

Understanding Disaster Risk with Open Data

Saturday, March 6 14:00 – 14:45 GMT

An Open Data Day webinar



ODRI Open Data for
Resilience Initiative

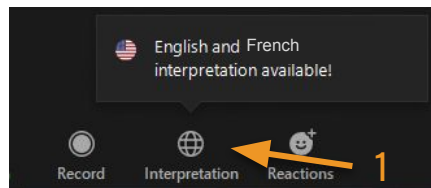


Photo by Aziz Kountche

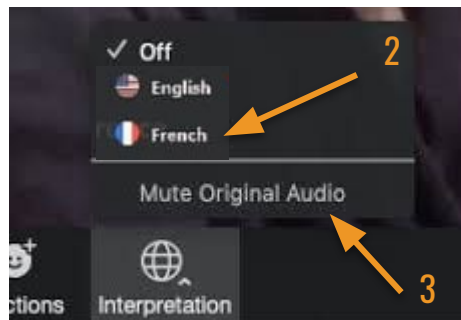
Interprétation en français

1. Cliquez sur le bouton d'interprétation

Ordinateur

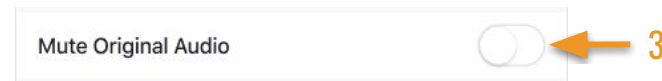
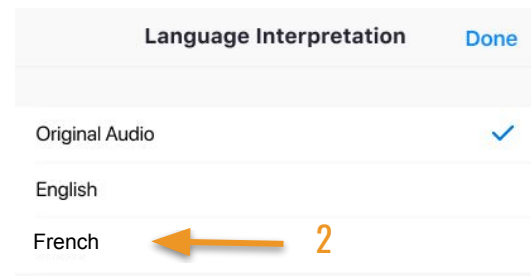
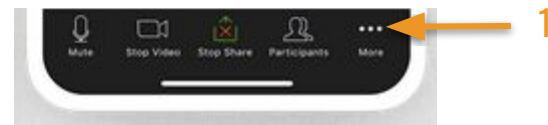


2. Cliquez sur "French"



3. Si cela vous intéresse : Coupez le son de la salle principale afin de n'entendre que l'interprétation en français. Si vous ne coupez pas le son, vous entendrez à la fois l'orateur et l'interprète.

Mobile



Speakers



Grace Doherty

Disaster Risk Management
Consultant, GFDRR

@DohertyGrace



Pierre Chrzanowski

Disaster Risk Management
Specialist, GFDRR

@pzwsk



Mattia Amadio

Disaster Risk Management
Consultant, GFDRR



What is disaster risk?



The **potential** loss of life, injury, or destroyed or damaged assets (...) as a function of **hazard**, **exposure**, **vulnerability** and **capacity**.

Source: UNITED NATIONS OFFICE FOR DISASTER RISK REDUCTION (UNDRR)

Who works on disaster risk?

