



# UNOSAT: Building DRR & Climate Resilience

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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 )

# Offices



LIAISON OFFICE  
NEW YORK

UNOSAT HQ  
GENEVA

NIGERIA

UGANDA

REGIONAL OFFICE  
NAIROBI

BANGLADESH

BHUTAN

LAO PDR

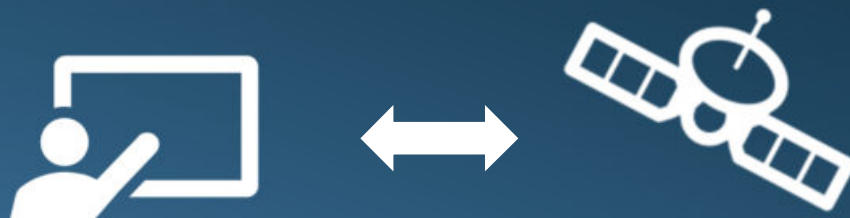
REGIONAL OFFICE  
BANGKOK

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](#)

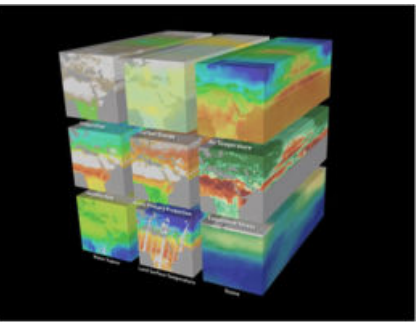
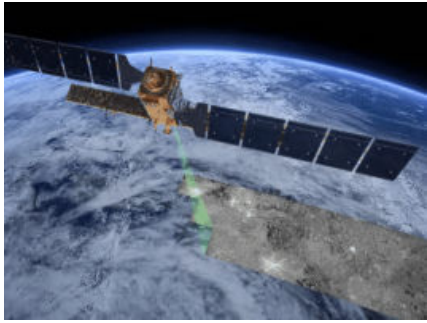


## Food Security

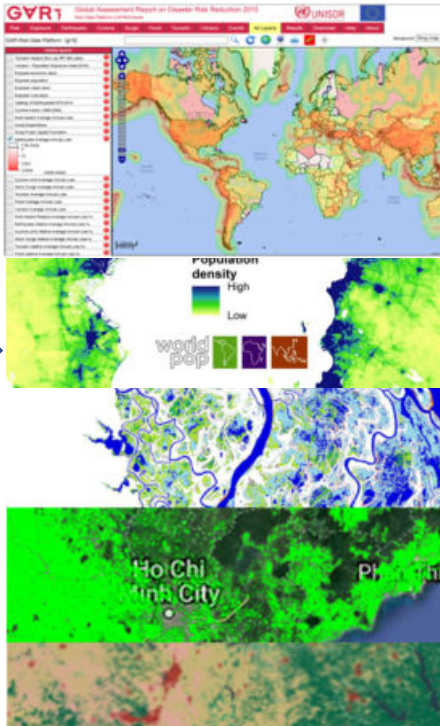
The open app is designed to provide the farmers or communities with suitability information of potential crops in any location in Fiji.

[EXPLORE](#)

