



UNOSAT: Building DRR & Climate Resilience

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Disaster Risk Management and Climate Resilience Section

UNOSAT - UNITAR

United Nations inter-agency meeting on outer space activities (UN-Space)

High Level Panel on Space-based Technologies for Disaster Risk Reduction

Friday, 9 December 2022 , Bangkok, Thailand

UNITED NATIONS SATELLITE CENTRE (UNOSAT)



- Division for Satellite Analysis and Applied Research at the **United Nations Institute for Training and Research (UNITAR)**
- Operational since 2001, recognized as the **United Nations Satellite Centre** in June 2021

Mandate:

“provide United Nations funds, programmes and specialized agencies with satellite analysis, training and capacity development, at their request, as well as to continue supporting Member States with satellite imagery analysis over their respective territories and to provide training and capacity development in the use of geospatial information technologies”

UNOSAT recognized by ECOSOC in June 2021 as
The United Nation Satellite Centre (UNOSAT) (Res. E/2021/L.22)

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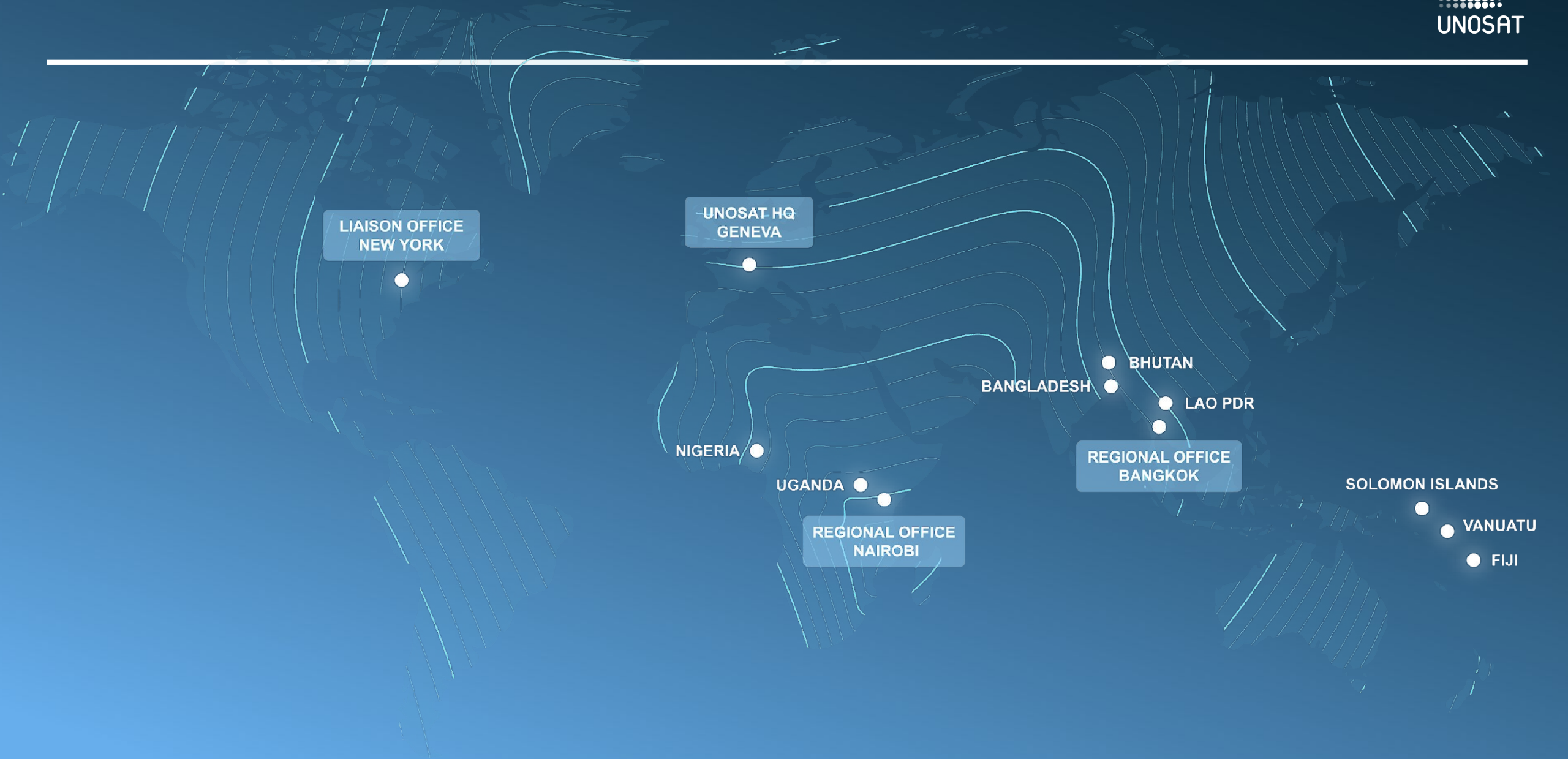
BHUTAN

