

DIGITAL EARTH FOR RESILIENCE

A WORLD BANK GLOBAL PROGRAM TO SUPPORT THE NEW GENERATION OF EARTH OBSERVATION FOR RESILIENCE



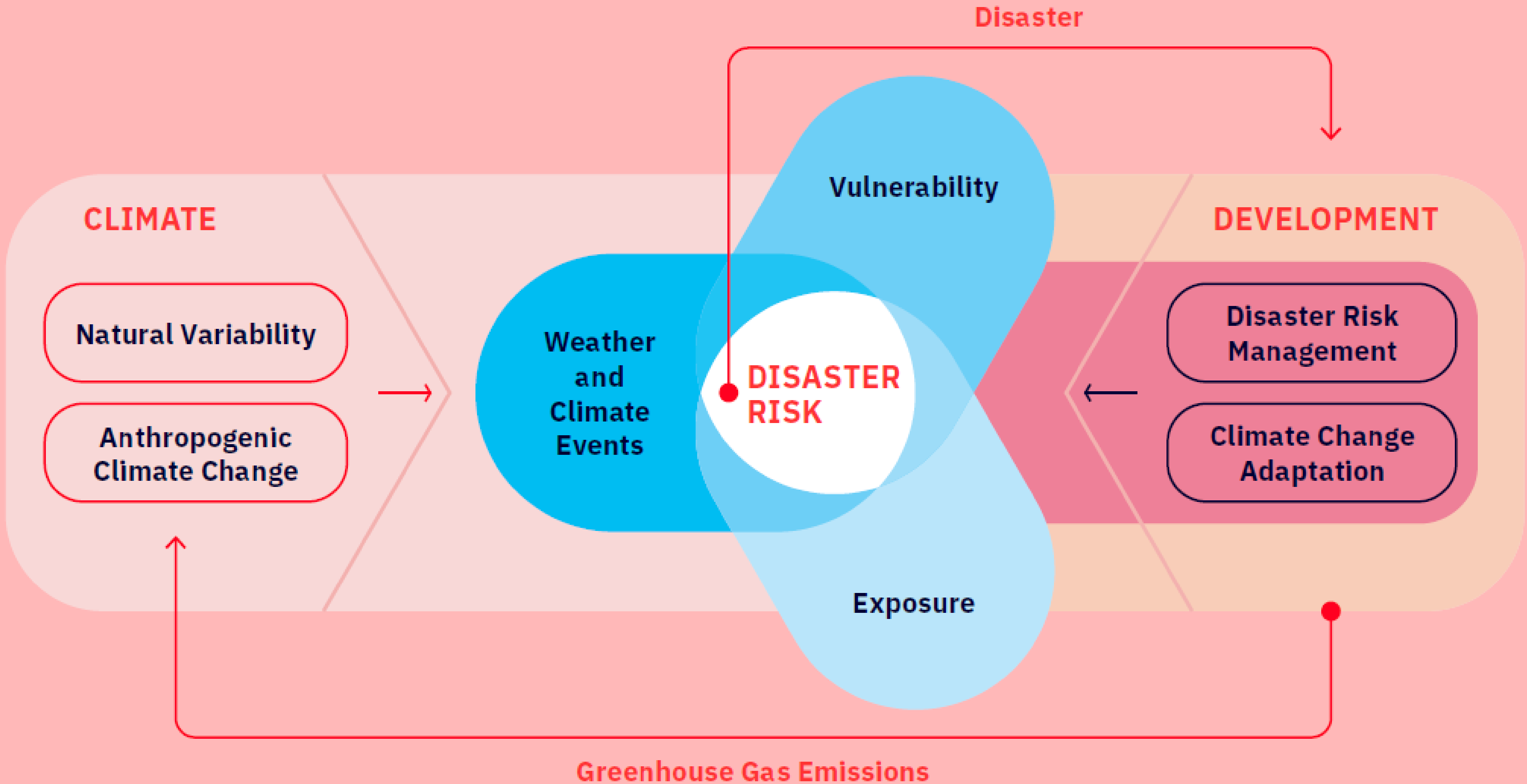
EAST GIS Conference, November 30, 2023

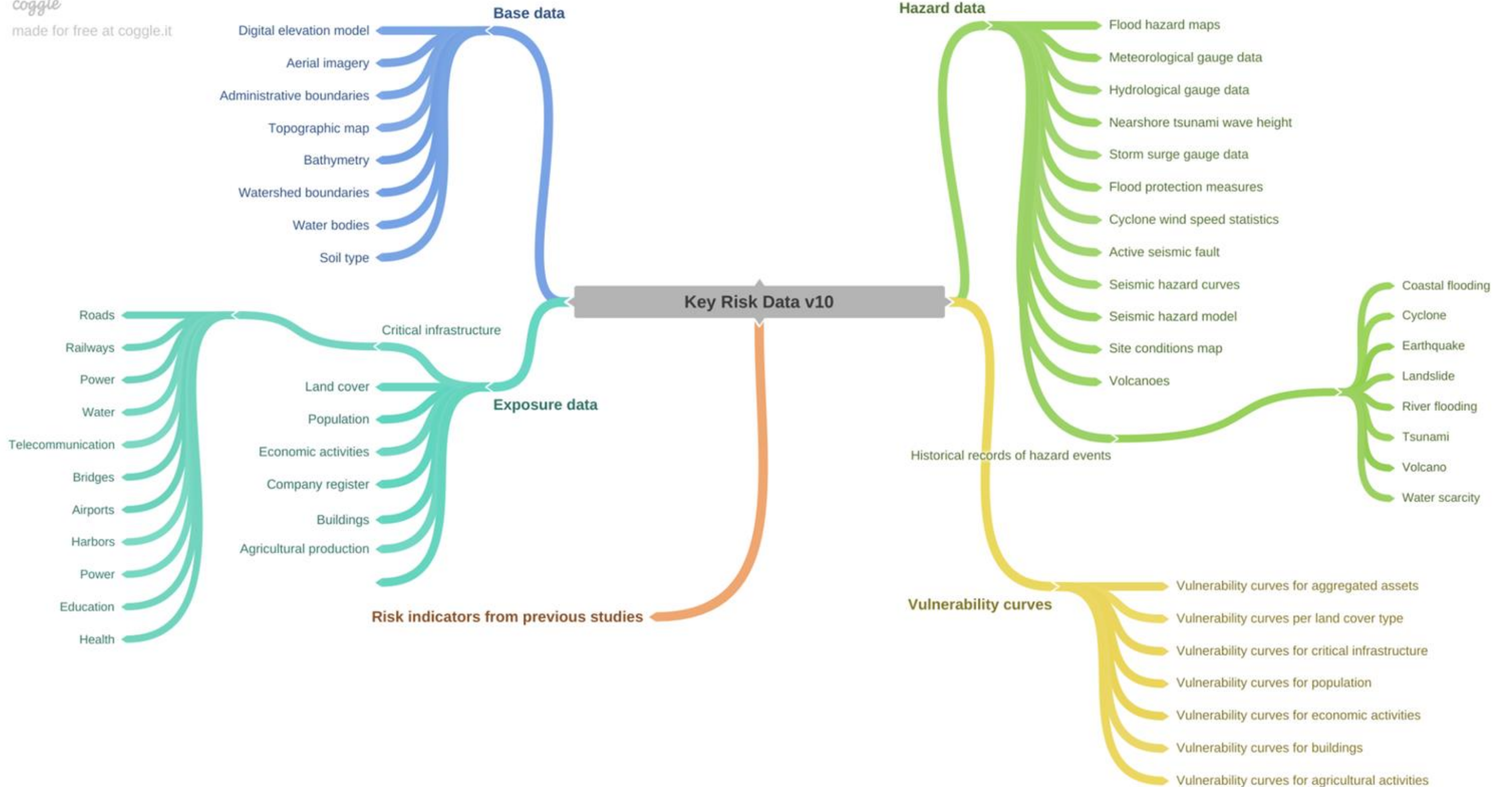
Pierre Chrzanowski | pchrzanowski@worldbank.org



WHAT IS RESILIENCE DATA?





