

Use of Exposure Data



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**PACIFIC
CATASTROPHE
RISK INSURANCE
COMPANY**

How does PCRIC use risk analytics and exposure data?

1

Better pricing and structuring of risk financing solutions

2

Payout calculation

3

Analysis and Reduction of Basis Risk

4

Better reinsurance placement options

5

Better culture of risk management

- Identification of risk drivers
- Reduction of uncertainties

Development of risk profiles for PCRIC

- For buildings, infrastructure and crops, used EQ and TC models developed by AIR Worldwide and transferred them to RiskScape
- For population, used newly developed models funded by the World Bank (Temblor for EQ, Reask for TC, and JBA for XSR)
- Based on the PCRAFI exposure data from SPC (vintage 2010)
- Completed with review of Census data, PacRIS (Pacific Risk Information System), the PRIF (Pacific Region Infrastructure Facility) database, and including publicly available datasets (e.g. OpenStreet maps), as well as latest satellite images.
- Performed a basic scale up of exposure data to 2020 (using population growth and average building replacement cost)

Country
Cook Islands
Fiji
Federated States of Micronesia
Kiribati
Marshall Islands
Niue
Nauru
Papua New Guinea
Palau
Solomon Islands
Tonga
Tuvalu
Vanuatu
Samoa

Number and replacement cost of buildings

- For most countries, estimated number of additional buildings based on population growth, and updated cost based on PRIF (2021) or World Bank inflation factors
- For Tongatapu, used ADB Multi-Hazard Risk Disaster Assessment report (2021)

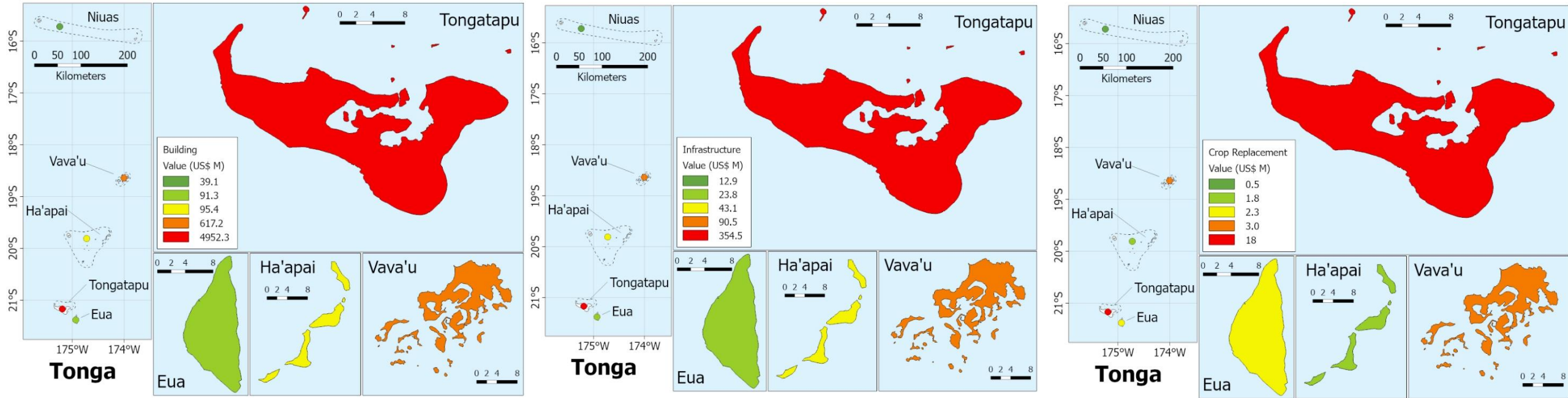
Country Code	Correction Factor
CK	1.1
FJ	1.0
FM	1.3
KI	1.3
MH	1.3
NU	1.3
NR	1.3
PG	1.1
PW	1.3
SB	1.2
TO	1.1
TV	1.3
VU	1.1
WS	1.2

Country-specific correction factors recommended by PRIF (2021), from Fiji valuations.

