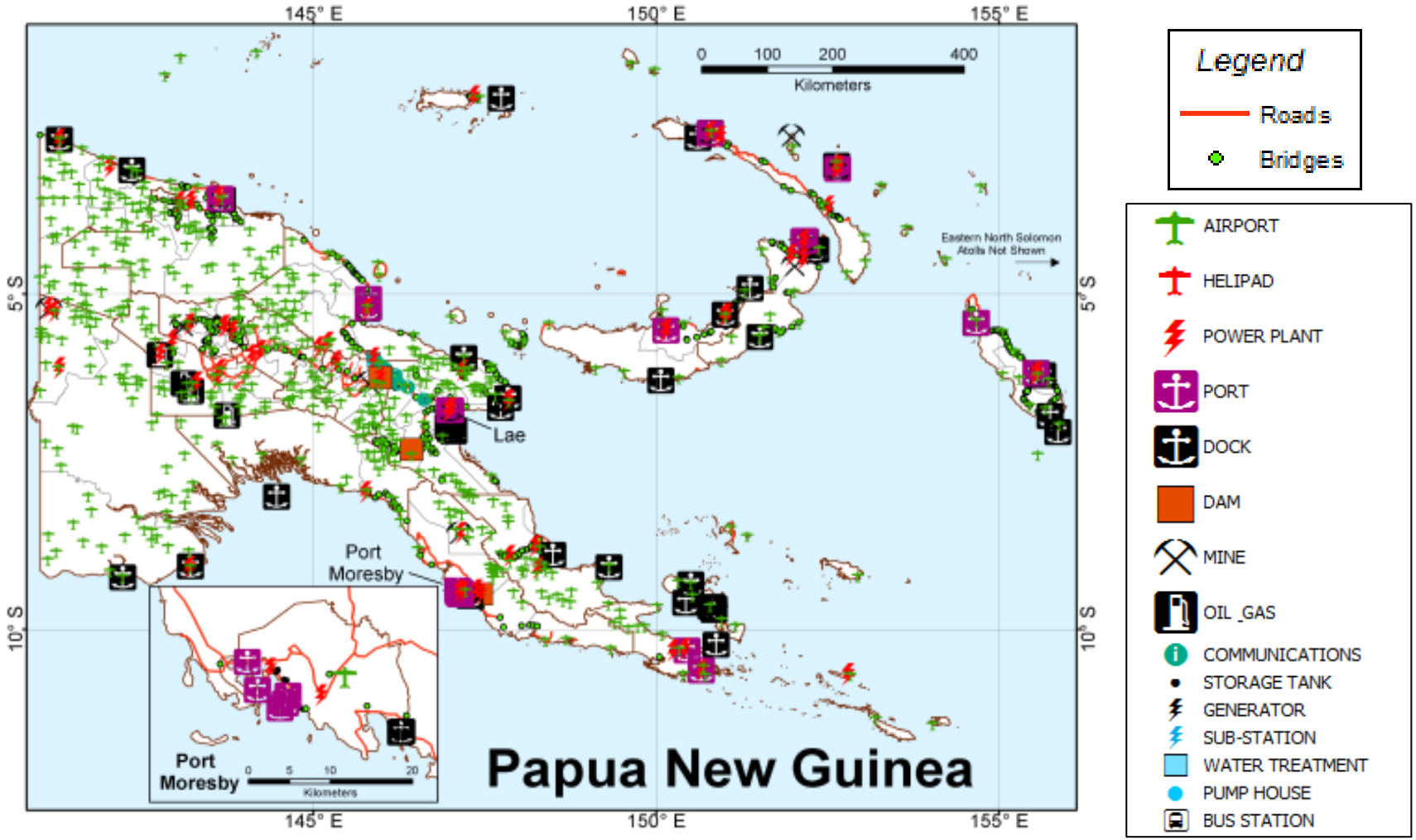
Building Attributes → Construction Classes → Replacement Cost

