Fact sheet of the 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

Sponsored by

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Partners

United Nations University - Institute for Environment and Human Security (UNU-EHS) – project coordination

Contact: Dr. Yvonne Walz
walz@ehs.unu.edu

Mundialis GmbH & Co. KG

Contact: Dr. Hajar Benelcadi
benelcadi@mundialis.de

In cooperation with

United Nations Office for Disaster Risk Reduction (UNDRR)

Contact: David Stevens
stevensd@un.org

National Service for Risk and Emergency Management of the Government of Ecuador

Contact: Gabriela Aguilar
maria.aguilar@gestionderiesgos.gob.ec

United Nations Development Programme (UNDP) - Country Office in Ecuador

Contact: Nury Bermudez
nury.bermudez@undp.org

VALE - Development and validation of earth observation-based indicators for the monitoring of the Sendai framework using the example of flooding in Ecuador

The VALE project is sponsored by the German Federal Ministry for Economic Affairs and Energy (BMWi) and administered by the Space Administration of the German Aerospace Center (DLR) as part of the funding initiative "Development of innovative methods for the creation of earth observation-based information products".

Together with the associate project partners (Ecuadorian National Service for Risk and Emergency Management, UNDP, and UNDRR), the VALE team of UNU-EHS and mundialis will develop an innovative method to quantify indicators of the Sendai Framework for Disaster Risk Reduction (SFDRR) using earth observation-based information products in combination with geospatial data, and validate this approach based on in-situ measurements.

Background

Natural hazards pose significant challenges to livelihoods, people, and governments in many areas of the world. Flooding accounts for about 40% of all losses related to natural hazards since 1980[1]. Due to climate change, the likelihood and severity of flood hazards is expected to increase. Disaster risk reduction is a central component of sustainable development. To protect human life and health, livelihoods, ecosystems, and critical infrastructure from adverse effects due to hazards, the United Nations Office for Disaster Risk Reduction (UNDRR) facilitated that 187 countries agreed on the SFDRR in March 2015.

The Sendai Monitor enables countries to report their progress of disaster risk reduction based on 38 defined indicators on a yearly basis. The progress of disaster risk reduction is quantified by comparing current and past losses and damages from disasters at the national level. The Sendai Monitor is a strategic tool to better understand the underlying drivers of loss and damage as basis for applying targeted measures to reduce disaster risks and impacts.

However, reporting for SFDRR has been a challenging task for many countries, mainly due to the lack of consistent disaster-related loss and damage data. A first attempt to develop a geospatial approach for modelling indicators of the Sendai framework has been made for the example of droughts at UNU-EHS in the EvIDENz project[2]; however, this approach is difficult to validate in a systematic way due to the absence of reliable and systematic reference data. The VALE project is filling this research gap by transferring this approach to the context of flooding in Ecuador and validating it based on in-situ measurements of flood-related loss and damage data.

Goals of the VALE project

The overall aim of VALE is to support countries in implementing the SFDRR. To achieve this, the project team collaborates with relevant national and international actors to ensure that the development and validation of this methodology is in line with the national and international approach of implementing the SFDRR.

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[1] https://www.munichre.com/en/risks/natural-disasters-losses-are-trending-upwards/floods-and-flash-floods-underestimated-natural-hazards.html

[2] https://ehs.unu.edu/research/evidenz-earth-observation-based-information-products-for-drought-risk-reduction-on-the-national-level.html#outline

The specific objectives of VALE are:

- To further develop the automated small-scale derivation of floodplains based on earth observation data in order to provide an information product of flood hazard in Ecuador;
- To derive a geospatial model approach to measure indicators of the SFDRR based on the combination of flood hazard, exposure, and vulnerability to flooding in Ecuador;
- To validate the earth observation-based Sendai indicators with in-situ measurements of actual loss and damage due to flooding.

Value of Earth Observation

The spatial nature of many SFDRR indicators (e.g., the recording of deforestation, degradation, or areas affected by floods) opens up new possibilities for earth observation as an objective measure. In this context, the VALE project builds on earth observation-based information products and adds additional value to these through the integration of national statistics in a geospatial model to produce information products tailored to assess the Sendai indicators. The European missions with complementary sensor properties, a global coverage with high-resolution image data, and the open data policy of the Copernicus Earth Observation Programme and its Sentinel Missions provide new opportunities for earth-observation-based information products at the global scale. The EvIDENz project has already shown that earth observation-based information products may become a realistic solution for a large number of countries to derive a retrospective reference measure of the Sendai baseline (2005-2015) for monitoring progress.

Project Region

Ecuador experiences flooding every year and is a role model for the structured recording of loss and damage data. These data have been continuously recorded within Ecuador since 1970 and have been reported directly to the Sendai Monitor via the existing system since 2015. Ecuador, with its geographical and topographical diversity between the highlands of the Andes Mountains, the coastal plains in the West, and the Amazon in the East, suffers the greatest losses due to flooding. The most frequent losses are recorded in the agricultural sector, with serious consequences for small farmers, some of whom lost more than 70% of their annual income due to an event in 2012[3]. Since 2005, Ecuador has registered more than 4200 flood events with detailed losses of affected people, infrastructure, and agricultural yields at the subnational level[4].

The high number of flood events in diverse ecological regions of Ecuador, along with the robust loss and damage data available, provides an ideal setting for the VALE team and the associated partners to develop an innovative method to quantify indicators of the SFDRR using earth observation-based information products in combination with geospatial data, and validate this approach.

[3] Galarza-Vilamar JA, Leeuwis C, Quinga GMP, Cecchi F, Parraga-Lema CM (2018). Local understanding of disaster risk and livelihood resilience: The case of rice smallholder and floods in Ecuador. *International Journal of Disaster Risk Reduction* 31: 1107-1120

[4] https://www.desinventar.net/DesInventar/profiletab.jsp?countrycode=ecu&continue=y