Country Code	Inflation Factor
CK	1.19
FJ	1.29
FM	1.17
KI	1.01
MH	1.09
NU	1.17
NR	1.23
PG	1.64
PW	1.21
SB	1.37
TO	1.28
TV	1.25
VU	1.23
WS	1.16

World Bank Country-specific inflation factors

Replacement cost for Buildings, Infrastructure and Crops aggregated by division

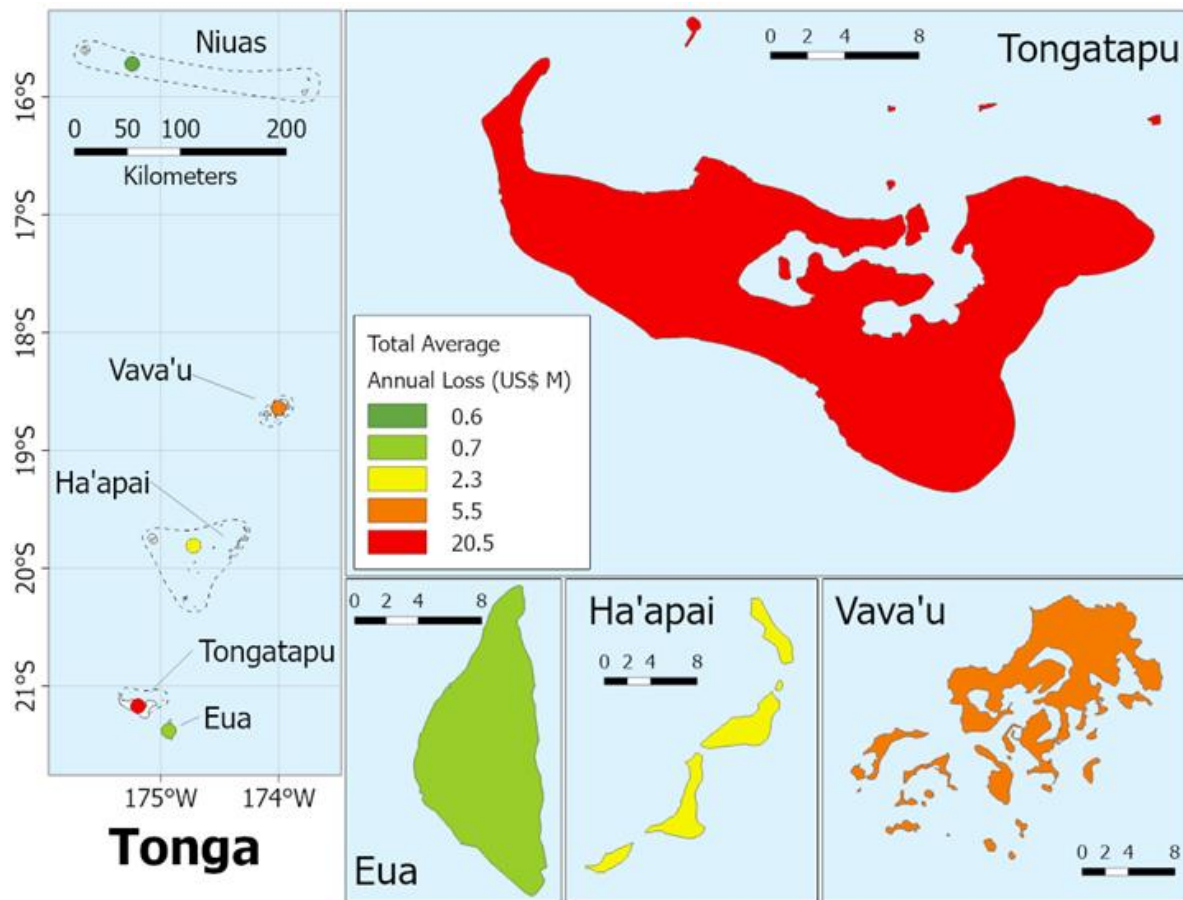


Buildings

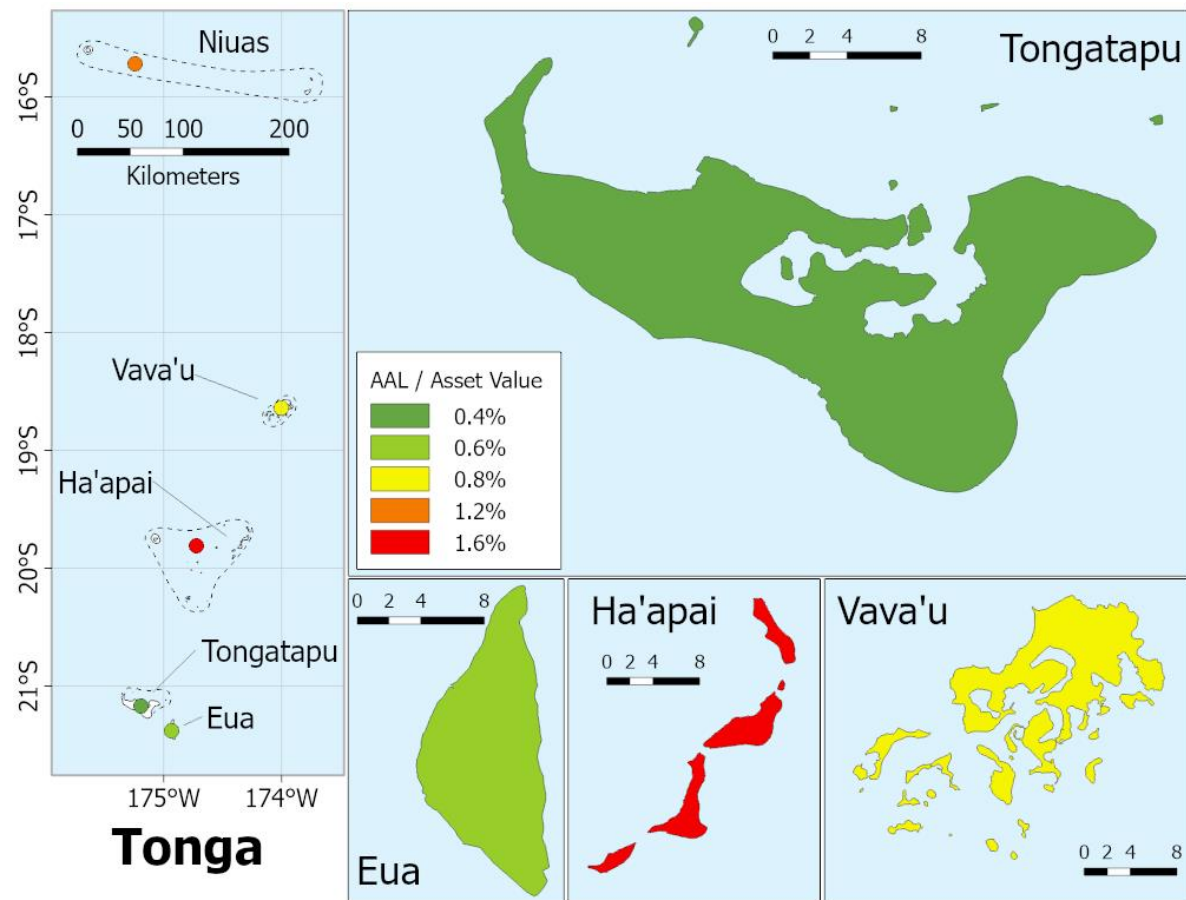
Infrastructure

Crops

Total Average Annual Losses for perils and assets combined (Buildings, Infrastructure and Crops)