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

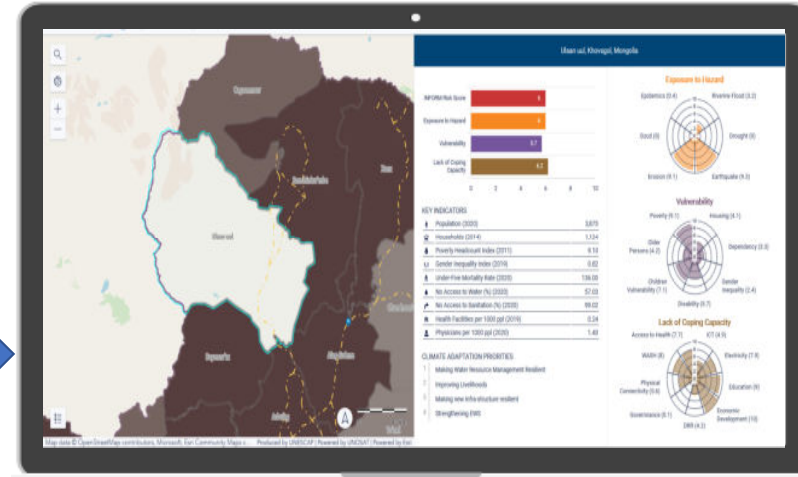


Data



Information

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



Insights



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



**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.

LAUNCH TOOL

**MCDA**

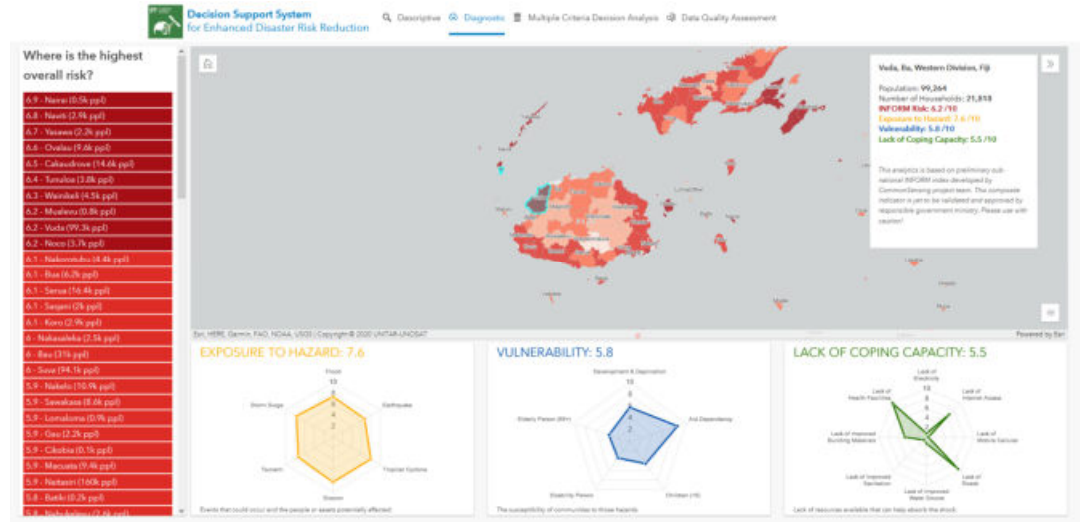
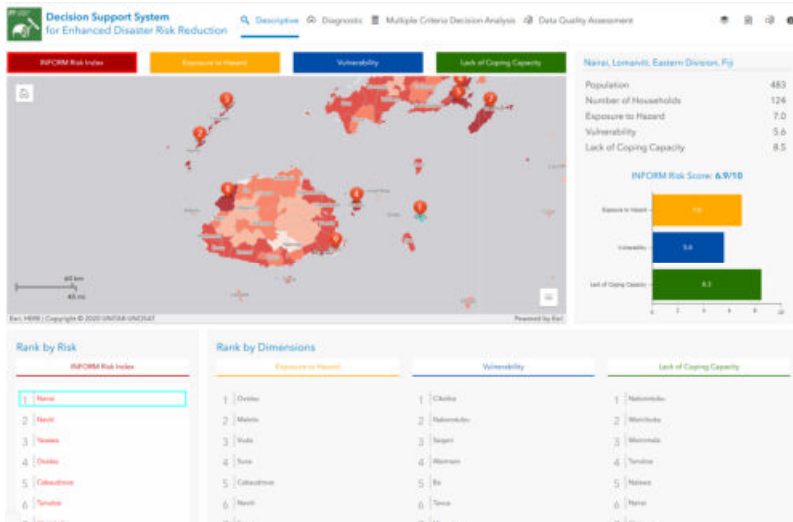
The Multiple Criteria Decision Analysis tool allows decision-makers to find an optimal disaster risk reduction measure based on multiple factors.