LAO PDR

SOLOMON ISLANDS

VANUATU

FIJI



Operational Pillars



Training and Capacity Development

Hands-on technical training, awareness raising and technical backstopping

Satellite Analysis

Satellite imagery derived geospatial products



Applied Research and Innovation

EO, AI, Machine Learning, Big Data Analytics, crowdsourcing

DRR - Capacity Development Projects



- **East Africa (2014- 2020):** Enhancing IGAD's Member States Capacity in GIT applications for DRR
- **West Africa (2018-2020):** Capacity Building Support to the Economic Community of West African States (ECOWAS) on DRR
- **Asia (2014-2020):** Technical trainings on GIT applications for DRR delivered in more than 10 countries in collaboration with ADPC & UNESCAP.
- **Africa (2020):** UNOSAT & UN Technology Bank: Enhancing Capacities in the use of GIT for Improved DRR/M, Climate change (CC), Natural Resources Management (NRM): Gambia, Uganda, Mozambique
- **Guyana (2018-2021):** National Flood Early Warning System (2018 – 2021)
- **Pacific (2018- 2022):** CommonSensing - Strengthen climate resilience in Fiji, Vanuatu & Solomon islands
- **IORA Member States (2021-2022):** Geospatial Information Technology (GIT) for Operational Planning and Decision Making in Disaster Risk Management
- **UNESCAP (2021-2022):** Asia Pacific Risk & Resilience Portal
- **UNESCAP (2022):** Utilizing Space Applications to Strengthen Drought and Land Management in Central Asia through Innovative Learning
- **Asia-Pacific and Africa (2021-2024):** Strengthening Capacities in the use of geospatial information for improved resilience in: Uganda, Nigeria, Bhutan, Lao PDR, Bangladesh, Fiji, Solomon Islands and Vanuatu.



CommonSensing – Building Climate Resilience with Small Islands Nations (2018-2022)



OBJECTIVE

Improve national resilience towards climate change in small island developing states. The project focused on improved food security, disaster risk reduction and better access to international climate finance and will contribute to sustainable development in Fiji, Solomon Islands and Vanuatu, through the use of geospatial and climate information technologies.

ACTIVITIES

- Capacity building in the use of geospatial and climate information services, strengthening technical skills across the region
- Technical Backstopping: Embedding specialists within government structures to ensure local data systems, knowledge and decision-making benefit from the added capabilities of CommonSensing
- Development of decision support systems

COUNTRIES

- Fiji, Solomon Islands and Vanuatu

THEMATIC AREAS



Climate
Information



Food
Security



Disaster
Risk
Reduction



Climate
Finance

PARTNERS



sensonomic



Spatial Days

FUNDED BY



International Partnership Programme (IPP)

CommonSensing – Building Climate Resilience with Small Islands Nations



DRR Decision Support System

The Decision Support System will provide contextual analyses of a variety of hazards, risk, vulnerability, and coping capacity data based on INFORM sub-national methodology to improve situational awareness.

[EXPLORE](#)



Open Data Cube

CommonSensing provides access to the Open Data Cube (ODC) products of various types, serving a range of use cases within climate change resilience.

[EXPLORE](#)



Climate Impact

The Climate Information app was created to allow users to look back in time at how Climate parameters have varied over time.

[EXPLORE](#)

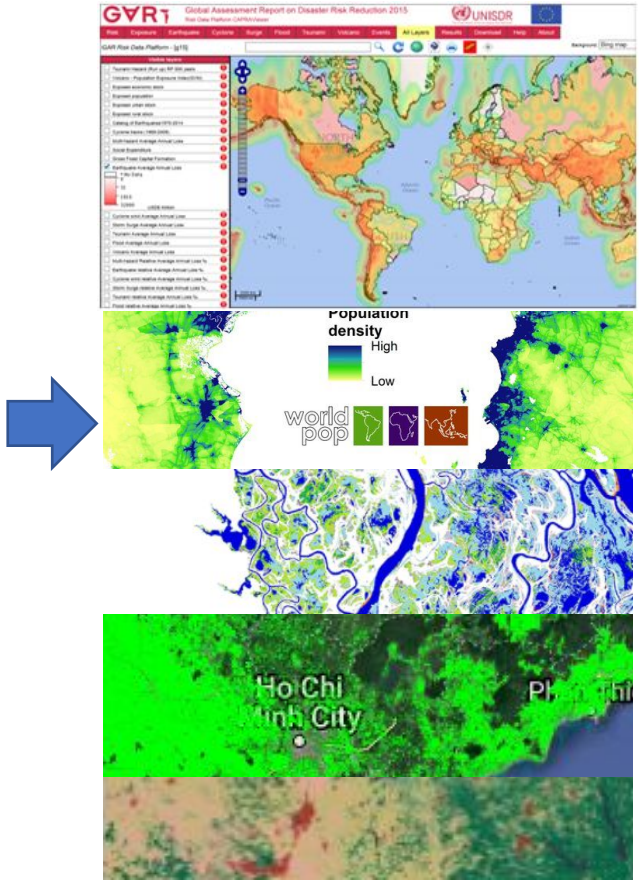
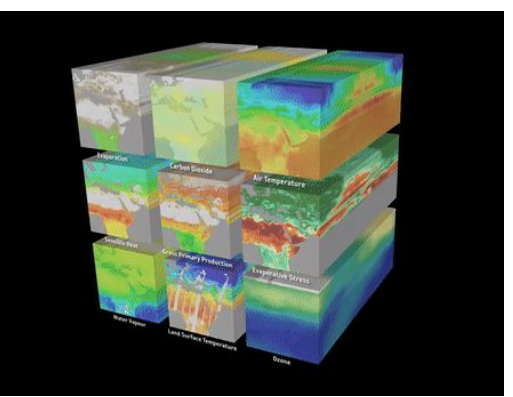
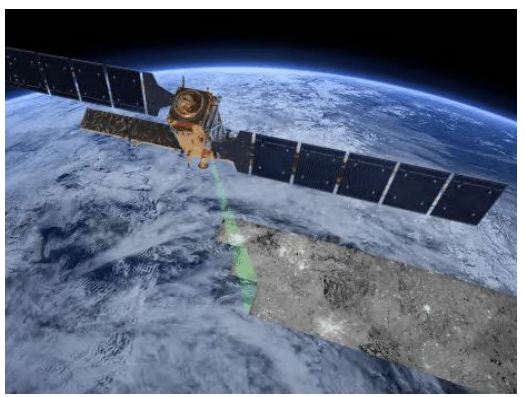


