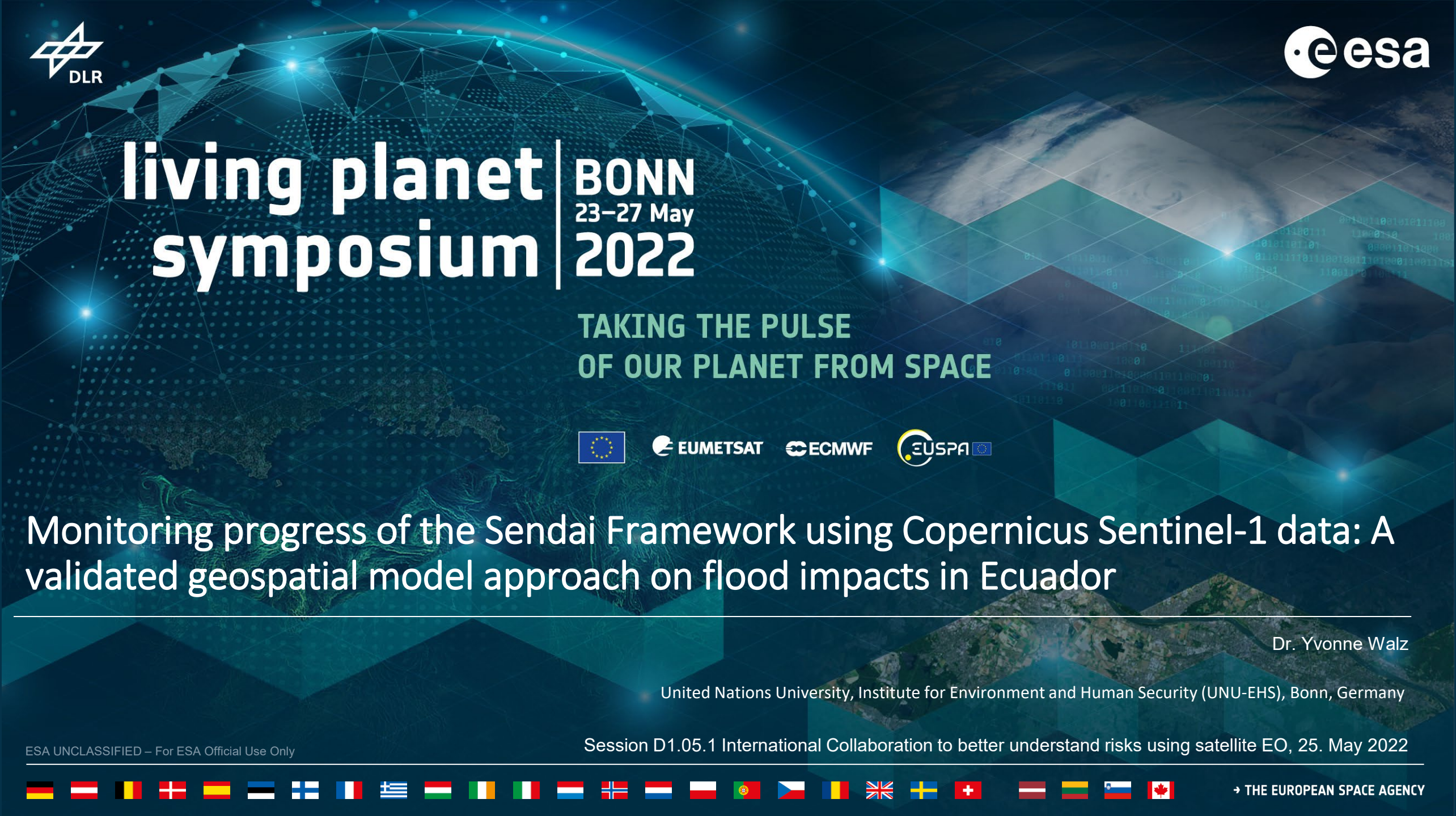

Monitoring progress of the Sendai Framework using Copernicus Sentinel-1 data: A validated geospatial model approach on flood impacts in Ecuador

Dr. Yvonne Walz

United Nations University, Institute for Environment and Human Security (UNU-EHS), Bonn, Germany

International Collaboration to better understand risks

Chart of the Sendai Framework for Disaster Risk Reduction

2015-2030

Goal

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

Targets

Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015	Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015	Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030	Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030	Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020	Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030	Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Priorities for Action

l global levels in the following four priority areas.

Priority 1
Understanding disaster risk

Disaster risk management needs to be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment

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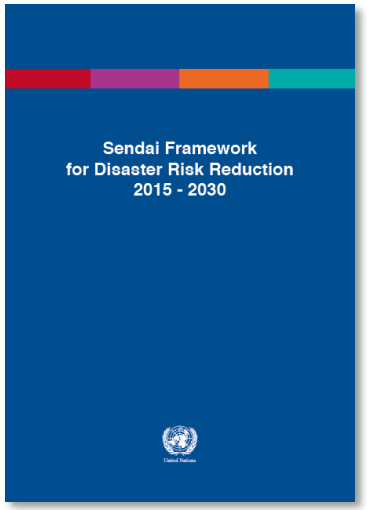
Priority 4
Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction

Experience indicates that disaster preparedness needs to be strengthened for more effective response and ensure capacities are in place for effective recovery. Disasters have also demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of the disaster, is an opportunity to «Build Back Better» through integrating disaster risk reduction measures. Women and persons with disabilities should publicly lead and promote gender-equitable and universally accessible approaches during the response and reconstruction phases