A collaborative effort of global and local communities



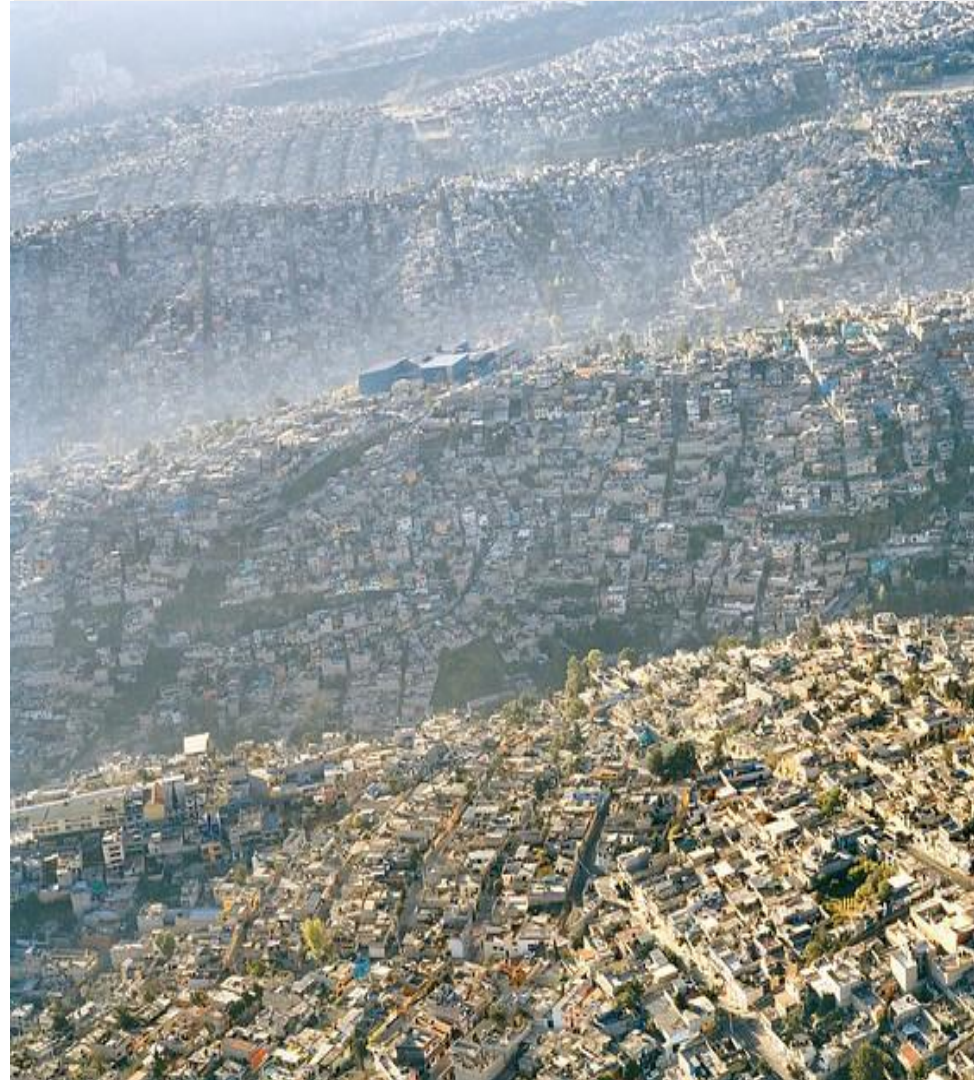
You?

Open disaster risk data?

