



# Decision Support System for Disaster Risk Reduction

Building **climate  
resilience** with  
small island nations

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UNOSAT Programme, UNITAR

# Outline

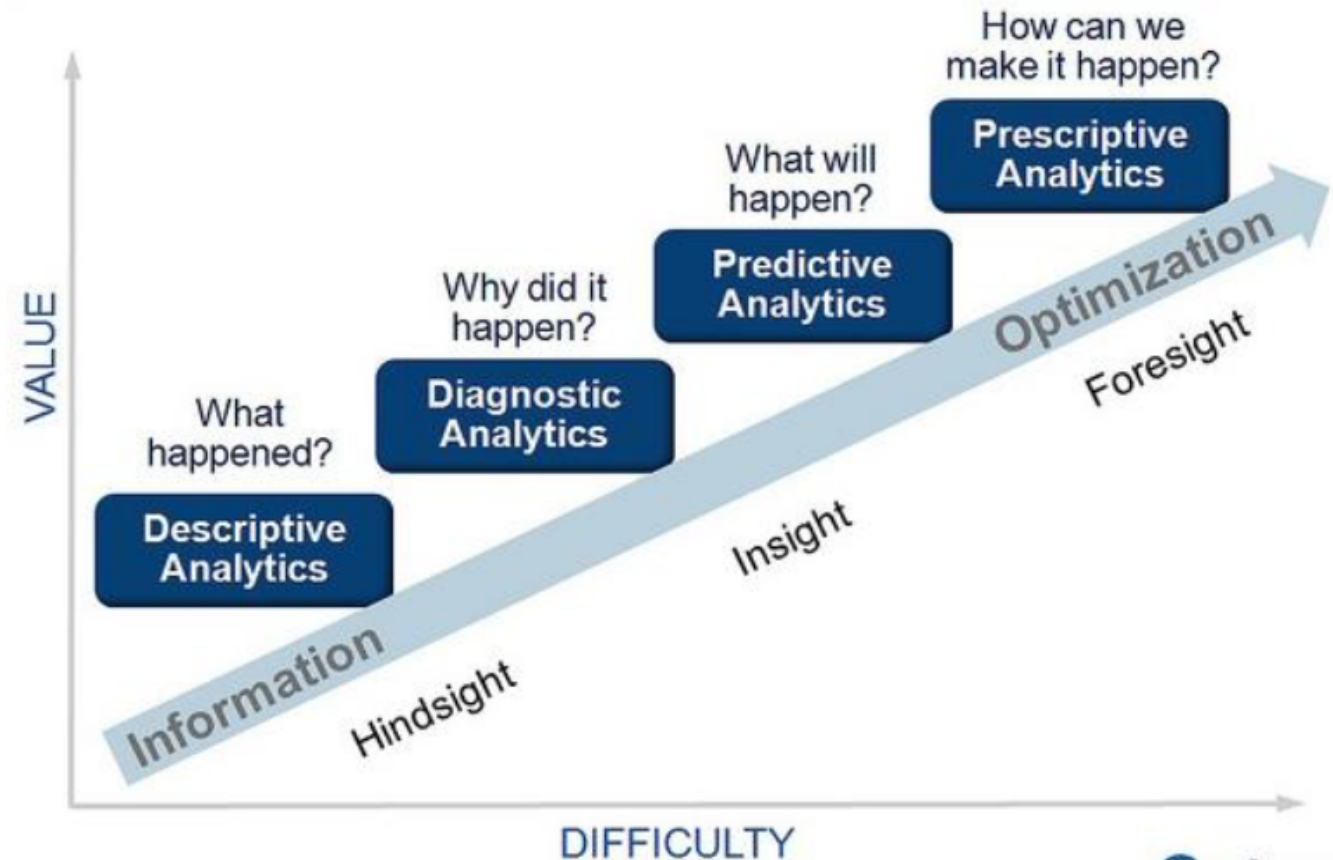
- Objective of the INFORM Decision Support Platform
- Overview of the descriptive, diagnostic and multi-criteria toolsets



# Data-Analytics Driven Decision Support

Support the decision makers in answering the critical question related to resilience building:

- What is happening?
- Why did it happen?
- What will happen?
- What should we do?