Structural classes affect vulnerability to hazards

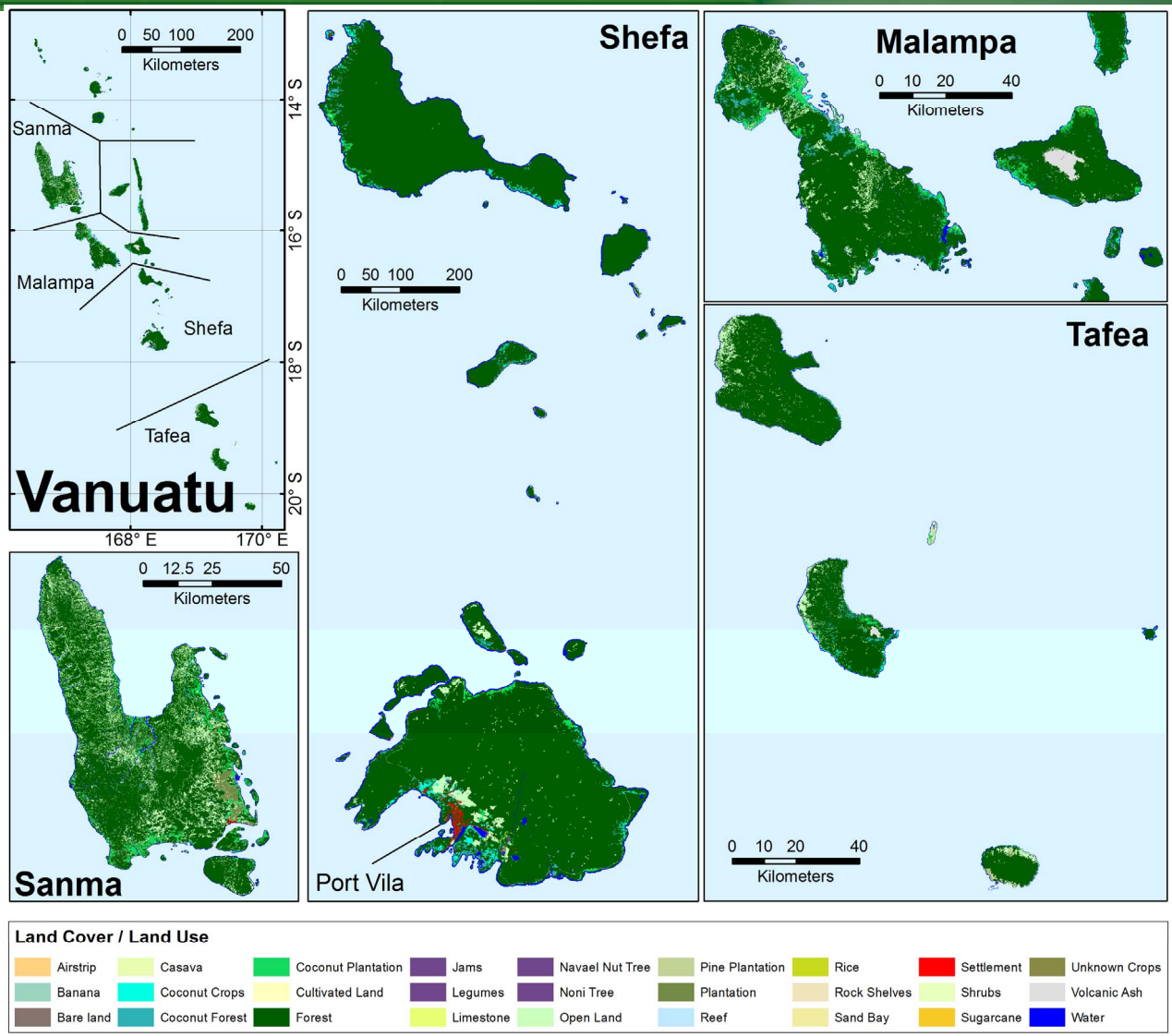
Building Replacement Cost Density



Elements at Risk: Major Infrastructure



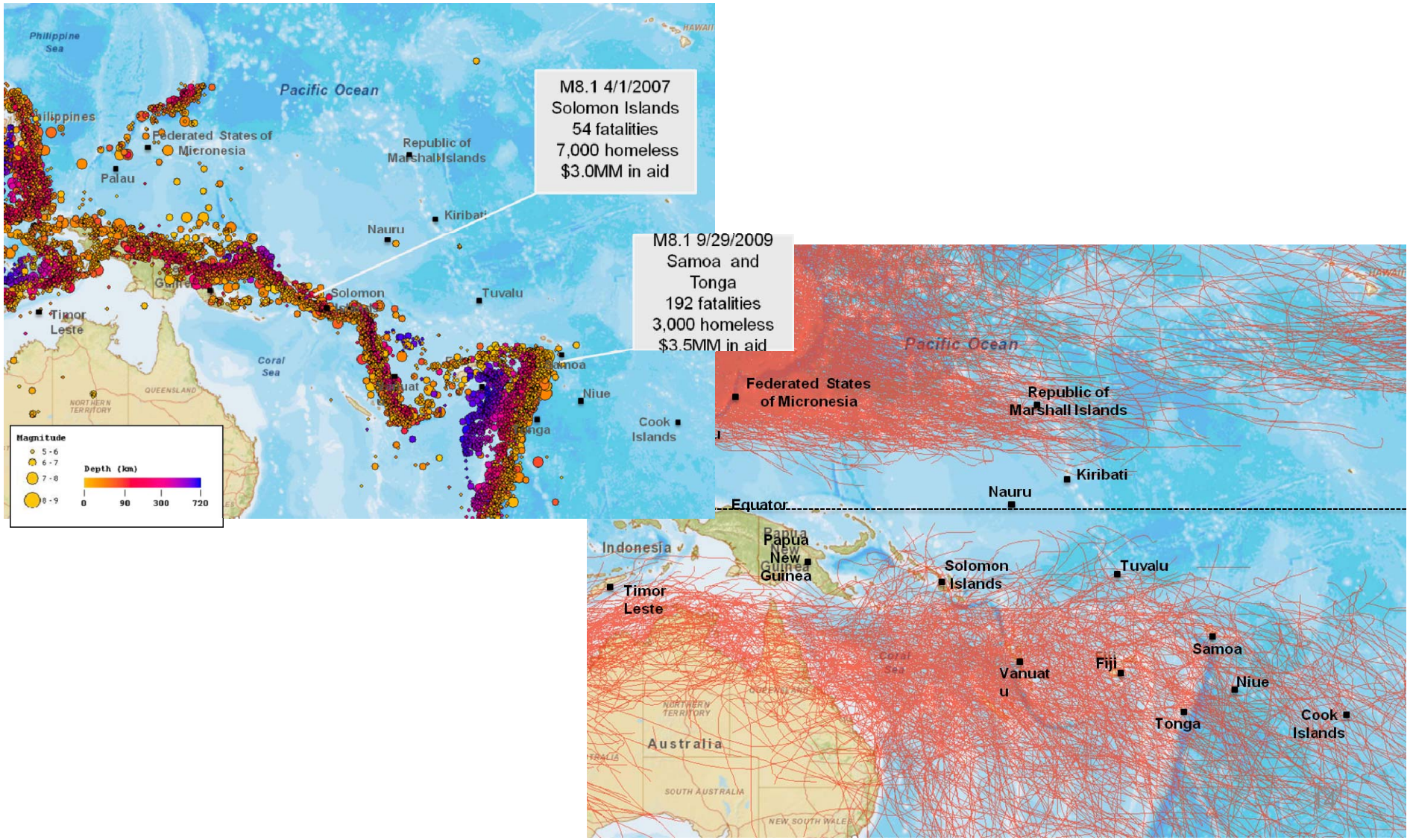
Elements at Risk: Cash Crops



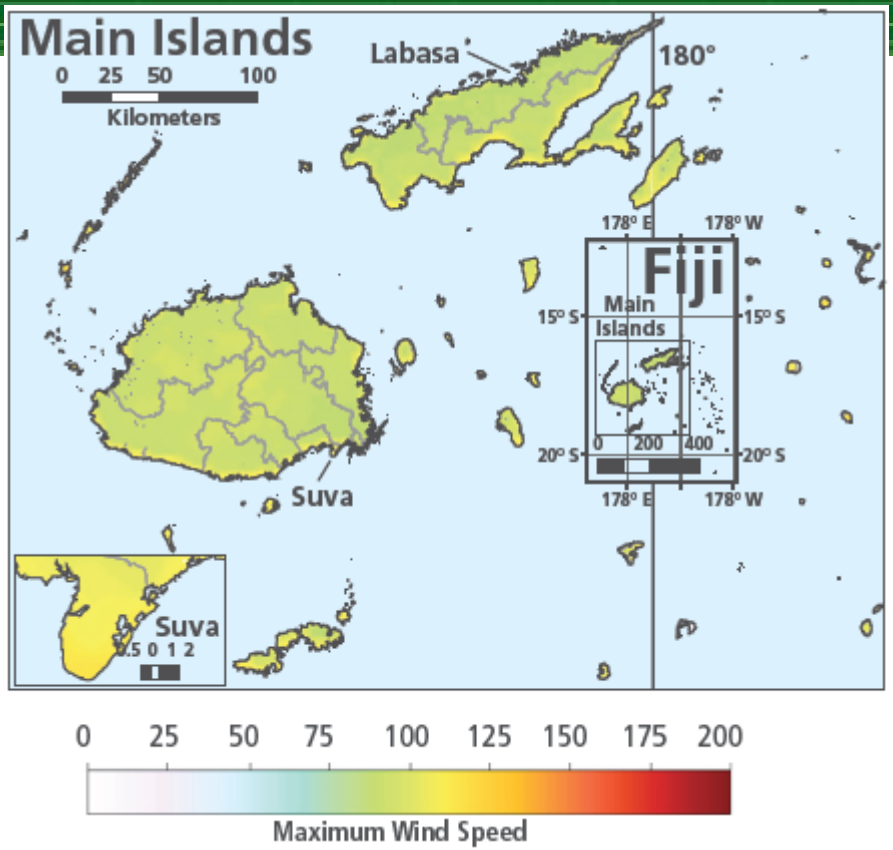
Summary of Exposure in Fiji(2010)