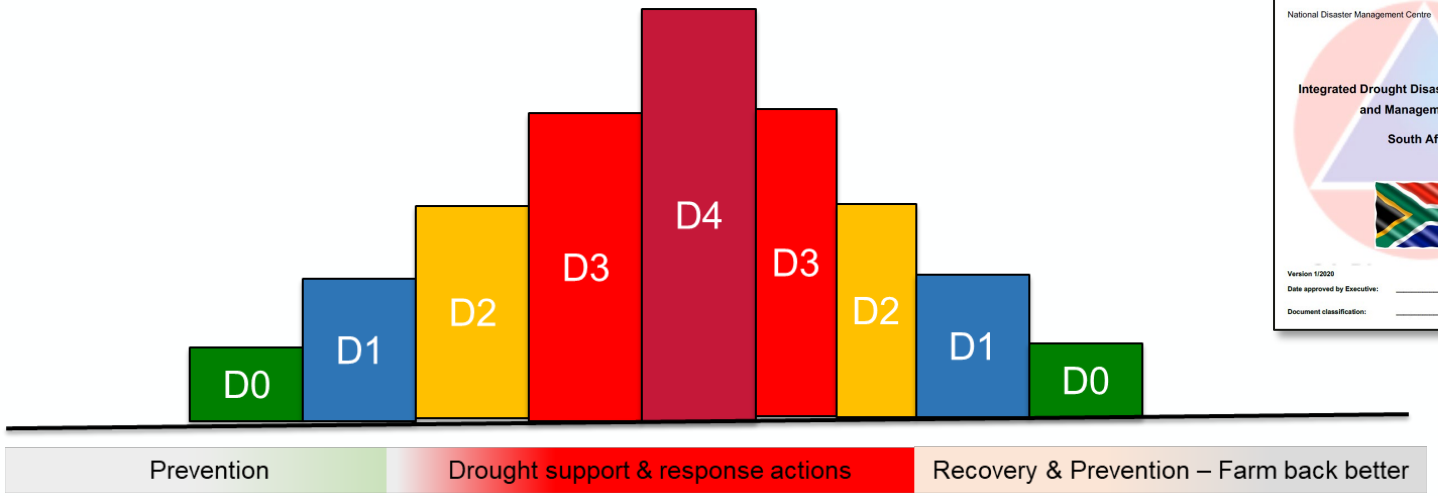


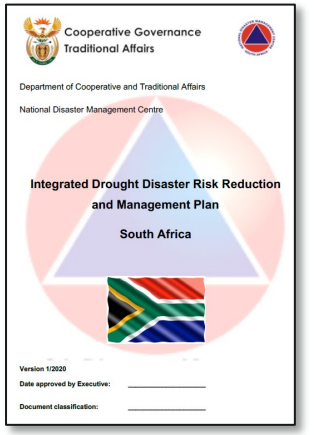
Why is “understanding risk” so relevant?

				Meteorological		Remote sensing				Hydrological			
Cat	Descript.	Potential impacts	Freq.	% Of normal preciptn.	SPI	NDVI	PASG	1-month VCI	St Veg health Index. SVHI	CPC Soil Moist. %	Dam levels - zone Z score	Stream Flow Z score	Ground water level % Z score
D0	Dry	Dry period: Short term dryness slowing plant Growth of crops and pastures; fire risk above average: some lingering water deficiencies: pastures and crops not fully recovered	1/3yr	<75%for 30days	-0,5 to -0,7		3month PASG <90%	< 90%	36-45	21-30	moderately low zone	21-30	60- 100
D1	Moderate drought	Some damage to crops & pastures: fire risk is high: Levels of streams, reservoirs or wells are low: Some water shortages are imminent and developing: voluntary water restrictions requested: early warning											
D2	Severe drought	Crop and pasture losses likely: Fire risk very high: Water shortages common: Water restrictions imposed: drought warning messages: Institutions to prepare for response mechanisms.											
D3	Extreme drought	Major crop and pasture losses: Extreme fire danger: Widespread water shortages and restrictions compulsory: Extended duration with critical impact: Warning messages must be adhered to: disaster drought declaration: Institutions to implement active response actions.											
D4	Exceptional drought	Exceptional and widespread crop & pasture losses: Exceptional high fire risk: shortages of water in reservoirs, streams and wells creating water emergencies. Water restrictions compulsory: Warning messages must be adhered to: Active response mechanisms: Impacts critical											

Hazard characteristics (biophysical indicators)

Drought Management Framework in South Africa



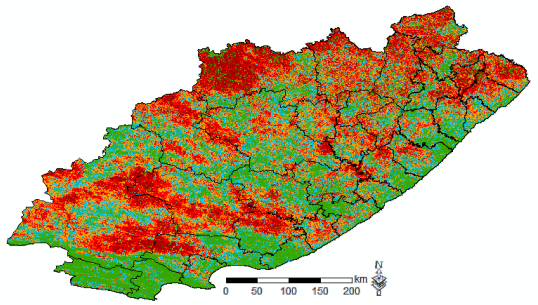


Jordaan, 2020: Input for the Integrated Drought Disaster Risk Reduction and Management Plan, South Africa

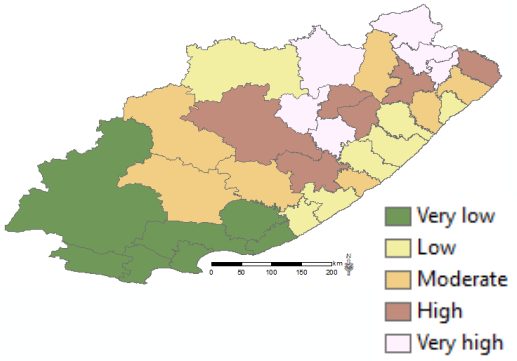
Priority 1: Understanding disaster risk in all its dimensions

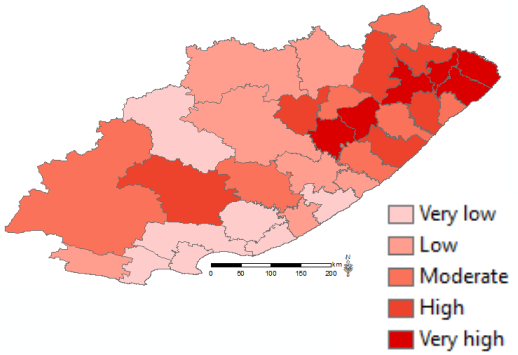
Agricultural drought risk

Hazard	Exposed elements	Vulnerability



provided by ZFL

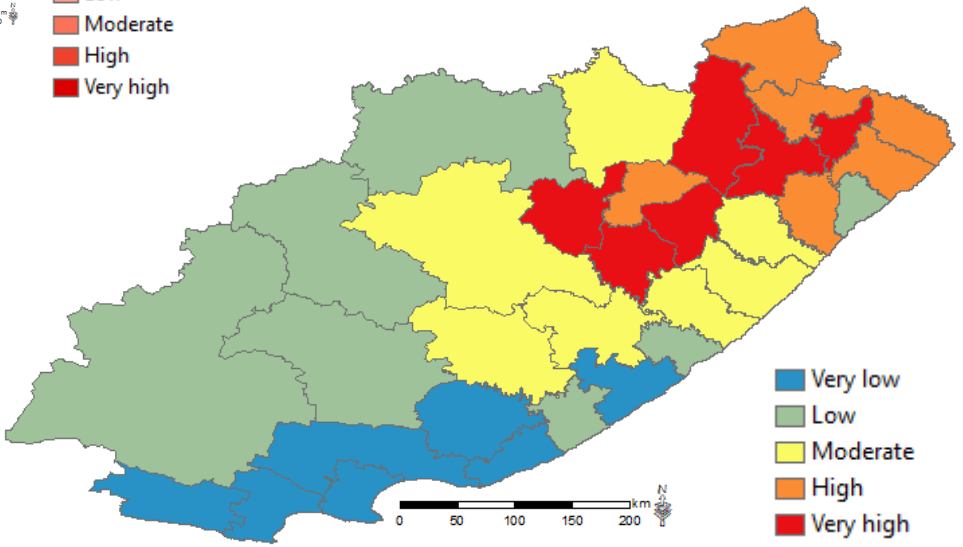




- D0 (VCI > 40)
- D1 (VCI 40 to >30)
- D2 (VCI 30 to >20)
- D3 (VCI 20 to >10)
- D4 (VCI <=10)

