

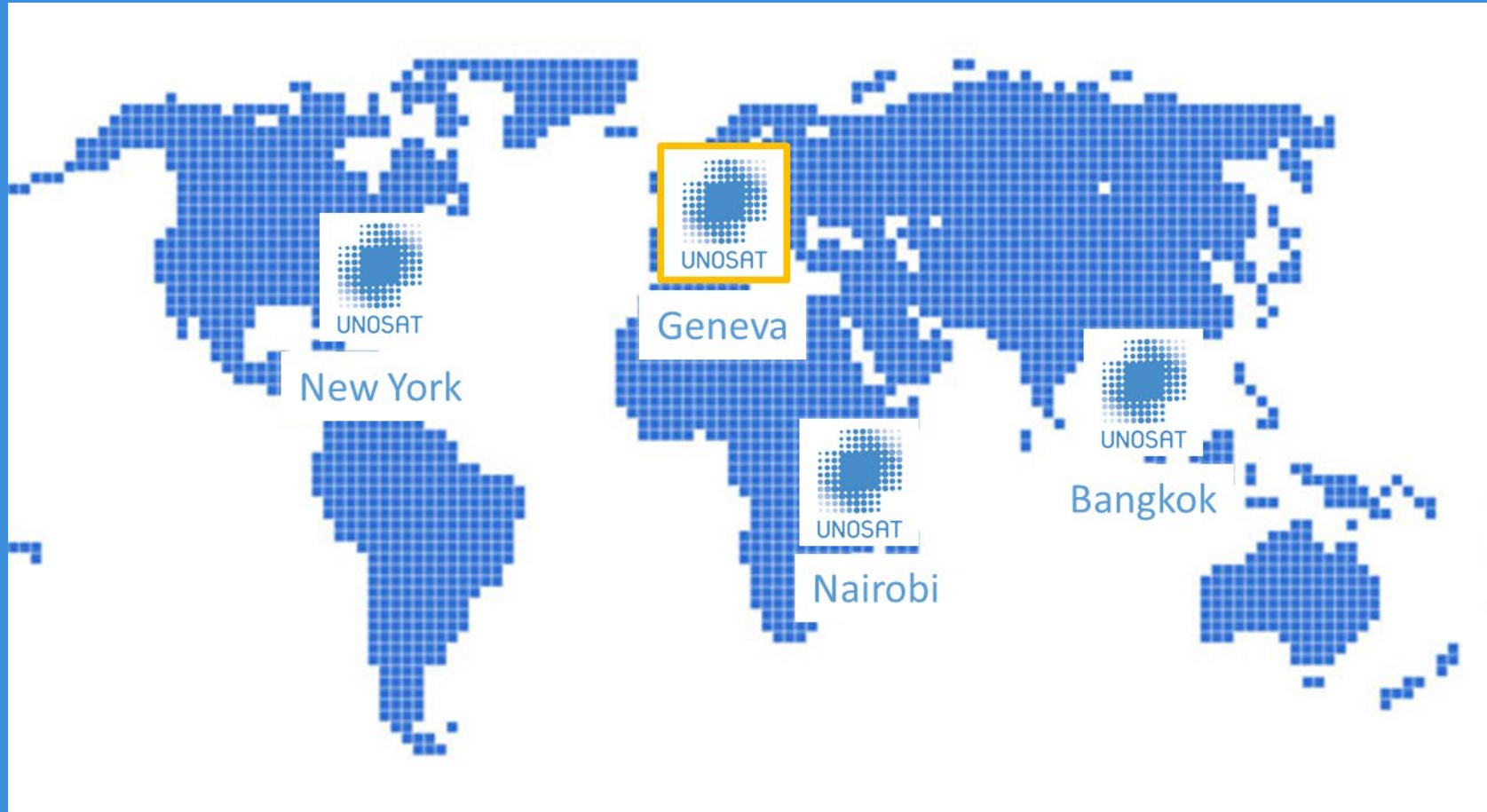
THE USE OF SATELLITE IMAGERY FOR IMPROVED DISASTER MANAGEMENT DECISION MAKING

Dr. Einar Bjørgo

Director, United Nations Satellite Centre (UNOSAT)