# Decision Support System for - Enhanced Disaster Risk Reduction

CommonSensing: Building climate resilience with small island nations

CommonSensing intends to build Disaster Risk Reduction (DRR) and Climate Change Resilience (CCR) through informed decision-making provided by Earth Observation and geospatial information technologies. The CommonSensing project is delivered by providing geospatial and climate information, decision-making tools and capacity development for various levels of government staff ranging from technical experts to decision-makers. The partner countries (Fiji, Vanuatu and Solomon Islands) are exposed to various climate-related hazards, and climate change can increase disaster risk, namely through changing exposure patterns and the increase in frequency and intensity of hazard events. Climate variability could further aggravate uncertainties related to the geographic distribution of weather-related hazards, which may lead to new patterns of risk thereby potentially rendering traditional coping capacities less effective. Thus, one of the key application domains of the CommonSensing project is disaster risk reduction (DRR).

This platform will inform decision-makers on disaster risk and its elements to bring real impact towards reducing disaster risk and increasing resilience to climate change.

## Country Specific Decision Support System

Supporting decision-makers in answering the critical questions related to climate change resilience



Access the site here:

<https://unosat-geodrr.cern.ch/portal/apps/sites/#/common-sensing>

Home / Fiji - Decision Support System

## Decision Support System for Enhanced Disaster Risk Reduction

Fiji, one of the partner countries of the CommonSensing, is exposed to various natural hazards and the disaster risk is further aggravated through the negative effect of climate change. 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. The users will be taken through a storyline describing where is the risk? why there is a risk? and what can be done to reduce the risk?



### 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>).

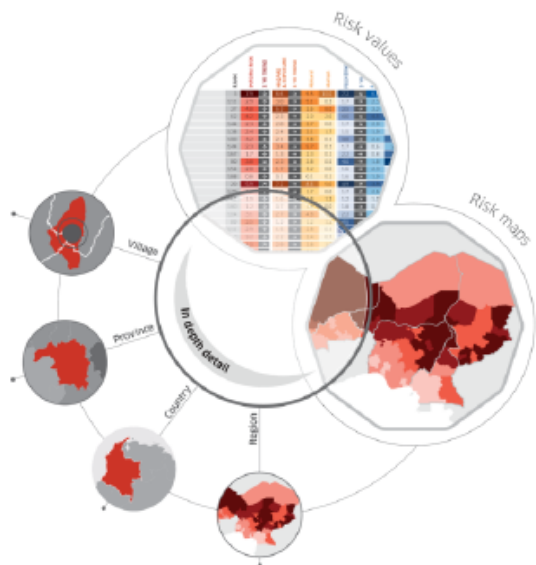
LAUNCH TOOL



## INFORM Index

INFORM is a global, open-source risk assessment for humanitarian crises and disasters. It can support decisions related to prevention, preparedness and response.

Project is in process of developing sub-national INFORM Index



Risk	INFORM																
Dimensions	Hazard & exposure					Vulnerability				Lack of coping capacity							
Categories	Natural		Human			Socio-Economic		Vulnerable groups		Institutional		Infrastructure					
Components	Earthquake	Tsunami	Flood	Tropical cyclone	Drought	Current conflict intensity	Projected conflict intensity	Level of deprivation (50%)	Inequality (25%)	Aid dependency (25%)	Uprooted people	Other vulnerable groups	DRR	Governance	Communication	Physical infrastructure	Access to health system

### Fiji

Unit: Admin 3 level (Tikina)

### Solomon Islands

Unit: Admin 3 level (Ward)

### Vanuatu

Unit: Admin 2 level (Area Council)