General Information:	
Total Population:	847,000
GDP Per Capita (USD):	3.550
Total GDP (million USD):	3,009.4
Asset Counts:	
Residential Buildings:	240,958
Public Buildings:	8,204
Commercial, Industrial, and Other Buildings:	16,974
All Buildings:	266,140
Hectares of Major Crops:	169,733
Cost of Replacing Assets (million USD):	
Buildings:	18,865
Infrastructure:	3,094
Crops:	216
Total:	22,175
Government Revenue and Expenditure:	
Total Government Revenue	
(Million USD):	652.5
(% GDP):	21.7%
Total Government Expenditure	
(Million USD):	2734.5
(% GDP):	24.4%

Simulating earthquake risks and tropical cyclone risk from regional historical hazard database

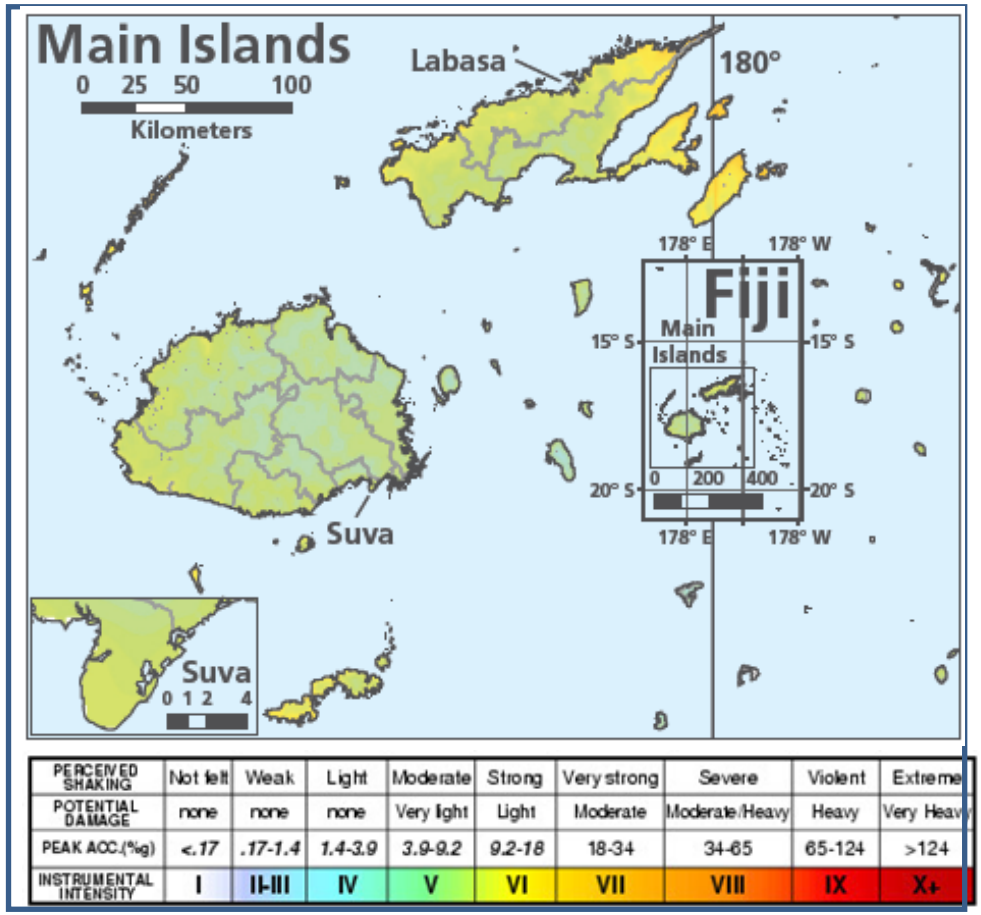


Hazard Maps: Applications for Planners



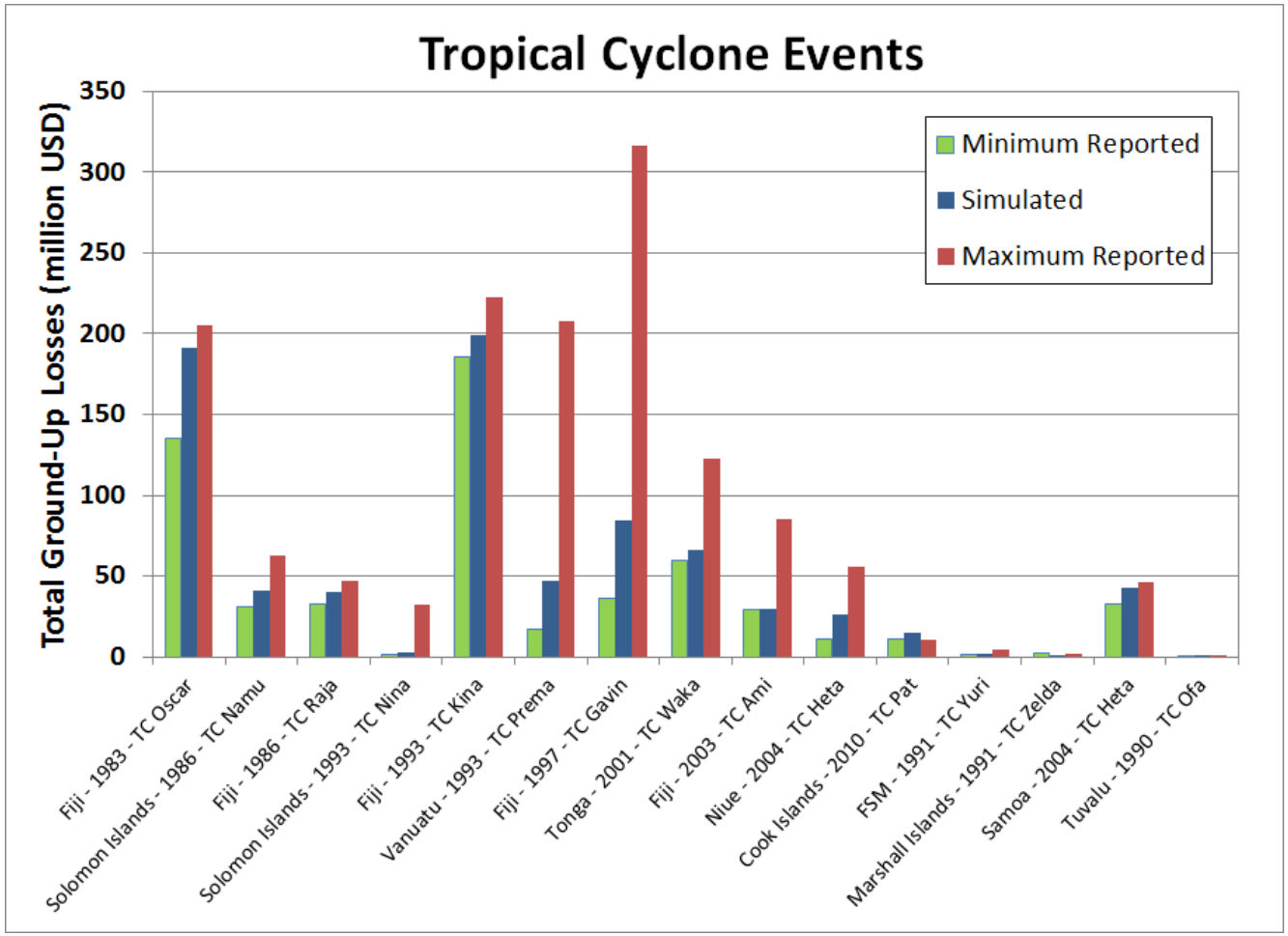
Severe damage to buildings, infrastructure and crops with large consequent economic damage