Open data on **hazards** past and future



Open data
on **exposure**
of population and
infrastructures



Open data
on **vulnerability**
of population and
infrastructure



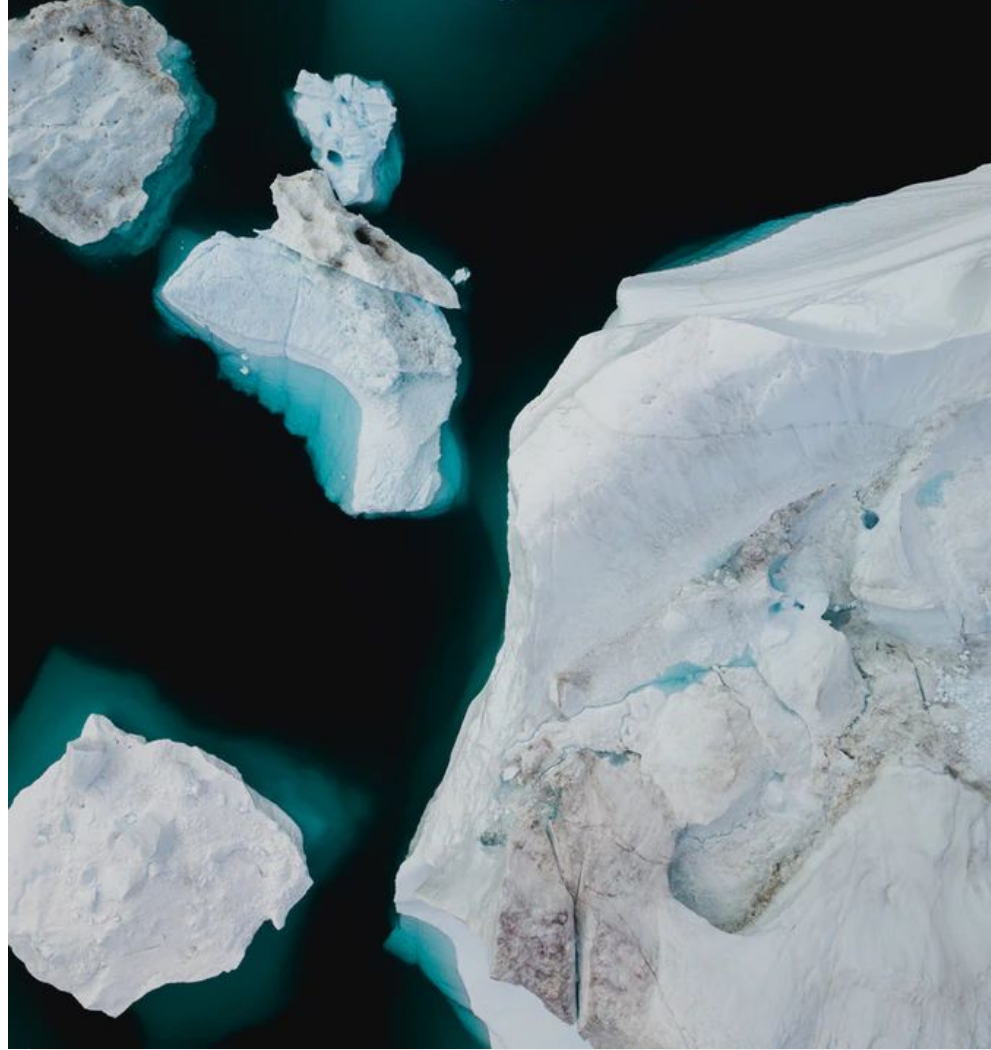
Open data