Descriptive



Diagnostic



Predictive



Prescriptive



Multiple Criteria  
Decision Analysis



## Decision Support System for Enhanced Disaster Risk Reduction

Descriptive

Diagnostic

Multiple Criteria Decision Analysis

Data Quality Assessment

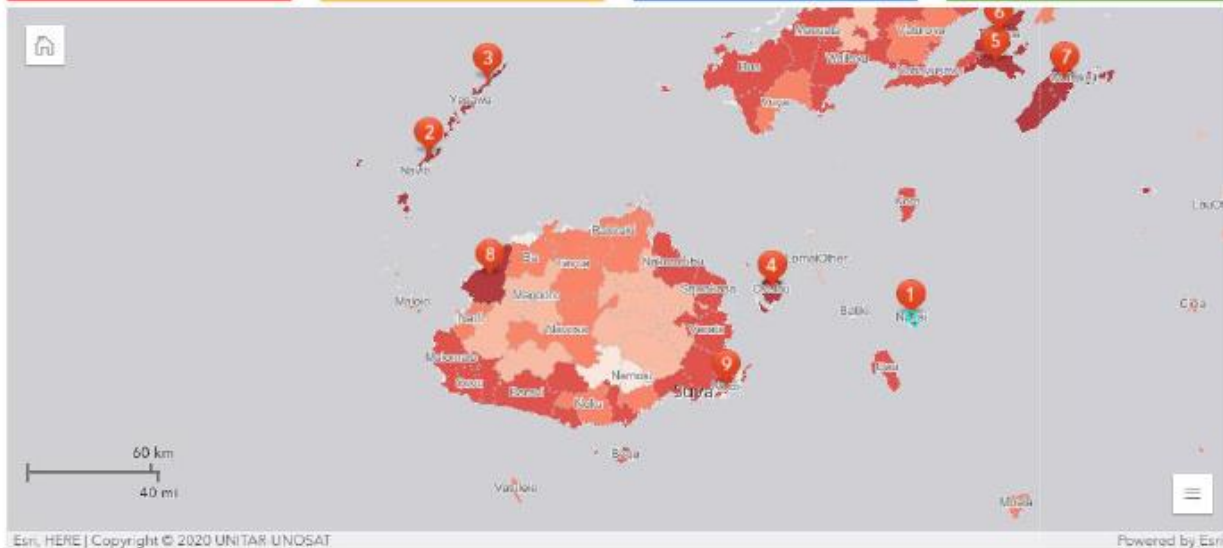


INFROM Risk Index

Exposure to Hazard

Vulnerability

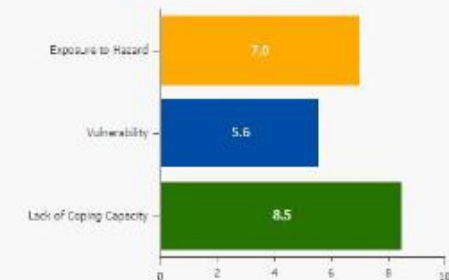
Lack of Coping Capacity



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

INFROM Risk Score: 6.9/10



### Rank by Risk

INFROM Risk Index

- 1 Nairai
- 2 Naviti
- 3 Yasawa
- 4 Ovalau
- 5 Cakaudrove
- 6 Tunuloa
- 7 Wainikeli

### Rank by Dimensions

Exposure to Hazard

- 1 Ovalau
- 2 Melolo
- 3 Vuola
- 4 Suva
- 5 Cakaudrove
- 6 Naviti
- 7 Serua

Vulnerability

- 1 Cikobia
- 2 Nakorotubu
- 3 Saqani
- 4 Waimaro
- 5 Ba
- 6 Tavua
- 7 Macuata

Lack of Coping Capacity

- 1 Nakorotubu
- 2 Wainibuka
- 3 Wainimala
- 4 Tunuloa
- 5 Nalawa
- 6 Nairai
- 7 Waimaro