UNITAR





- Fiji
- Vanuatu
- Solomon Islands



HUMANITARIAN RAPID MAPPING

SATELLITE IMAGE ANALYSIS
DURING HUMANITARIAN
EMERGENCIES



SERVICE OVERVIEW

Operational since 2003, the UNOSAT Rapid Mapping service offers a 24/7 year round availability to process requests from humanitarian actors and to deliver satellite imagery derived analysis, maps, reports and data ready to use data following major sudden onset disaster events and conflict situations. Typical situations for which UNOSAT Rapid Mapping is activated include floods, earthquakes, storms, landslides, volcanoes, oil spills, chemical waste, refugee and internally displaced person camp mapping, conflict damage assessment and situation analysis. UNOSAT benefits from a variety of sources for its satellite imagery: free and open source, commercial vendors, International Charter Space and Major Disasters (natural and technological disasters only) and in-kind donations.



UN-ASIGN

Download and use
the **UN-ASIGN** app
to capture images of
humanitarian disasters



HOW WE SUPPORT DURING HUMANITARIAN EMERGENCIES

Wide and timely distribution of rapid mapping products to support evidence based operational planning and decision making of humanitarian actors in the field and at headquarter level.

Broad and rapid coverage of areas of interest using satellite images collected through different acquisition mechanisms including the activation of the International Charter Space and Major Disasters.

24/7 on-call service for UN member states, UN agencies, Red Cross and Red Crescent Movement (ICRC and IFRC), international and regional organizations and humanitarian non-governmental organizations.

Rapid satellite derived analysis and assessments in support of emergency response operations.