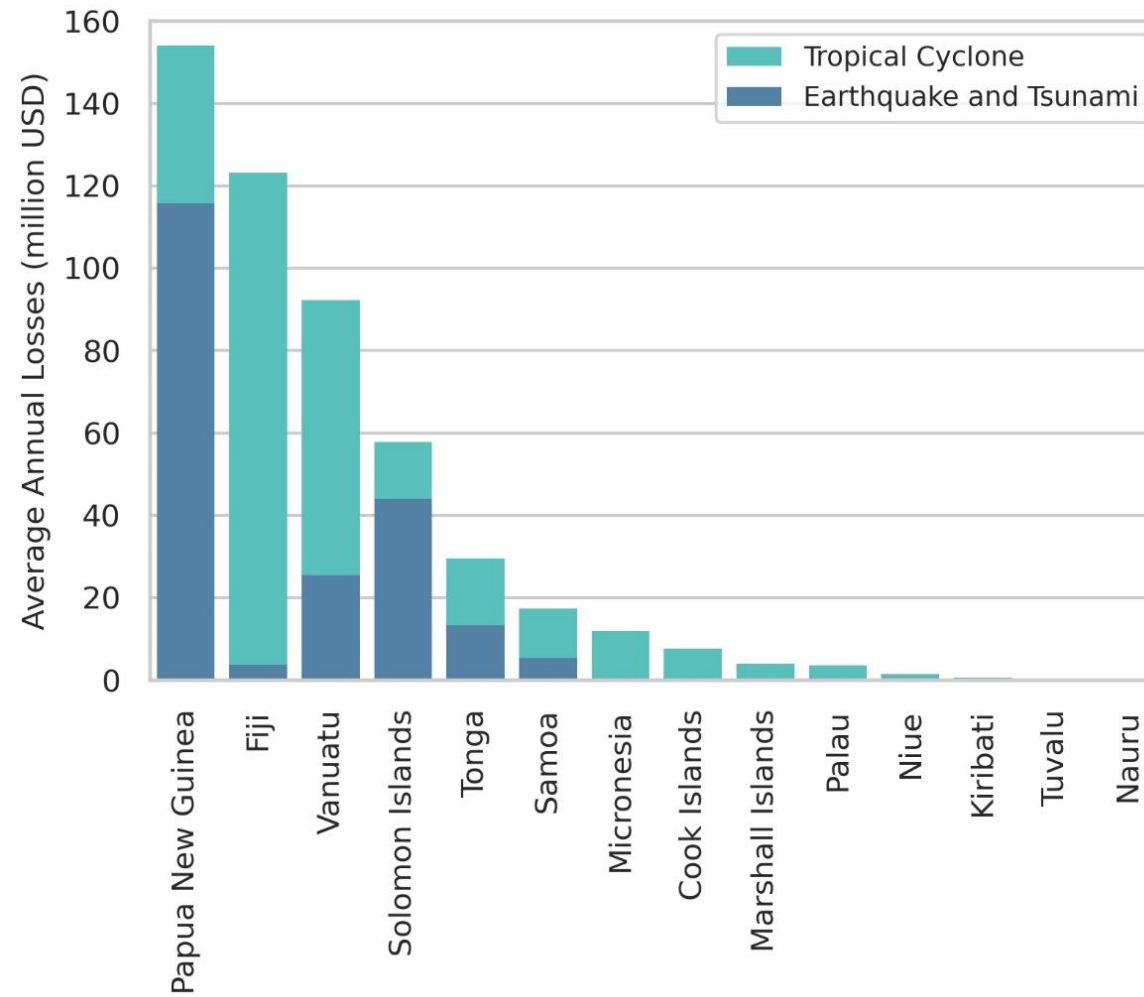


\$ Loss



Loss Ratio (%)