Descriptive



Diagnostic



Predictive



Prescriptive



Multiple Criteria  
Decision Analysis

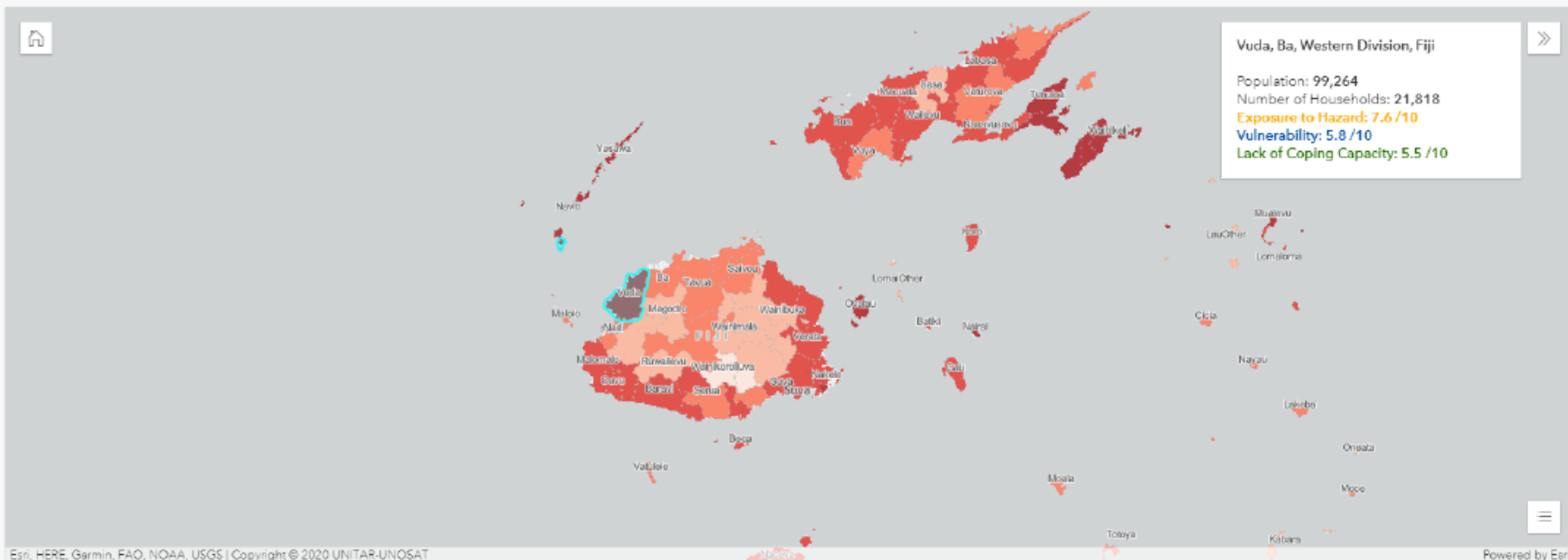


## Decision Support System for Enhanced Disaster Risk Reduction

Descriptive Diagnostic Multiple Criteria Decision Analysis Data Quality Assessment

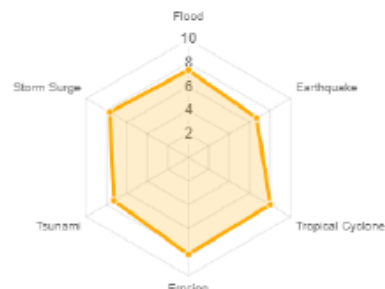
### Where is the highest overall risk?