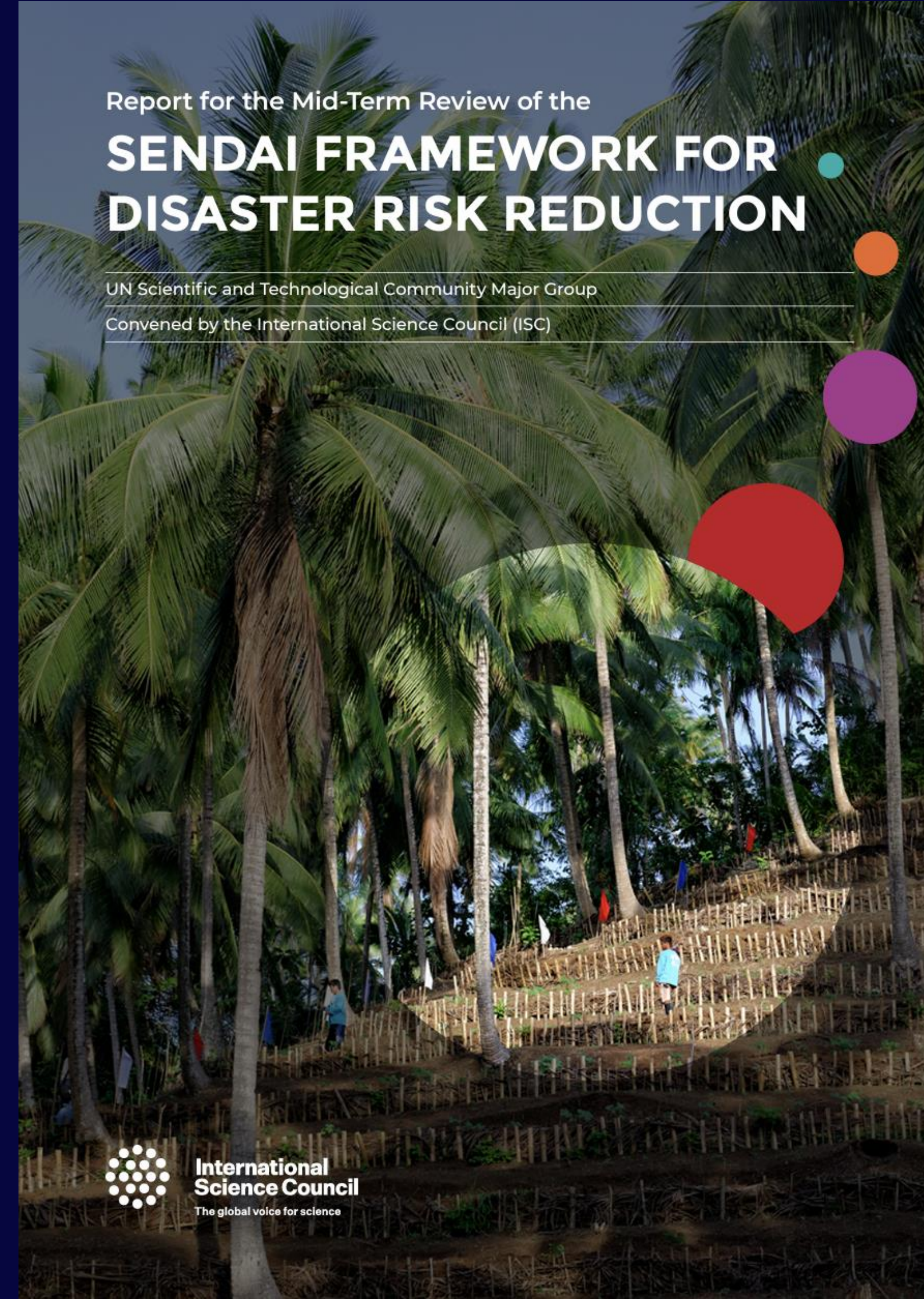


SENDAI FRAMEWORK MID-TERM REVIEW

“With advances in computing power, data availability and use of artificial intelligence, a priority is the **circulation and interoperability of data and risk information across domains and data systems.**”

“Investment is required in training and education for **entities beyond those traditionally or commonly mandated to lead disaster risk reduction.**”

“The production of data and risk assessment that **promotes participation and leadership of women, girls and persons with disabilities is a priority.**”



Report for the Mid-Term Review of the

SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION

UN Scientific and Technological Community Major Group