LAUNCH TOOL

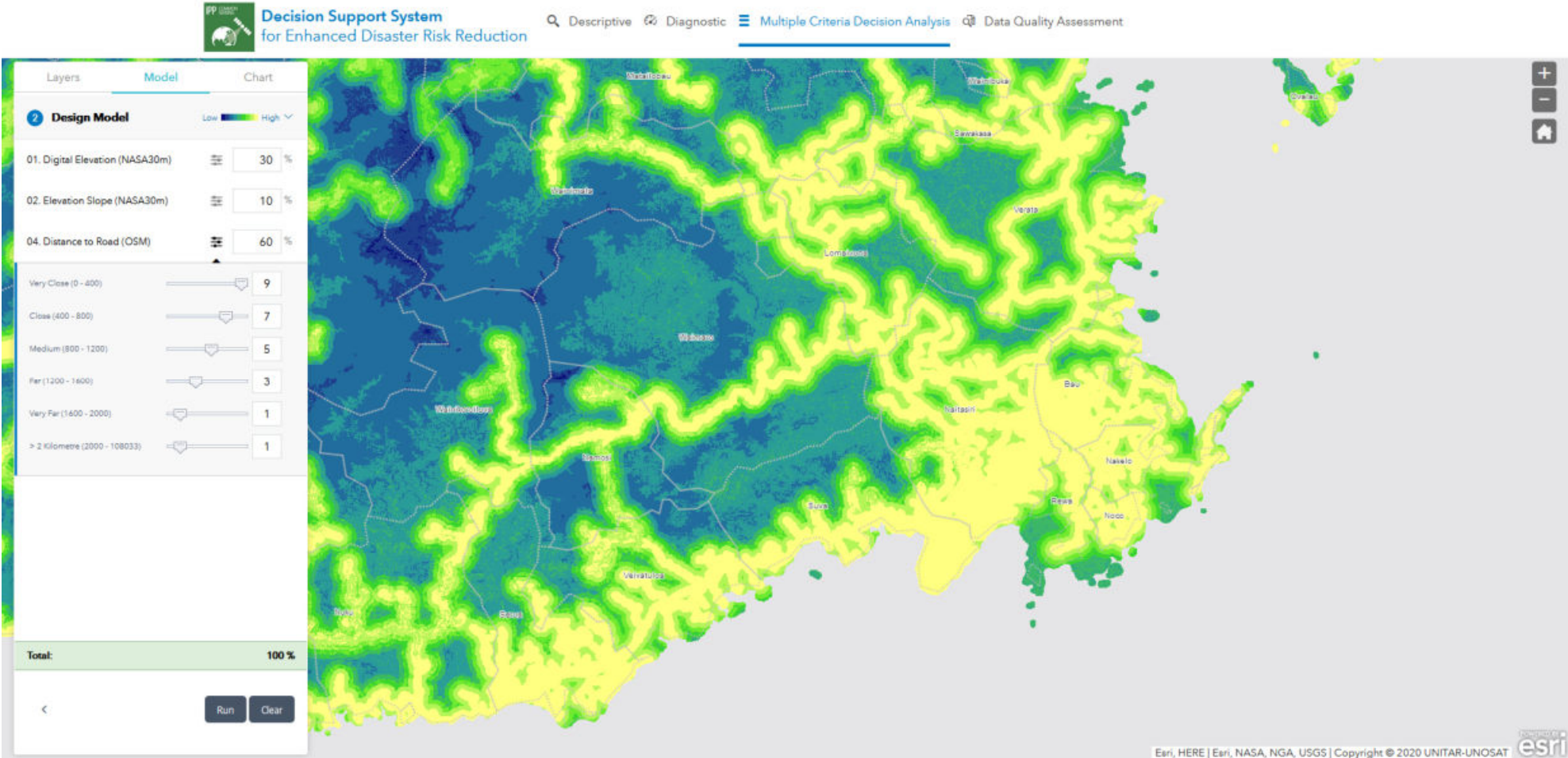
**Data Quality Assessment**

The Data Quality Assessment shows OSM map coverage by comparing the number of OSM object counts (number/km<sup>2</sup>) to the local population density (population/km<sup>2</sup>).