on **capacity**

to prepare,
mitigate and
respond



Open data on
climate change

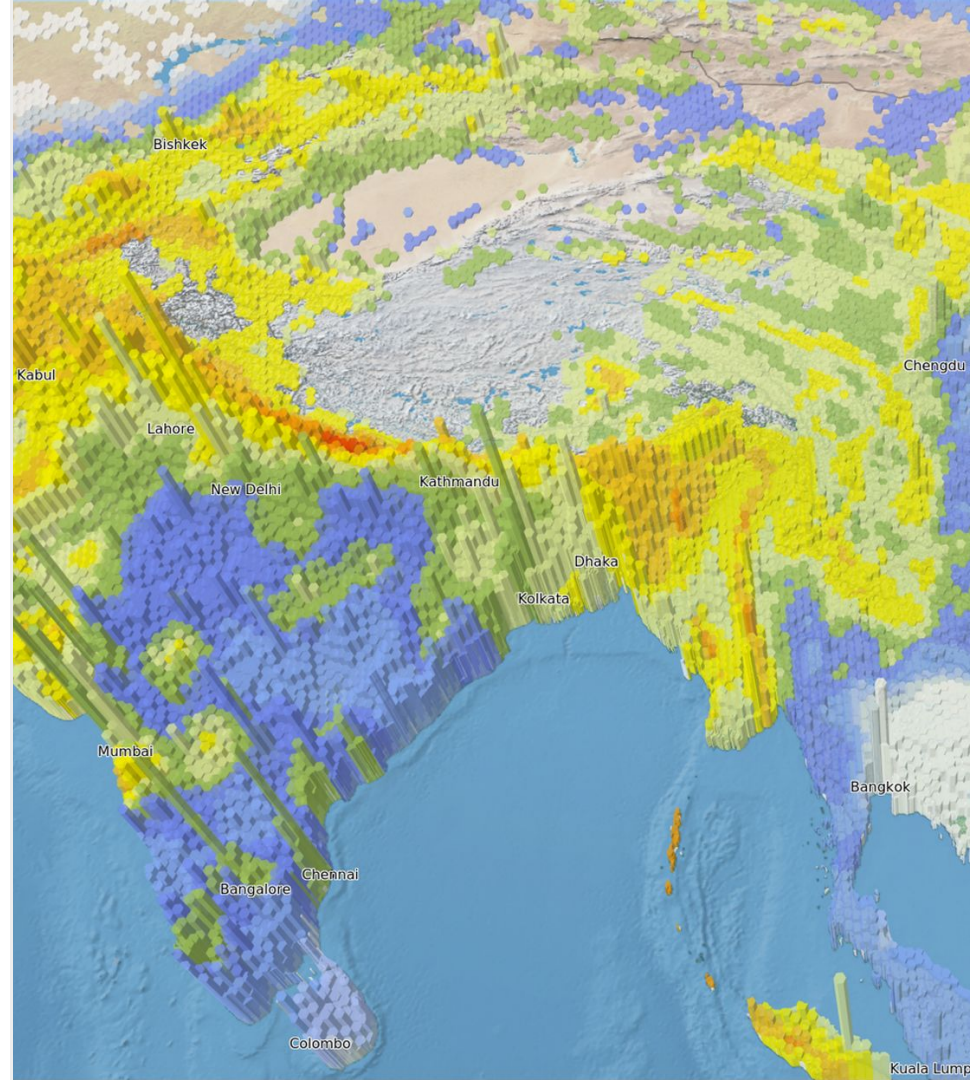
and its impact on
disaster risk



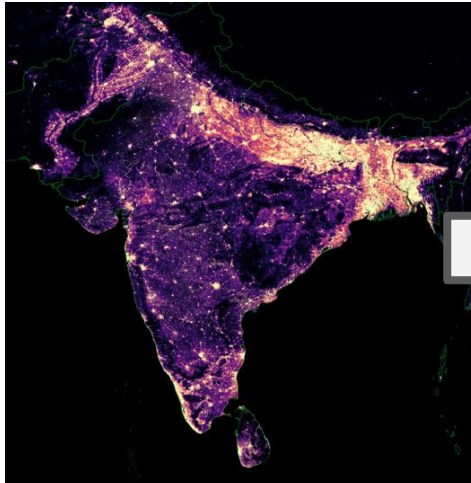
How to understand risk with data?