PRODUCTS



SATELLITE
ANALYSIS



REPORTS
& DATA



WEB MAP



VULNERABLE
POPULATION



ROADS &
FEATURES

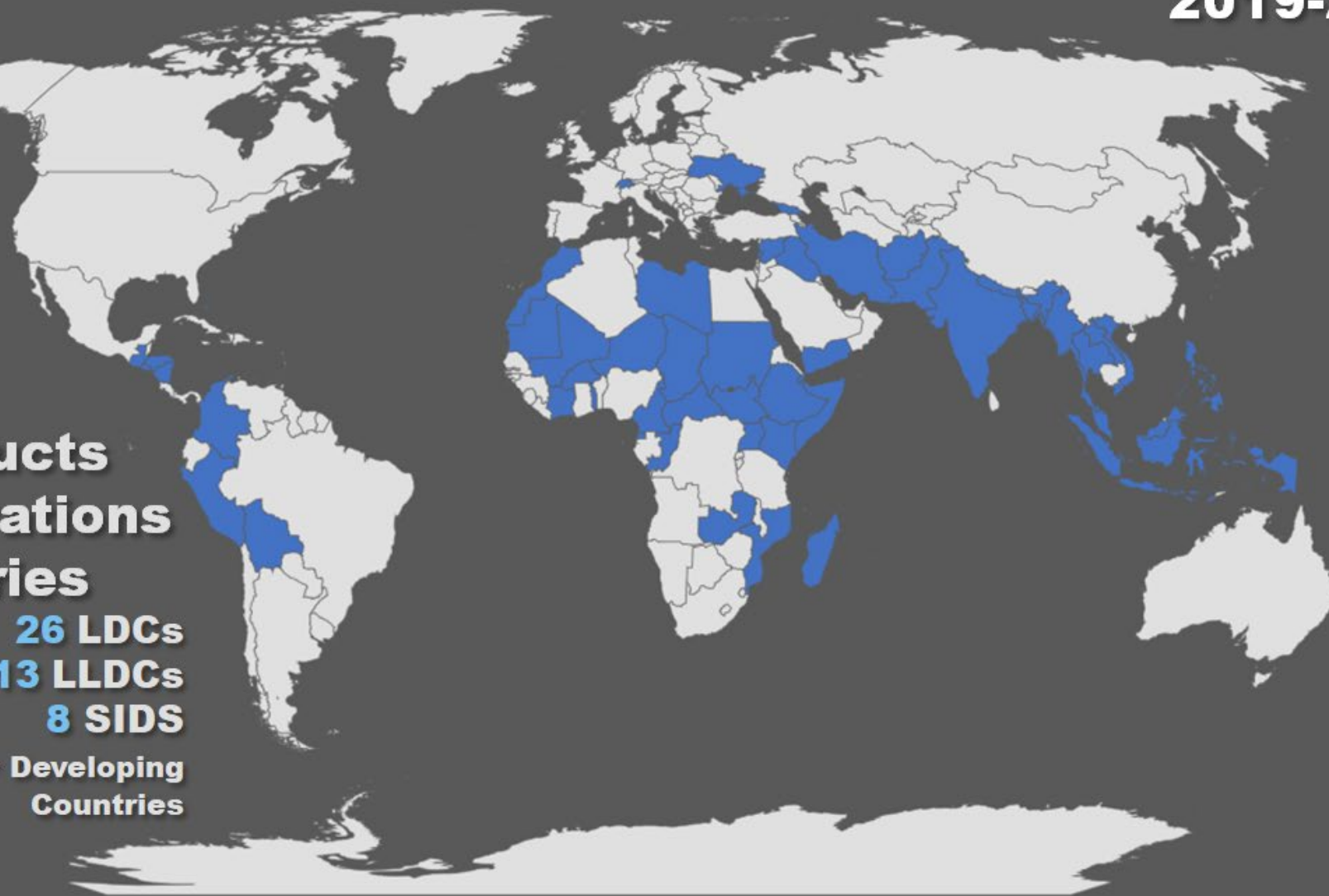


AREA OF
IMPACT



2019-2021

409 products
102 activations
60 countries
 26 LDCs
 13 LLDCs
 8 SIDS
 26 Other Developing
 Countries



GUYANA

Rupununi West Sub-Region, Region 9 - Upper Takutu - Upper Essequibo

IMAGERY ANALYSIS: 16 AUG 2021 PUBLISHED 19 AUG 2021

ANALYZED
AREA
24467 km²

AREA
AFFECTED
1417 km²

POTENTIALLY
AFFECTED
POPULATION
2200

POTENTIALLY
AFFECTED
ROADS
23 km



FLOOD
FL20210817GUY



Satellite detected water extent
in Region 9 - Upper Takutu-
Upper Essequibo, Guyana as
of 16 August 2021

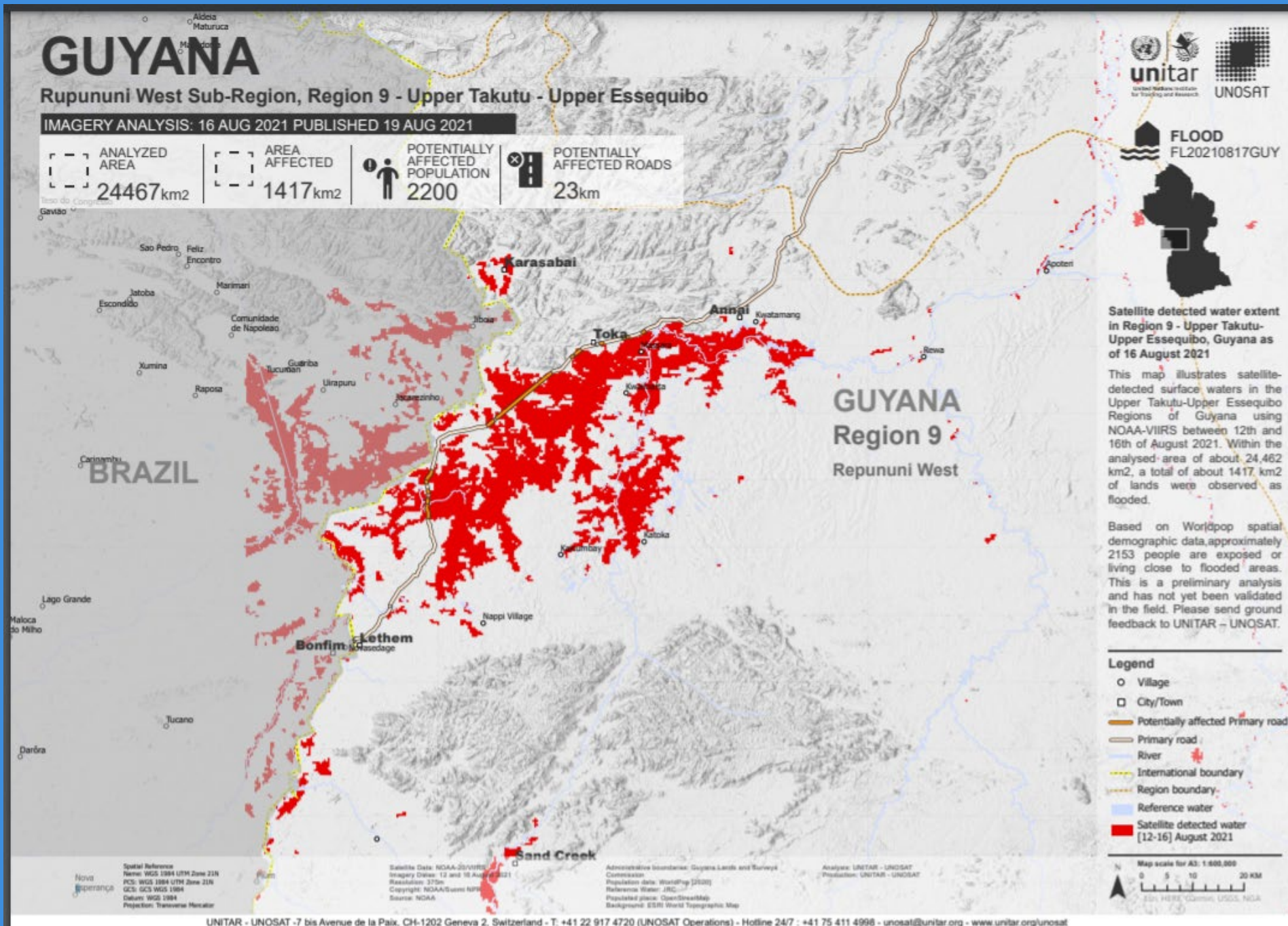
This map illustrates satellite-detected surface waters in the Upper Takutu-Upper Essequibo Regions of Guyana using NOAA-VIIRS between 12th and 16th of August 2021. Within the analysed area of about 24,462 km², a total of about 1417 km² of lands were observed as flooded.