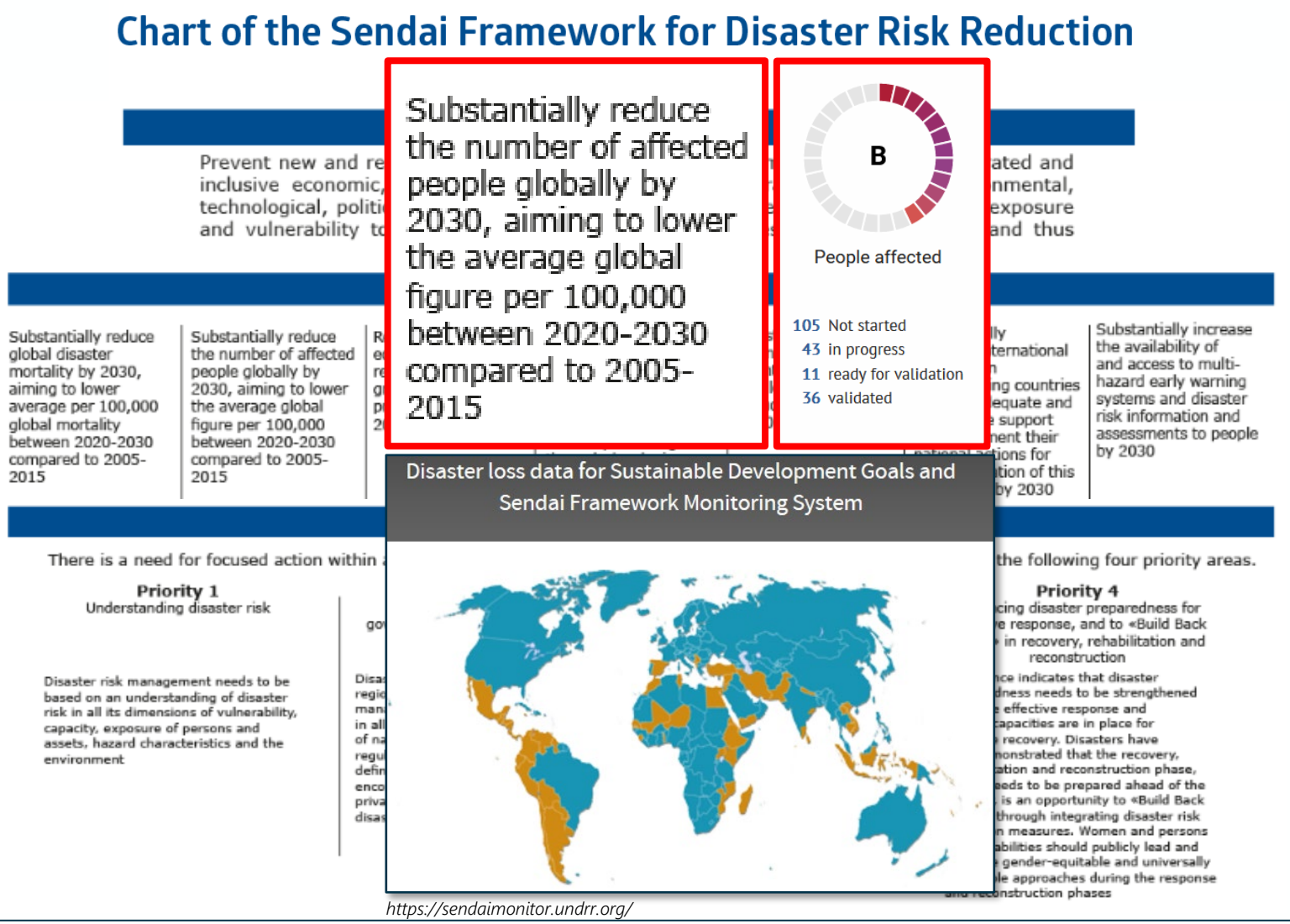
Drought support and response action according to management plan

Agricultural drought risk

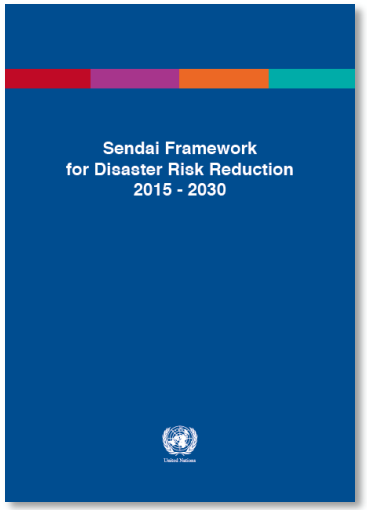


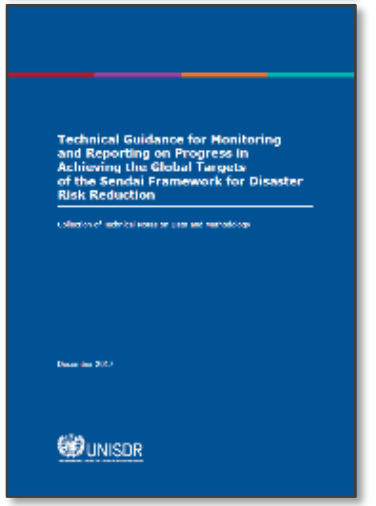
Supported by:
Federal Ministry for Economic Affairs and Energy
on the basis of a decision by the German Bundestag
DLR Space Administration

Need for international collaboration to advance the Sendai monitoring process



https://sendaimonitor.undrr.org/





Source: https://sendaimonitor.unisdr.org/, *accessed 16.11.2021*

http://www.unisdr.org/files/54970_techguidancefdigitalhr.pdf *(14.10.2020).*

Context: VALE project

Development and **Val**idation of Earth Observation-Based Indicators for the Monitoring of the Sendai Framework Using the Example of Flooding in **E**cuador

- Research project with execution time from 01/2020 to 03/2022. Funded by the German Federal Ministry of Economics and Energy.