Open data into
Risk models

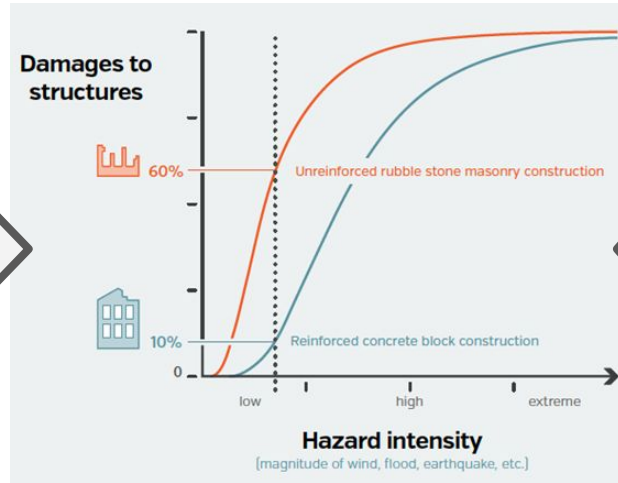
to obtain
loss-probability
estimates



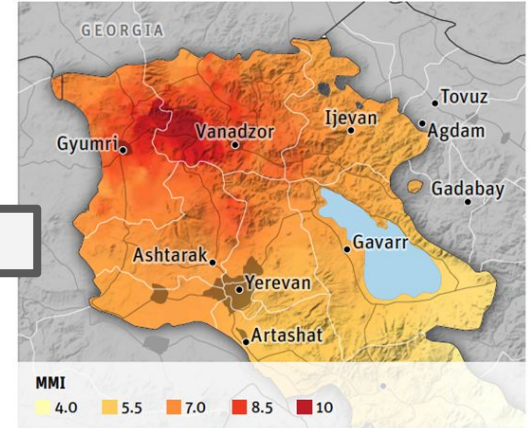
Risk Assessment Framework



Exposure

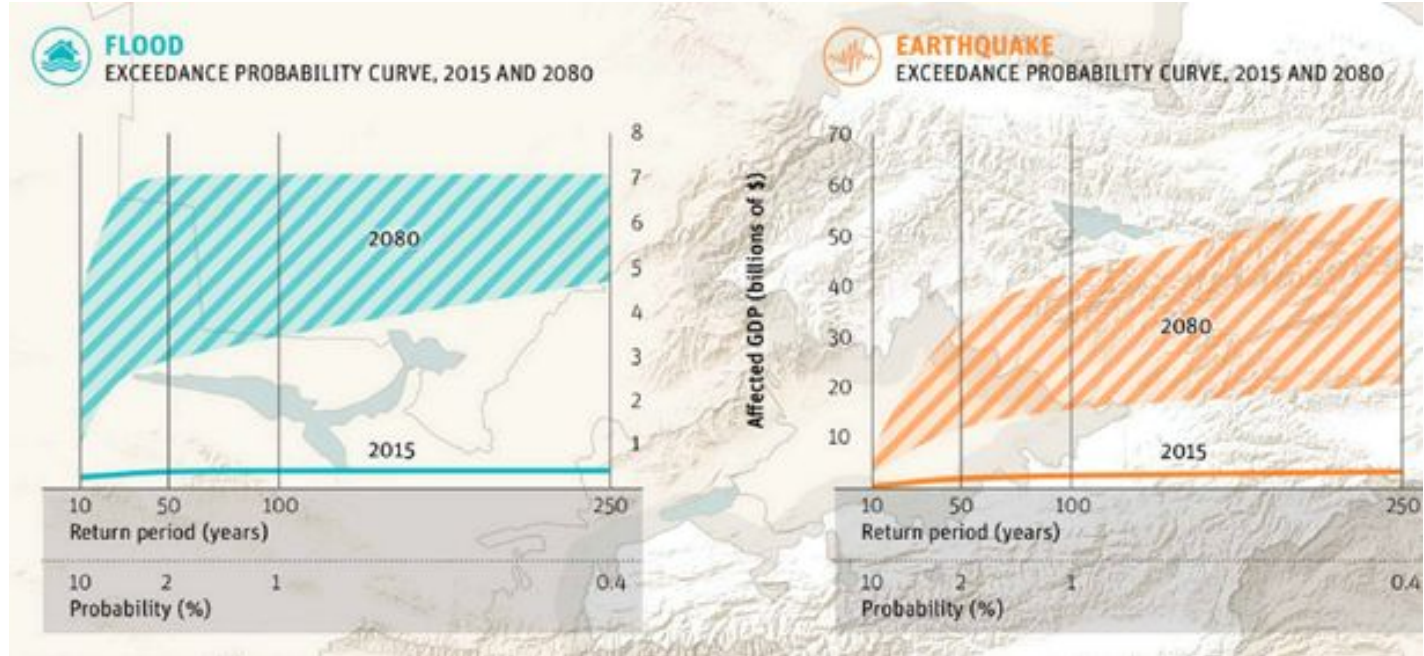


Vulnerability/
Capacity



Hazard

Risk Assessment Framework



$$\text{Risk} = \text{Loss} \times \text{Probability}$$

Tools, methodologies and risk data sources

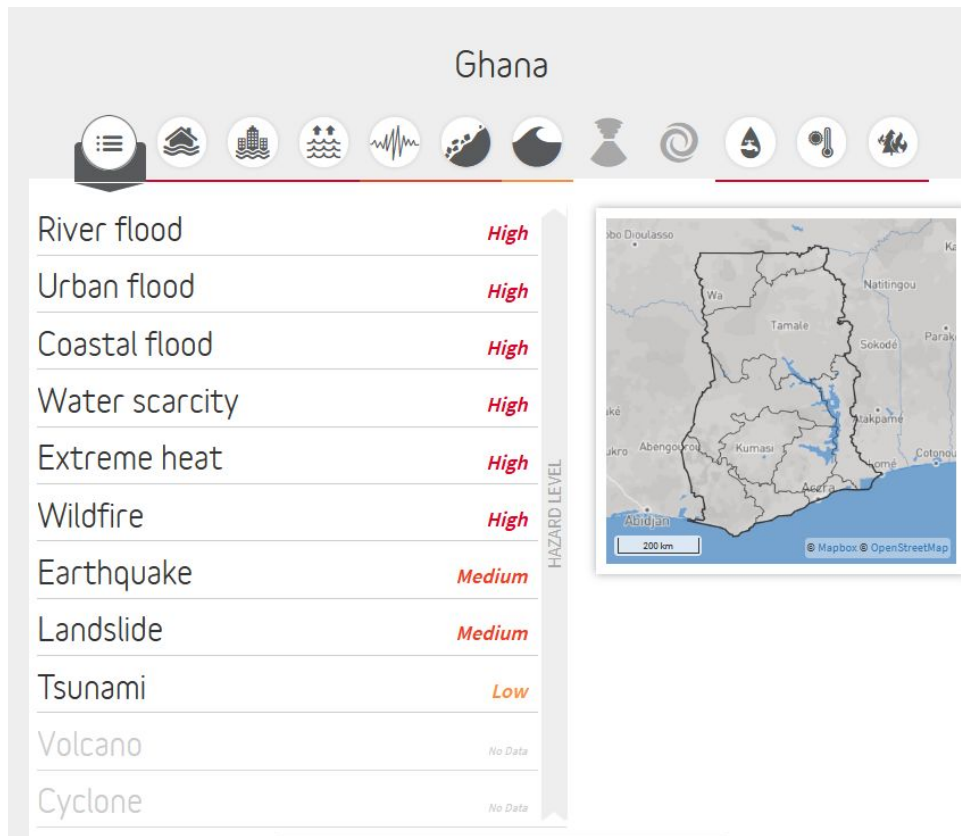
ThinkHazard.org

ranking of natural hazards

Global coverage

ThinkHazard!


Identify natural hazards in your project area
and understand how to reduce their impact




GFDRR GeoNode

improving access to
hazard data

Global coverage



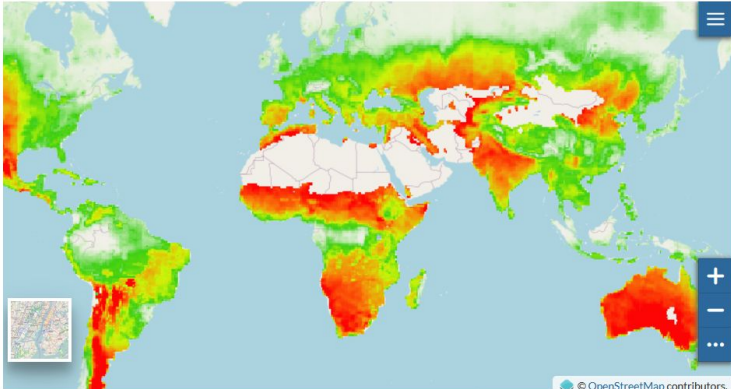


Dato ▾

Mappe

A proposito ▾

WF-GLOBAL-CSIRO-10



Informazioni

Attributi

Condividi

Valutazioni

Commenti

Preferito

Titolo

WF-GLOBAL-CSIRO-10

Licenza

Not Specified ⓘ

Abstract

The approach to classify wildfire hazard levels used is based solely on fire weather index climatology. Fire weather indices are used in many countries to assess both the onset of conditions that will allow fires to spread, as well as the likelihood of fire at any point in the landscape. The method presented uses statistical modelling (extreme value analysis) of a 30 year fire weather climatology to assess the predicted fire weather intensity for specific return period intervals. These in...