100 yr mean return period: wind speed, ground acceleration with ~40% chances to be exceeded in 50years



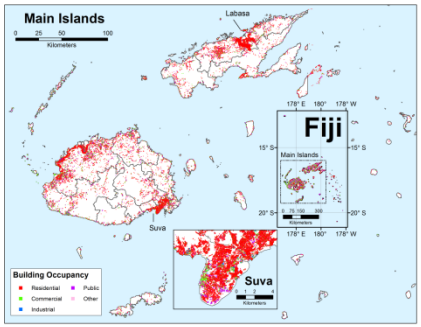
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

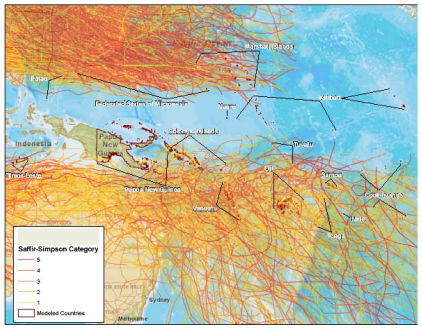
Historical vs simulated losses

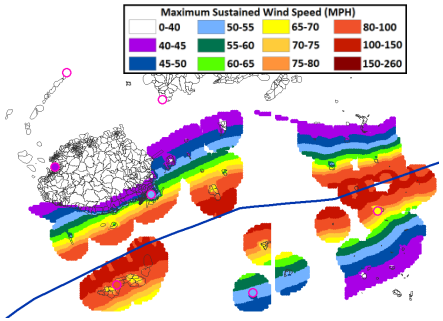


Country Risk Profile

EXPOSURE INFORMATION