- Main Objective:
  To reduce flood-related impacts in Ecuador and other countries through the development and validation of an innovative method for obtaining Earth-based information products to monitor the Sendai Framework for Disaster Risk Reduction indicators.

- Project consortium:

Supported by:

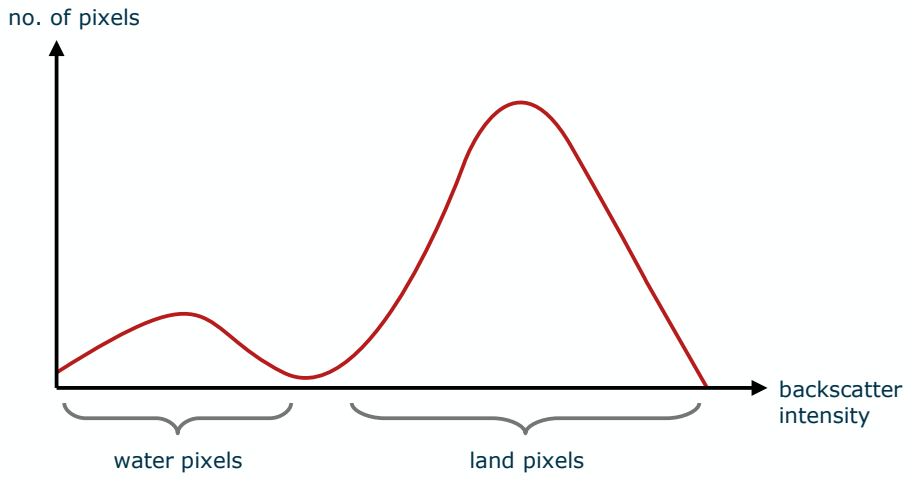
Federal Ministry for Economic Affairs and Energy

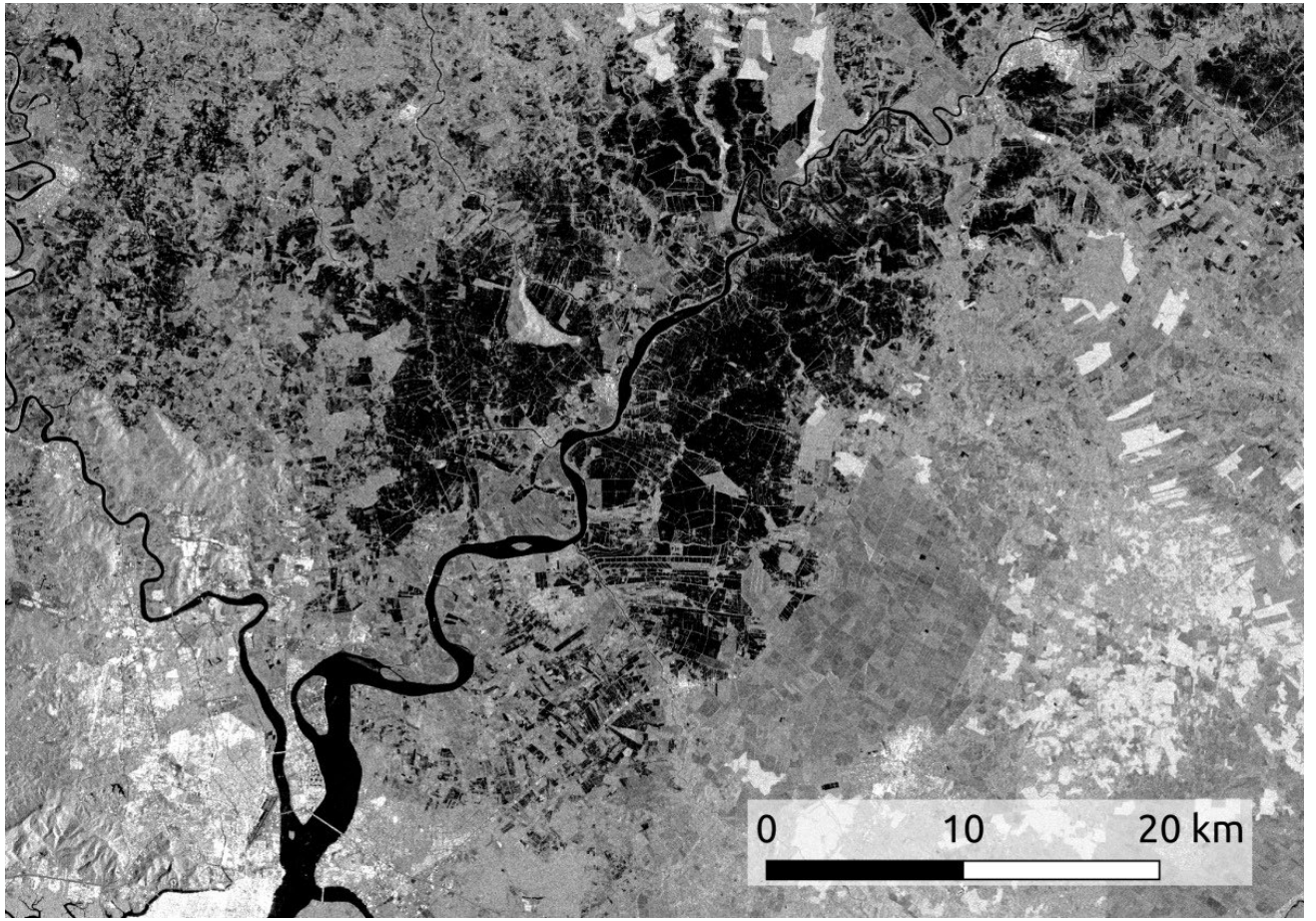
on the basis of a decision by the German Bundestag