Convened by the International Science Council (ISC)



International
Science Council
The global voice for science



The

DIGITAL EARTH PARTNERSHIP

The Digital Earth Partnership aims to enhance the resilience of vulnerable countries and communities to climate change and natural hazard disasters through **greater access to and adoption of frontier earth observation tools & services.**

A NEW PROGRAM WITH A DUAL LEGACY



GFDRR Innovation Labs
*A tradition of openness and
participatory approach*



WB & ESA Partnership
*Supporting the use of Earth
Observation in Development Projects*

A BLENDED APPROACH

LOCAL PARTICIPATION

- context
- calibration
- training

EARTH OBSERVATION

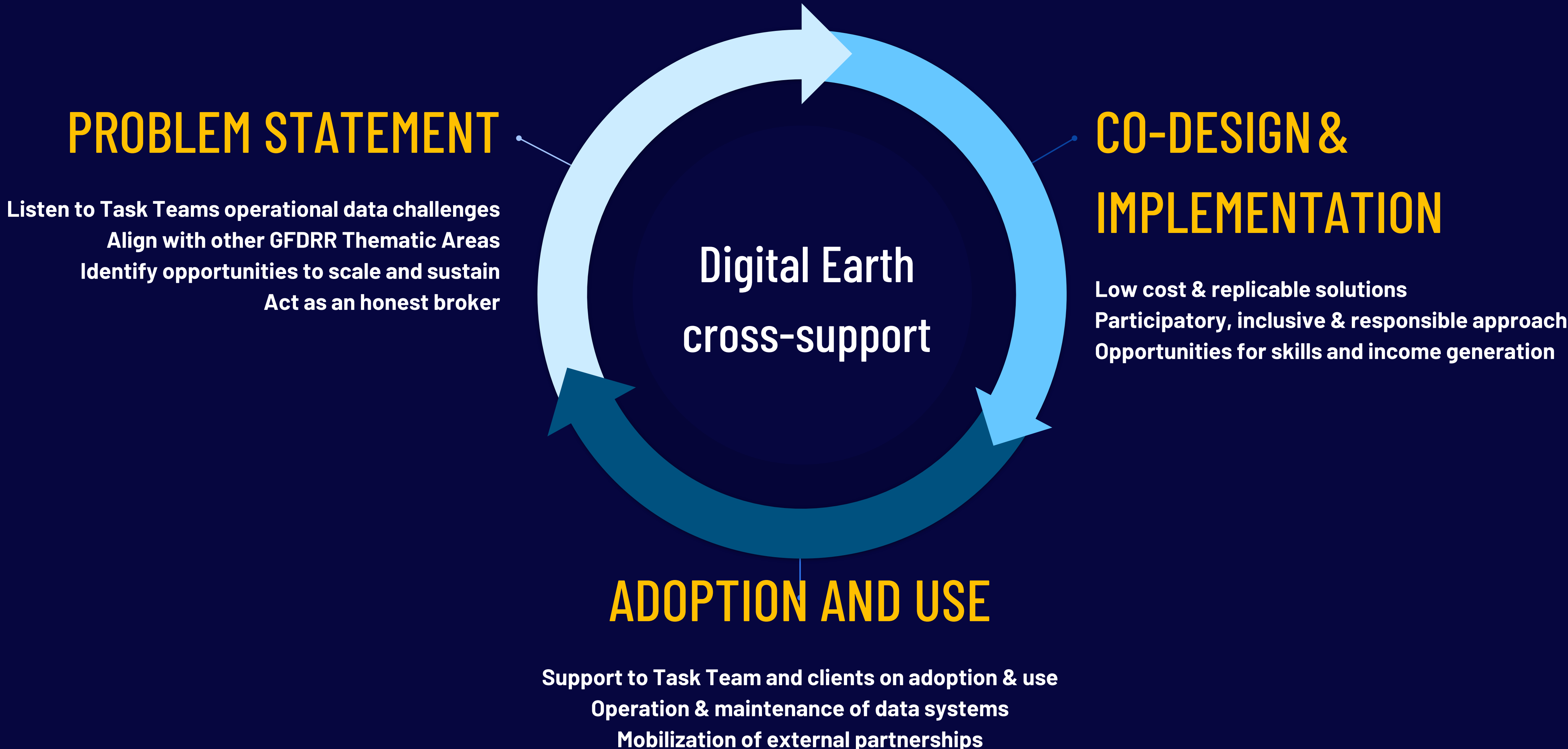
- independence
- trust
- cost effective at scale