Food Security

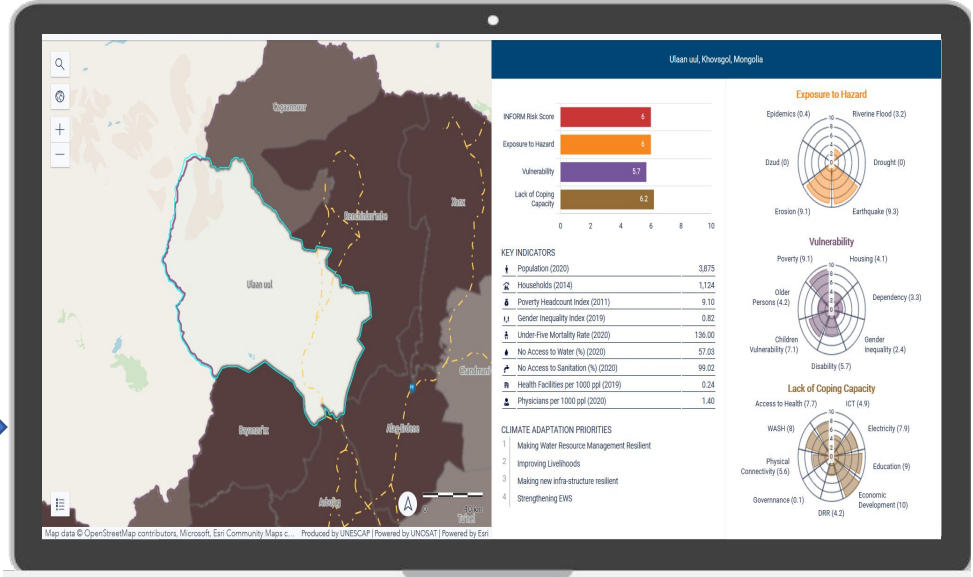
The open app is designed to provide the farmers or communities with suitability information of potential crops in any location in Fiji.

[EXPLORE](#)

Decision Support System promoting risk-informed & evidence-based decision making



- Global disaster risks
- High resolution population models
- Global surface water
- Global cropland
- Global landcover

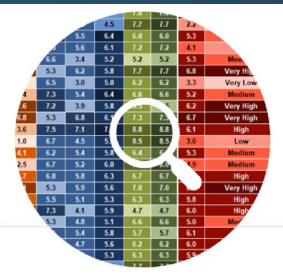


Data

Information

Insights

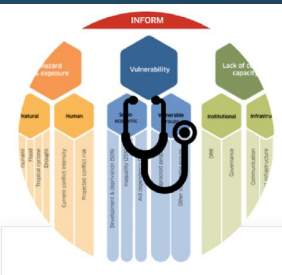
Decision Support System promoting risk-informed & evidence-based decision



Descriptive Analytics

The descriptive analytics presents the INFORM risk index at the sub-national level, where users can easily recognise the relative risks of different administrative units.

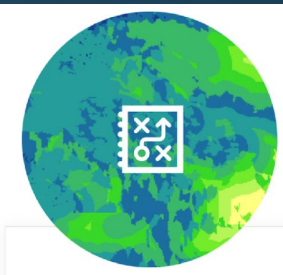
[LAUNCH TOOL](#)



Diagnostic Analytics

The diagnostic analytics breaks down the INFORM risk index into exposure to hazard, vulnerability, and lack of coping capacity indexes for selected sub-national levels.

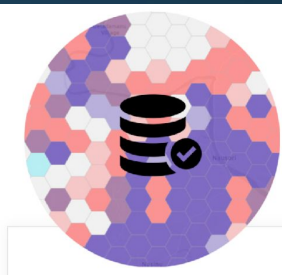
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MCDCA

The Multiple Criteria Decision Analysis tool allows decision-makers to find an optimal disaster risk reduction measure based on multiple factors.

[LAUNCH TOOL](#)



Data Quality Assessment

The Data Quality Assessment shows OSM map coverage by comparing the number of OSM object counts (number/km²) to the local population density (population/km²).

[LAUNCH TOOL](#)

Decision Support System for Enhanced Disaster Risk Reduction

Descriptive Diagnostic Multiple Criteria Decision Analysis Data Quality Assessment

INFORM Risk Index Exposure to Hazard Vulnerability Lack of Coping Capacity

Nairai, Lomaiviti, Eastern Division, Fiji

Population: 483
 Number of Households: 124
 Exposure to Hazard: 7.0
 Vulnerability: 5.6
 Lack of Coping Capacity: 8.5

INFORM Risk Score: 6.9/10

Exposure to Hazard: 7.0
 Vulnerability: 5.6
 Lack of Coping Capacity: 8.5

Rank by Risk

Rank	INFORM Risk Index
1	Nairai
2	Naviti
3	Yasawa
4	Ovalau
5	Cakaudrove
6	Tunuloa
7	Malolo

Rank by Dimensions

Rank	Exposure to Hazard	Vulnerability	Lack of Coping Capacity
1	Ovalau	Cikobia	Nakorotubu
2	Malolo	Nakorotubu	Wainibuka
3	Vuda	Saqani	Wainimala
4	Suva	Waimaro	Tunuloa
5	Cakaudrove	Ba	Nalawa
6	Naviti	Touva	Nairai
7	Malolo	Malolo	Malolo

Where is the highest overall risk?