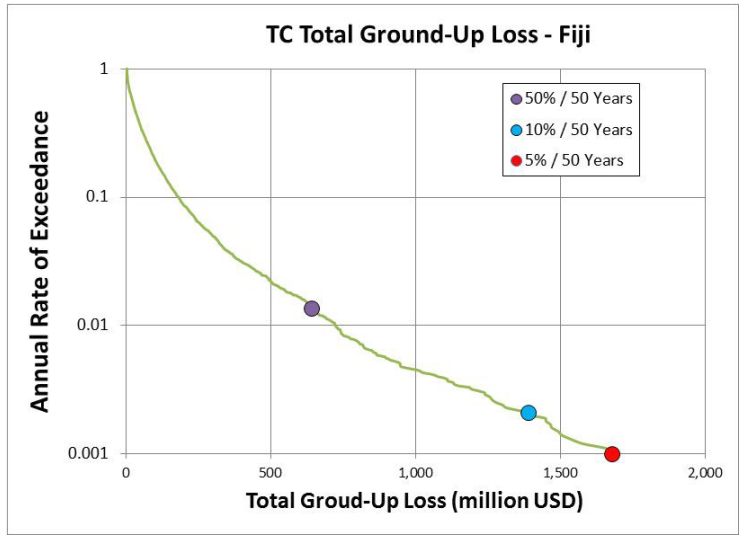




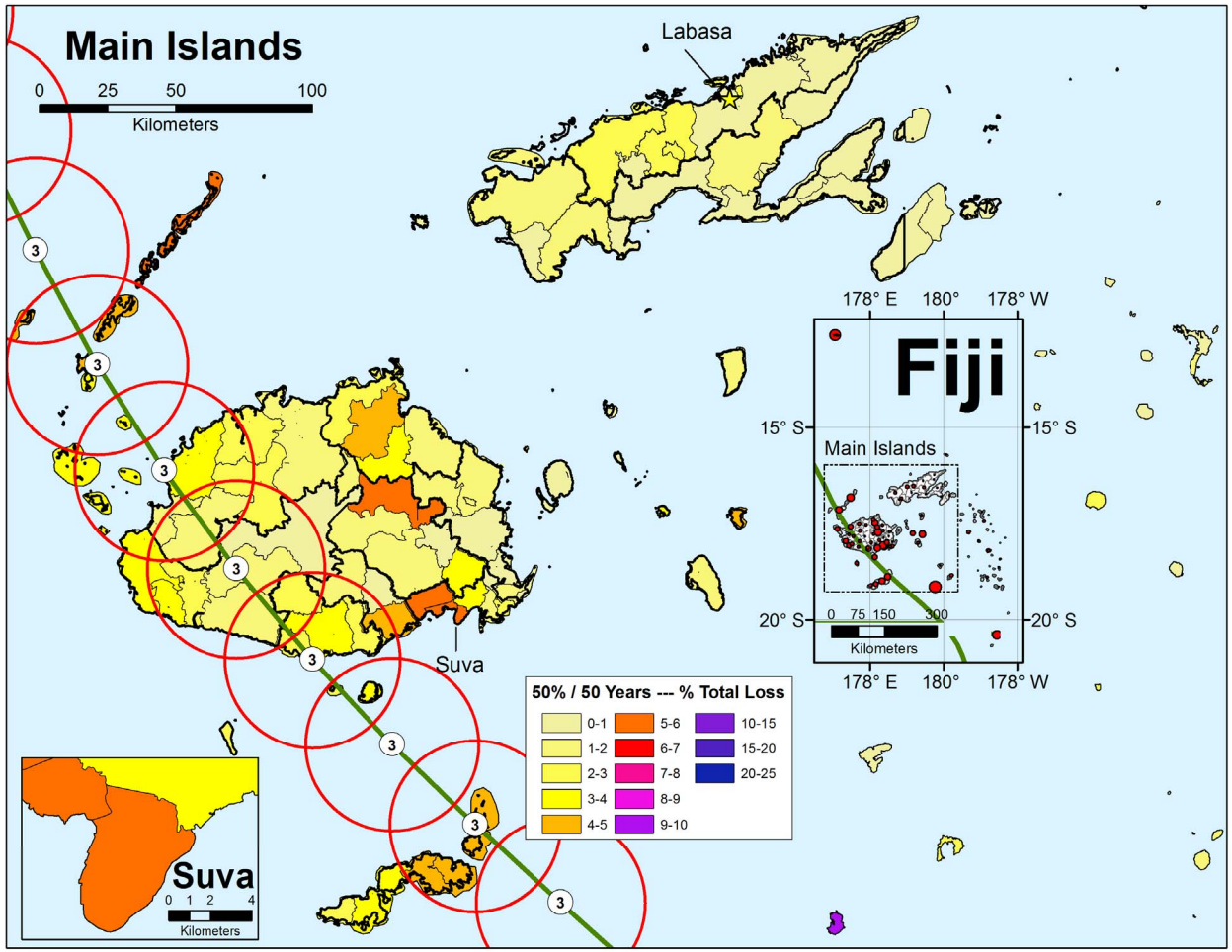


HAZARD ASSESSMENT

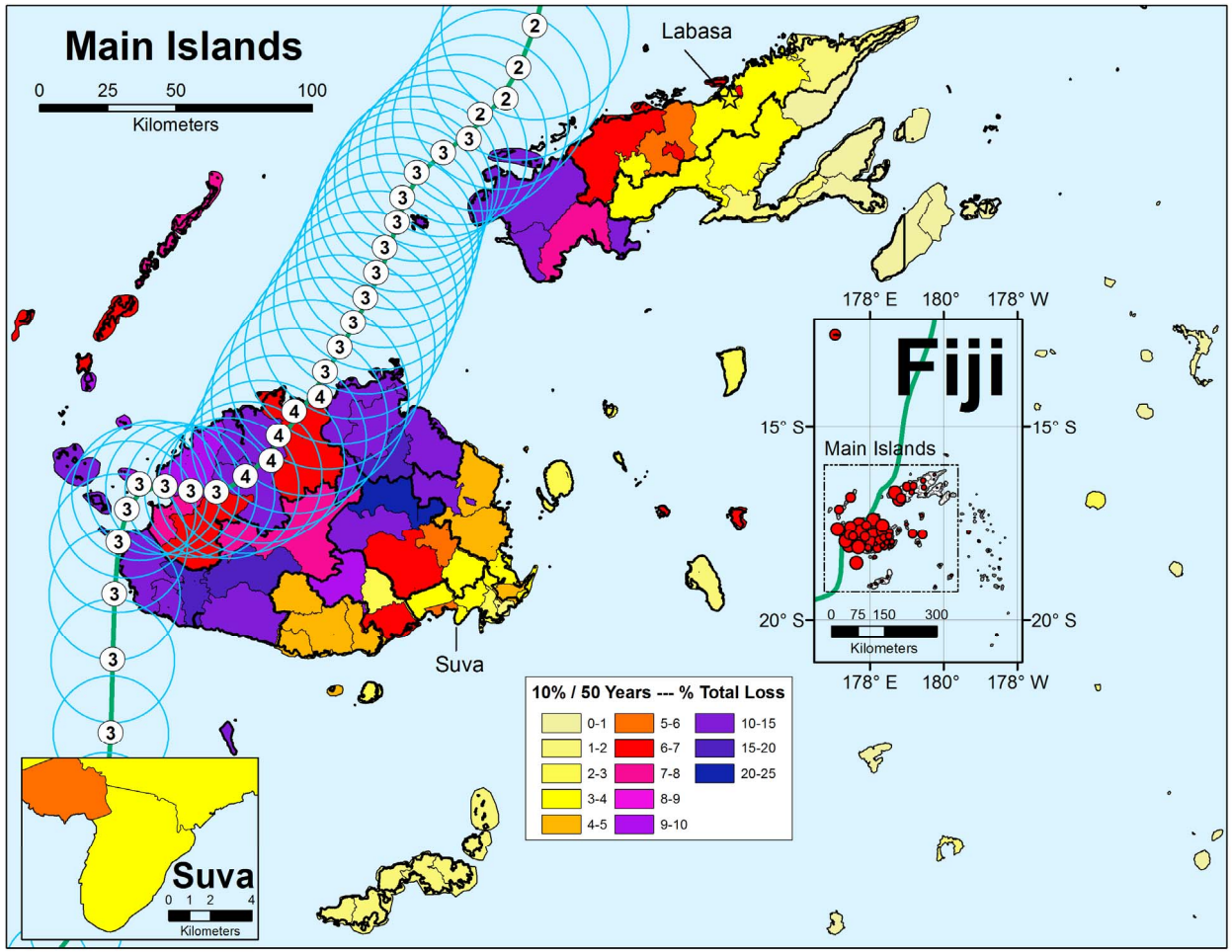
DAMAGE ESTIMATION



Infrequent Event - 50% in 50 years - $641 million loss
73 year return period

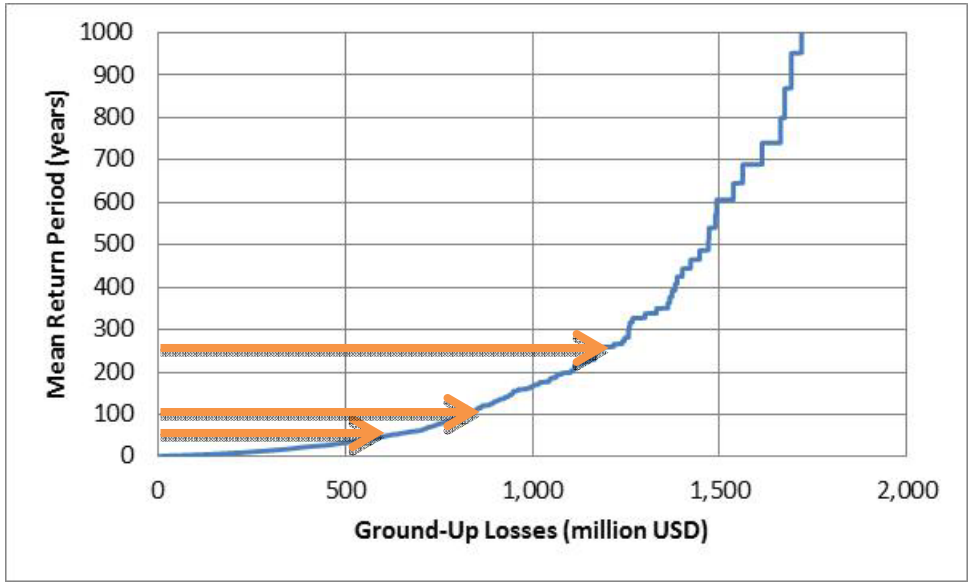


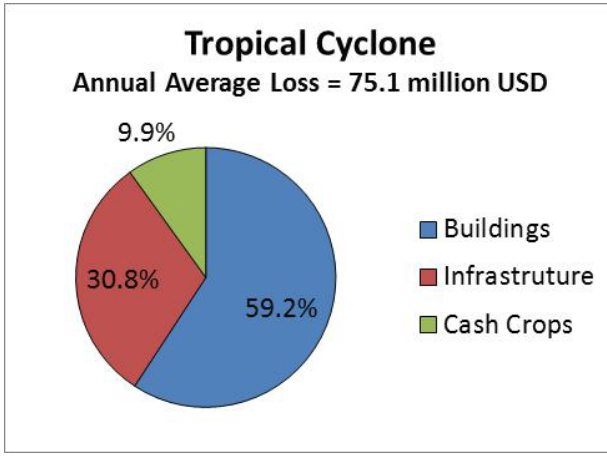
Rare Event - 10% in 50 years - $1,390 million loss
475 year return period