ARTIFICIAL INTELLIGENCE

- customization
- cost reduction
- analysis potential



DIGITAL EARTH MODEL OF INTERVENTION



DIGITIZING EARTH

Satellite ●

● Drone

● Mobile data collection

● Car mounted

LOCAL PEOPLE, LOCAL DEVICES, OPEN ACCESS

✔ RESPECT ETHICAL STANDARDS

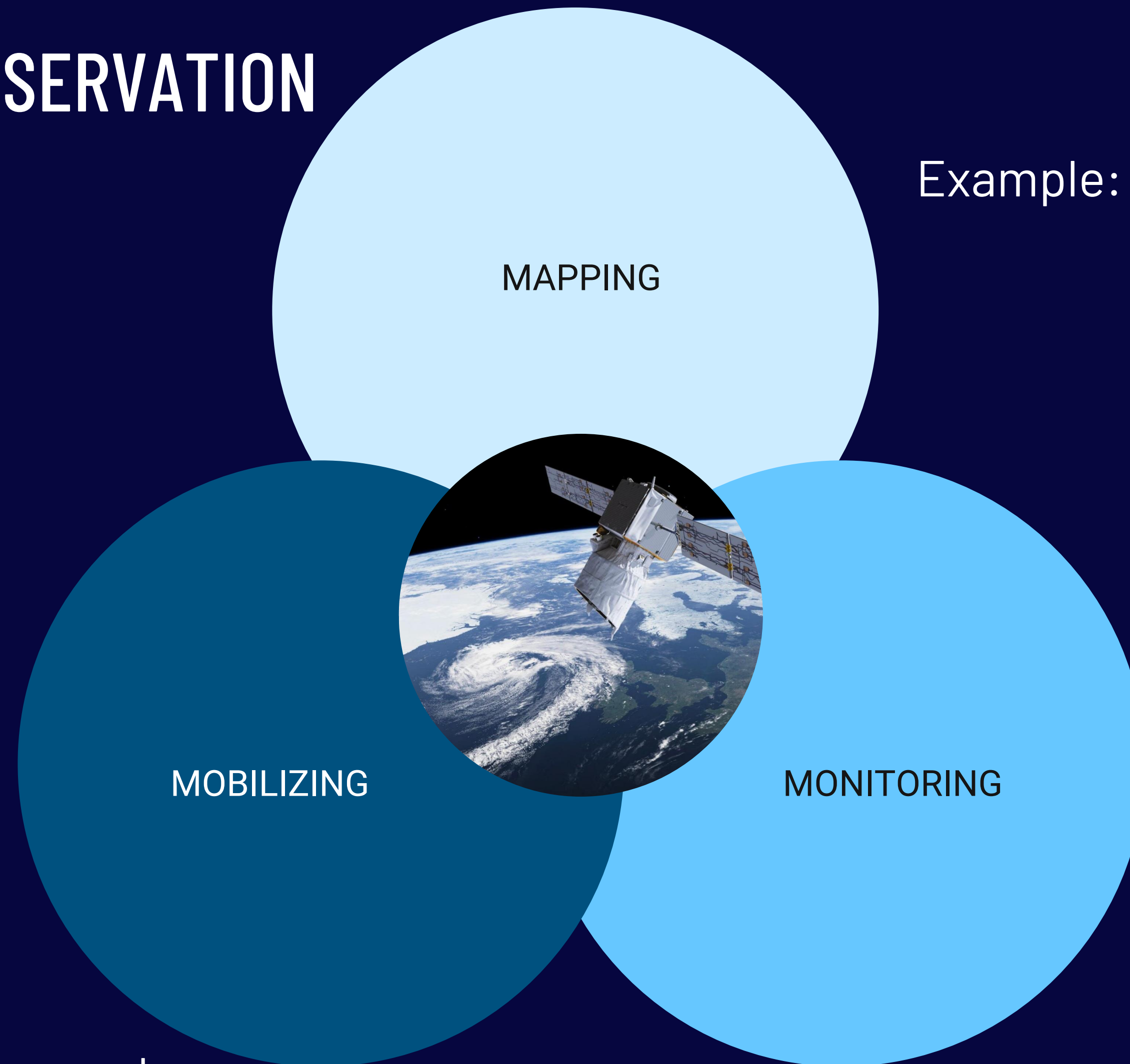
✔ FIT LOCAL CAPABILITIES



✔ ENSURE ECOSYSTEM INTEGRATION

✔ BUILD LONG TERM CAPACITY

THE 3 M OF EARTH OBSERVATION



Example: Building exposure mapping

Example: Rapid damage assessment

Example: Reforestation monitoring

Agriculture

Water Resources

Clean Energy

Marine Environment & Blue Economy

Fragility, Conflict & Security

Climate Resilience

Urban Sustainability

Disaster Resilience

GDA

Global Development Assistance

Monitoring & Evaluation