- 6.9 - Nairai (0.5k ppl)
- 6.8 - Naviti (2.9k ppl)
- 6.7 - Yasawa (2.2k ppl)
- 6.6 - Ovalau (9.6k ppl)
- 6.5 - Cakaudrove (14.6k ppl)
- 6.4 - Tunuloa (3.8k ppl)
- 6.3 - Wainikeli (4.5k ppl)
- 6.2 - Musilevu (0.8k ppl)
- 6.2 - Vuda (99.3k ppl)
- 6.2 - Noco (3.7k ppl)
- 6.1 - Nakorotubu (4.4k ppl)
- 6.1 - Bua (6.2k ppl)
- 6.1 - Serua (16.4k ppl)
- 6.1 - Saqani (2k ppl)
- 6.1 - Koro (2.9k ppl)
- 6 - Nakasaleka (2.5k ppl)
- 6 - Bau (31k ppl)
- 6 - Suva (94.1k ppl)
- 5.9 - Nakelo (10.9k ppl)
- 5.9 - Sawakasa (8.6k ppl)
- 5.9 - Lomaloma (0.9k ppl)
- 5.9 - Gau (2.2k ppl)
- 5.9 - Cikobia (0.1k ppl)
- 5.9 - Mucuta (9.4k ppl)
- 5.9 - Naitasiri (160k ppl)
- 5.8 - Batiki (0.2k ppl)
- 5.8 - Nabukilevu (2.6k ppl)

Decision Support System for Enhanced Disaster Risk Reduction

Descriptive Diagnostic Multiple Criteria Decision Analysis Data Quality Assessment

Vuda, Ba, Western Division, Fiji

Population: 99,264
 Number of Households: 21,818
 INFORM Risk: 6.2 / 10
 Exposure to Hazard: 7.6 / 10
 Vulnerability: 5.8 / 10
 Lack of Coping Capacity: 5.5 / 10

This analysis is based on preliminary sub-national INFORM index developed by CommonSensing project team. This composite indicator is yet to be validated and approved by responsible government ministry. Please use with caution!

EXPOSURE TO HAZARD: 7.6

Storm Surge, Earthquake, Tsunami, Tropical Cyclone, Erosion

VULNERABILITY: 5.8

Development & Deprivation, Elderly Person (65+), Disability Person, Children (<5), Aid Dependency

LACK OF COPING CAPACITY: 5.5

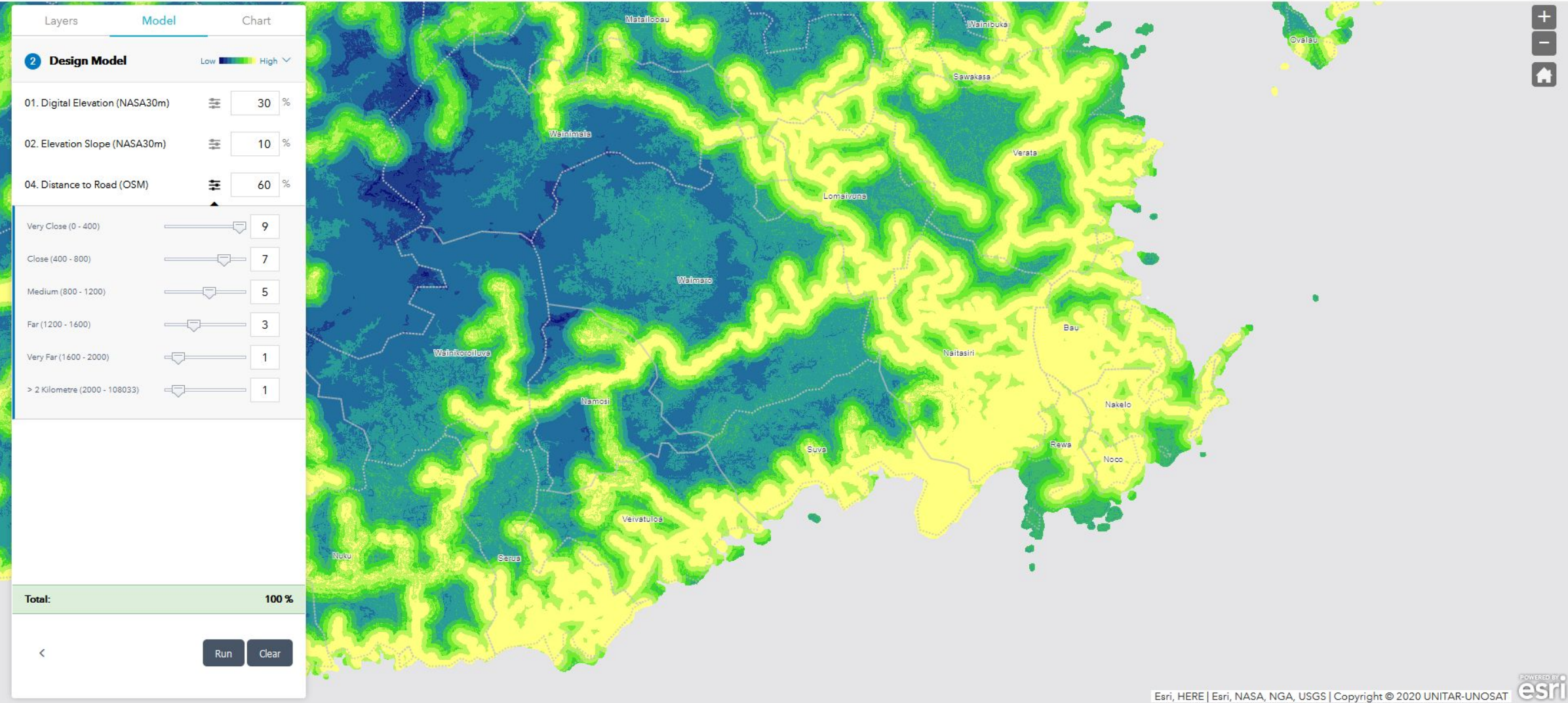
Lack of Health Facilities, Lack of Electricity, Lack of Internet Access, Lack of Improved Building Materials, Lack of Improved Water Source, Lack of Improved Sanitation, Lack of Roads, Lack of resources available that can help absorb the shock.