Based on Worldpop spatial demographic data, approximately 2153 people are exposed or living close to flooded areas. This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to UNITAR - UNOSAT.

Legend

- Village
- City/Town
- Potentially affected Primary road
- Primary road
- River
- International boundary
- Region boundary
- Reference water
- Satellite detected water [12-16] August 2021

Map scale for A3: 1:600,000
0 5 10 20 KM
N
Sat. Imag. © 2021 UNOSAT, NOAA



Nova
esperança

Spatial Reference
Name: WGS 1984 UTM Zone 21N
PCS: WGS 1984 UTM Zone 21N
GCS: GCS WGS 1984
Datum: WGS 1984
Projection: Transverse Mercator

Satellite Data: NOAA-20/VIIRS
Imagery Dates: 12 and 16 Aug 2021
Resolution: 375m
Copyright: NOAA/US Navy
Source: NOAA

Administrative boundaries: Guyana Lands and Surveys
Commission
Population data: WorldPop (2020)
Reference Water: JRC
Populated areas: OpenStreetMap
Background: SRTM World Topographic Map

Analysts: UNITAR - UNOSAT
Production: UNITAR - UNOSAT

HAITI

NIPPES DEPARTMENT

IMAGERY ANALYSIS: BETWEEN 14 & 16/08/2021 PUBLISHED 18/08/2021 V1.

ANALYZE AREA
150km²

DAMAGED STRUCTURE
73

POTENTIALLY DAMAGED STRUCTURE
125



EARTHQUAKE
EQ20210814HTI



epicentre

NIPPES

INSET 3

INSET 4

Damaged structures

See inset 1 & 2 for close up view

See inset 3 & 4 for close up view

Cavaillon

Changieux

Abricot

Charpentier

L'Asile

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Imagery Date: 14-16/08/2021
Imagery Type: EO-1
Imagery Resolution: 30m
Imagery Sensor: EO-1
Imagery Platform: EO-1

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FLOOD A.I. MAPPING

AUTOMATIC FLOOD
MAPPING DONE USING
ARTIFICIAL INTELLIGENCE



SERVICE OVERVIEW

UNOSAT has years of experience mapping floods in support of the UN and member states all over the world. Advances in Artificial Intelligence and improved radar data availability allows UNOSAT flood mapping to address a larger portion of global flood events than in the past. UNOSAT analysts will be able to process more imagery over wider scales than ever before, which together with targeted radar tasking can greatly expand the amount of flood events UNOSAT can address.