DIGITAL EARTH “PRODUCTS”



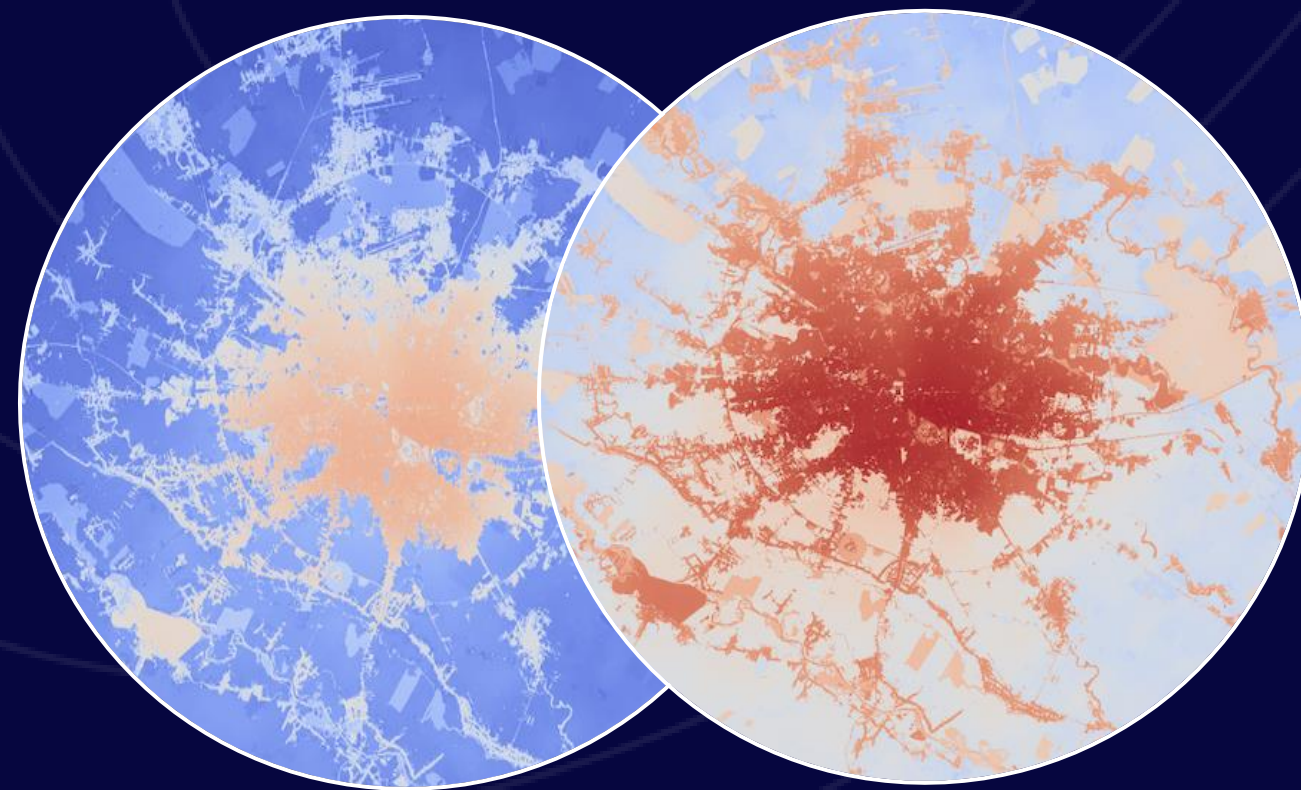
URBAN EXTREME HEAT MAPPING

In collaboration with RCP

1. BUILD EVIDENCE BASE

With remote sensing and climate modeling partners, the Digital Earth Partnership team has delivered forward-looking heat stress projections to underpin climate diagnostics in South Africa, Tunisia, Romania, Greece and Cambodia.

Bucharest: projected number of hot nights per year



Present

2041-2060

TOOLS: Climate modeling; remote sensing; cost-benefit analysis.

2. ENGAGE STAKEHOLDERS

Citizen science volunteers were mobilized across seven cities so far to conduct heat mapping using sensors fitted to motorbikes or cars, or carried by hand. Participants also used thermal imagery cameras to identify localized responses.