DLR Space Administration

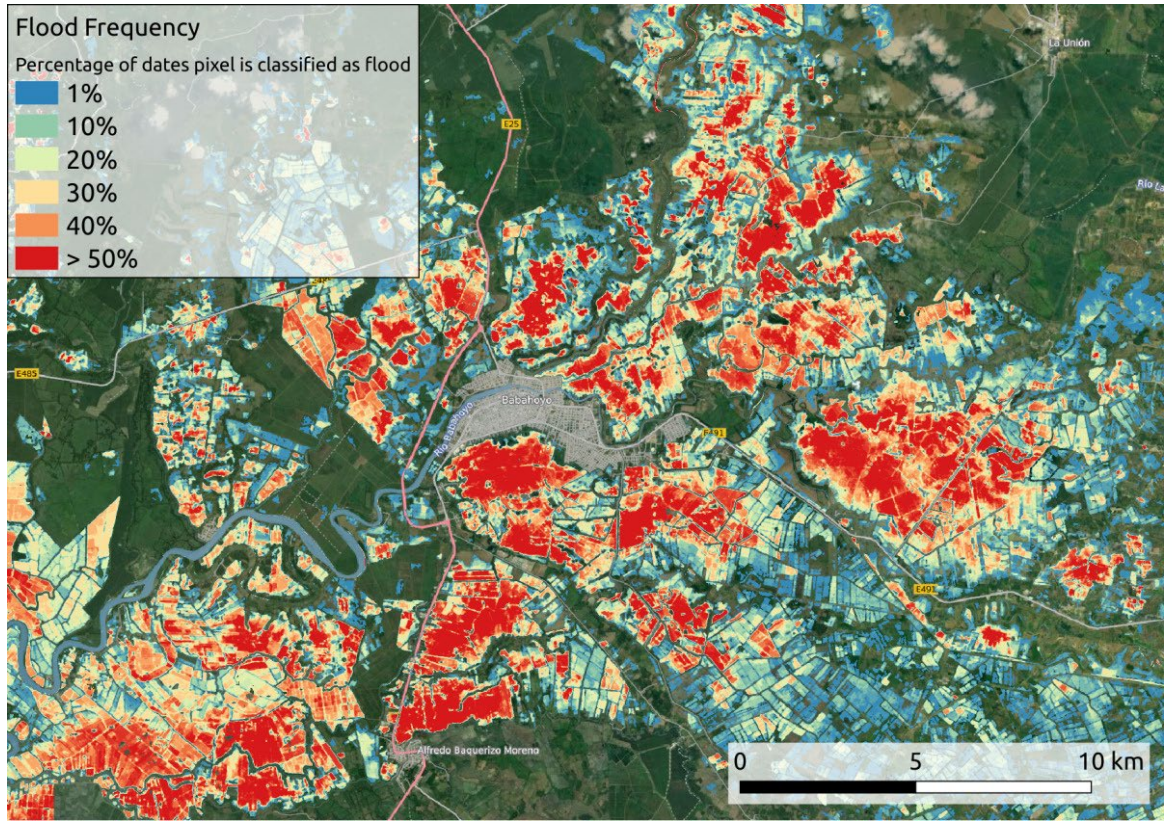
The contribution of Earth Observation: Semi-automated flood hazard mapping with Sentinel-1 data in GRASS GIS

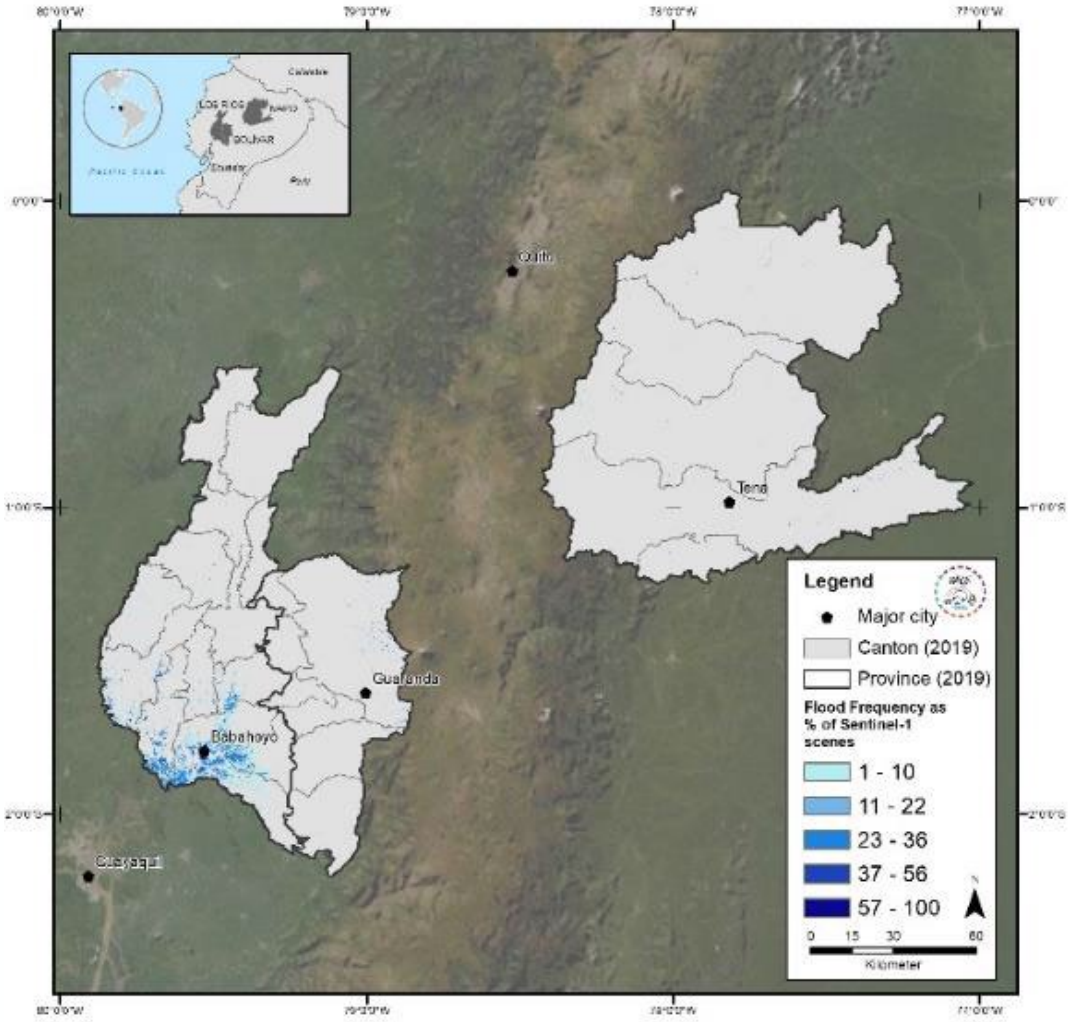
- identification of flooded areas by automatic thresholding of low-backscatter values and image segmentation
- false alarm correction via digital elevation model