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 - Mualevu (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 - Macuata (9.4k ppl)
5.9 - Naitasiri (160k ppl)
5.8 - Batiki (0.2k ppl)
5.8 - Nabukelevu (2.6k ppl)
5.8 - Nacova (1.8k ppl)

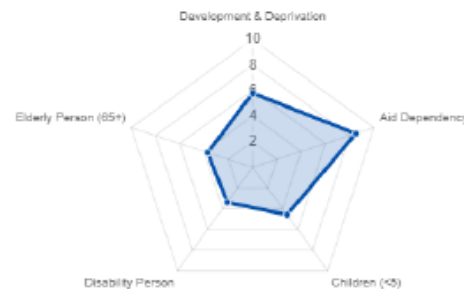


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### EXPOSURE TO HAZARD: 7.6



### VULNERABILITY: 5.8



### LACK OF COPING CAPACITY: 5.5





Descriptive



Diagnostic



Predictive



Prescriptive

Multiple Criteria  
Decision Analysis

## Selected Intervention: Relocation



Score

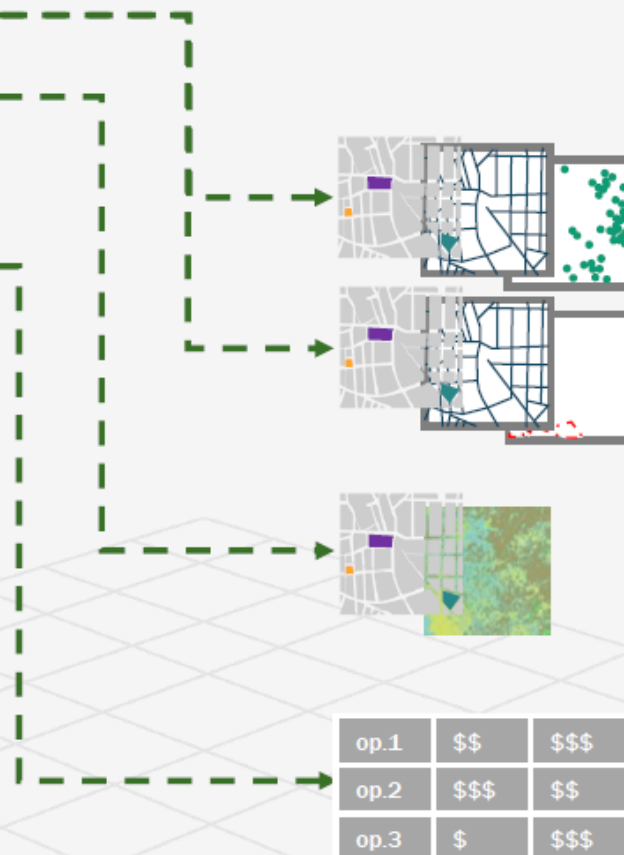
### All Criteria

Accessible to existing neighborhood	1
Accessible to planned neighborhood	1
Minimized tree and vegetation disruption	1
Avoided topological challenges	1
Minimized impact on watershed	1
Reduced on-site dev't costs	1
Reduced off-site dev't costs	1



Weight

Criteria	Imp.	Rk.	Wt.	Sub-Criteria	Sub Wt.
Proximity to users	imp.	3	10	Access-existing	9
				Access-planned	8
Env. impact	Very Imp.	1	60	Min. veg. disruption	30
				Min. topo.	45
				Min. watershed impact	60
Cost	Mod. imp.	2	30	On-site dev't costs	30
				Off-site dev't costs	25



**Provide scores for each option**

**For example:**

**Accessibility to neighborhood:**

- 5: Dist. from each settlement < 3 min. walk
- 1: Dist. from each settlement > 15 min. walk

**Min. tree and vegetation disruption:**

- 5: No. of tree = 0 + Grass area < 10 sqmt
- 1: No. of tree > 4 + Grass area > 50 sqmt