TOOLS: Citizen science assessment using vehicle-based, handheld and smartphone sensors.

3. IMPLEMENT ACTIONS

Workshops underpinned by the data products and citizen engagements were used to define governmental priorities on heat mitigation, underpinning responses such as the forthcoming Cape Town Heat Action Plan.



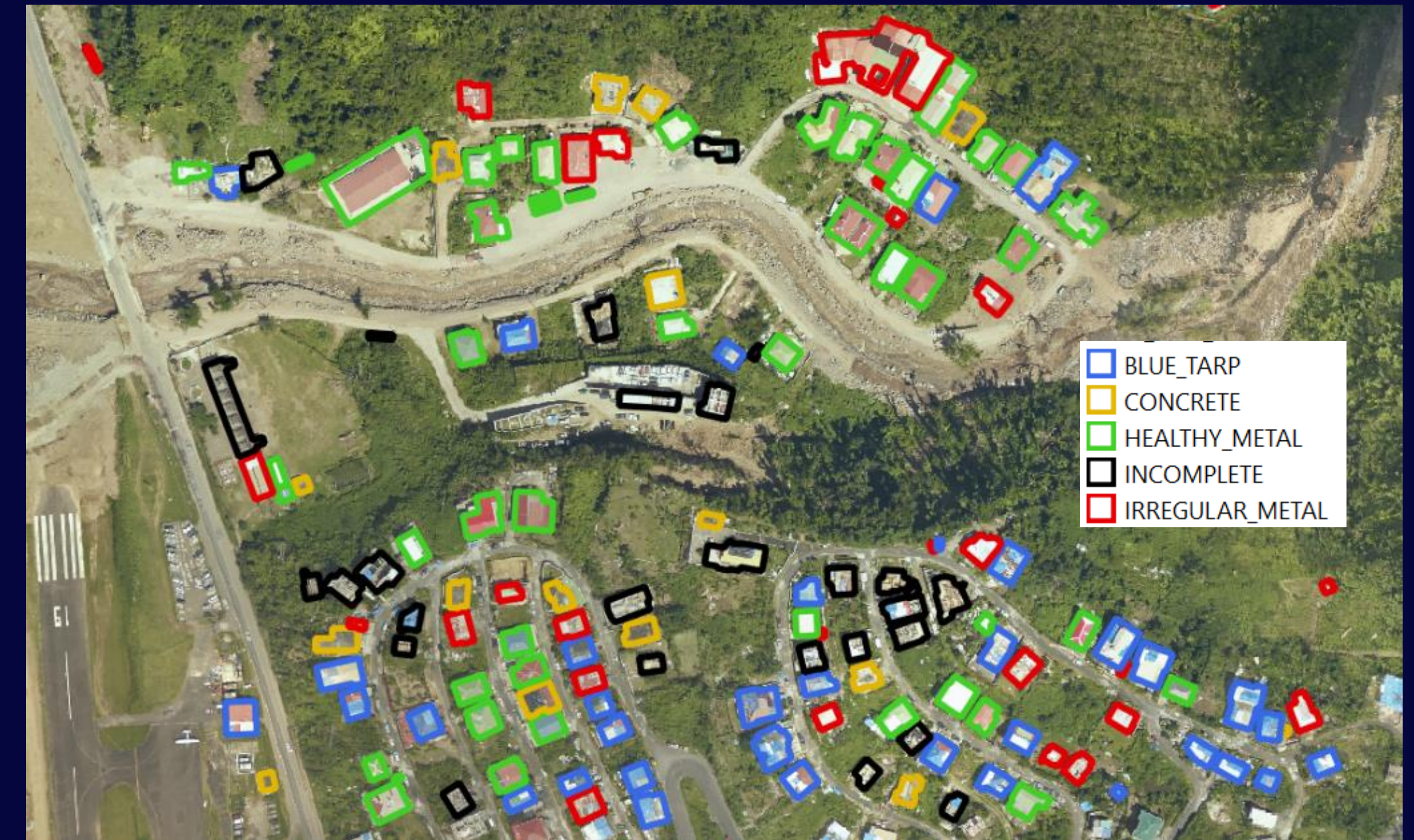
TOOLS: Multi-stakeholder planning workshops, implementation support.



BUILDING LEVEL EXPOSURE MAPPING

Drone, Street View, Participatory Mapping, AI

- Building on the work of Global Program for Resilience Housing GPRH
- Develop tools and methodologies on AI, Drones, Street View Imagery
- Generate a replicable model to generate building level exposure datasets, making use where possible of existing government datasets, and supplementing where needed