Publication Data

Venerdì 02 Giugno 2017 13:54

Tipo

Raster Data

Parole chiave

csiro_wf_max_fwi_rp10, GeoTIFF, WCS

Categoria

Geoscientific Information ⓘ

Regioni

Global

Index.OpenDRI.org

tracking open data for resilience

Global coverage



Open Data for Resilience Index

ST. LUCIA

■ Open Data 6 ■ Restricted 2 ■ Closed 18 ■ Missing 14

Free to access, use and share Technical, legal or cost restrictions Access not permitted or does not exist No information provided for the dataset

Show: Submitted, Not submitted, All

Search for a dataset name

Dataset

Open data criteria

Administrative boundaries

ST LUCIA DISTRICTS CENTRAL STATISTICAL OFFICE, SAINT LUCIA
16/09/2017



Buildings

ST LUCIA BUILDINGS CHARIM
11/04/2016



Flood hazard maps

ST LUCIA FLOOD SUSCEPTIBILITY MAP CHARIM
11/04/2016



Population

SAINT LUCIA POPULATION AND SETTLEMENTS CHARIM
April 26, 2016



Critical infrastructure

ST LUCIA SCHOOLS CHARIM
11/04/2016



ST LUCIA HEALTH_CENTERS CHARIM
11/04/2016



Critical Infrastructure (Power)



Critical Infrastructure (Education)



Digital elevation model



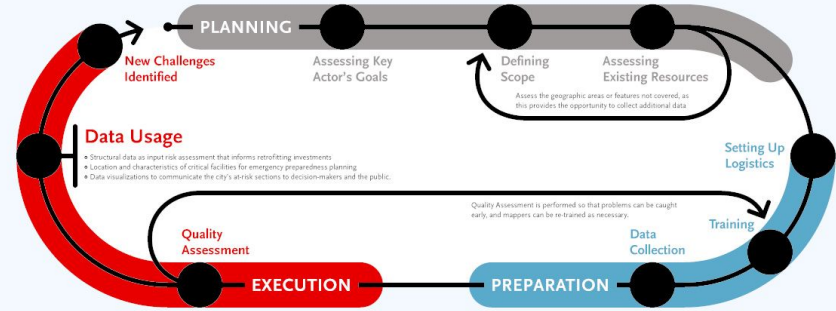
Open Cities

mapping to build skills and resilience of communities

Neighborhoods, cities, & islands

Open Cities Process Diagram

Designing and executing Open Cities projects is a complex task that involves a great deal of coordination with partners, technical and scientific work, team and volunteer coordination and management, and logistical work. While the format of this book necessarily presents these steps as linear, in practice these tasks are ongoing, iterative, and happening in parallel.



Building the Ecosystem

Each part of an Open Cities project offers opportunities for involving new participants, demonstrating the value of open data, and supporting the growth of the networks organizations and individuals who can continue to

update the data or champion the work after the project itself is complete. Finding ways to build the ecosystem of data contributors and users involved in an Open Cities project is key to long-term sustainability and impact.



Machine Learning

advancing data for
understanding risk

All scales

ML IN THE REAL WORLD

Since disasters often affect poor and vulnerable areas most significantly, it's imperative to use the technology we have to protect those areas. For example:

Guatemala: Earthquake Vulnerability

In 1976, an earthquake decimated the Guatemalan town of Los Amates, causing:



23,000 deaths



Economic damage
estimated at nearly 20% of
the country's GDP



76,000 injuries

Hurricanes, volcanic activity, landslides, and other disasters have continued to hit Guatemala in the years since, raising questions about how the country can better prepare for hazards.