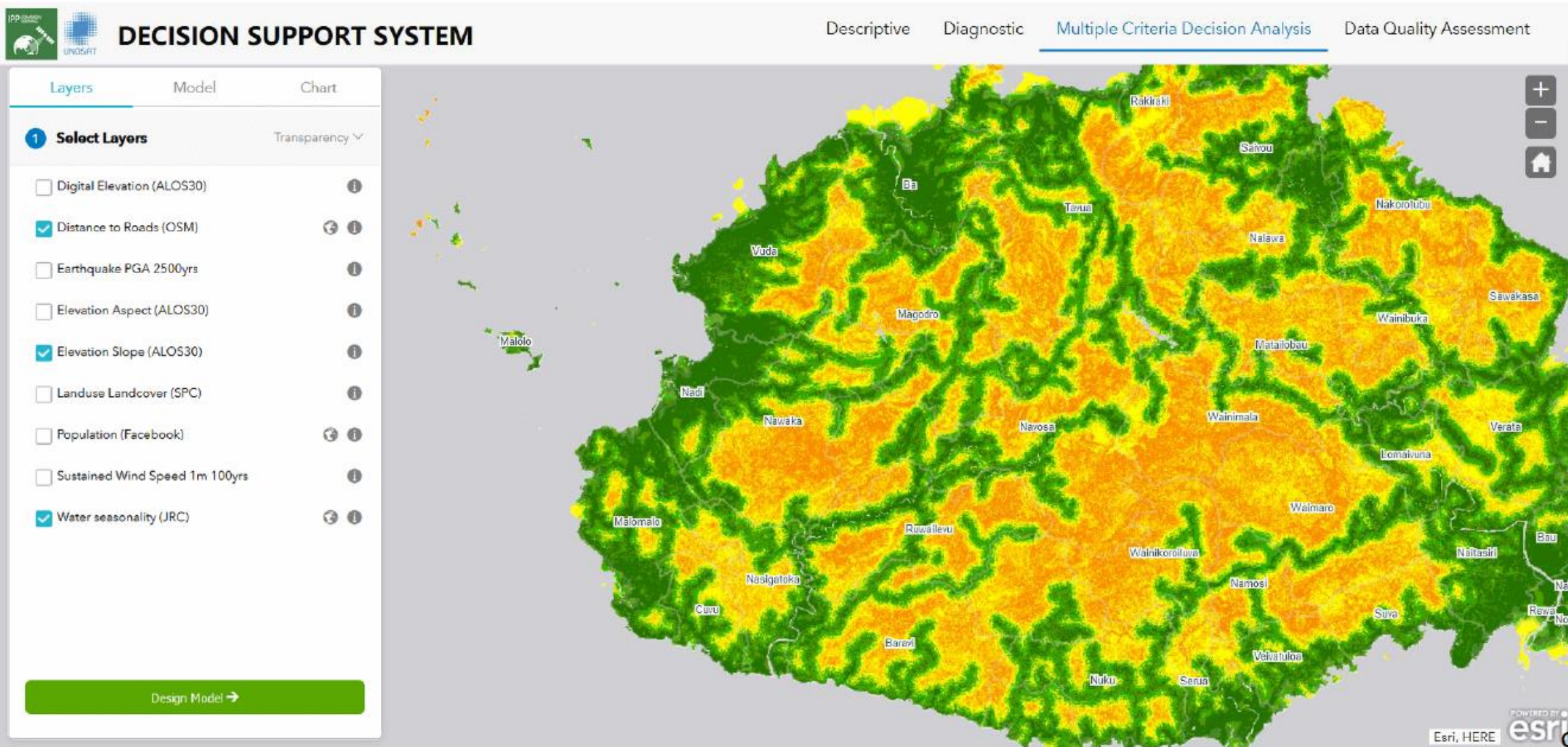
**Reduced on-site development cost:**

- 5: Total on-site development cost < \$90,000
- 1: Total on-site development cost > \$250,000

op.1	\$\$	\$\$\$	\$\$
op.2	\$\$\$	\$\$	\$\$\$\$
op.3	\$	\$\$\$	\$\$\$\$



# Multi Criteria Decision Analysis (Demonstration)



# Decision Support Platform for DRR

Access the application here

- <https://unosat-geodrr.cern.ch/dss/FJI>

Please provide your feedback here;

- [User Experience Survey Form \(DRR DSS Tool\)](#)

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