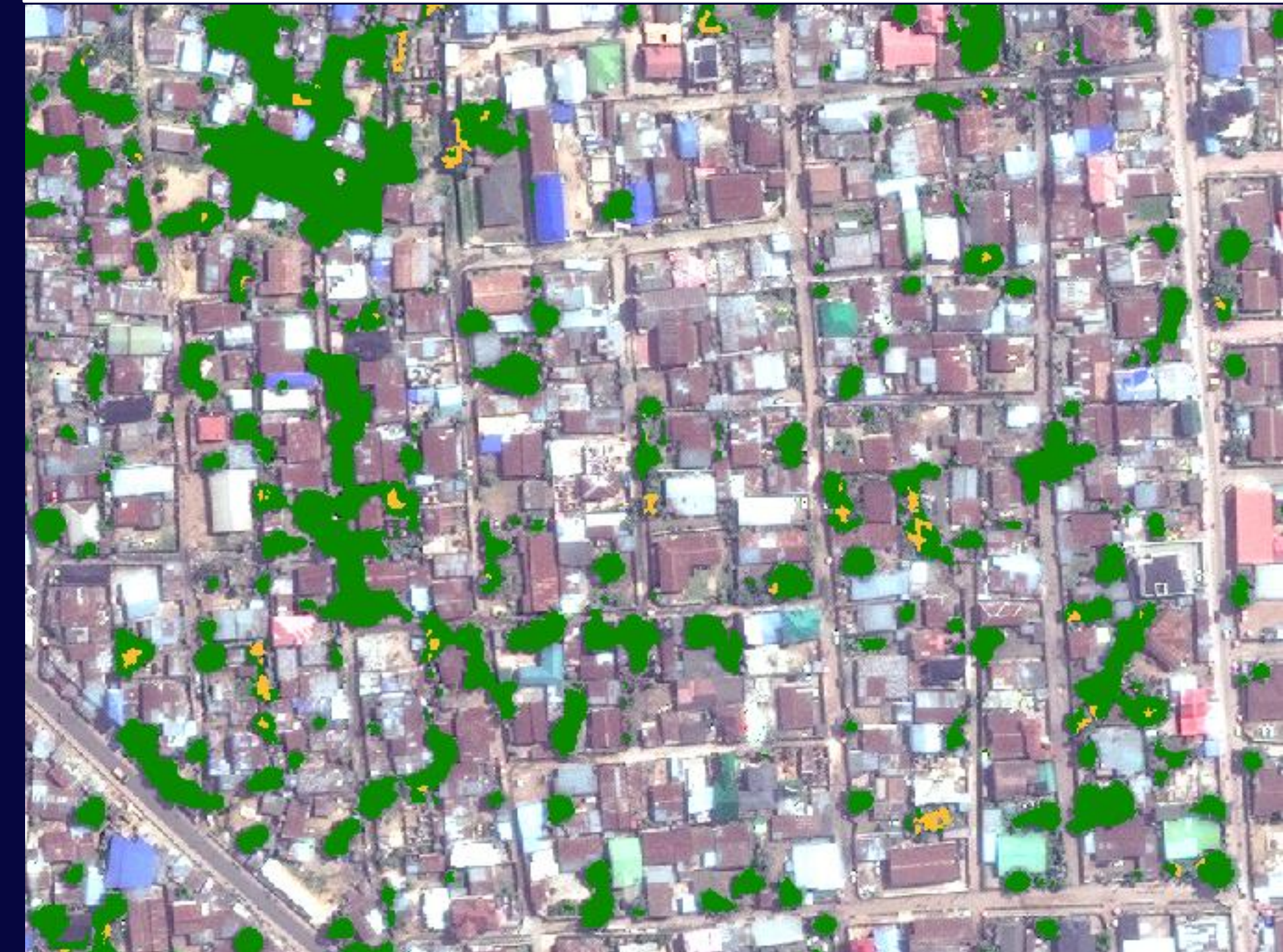


VEGETATION MAPPING

Technological approaches to support Nature Based Solutions

APPROACH:

- Using high-res imagery local mappers identified, digitized and labeled representative samples of existing urban canopy cover.
- This data was used to train a ML algorithm, to classify historic imagery, and establish a “greening” baseline.
- Tree canopy map is produced for the whole urban expanse
- Repeat as needed for change detection





DRAINAGE & SOLID WASTE MAPPING

Support to urban development operations

APPROACHES

- ① Data labeling and use of ML models to detect solid waste in Bamako
- ② Local mobile data collection to map drainage network in Tanzania and Kinshasa

Drainage to be digitized

1 Zoom to localisation

2. Toggle editing mode

3. Identify begin and point

4 fill in attributes

5 save

6 Push to cloud

7 Synchronize on QGIS

QGIS

Vous cherchez: Déchets solides

First High Resolution Solid Waste Map

covered an area of 455.9 square kilometers. MapSwipe users identified that in 32.6 square kilometers (7.1% of the entire area) solid waste has been deposited.

HeiGIT
HEIDELBERG INSTITUTE FOR GEOINFORMATION TECHNOLOGY

Author: B. Herfort, 2021
Data: MapSwipe, background map: © OpenStreetMap Contributors



RESILIENCE ACADEMY



Resilience
Academy

Resilience Academy trains young people with tools, knowledge, and skills to address the world's most pressing urban challenges and to discover solutions for resilient urban development

APPROACH:

- Accredited Class Training on local digital tools
- Mass Internship experience on local Digitization needs
- Open Access Climate and Risk Database and Analytics
- Research and Development on Data Services

FOUR ACADEMY THEMES:

1. Open Data for Resilience
2. Flood Resilience in a Changing Climate
3. Community Mapping for Improved Spatial Planning
4. Earth Observation for Resilience

IMPACT:

< 25% of typical data cost

500 student trained per year





JOBS AND SKILLS OPPORTUNITIES THROUGH DIGITAL RESILIENCE WORK

As urban populations continue to grow, managing growth in a way that fosters cities' resilience to natural hazards and climate change requires detailed, up-to-date geographic data of the urban environment.