Regional Benchmarking across all 14 PICs



Resolution of population data

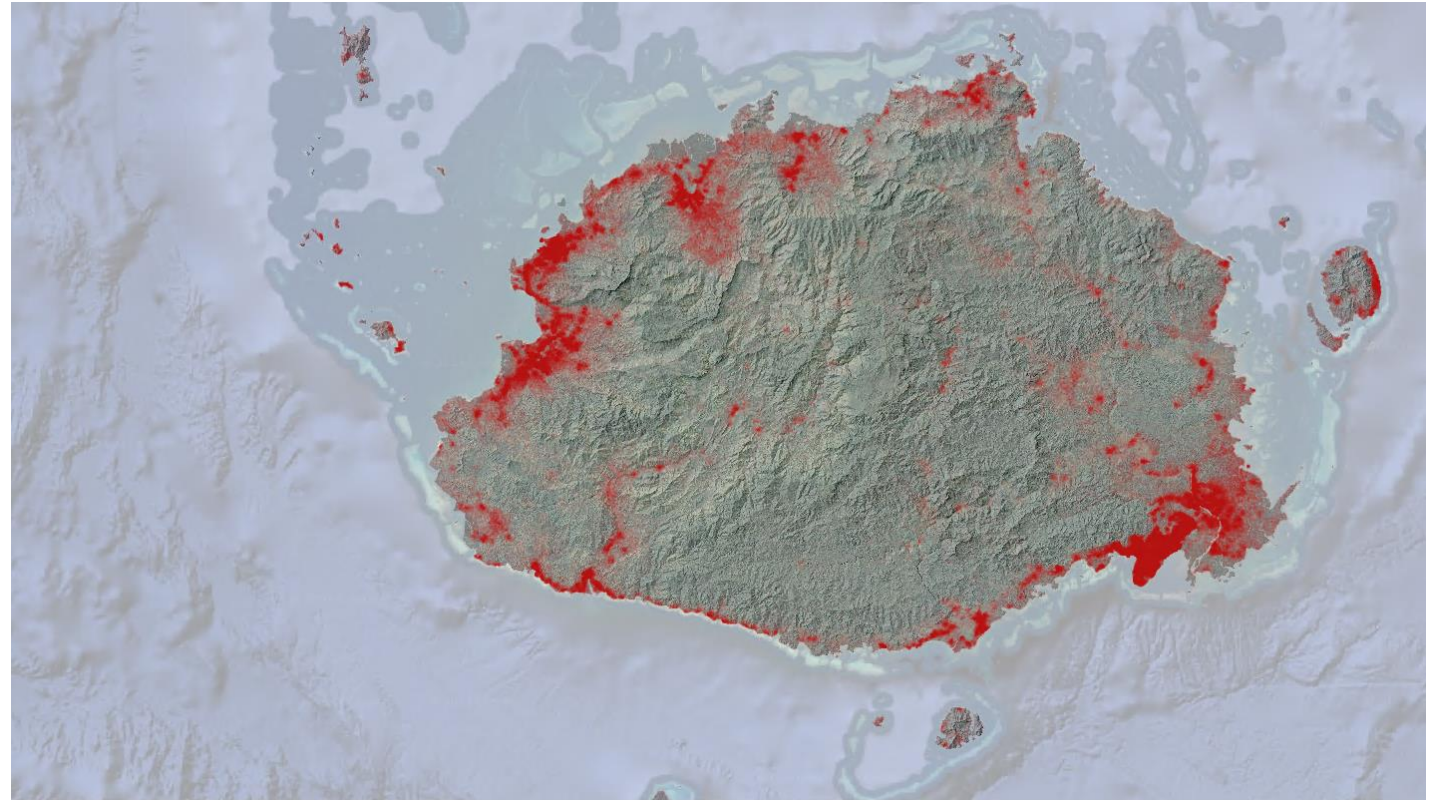
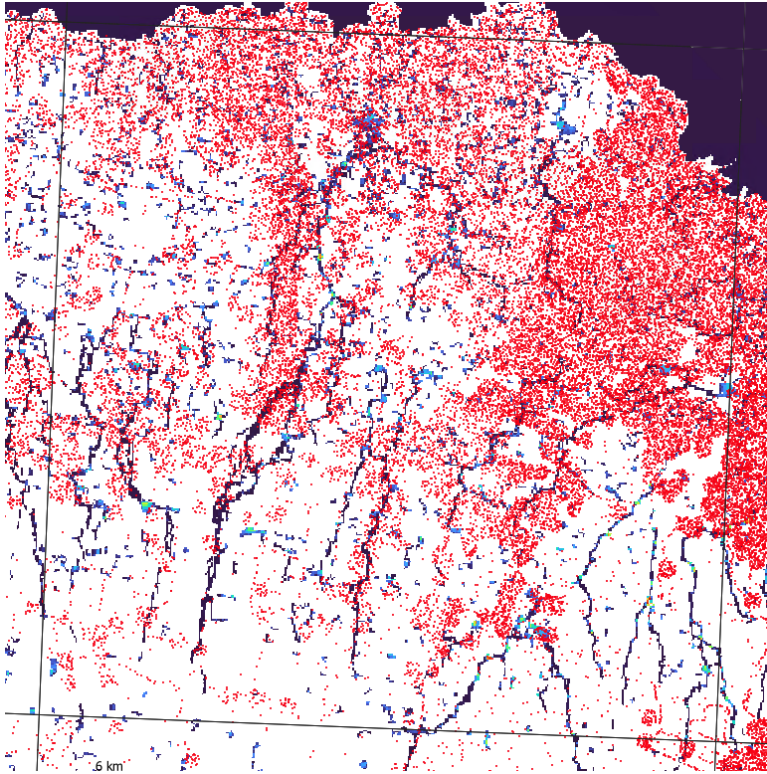
- Country codes and administrative levels, with the level used to obtain the population data in bold.
- Main source of the population data was the PopGIS website (SPC SDD c2022) hosted by the Statistics for Development Division of SPC