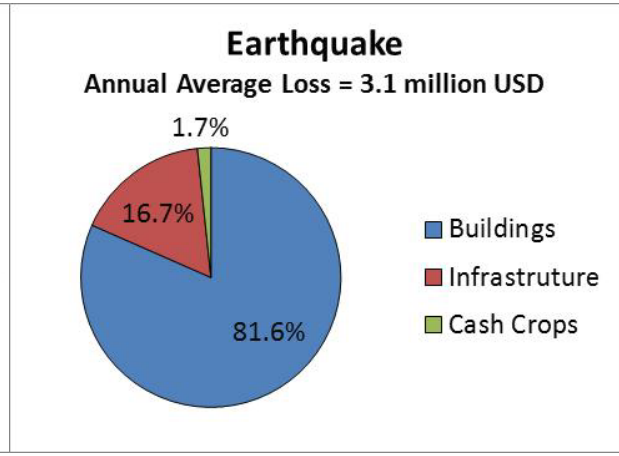


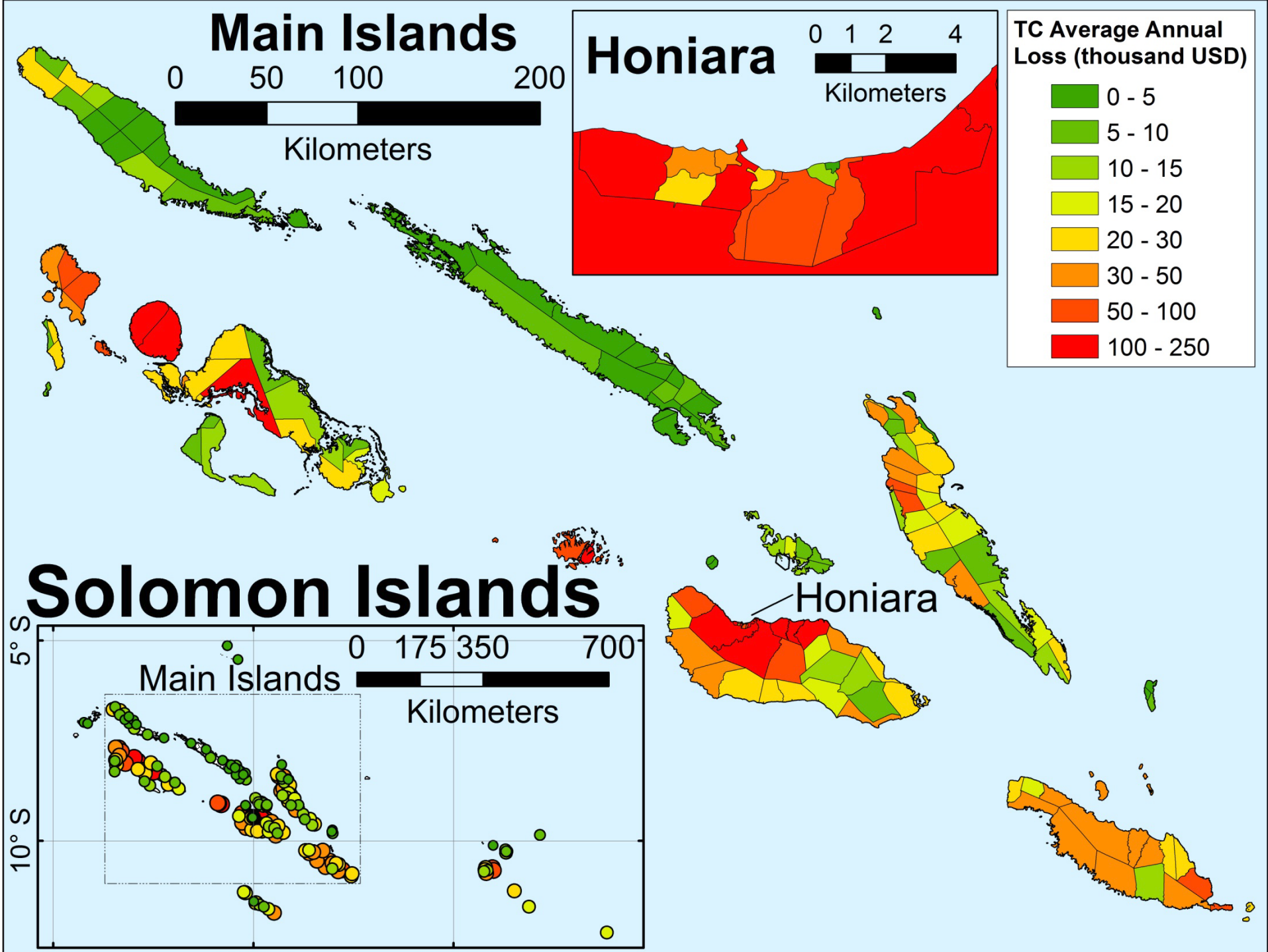
Country risk profiles
Illustration with Fiji