HOW WE SUPPORT FLOOD MAPPING

Floods can be addressed 'at scale' instead of 'as possible'

More frequent updates of flood mapping can be done

Automatic ingestion of results into live dashboard for decision making



UNOSAT S-1 Flood AI Monitoring Dashboard

Activation GLIDE: AI20210829NPL

Start Date 2021-08-29

End Date 2021-09-05

UN ASIGN Latest
Photos (1 Month) -
Points



Report Point

- Flood Area
- Building-affected
- School-affected
- House-affected
- Health-facility-affected
- Bridge-affected

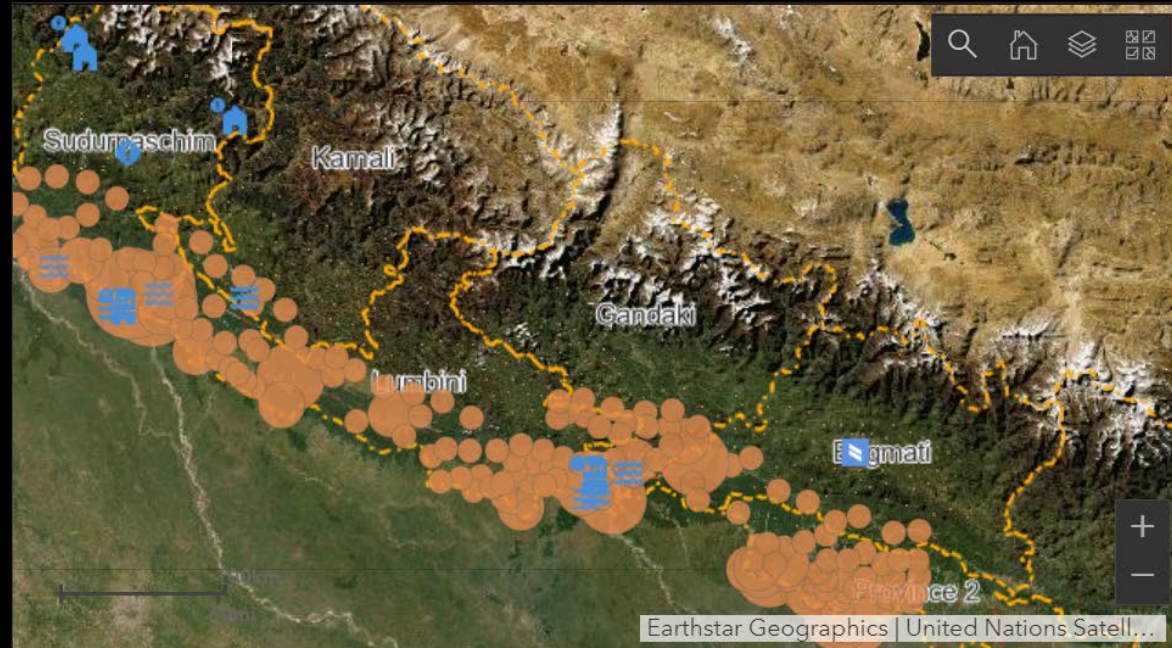
Download shapefile >>
[Here](#)
Download csv >> [Here](#)