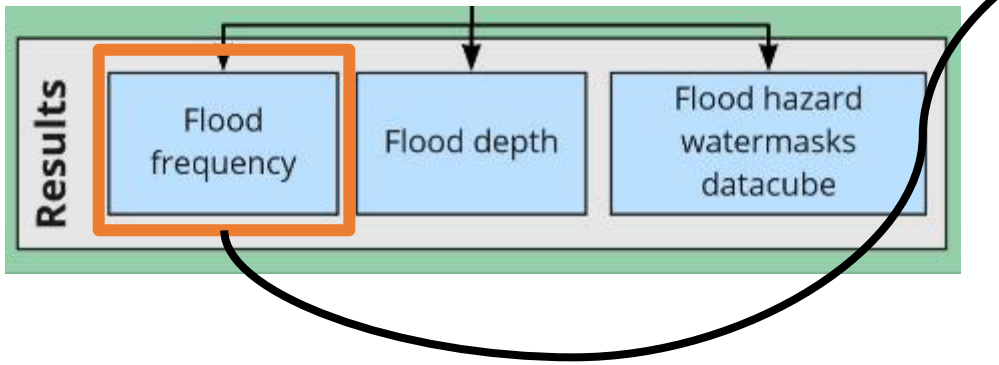


The contribution of Earth Observation: Semi-automated flood hazard mapping with Sentinel-1 data in GRASS GIS



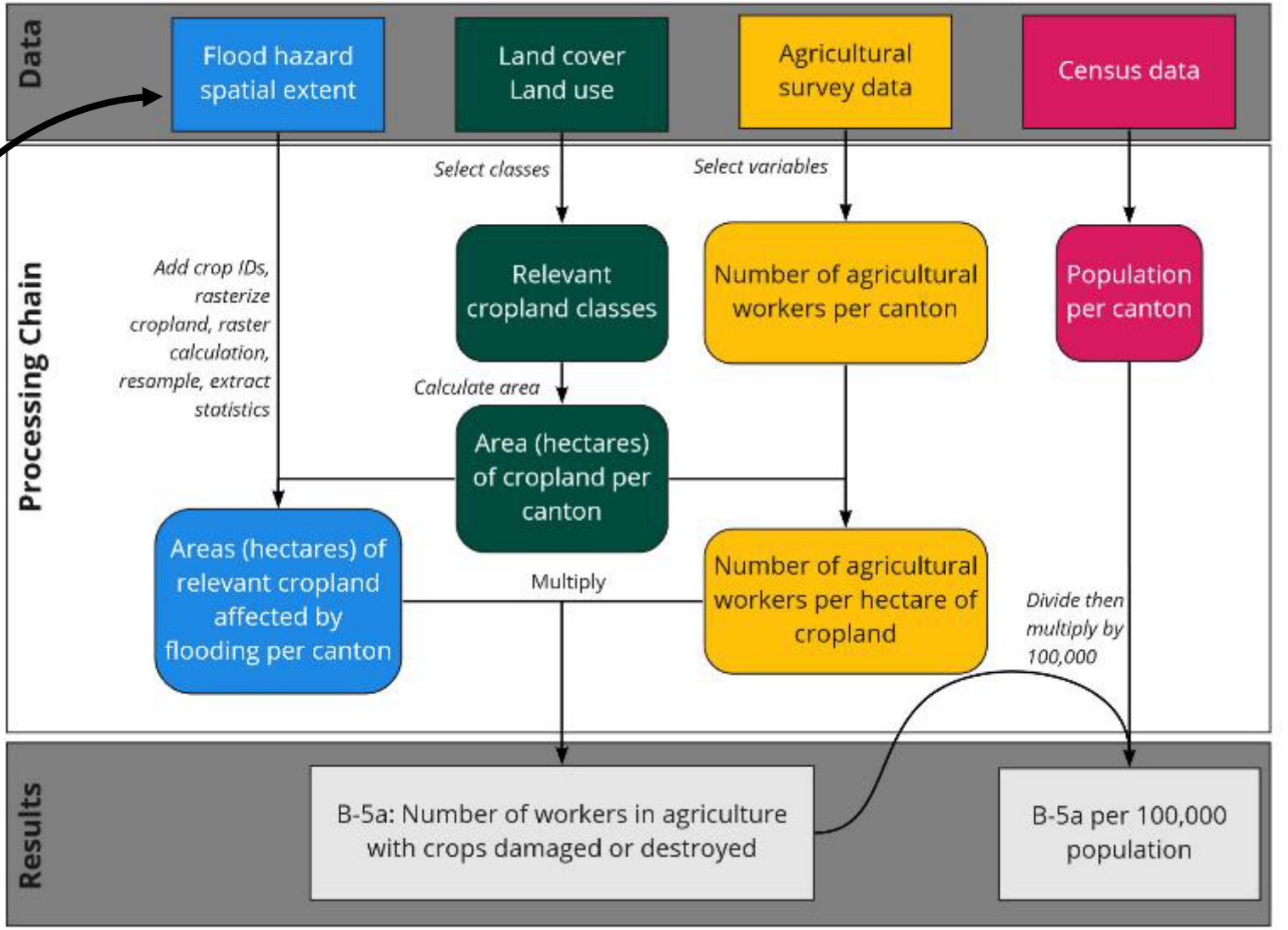


Modelling a Sendai indicator: Example of B-5a

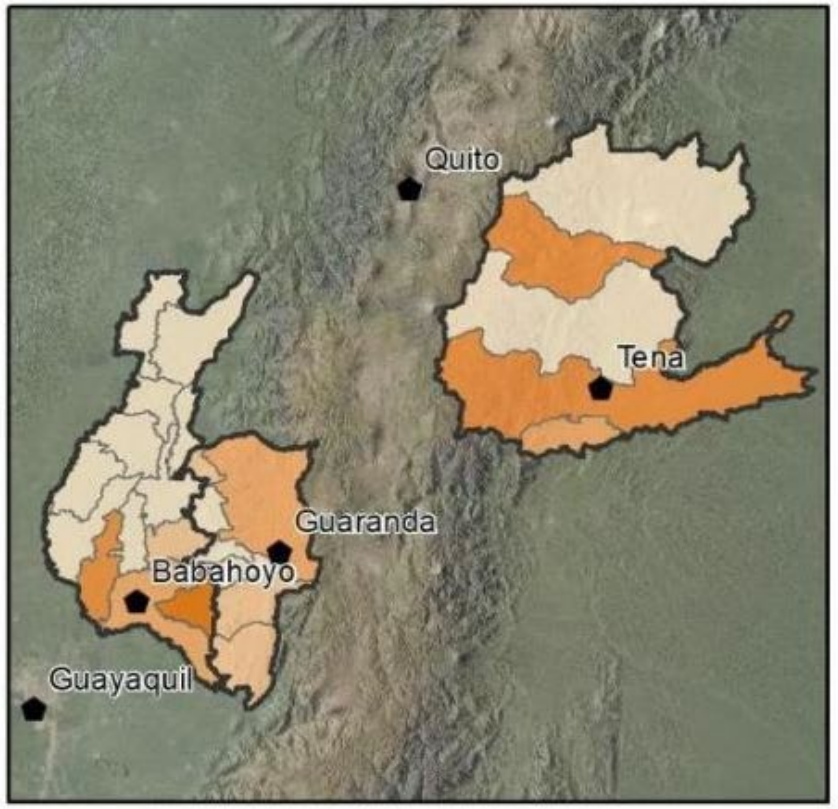


SFDRR Technical Guide formula* used to measure indicator B-5a at the canton level