Multi-criteria decision analysis tool (MCDA)



Decision Support System
for Enhanced Disaster Risk Reduction

Descriptive Diagnostic **Multiple Criteria Decision Analysis** Data Quality Assessment



Crop Suitability Application



Food Security - Crop Suitability

View by crop types View by location

Crop Suitability Overview
Click on the map to view more details

lon: 178.4894 lat: -18.0732
Soil series: Nadroga
Land cover: IVE
Map code: 114D
Main limit: Slope, profile shallowness, erosion risk, nutrient deficiency, soil moisture deficit

Crop Suitability by Type

Crop Type	Suitability
Cassava	S2
Dalo	S3
Ginger	N
Potato	N
Rice Upland	N
Rice Irrigation	N
Sugar	N
Sweet Potato	N
Yagona	N
Yam	N

Major Rivers

Crop Suitability

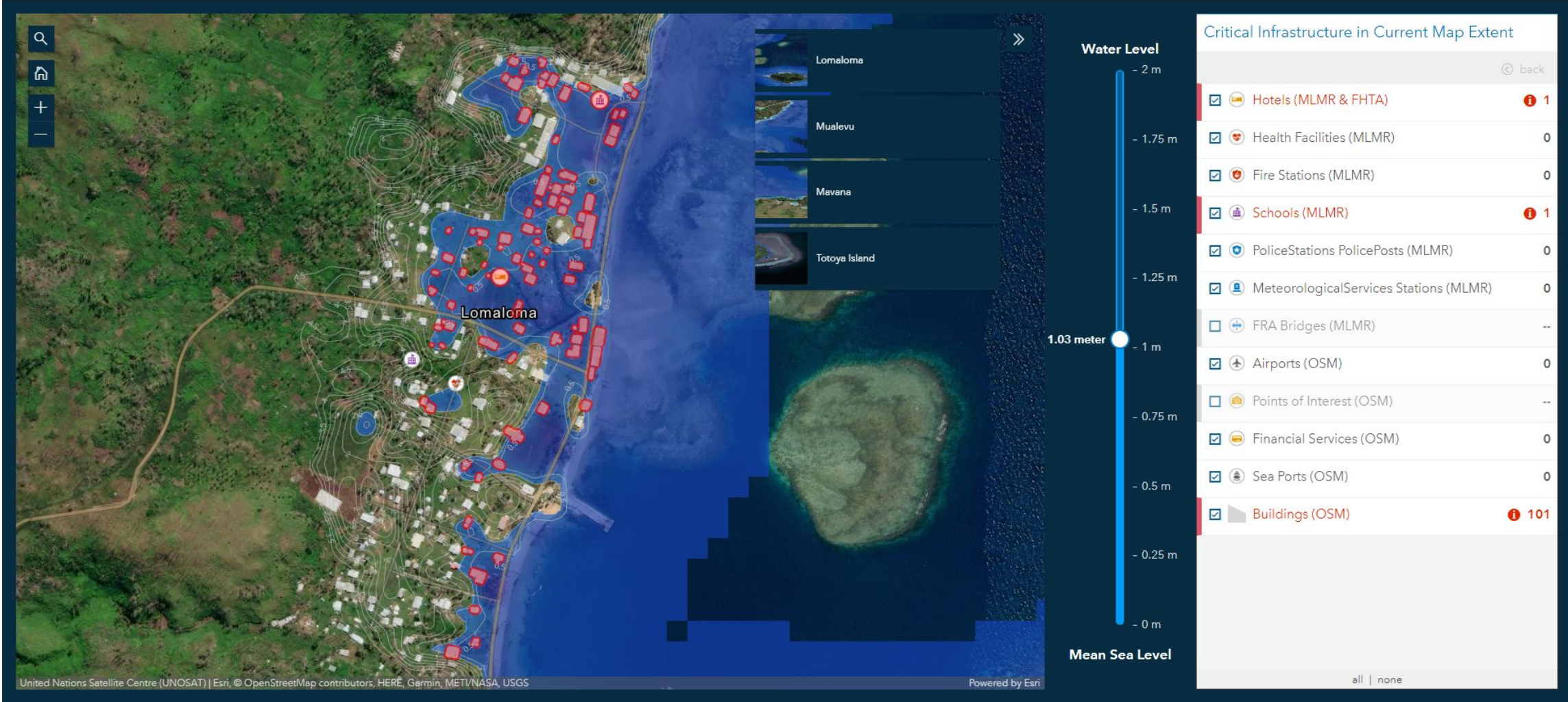
DALO

- Highly suitable
- Moderately suitable
- Marginally suitable
- Not suitable

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Sea Level Rise



UNESCAP Risk and Resilience Portal



RISK AND RESILIENCE PORTAL
An Initiative of the Asia Pacific Disaster Resilience Network