Disclaimer:
- Flood analysis from SAR

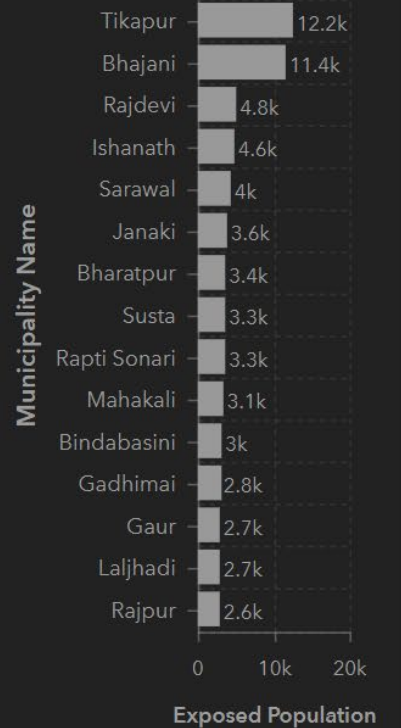
155.9k
Population Exposed

430
Inundated Area (SqKM)

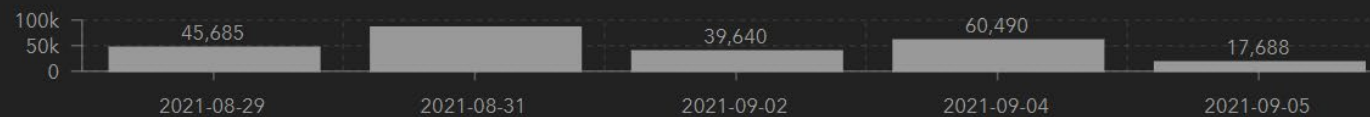
122.9k
Monitored Area (SqKM)



Exposed Population by Municipality



Exposed Population Over Time



Benefits

of using geospatial information technology (GIT) and satellite earth-observation data to strengthen evidenced-based decision making

- **Access to current information**
such as land use and infrastructure information, covering wide and remote areas
- **Access to historic information**
satellite imagery for an area back to the 1970s which allows to see changes over time
- **Access to future climate information**
overlay them with other satellite/ground data to better understand potential scenarios for strategic planning
- **Understand existing and future risks**
explore to natural hazards and community's vulnerability level with information on population, agricultural production and infrastructure

Technical Platform and Data

"The CS Platform is a fantastic resource and includes a broad spectrum of useful and relevant data sets. It has high potential to be extremely useful for numerous applications, including Climate Finance proposals. Risk Information Application and Decision support is already highly intuitive, and it is clear how it can be usefully applied. Application of some of the Data Cube products require expertise."

Anonymous test user in Fiji

 CommonSensing





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



Fiji

EXPLORE TOOL



Solomon Islands

EXPLORE TOOL



Vanuatu

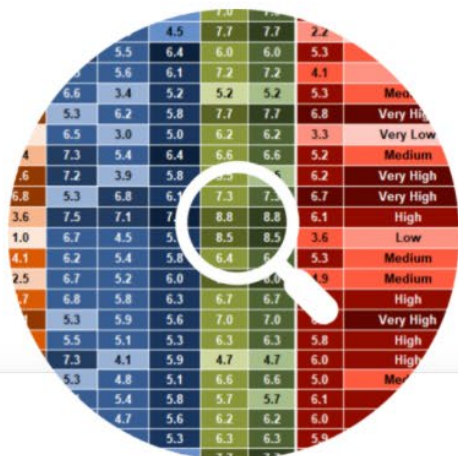
EXPLORE TOOL

Benefits:

- Access to current information
- Access to historic information
- Building understanding of future climate and risks

End-users:

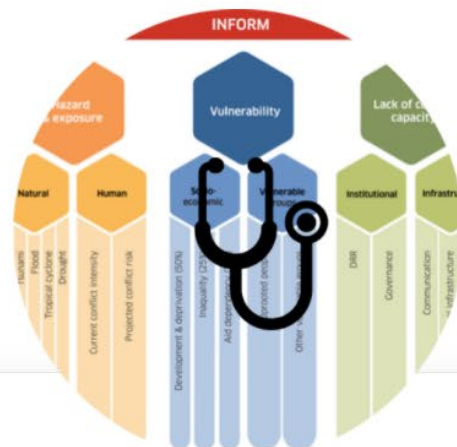
- Technical experts
- Sectoral experts
- Decision makers
- Secondary regional users



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/km²) to the local population density (population/km²).

LAUNCH TOOL

- **Lack of national capacity for using GIT applications and accessing, analyzing, and visualizing satellite data**
- **Scattered information with no central point for data sharing facilitation**
- **Costs for advanced GIS tool and high-resolution satellite imagery**

Challenges

in using geospatial information technology (GIT) and satellite earth-observation data to strengthen evidenced-based decision making

Capacity Development

"NDMO applied the new skills learned from the CommonSensing Advanced GIT Training during TC Yasa to take the lead role in emergency responses. We leveraged skills and knowledge about damage assessments, visual interpretation, as well as the use of demographic data for assessing affected communities by provinces and districts. A live dashboard showing the results of multiple assessments was developed by the training participant from the Bureau of Statistics with the help of CS country officer, and it was displayed in the National Emergency Operations Centre in Suva."

*Senior Geospatial Officer
at Fiji NDMO*

Practical training and awareness-raising events:





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