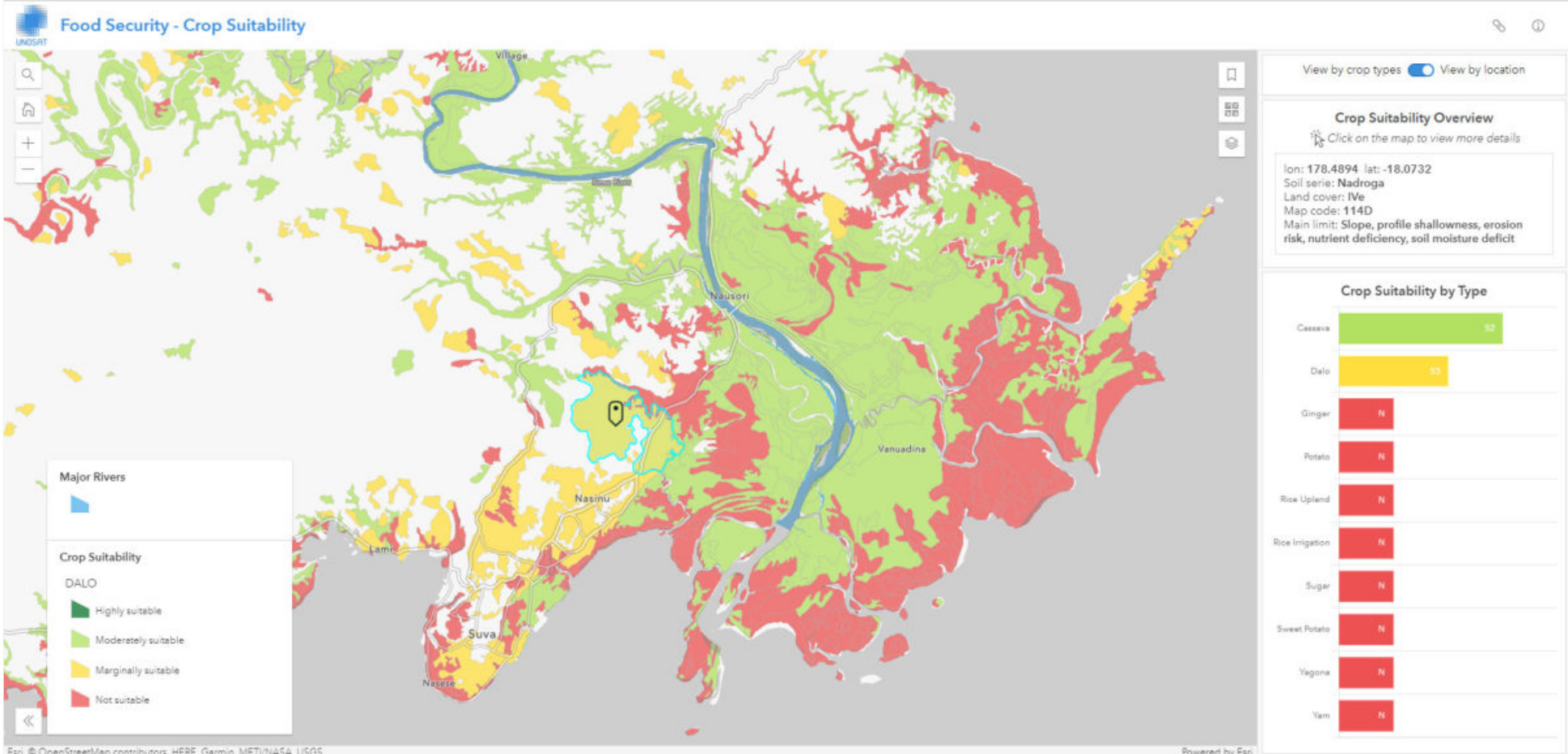
LAUNCH TOOL



# Multi-criteria decision analysis tool (MCDA)

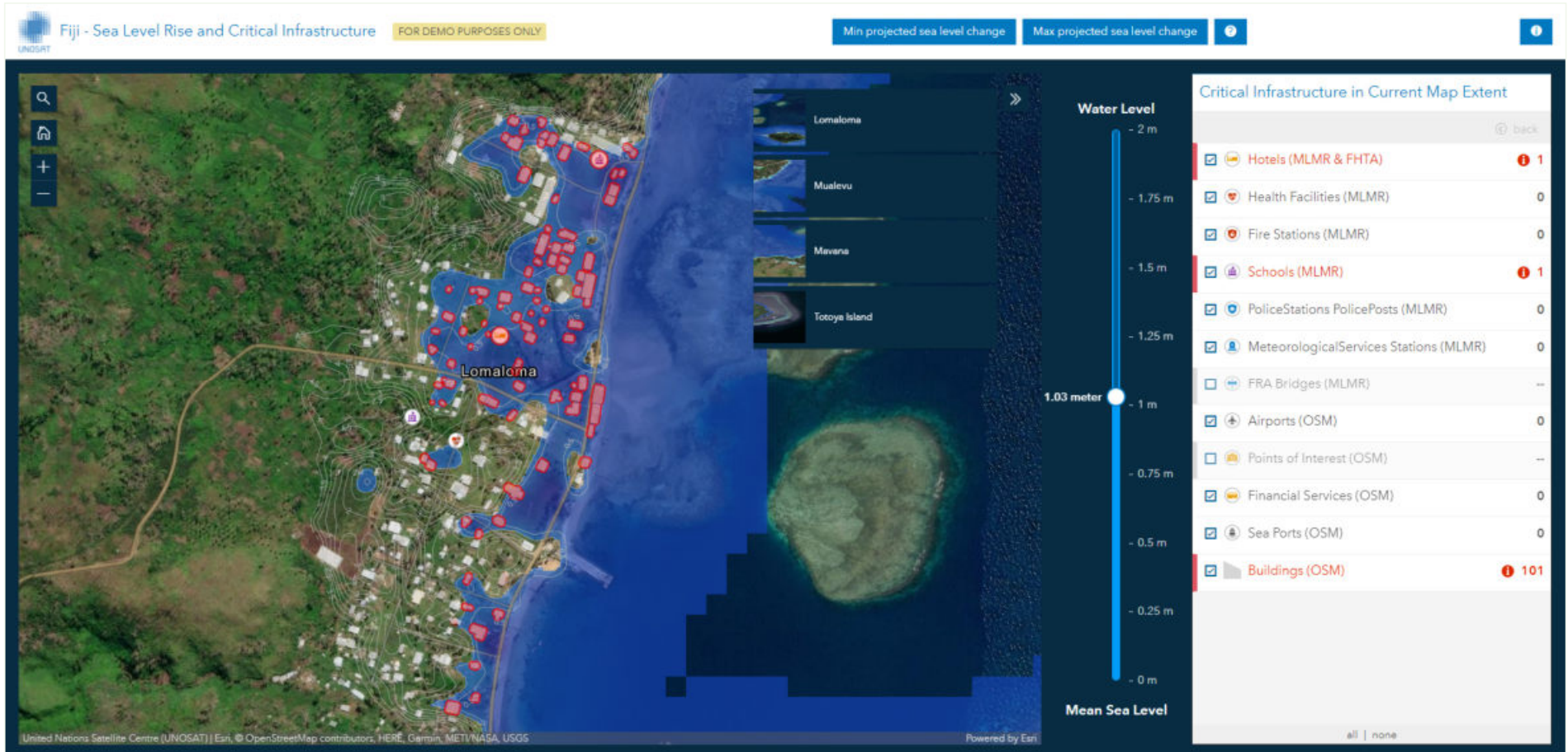


# Crop Suitability Application



<https://unosat-geodrr.cern.ch/FoodSecurity/CropSuitability/>

# Sea Level Rise



<https://unosat-geodrr.cern.ch/Climate/SeaLevelRise/>

# 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

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

@iStock

# 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 >100k	Light Blue	Dark Blue	Dark Purple
Population >50k	Light Blue	Dark Blue	Dark Purple
Population >20k	Light Blue	Dark Blue	Dark Purple

UNESCAP  
Economic and Social Commission for Asia and the Pacific

UNOSAT

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

**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 | 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

<https://rrp.unescap.org/>

# UNESCAP Risk and Resilience Portal



The screenshot displays the UNESCAP Risk and Resilience Portal interface. At the top, the ESCAP 75 logo and the UN Sustainable Development Goals (SDG) logo are visible, along with the text "RISK AND RESILIENCE PORTAL" and "An Initiative of the Asia Pacific Disaster Resilience Network". Navigation links for Home, Storyboard, Rank, and Compare are present. The main content area features a map of Myanmar with a semi-transparent overlay box titled "Welcome to Myanmar Decision Support System".

**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.

Logos for ESCAP 75, SDG ACTION, and UNOSAT are displayed at the bottom of the overlay. A "hide on startup" checkbox and an "OK" button are also present.