HOME HAZARD HOTSPOTS ECONOMIC IMPACT ADAPTATION COST & PRIORITIES DECISION SUPPORT SYSTEM COUNTRY ANALYSIS KNOWLEDGE PRODUCTS

Asia Pacific Risk & Resilience Portal

Bridging the science policy gap for informed action

🔗 Data Explorer

700+
Datasets

100+
Policy documents

@iStock

<https://www.youtube.com/watch?v=clixQxvjo-4>

UNESCAP Risk and Resilience Portal



Flood

Infrastructure & Economic Exposure

- Economic stock
- Health facilities (HDX)
- All types of power plants (UNESCAP)
- Asian highway roads (UNESCAP)

Disaster-climate-health risk hotspots

- Location of most vulnerable population (flood under climate change, biological hazard, low-medium HDI)

Opacity: 0% 100%

Map Legend

Location of most vulnerable population (flood under climate change, biological hazard, low-medium HDI)

Population	Low	Medium	High
Population - HIGH	Dark Blue	Medium Blue	Dark Purple
Population - MEDIUM	Light Blue	Light Purple	Light Red
Population - LOW	Very Light Blue	Very Light Purple	Very Light Red

LOW MEDIUM HIGH
Climate projection for flood 2020-2039 and related health hazard with socio-economic vulnerability

Moderate scenario (RCP 4.5) Worst-case scenario (RCP 8.5)

This map shows integrated analytics of location of most vulnerable population (flood under climate change, biological hazard, low-medium HDI) based on probabilistic estimates from various sources. These estimates are yet to be validated by government ministries.

Full metadata for map layers can be found here: [Metadata table](#)
The base map is retrieved from UN Clear Map. You can find more details here: [United Nations Clear Map](#)

How to use the map:

Zoom In: User can zoom in within a view.	Home: Switches the View to its initial Viewpoint.	Layers: Expand and display a list of layers, and switch on/off their visibility.
Zoom Out: User can zoom out within a view.	Full screen: Present the View using the entire screen.	Legend: Expand the map legend.
Compass: Click for rotates the view to face north.	Lock screen: Allow user to Lock Mapview.	

DISCLAIMERS:

- These are probabilistic estimates, based on data from World Bank Climate Change Knowledge Portal, World Health Organization (2020) Disability-Adjusted Life Years (DALYs) estimates, WorldPop Population Counts, United Nations Development Programme (UNDP) Sub-national Human Development Index (SHDI), Health infrastructure from OCHA Services Data World – Humanitarian Data Exchange (HDX), and ESCAP Transportation Data.
- The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Produced by UNESCAP | Powered by UNOSAT | Map source: UN... Powered by Esri

UNESCAP Risk and Resilience Portal



RISK AND RESILIENCE PORTAL
An Initiative of the Asia Pacific Disaster Resilience Network

[HOME](#) [HAZARD HOTSPOTS](#) [ECONOMIC IMPACT](#) [ADAPTATION COST & PRIORITIES](#) [DECISION SUPPORT SYSTEM](#) [COUNTRY ANALYSIS](#) [KNOWLEDGE PRODUCTS](#)

Welcome to the Decision Support System (DSS) of the Risk and Resilience Portal

The Decision Support System provides contextual analysis of variety of hazard, risk and vulnerability, socio-economic information to support informed decision making. Using different tools, users can easily understand the location of risky areas, what makes them risky and finally identify the means for reducing and adapting to those risks.

Papua New Guinea



Country Profile

[Go to Storyboard](#)

[Launch DSS](#)

Pakistan



Country Profile

[Go to Storyboard](#)

[Launch DSS](#)

Myanmar



Country Profile

[Go to Storyboard](#)

[Launch DSS](#)

Mongolia



Country Profile

[Go to Storyboard](#)

[Launch DSS](#)

Armenia



Country Profile

[Go to Storyboard](#)

[Launch DSS](#)

UNESCAP Risk and Resilience Portal



RISK AND RESILIENCE PORTAL
An Initiative of the Asia Pacific Disaster Resilience Network

Home Storyboard Rank Compare

Search by Township name

Click on a township to see details

Welcome to Myanmar Decision Support System

The Decision Support System provides contextual analysis of variety of hazard, risk and vulnerability, socio-economic information to support informed decision making. Using different tools, users can easily understand the location of risky areas, what makes them risky and finally identify the means for reducing and adapting to those risks.

Instructions:

- Click - you can click on the map to see details including INFORM risk score, exposure to hazard score, vulnerability score, lack of coping capacity, key indicators, and climate adaptation priorities
- Rank - provides a list of townships sorted by INFORM score, exposure to hazard score, vulnerability score, or lack of coping capacity
- Compare - allow you to compare one township with another township to report similarities and differences.

This analytics is based on preliminary sub-national INFORM index developed by the United Nations Satellite Centre (UNOSAT) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). This composite indicator is yet to be validated and approved by responsible government ministry. Please use with caution.

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

hide on startup **OK**

INFORM Risk Index

Summary Ranking

- Very High Risk (5.2 - 6.5)
- High Risk (4.3 - 5.1)
- Medium Risk (3.3 - 4.2)
- Low Risk (1.3 - 3.2)
- Very Low Risk (0.6 - 1.2)

Map source: UK Ordnance Survey | Myanmar Information Management Unit (MIMI)

Produced by UNESCAP | Powered by UNOSAT | Powered by Esri



Risk Informed Climate Change relocation for vulnerable communities in Fiji

GRAF: Risk Informed Climate Change Relocation for Vulnerable Communities in Fiji



- Activity 1. Conduct a preliminary climate change adaptation study in 17 vulnerable communities to identify potential adaptation interventions based on their socio-economic status, development plans, susceptibility to various natural hazards, including climate-related risk drivers.
- Activity 2. Supporting the Ministry of Economy (CCICD) with evidence-based information, geospatial products (i.e., Web-maps, Dashboards and Story Maps), and Spatial Decision Support Tools (SDST) for relocation.



