Open technologies for monitoring systems aimed at disaster risk reduction
Climate change and environmental degradation undermine progress achieved, and poor people suffer the most.
Overexploitation of marine fish stocks

Weather extremes
Water scarcity and floods

Risk to society
Poor people live in most vulnerable areas

Altered ecosystems
Overexploitation of marine fish stocks

Urgent, critical challenge for the global community

Image: http://treasury.worldbank.org
This report states:

Despite improvement, critical data for development policymaking are still lacking

«Large data gaps remain in several development areas. Poor data quality, lack of timely data and availability of disaggregated data on important dimensions are among the major challenges. As a result, many national and local governments continue to rely on outdated data or data of insufficient quality to make planning and decisions. »
Why do we need to monitor?

Measure what we treasure: sustainable data for sustainable development

«Strengthening data production and the use of better data in policy-making and monitoring are becoming increasingly recognized as fundamental means for development»
'values’ are not enough...

« key aspects for wise decisions »

Understand the situation and timely react
Understanding by integrating multiple data sources and types

- Physical maps
- Satellite observations
- In-situ observations
- Socio-economic indicators
- Sectorial statistics
- Political maps
- Properties and population registers
Satellites and in-situ

Andreas Veispak, head of unit for space data for societal challenges and growth at the European commission. (source: talk at FOSS4G 2016)

Non-conventional sensors

- Data gaps exist in low-income economies due to existing barriers on:
  - Hardware & software costs
  - Missing local support
  - Inadequate integration among projects

~ 10’000 €
Sharing and capitalizing experiences

IWMI
Open meteo stations

4ONSE
Open Data for Resilience Initiative
The GFDRR challenge fund in Sri Lanka

**Challenge Fund 2015 Winners**

- **Building resilience to drought in the Sahel by early risk identification and advices**
- **Flying sensors for ultra-high resolution flood risk identification and local scales**
- **Assessing and reducing flood hazards in global cities through participatory terrain data and modeling**
- **Piloting and crowdsourcing enhancement for multi-hazard mobile applications**
- **Open source mobile weather stations: reducing flood damages and increasing preparedness of communities**
- **Real-time urban flood risk management and open source access decision support tool**
- **Mali, Niger, Burkina Faso**
- **Tanzania, Mozambique**
- **Myanmar, Philippines, Indonesia**
- **Sri Lanka**
- **Forecasting communication to action: Enabling institutions to manage storm surge risks**
- **Using VISUS for earthquake school safety in Indonesia**
- **Flood risk identification and visualization using Twitter**

**Regional or Geographically Dispersed Proposals**

- **Development of open source, real-time, probabilistic drought risk visualization through Pacific Island Meteorological Services**
  - **Location**: Pacific Islands
- **Multi-lingual and multi-platform films for resilience to risks from volcanic hazards**
  - **Location**: East Caribbean, Democratic Republic of the Congo, and the South Pacific
- **Embracing local information and local users in the global flood awareness system through co-producing a learning framework**
  - **Location**: Regional Africa Focus
- **Development of Web Map Services**
  - **Location**: West African Region
- **Providing local risk knowledge to strengthen effective action in building community resilience**
  - **Location**: Cambodia, Cameroon, India, Indonesia, Kenya, Nepal, Nigeria, the Philippines, Senegal, and Uganda
Give time to reservoir managers

- When the rain falls upstream
  - When it is too much
  - If the reservoir is too full already
  - Then it should be emptied before run-off arrives

- Time is of the essence
  - 4-8 hours before incoming peak
  - Real time info gives time to managers
  - Emergency flush of a portion of the storage
  - Saves crops, houses, sometimes lives
SMS reception from the station
Happy Building with Lahiru!
Athuruwilla Irrigation Field Office

Approximate cost ~ 300 USD
Capitalizing experiences: from GFDRR challenge to r4D project

- From 5 to 30 stations in Malwatu Oya basin
- Densify and extend the warning capacity
- Expand information to internet with istSOS
- Starting now!
Yann Chemin, International Water Management Institute, teaches participants how to build a mobile weather station during a Focus Day workshop.

**Organization:** International Water Management Institute & GFDRR

**Session Lead**

- Dr. Yann Chemin

**Description**

A growing number of national agencies, research institutions and development implementation agencies are adopting the use of open source hardware (OSS) and software (FOSS) to meet their requirements in various sectors. This session aimed to look at climate monitoring and early warning from this perspective. With OSS and FOSS Commodity Off The Shelf (COTS), it is now simple and cost efficient, to locally build & maintain weather stations, set them up in a gridded sensor network, and interconnect them through Internet.

Existing Open Standards permit the interoperable connection of sensors, not only in registering stations and observations but also in accessing and distributing measurements and information, at the same time maintaining independent sending SMS alerts to proximal key community stakeholders. This is but one of the many different possibilities that can be organised through the use of COTS and with the Global Open Source and Maker Lab communities.

The session looked at different solutions being implemented to provide first hand experience in the technologies needed to solve local problems by building skills locally, and providing COTS locally. There is tremendous capacity and many of the solutions are already having local building blocks to be discovered within the country where the issue needs to be resolved.
4ONSE

4 times Open

Non-coventional monitoring system for Sensing the Environment
r4d: research for development

« Research supports the management of risks in the global economy, environment and society. The r4d programme of the Swiss Agency for Development and Cooperation and the Swiss National Science Foundation finances research partnerships between Switzerland and African, Asian and Latin American countries in order to provide policy-makers with scientific and development-relevant knowledge. »
Consortium
MAIN RESEARCH QUESTIONS

- Is a 4ONSE system a viable solution to monitor local phenomena in a sustainable and effective way?
- Does it solve issues found in literature on: data quality, metadata accessibility and interoperability?

METHOD

- Integrate and further develop the available technologies
- Deploy an experimental monitoring system composed of about 30 stations (SL) + testing sites (PK, ID, CH, others..)
- Analyses in term of: (i) data quality; (ii) system durability; (iii) management costs; (iv) performances; (v) sustainability.
- Verify its application in some real cases
4ONSE system
Case study

Malwathu Oya Basin
- **Malwathu Oya**
  (Malwathu Oya – Aruvi Aru)
- 166 kms
- 2\textsuperscript{nd} Largest Basin in Sri Lanka
- Covers 3284 Sq km
- Uses - Mainly Agriculture and Domestic Water
  Some industrial
- Clay /Sand mining for building industry
- Trans Basin diversion from Kala Oya
- Main Cities - Anuradhapura, Mannar
# Project plan

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Kick-off meeting
istSOS challenges

1. Decoupling service from data repository

2. Big data support

3. Integrating CKAN for reporting generation and sharing
Open data

A recognized pre-requisite to inclusiveness and innovation

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Open data for resilience initiative @ GFDRR

Resources

At OpenDRI we are committed to increasing information that can empower individuals and their governments to reduce risk to natural hazards and climate change in their communities. We’ve compiled a database of relevant resources to share what we have learned through our own projects and from the work of others.

VIEW ALL RESOURCES
What’s next?

Share knowledge in an open community to advance in this topic and impact the real world by supporting the actions to increase the resilience.

Join us!

«Build your non-conventional meteo station»

Workshop in Trento [late Nov. / early Dec]