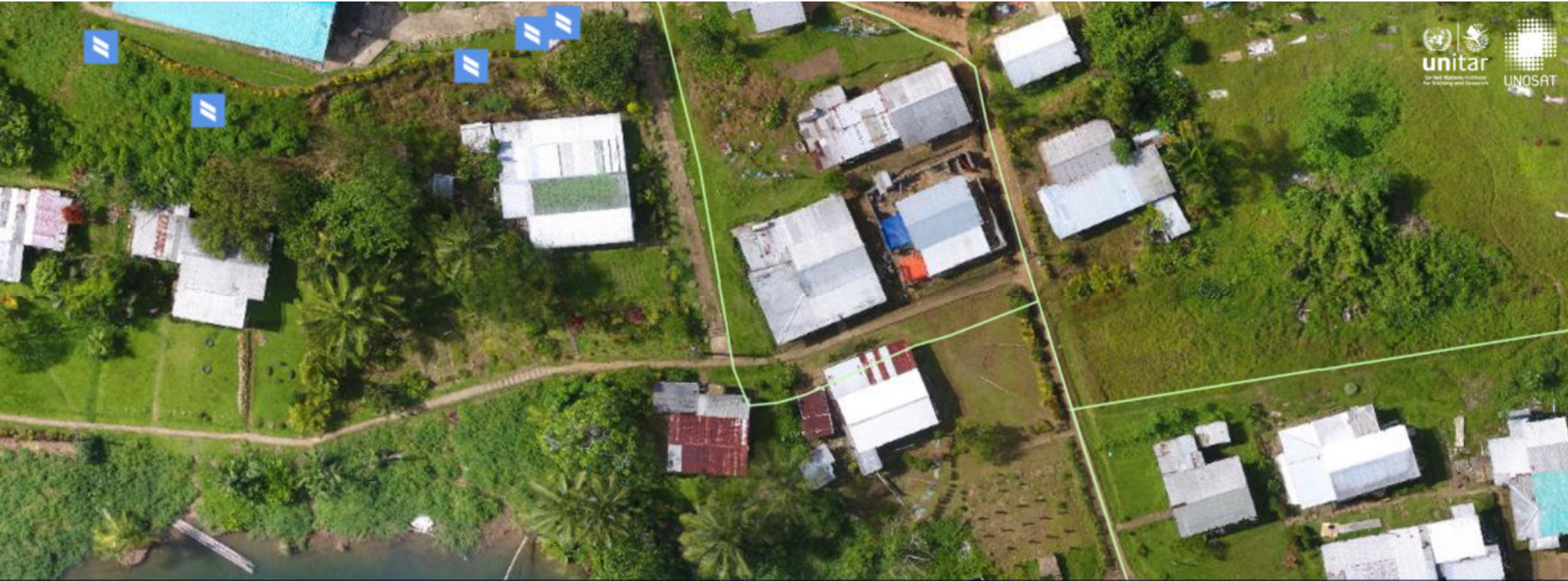
**INFORM Risk Index**

Summary Ranking

- Very High Risk (8.2 - 8.5)
- High Risk (4.2 - 5.1)
- Medium Risk (3.2 - 4.2)
- Low Risk (1.3 - 3.2)
- Very Low Risk (0.2 - 1.2)

<https://rrp.unescap.org/>





***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 Wainanu River. They use a part to get to main access 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 Wainanu river for 30 years, where situation of the community happens whenever the river bursts its banks.

**Geological Information**

The village is located downstream along the Wainanu river below the 10 meter contour line. A part of the village is situated in the center (neck) of a meanderic 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 2000 it was reported that 50 households had been reduced to 13, due to riverbank erosion.

**Natural Hazards**

1. Flash Flooding
2. Riverine Flooding
3. Riverbank Erosion

**Tropical Cyclone Wind**  
Soft - Simpson scale  
2-95 mph (Category 1)

**Earthquake**  
Insignificant Intensity scale:  
0.04 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



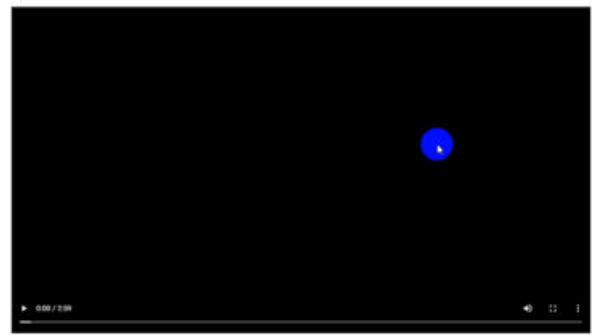
# Strengthening GIT Capacities for Improved Disaster Resilience in Pacific, Asia and Africa