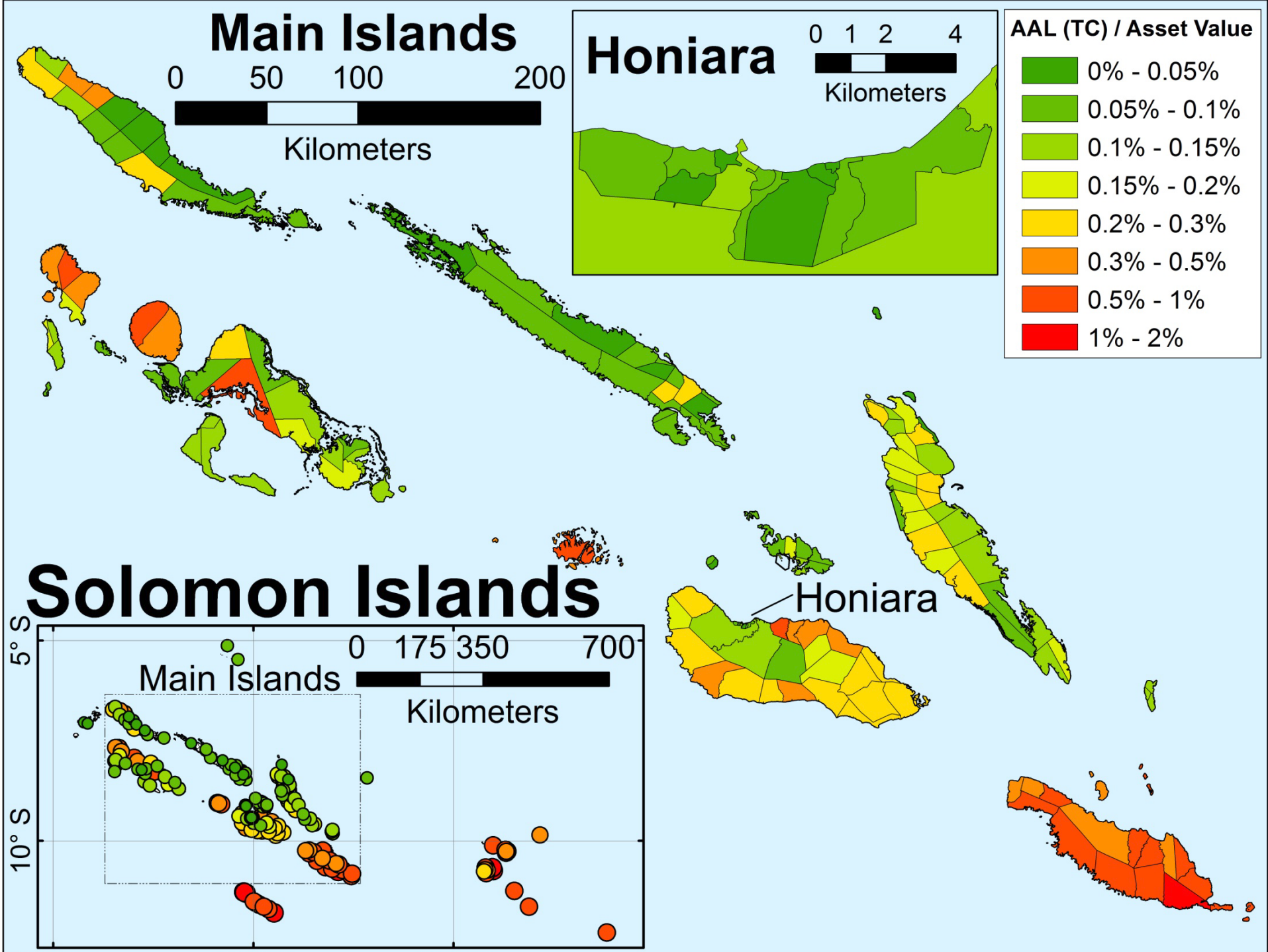
Mean Return Period (years)	50	100	250
Risk Profile: Tropical Cyclone			
Direct Losses			
(USD million)	592.9	809.2	1,168.6
(% GDP)	19.5%	26.7%	38.5%
Emergency Losses			
(USD million)	136.4	186.1	268.8
(% of total government expenditures)	15.0%	20.4%	29.5%
Risk Profile: Earthquake and Tsunami			
Direct Losses			
(USD million)	14.0	46.5	243.3
(% GDP)	0.5%	1.5%	8.0%
Emergency Losses			
(USD million)	3.0	9.3	44.1
(% of total government expenditures)	0.3%	1.0%	4.8%
Risk Profile: Tropical Cyclone, Earthquake, and Tsunami			
Direct Losses			
(USD million)	609.0	831.7	1,169.7
(% GDP)	20.1%	27.4%	38.5%
Emergency Losses			
(USD million)	139.6	186.6	268.9
(% of total government expenditures)	15.3%	20.5%	29.5%

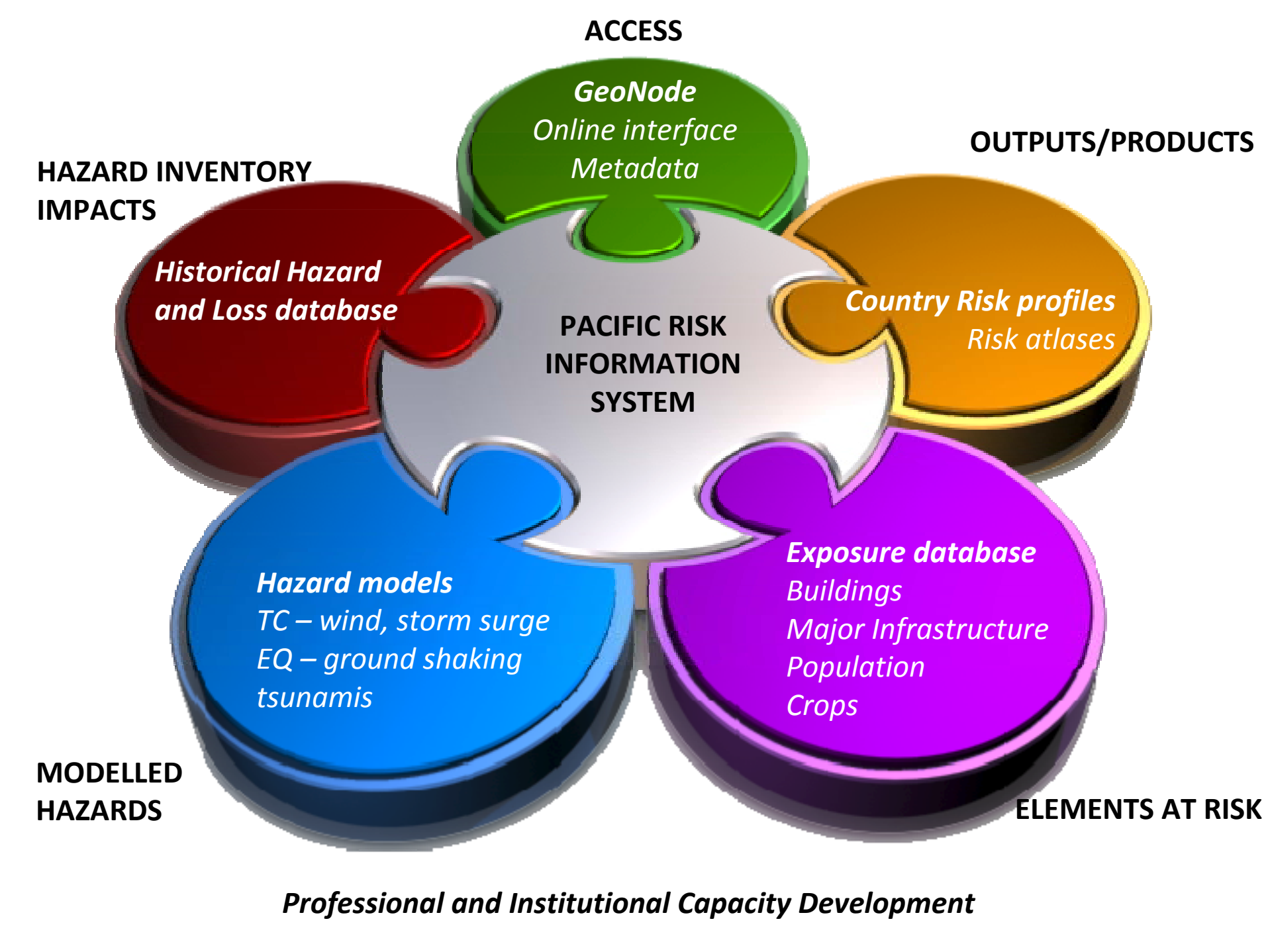







Main Islands
0 50 100 200
Kilometers
Honiara
0 1 2 4
Kilometers
TC Average Annual Loss (thousand USD)
0 - 5
5 - 10
10 - 15
15 - 20
20 - 30
30 - 50
50 - 100
100 - 250
Honiara
Solomon Islands
5° S
10° S
Main Islands
0 175 350 700
Kilometers