Village Information
 Vuniniudrovu, Central Division
 Vuniniudrovu village is located beside the Waimanu River. They use a punt to get to main princess road. From a village of 50 homes, this has been reduced to a community of only 13 dwellings. Villagers have been at the mercy of the Waimanu river for 30 years, where ruination of the community happens whenever the river bursts its banks.

Geological Information
 The village is located downstream along the Waimanu river below the 10 meter contour line. A part of the village is situated in the center (neck) of a meandering river bend and is affected by heavy riverbank erosion on each side of the village. This might potentially form what is called an ox-bow-lake, which is caused when flood water erodes the narrowest part of the terrain and cut of the rest of the river. In 2020 it was reported that 50 households had been reduced to 13, due to riverbank erosion.

<p>Legend</p> <ul style="list-style-type: none"> Community boundary Buildings Potential landslide identified River erosion Identified landfills HydroLINES Roads Contour 3m Interval HydroLINES Storm Surge Flood Susceptibility (50% Threshold) Height above nearest river 0 - 2 m 2 - 4 m 4 - 6 m 6 - 8 m 8 - 10 m 	<p>Environment (iTaukei Affairs)</p> <ul style="list-style-type: none"> Area: 622286.8 m² Buildings count: 61 buildings Occupants: 175 people Households: 38 Households 	<p>Vulnerability (iTaukei Affairs)</p> <ul style="list-style-type: none"> Children (under 10): 37 people Elderly (> 60): 17 people Disability: 1 people No Toilet: 7 people Has NCD: 2 people 	<p>Spatial Reference</p> <ul style="list-style-type: none"> Name: Fiji 1986 Fiji Map Grid GCS: GCS Fiji 1986 Datum: Fiji 1986 Projection: Transverse Mercator Map Units: Meter Map scale for A3: 1:2,500
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- Natural Hazards**
1. Flash Flooding
 2. Riverine Flooding
 3. Riverbank Erosion
- Tropical Cyclone Wind**
 Saffir-Simpson scale: ≤ 95 mph (Category 1)
- Earthquake**
 Instrumental Intensity scale: ≤ 0.34 g (Very strong)

Strengthening GIT Capacities for Improved Disaster Resilience in Pacific, Asia and Africa



- **Develop technical and institutional capacities** of professionals in selected countries on the use of geospatial information technologies.
- Apply geo-information technologies to tackle **disaster risk but also environmental degradation, food security, and resilience in a changing climate.**
- **“End-to-end capacity development” - solution and capacity development** will go hand in hand.
- Funded by the Norwegian Agency for Development Cooperation (NORAD)
- 3-year project (until June 2024)
- 8 target countries



Strengthening GIT Capacities for Improved Disaster Resilience in Pacific, Asia and Africa



Project Activities :

- Introductory and advanced **training courses** to support learning needs of technical staff. Training methodology can be in-person, online, or blended approaches. Training materials to be accessed through a knowledge platform.
- **Customized decision support applications**. UNOSAT co-designs the solutions with the users through UX design. We aim for tools that are sustainable on the long-term.
- **Technical Backstopping** and In-country Expert for ad-hoc support to project implementation activities in close collaboration with national stakeholders



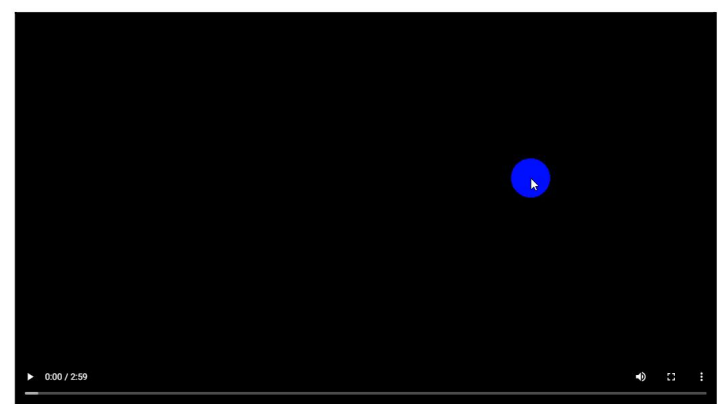
Strengthening GIT Capacities for Improved Disaster Resilience in Pacific, Asia and Africa