## Building Sustainable Capacities

### Tutorials

#### PART C: Perform Unsupervised Image Classification

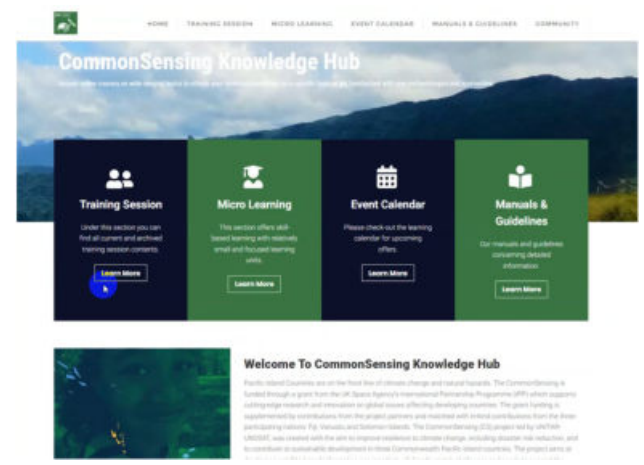


Unsupervised classification finds the spectral classes or clusters in a multiband image without the analyst's intervention. This tutorial will use [ArcGIS QGIS/Python](#) for performing the unsupervised classification.

### Video Tutorials



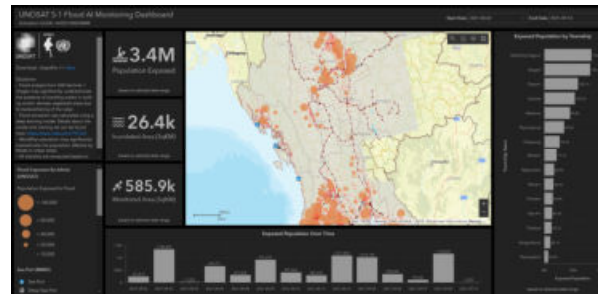
### Knowledge Hub and Community of Practice



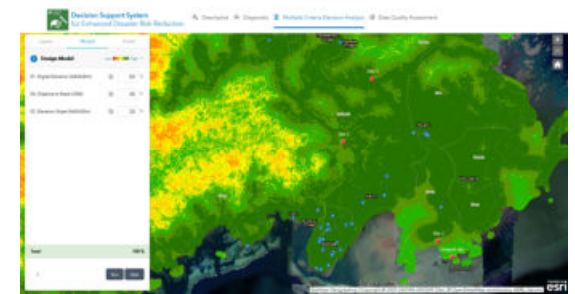
# Strengthening GIT Capacities for Improved Disaster Resilience in Pacific, Asia and Africa



Decision Support Systems



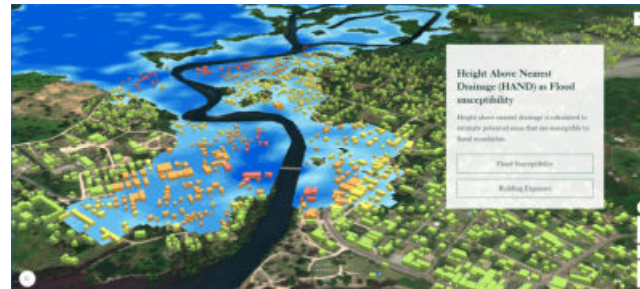
Flood AI Monitoring Dashboard



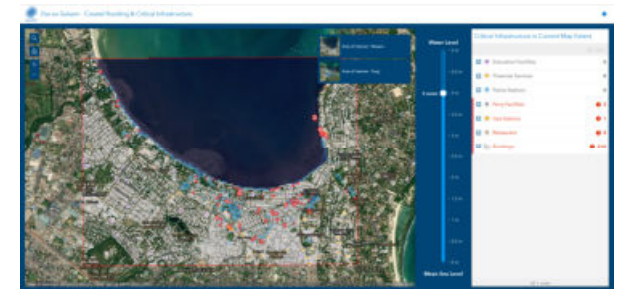
Multiple Criteria Decision Analysis



Damage Assessment Visualization



Hydrological Information System



Coastal Flooding & Critical Infrastructure

***THANK YOU!***