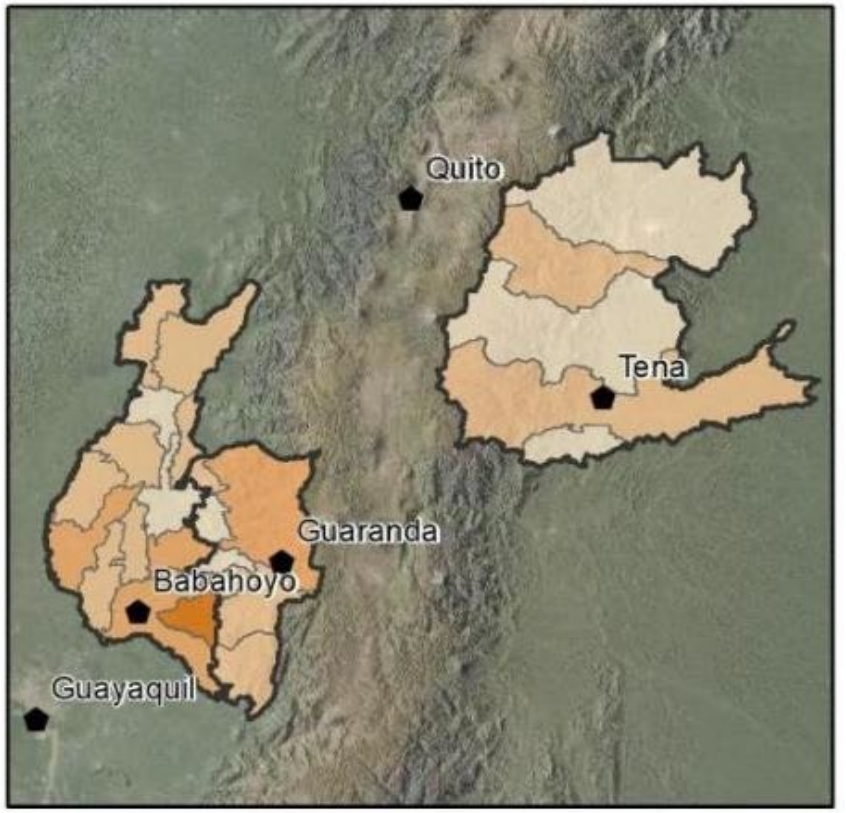
*B-5a = total hectares of crops damaged or destroyed
* average number of farm workers per hectare of agricultural land (UNISDR 2017)



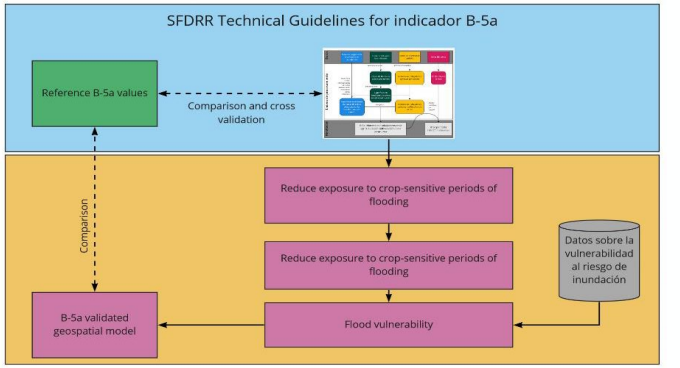
Validating a Sendai indicator: Example of B-5a

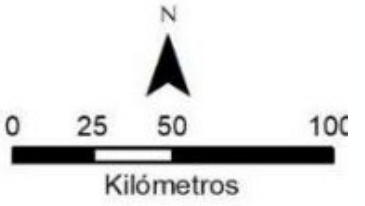


B-5a Referential



B-5a Validated model





Source: Urrutia II, JM., Scheffczyk, K., Riembauer, G., Mendoza, J., Yanez, D., Jímenez, S., Ramírez, A., Acosta, M., Arguello, J., Huerta, B., Neteler, M., Walz, Y. (2022) A validated geospatial model approach for monitoring progress of the Sendai Framework: The example of people affected in agriculture due to flooding in Ecuador. Progress in Disaster Science, accepted 12 May 2022, publication in progress.

The role of international collaboration for integration of EO data into policy processes: Collaboration with national policy makers and implementers

February 2020: Project kick-off meeting

March 2020: Workshop and user-dialogue in Ecuador

- Quito (workshop and meetings)
- Los Ríos and Bolívar (field trip)
- Samborondón and Durán (field trip and meetings)

October 2020: Participatory local expert workshop on flood risk indicators

November 2021: Training of Trainers Workshop (2 weeks)


Photo: UNU-EHS, 2020

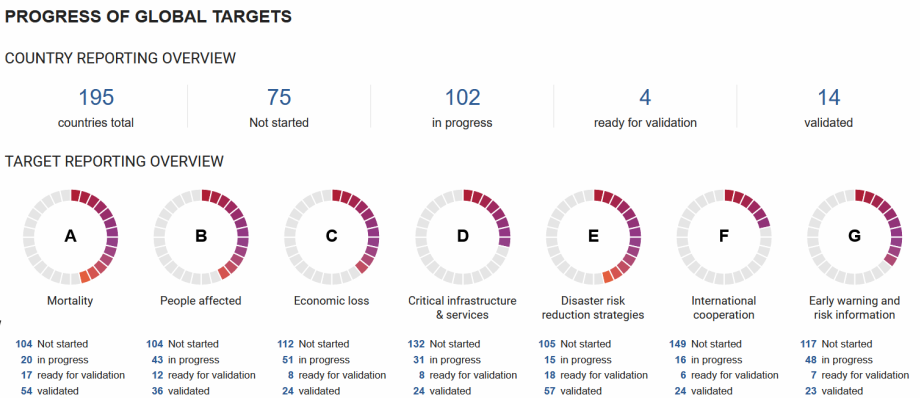

Photo: UNU-EHS 2020, M. Urrutia


Photo: UNU-EHS 2020, Y. Walz


Photo: UNU-EHS 2020, Y. Walz

Collaboration with UNDRR

https://sendaimonitor.undrr.org/



UNDRR
UN Office for Disaster Risk Reduction

Technical Forum on Sendai Framework Monitoring

7 – 8 December 2021 [Virtual]