Main Islands
0 50 100 200
Kilometers
Honiara
0 1 2 4
Kilometers
AAL (TC) / Asset Value
0% - 0.05%
0.05% - 0.1%
0.1% - 0.15%
0.15% - 0.2%
0.2% - 0.3%
0.3% - 0.5%
0.5% - 1%
1% - 2%
Honiara
Solomon Islands
5° S
10° S
Main Islands
0 175 350 700
Kilometers


ACCESS
GeoNode
Online interface
Metadata
OUTPUTS/PRODUCTS
HAZARD INVENTORY
IMPACTS
Historical Hazard
and Loss database
Country Risk profiles
Risk atlases
PACIFIC RISK
INFORMATION
SYSTEM
Hazard models
TC – wind, storm surge
EQ – ground shaking
tsunamis
Exposure database
Buildings
Major Infrastructure
Population
Crops
MODELLED
HAZARDS
ELEMENTS AT RISK
Professional and Institutional Capacity Development

Pacific Risk Information System (PacRIS) - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Pacific Risk Information System (PacRIS)

paris.sopac.org

Google

Home Data Maps Partners

English

Explore Maps

Explore pre-made maps, and those made by website users, on such things as earthquake intensity, flood hazards, topography, road networks, buildings, bridges, and much more.

Explore Maps

Create Maps

Using the same raw data used to create other maps on the site, PacRisk lets you compose and share your own maps. Create a map with our cartography tool to develop new insights and track changes over time. Save, print and share these maps if you wish!

Create Map

Search for Data

PacRIS lets you access and browse geospatial data. Search for data that is valuable to you in a number of geospatial formats.

Search

View All

Upload data

PLEASE NOTE: These data layers have been derived from georeferenced satellite imagery. The data layers may appear misaligned when viewing over other base layers eg google earth base maps or imagery/data services. The georeferenced satellite imagery can be viewed as part of this catalogue.

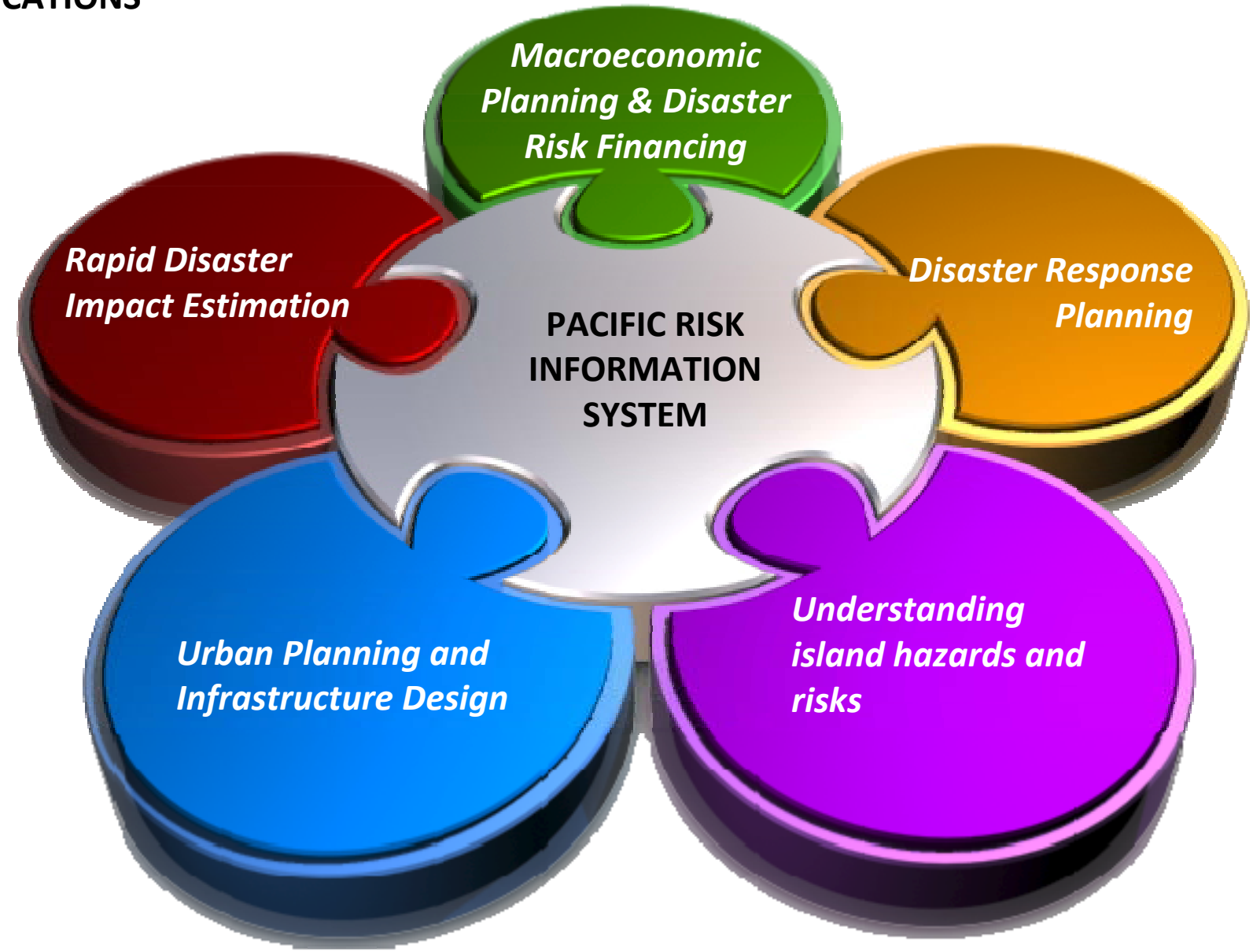
About

Pacific Risk Information Systems (PacRIS) is one of the largest collections of geospatial information for the Pacific island region. It contains information and data layers on:

- Base maps *(administrative boundaries, topography, bathymetry, land use cover, surface soil , geology)*
- Hazard maps *(tropical cyclone, earthquakes)*
- Field Survey Results *(Building, Infrastructure) -partial coverage*
- Risk exposure *(population, buildings, infrastructure, crops)*
- Risk and loss maps
- Historic event and disaster impact catalogues

PacRIS was assembled to provide detailed probabilistic risk information for 15 Pacific island countries for a range of decision makers including disaster risk management agencies. The perils covered are tropical cyclones (wind, storm surge and rain) and earthquakes (ground shaking, tsunami). The countries covered are Cook Islands, Fiji, Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor Leste, Tonga, Tuvalu and Vanuatu.

APPLICATIONS



Professional and Institutional Capacity Development

Beyond PCRAFI

- Post Disaster Damage and Loss Assessments
- Damage and Loss databases
- Joint National Action Plans addressing Climate Change and Disaster Risk Management priorities
  - Support by SPREP and SOPAC and their respective partners
  - Sharing of data between initiatives implemented in same area.
- Improving hazard and risk modelling in targeted areas

Lessons Learnt

- Partnerships and collaboration. Don't just assume it
- Sustainability. National buy in
- Communications targetted at policy makers
- Links to initiatives being planned.
- Fragility functions
- Ensure information is handed over
- Capacity Development
- Be prepared to do a whole lot of data cleaning. IGOs also hold of data for countries