Country Code	Region 1	Region 2	Region 3	Region 4
CK	Group	Island	Electoral Boundary	Enumeration Area
FJ	Province	Tikina	Enumeration Area	-
FM	State	Municipality	Electoral District	-
KI	Group	Island	Village	Village
MH	Atoll	Islet	-	-
NR	District	-	-	-
NU	Village	-	-	-
PG	Province	District	-	-
PW	State	Hamlet	-	-
SB	Province	Ward	Enumeration Area	-
TO	Division	District	Village	Census Block
TV	Island	Village	-	-
VU	Province	Island	Area Council	Enumeration Area
WS	Island	Region	District	Village

Population data per country: PCRAFI 2010, latest census, growth rates and updated 2020 population

Country Code	PCRAFI 2010 Population	Census Year	Population at Census Year	Population Growth since Last Count (%)	PCRAFI 2020 Population
CK	19,826	2011	17,794	-14.92	15,140
FJ	846,842	2017	884,887	1.32	896,599
FM	111,567	2010	102,839	2.66	105,581
KI	101,403	2020	119,438	N/A	119,438
MH	54,827	2011	53,158	1.60	54,010
NR	9579	2011	9945	14.61	11,398
NU	1479	2011	1611	-4.29	1541
PG	6,405,599	N/A	N/A	25.70	8,051,585
PW	20,503	2015	17,661	1.16	17,865
SB	547,540	2009	515,870	29.11	666,039
TO	103,352	2016	100,651	-1.43	99,214
TV	9960	2017	10,645	2.13	10,872
VU	245,864	2020	293,963	N/A	293,963
WS	182,901	N/A	N/A	6.68	195,126

Geographic Distribution of Population



- Population dataset is distributed according to Population Census and Meta for Good population density dataset (being based on building footprints derived from earth observation imagery)
- People represented as points at 30m resolution

Conclusions

- **Useful applications such as:**
 - Disaster risk financing and insurance solutions and ex ante budget planning
 - Urban and development planning
 - Community-based disaster risk management and climate change adaptation
 - Baseline for post-disaster damage assessments
- **Limitations:**
 - It is crucial for data to be as up to date as possible
 - Regional inconsistency and incompleteness of exposure data

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