Wed, 8 Dec 2021

Session 3

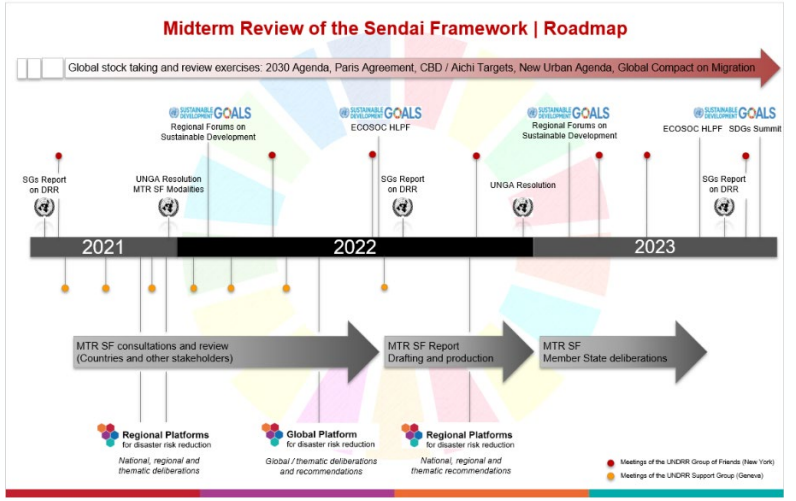
Strengthening reporting on the Sendai Framework Monitor: Innovations and insights

This session will call upon Member States to share their experience on the reporting in the Sendai Framework Monitor. It will also outline the latest thinking from UN and other international partners who can support the Member States in reporting better on specific targets and indicators of the Sendai Framework and SDGs. Initial results of the user experience on SFM will also be presented.

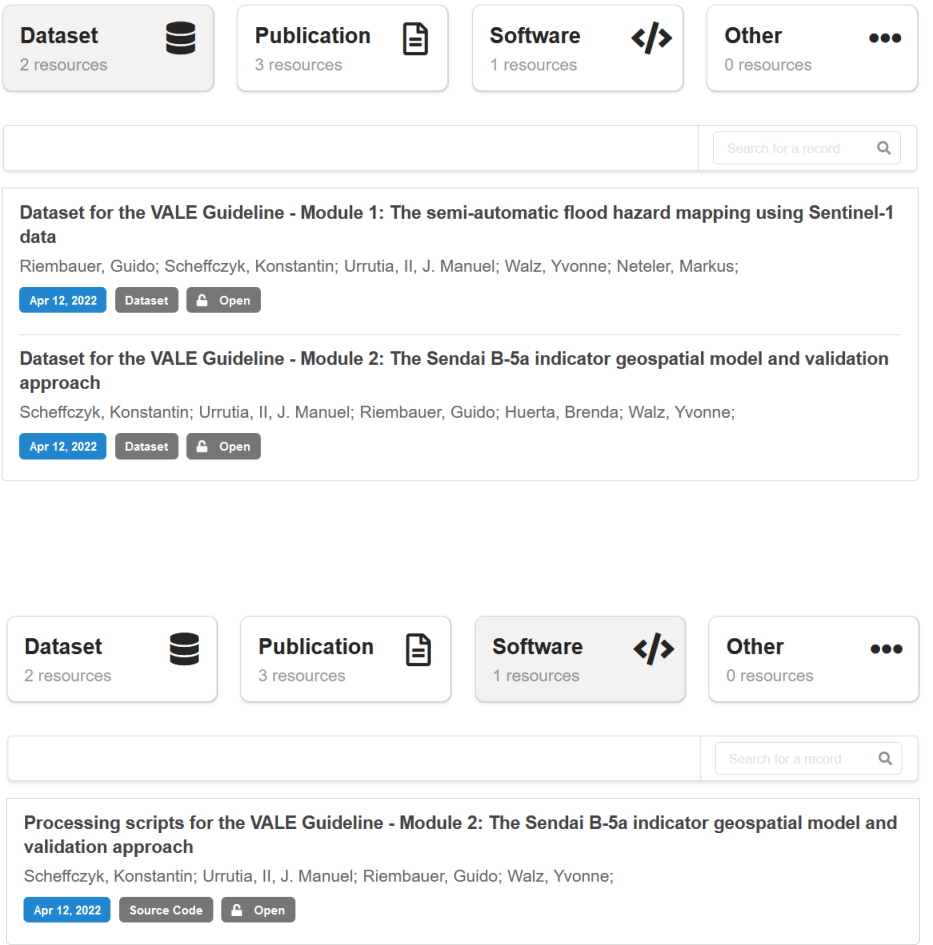
Earth observation-based indicators for Sendai Framework Monitoring: Yvonne Walz, UNU-EHS

The Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030

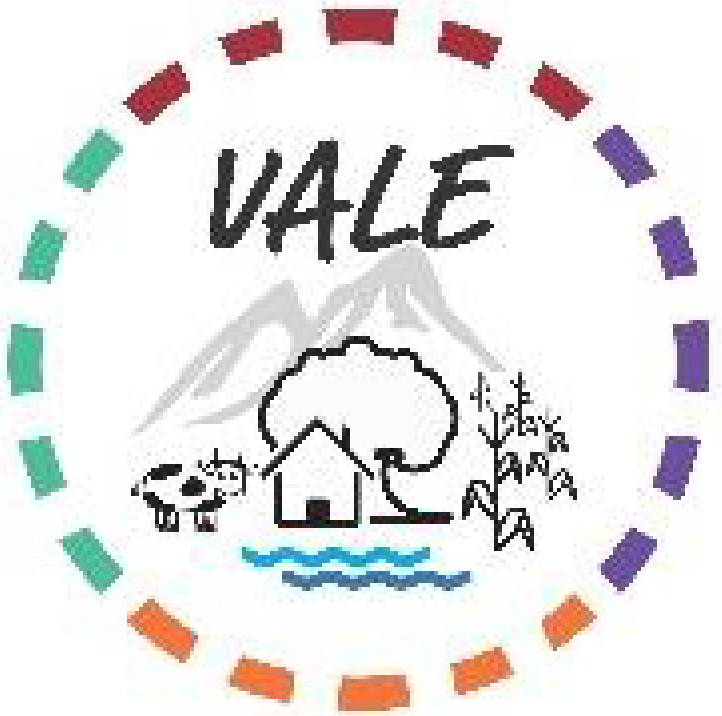
Concept Note



Capacity building and wider dissemination



https://gkhub.earthobservations.org/records/4sj8k-5z391



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Thank you for your attention!