THE CHALLENGE

In areas of high seismic activity, identifying high-risk buildings can help prioritize retrofitting investments and, most importantly, save lives.



However, sending large teams of surveyors into the field is time-consuming and expensive.

Pre-made interactive notebooks for facilitated risk analysis

DEMO: <http://bit.ly/gfdrr-pytools>

2. Flooded population

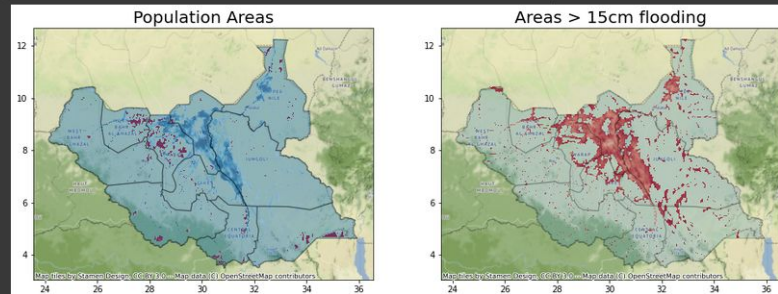
Set an hazard threshold and measure the number of population within hazard extent, then summarise at ADM level.

```
[ ] masked_pop = np.ma.masked_where(pop_data == 0, pop_data)
```

Show population distribution

```
[ ] fig, (ax1, ax2) = plt.subplots(1, 2, figsize=(16, 10))
ax1 = plot_affected_area(adm1, col=None, ax=ax1, title='Population Areas', cmap=None, alpha=0.4)
ax1 = show(flood_mask, ax=ax1, alpha=0.6, transform=flood_transform,
           cmap='Blues', vmin=0.1, vmax=2)
ax1 = show(masked_pop, ax=ax1, transform=pop_transform, cmap='coolwarm_r');

ax2 = plot_affected_area(adm1, col=None, ax=ax2, title='Areas > 15cm flooding', cmap=None, alpha=0.2)
ax2 = show(flood_mask, ax=ax2, transform=flood_transform,
           cmap='coolwarm_r')
```



Estimate population within hazard extent and plot as map

```
[ ] # Get populated areas that experienced > 15cm of flooding
pop_fd = np.ma.masked_where(np.ma.getmask(flood_mask), masked_pop)
```

Summary for ADM1 level - zonal statistics

```
[ ] # Get total population in each administrative area
stat = "sum"
adm1_stats = collect_stats(pop_profile, adm1, pop_fd, stats=stat, colname='ADM1_PCODE')
```

```
[ ] res_df1 = convert_stats_to_df(adm1_stats, 'population_'+stat, stat)
```

```
[ ] # Relative normalization: 0 to 1 (i.e., 1 is populated area most affected by flood)
res_df1 = (res_df1 / res_df1.max())
```

```
[ ] pop_flood_adm1 = adm1.join(res_df1, on='ADM1_PCODE')
```

```
[ ] ax = plot_affected_area(pop_flood_adm1, 'population_'+stat, title="Flood affected population (ADM1)", alpha=0.4);
```

**What about disaster risk in your
country or city?**

Thank you for joining!

contact:
opendri@gfdr.org

gfdr.org
and
opendri.org



GFDRR

Global Facility for Disaster Reduction and Recovery

OPEN
DRI

Open Data for
Resilience Initiative

Find our tools at:

Think Hazard!
thinkhazard.org

Risk Data Library
riskdatalibrary.org

OpenDRI Index
index.opendri.org

GeoNode
www.geonode-gfdr.org

Guidance Note: Machine Learning for
Disaster Risk Management
<https://opendri.org/resource/machine-learning-for-disaster-risk-management/>

Guide: Planning an Open Cities Mapping
Project
<http://gfdr.github.io/community-mapping/>

Notebook demo:
<https://github.com/GFDRR/rdl-pyTools>