Building Sustainable Capacities

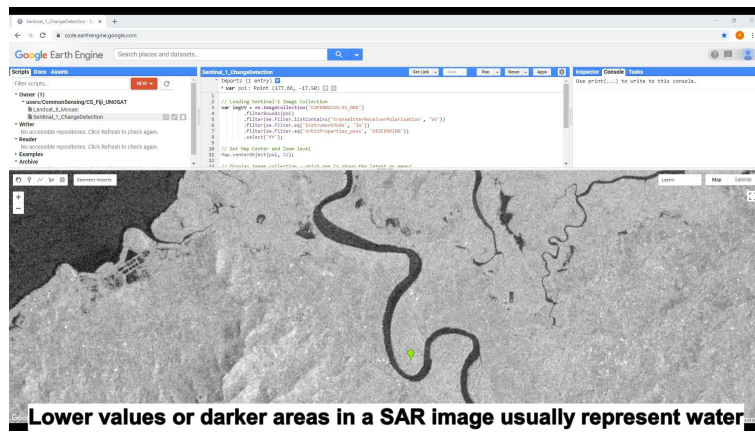
Tutorials

PART C: Perform Unsupervised Image Classification

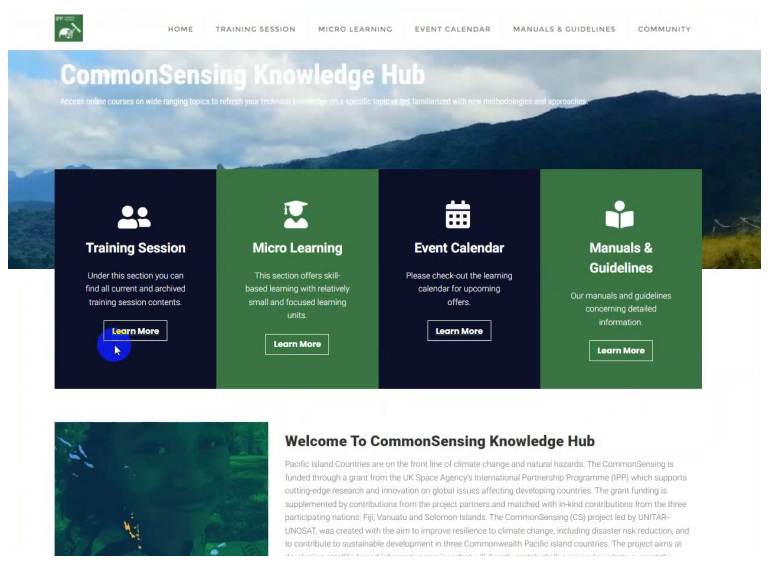


Unsupervised classification finds the spectral classes (or clusters) in a multiband image without the analyst's intervention. This tutorial will use [KMeans classification](#) for performing the unsupervised classification.

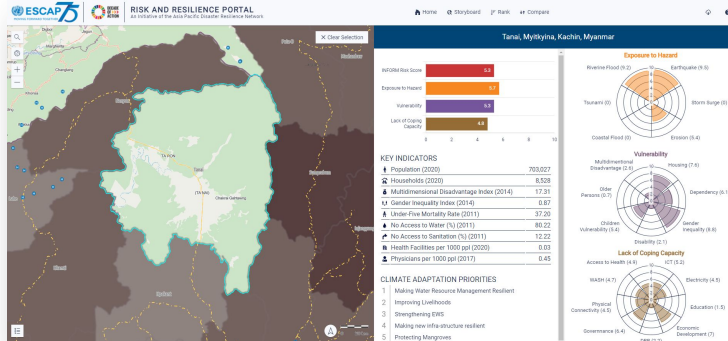
Video Tutorials



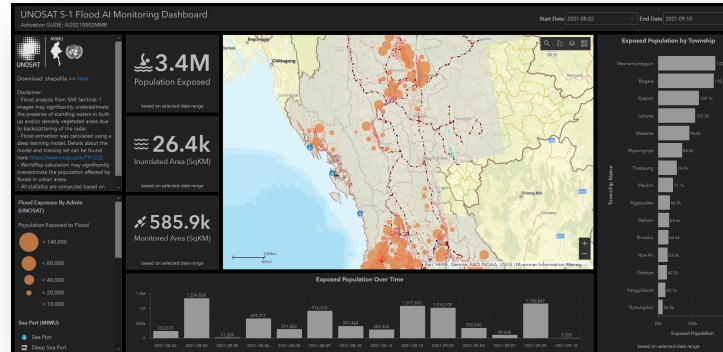
Knowledge Hub and Community of Practice



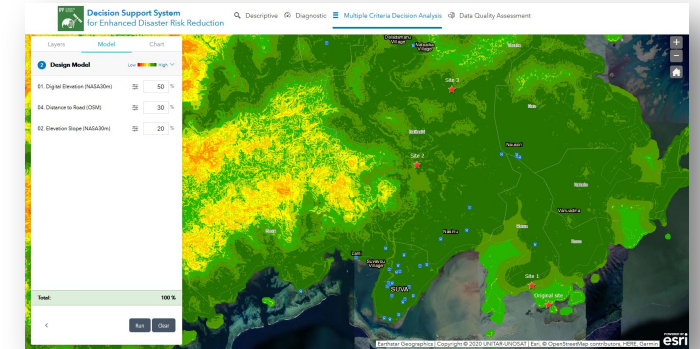
Strengthening GIT Capacities for Improved Disaster Resilience in Pacific, Asia and Africa



Decision Support Systems



Flood AI Monitoring Dashboard



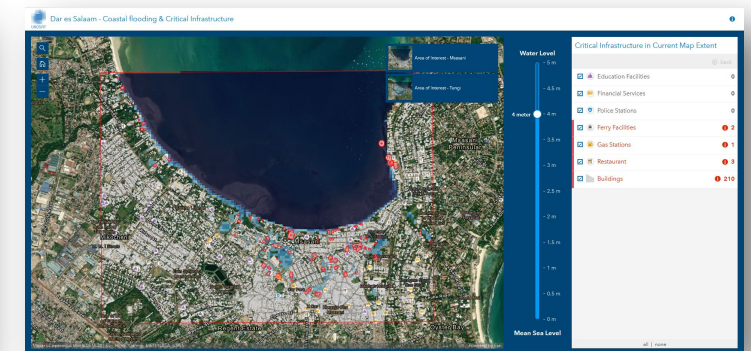
Multiple Criteria Decision Analysis



Damage Assessment Visualization



Hydrological Information System



Coastal Flooding & Critical Infrastructure

THANK YOU!