Successful activities are contingent on local capacity to develop accurate, up-to-date information that can support real-time decision making, affect long-term policy and planning, and develop tools to translate data into meaningful action.





Public Disclosure Authorized

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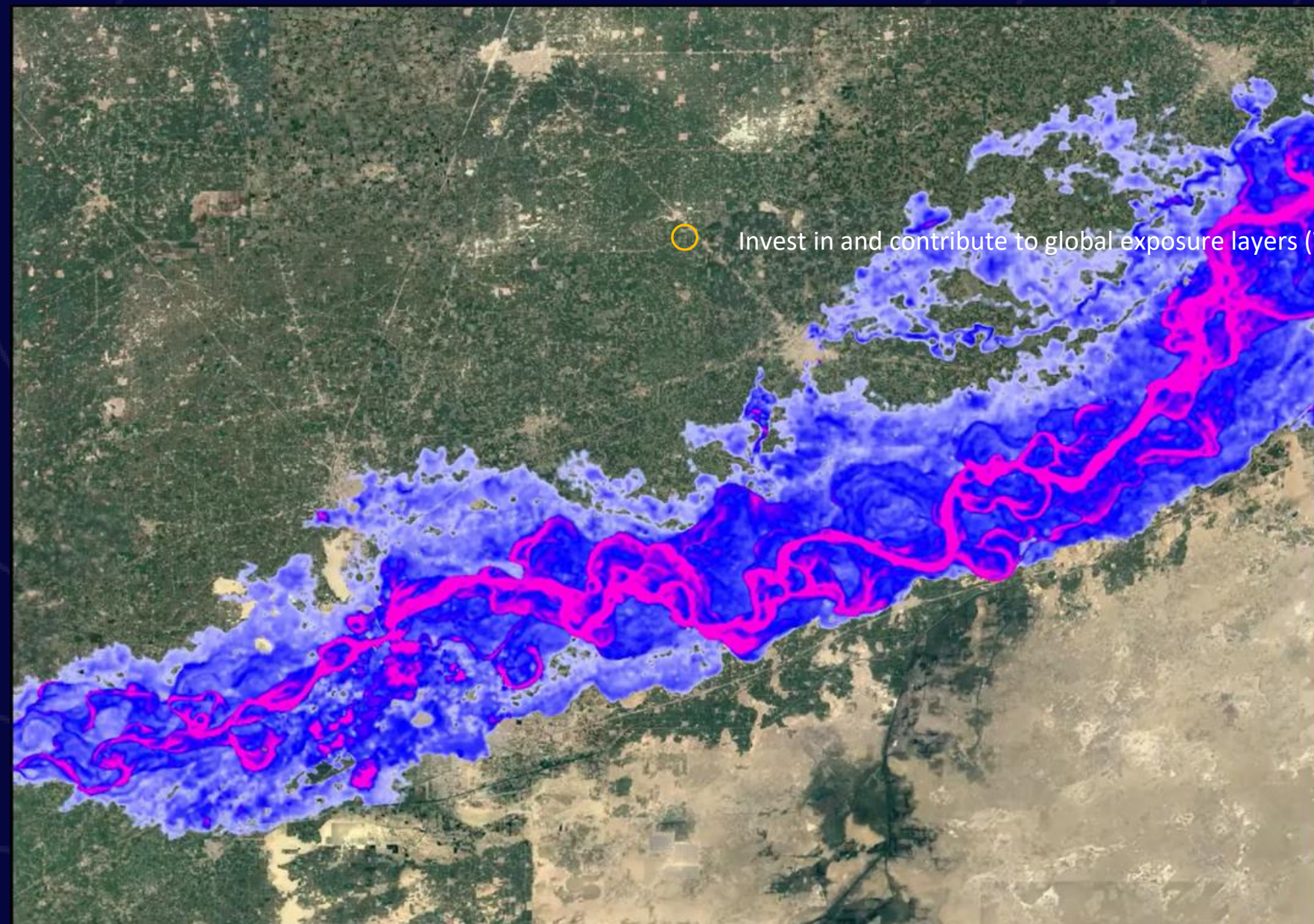
RAPID PILOT PHASE

FINAL REPORT



GLOBAL DATASETS

- Coordinate co-financing of global flood data (Fathom 3.0)



- Invest in and contribute to local validation of global exposure maps (World Settlement Footprint by DLR)



RISK DATA LIBRARY STANDARD

The Risk Data Library Standard, a suite of tools and standards for disaster and climate risk data.

The Risk Data Library Standard (RDLS) is an open data standard that provides a common description of the data used and produced in risk assessments, including **hazard, exposure, vulnerability, and damage & loss data.**

VULNERABILITY DATA

LOSS & DAMAGE DATA



EXPOSURE DATA

HAZARD DATA

Development Data Hub

Home / Search Results

Risk Data Library

54 Dataset(s)

This collection contains data on disaster and climate risk assessments curated by the Global Facility for Disaster Reduction and Recovery (GFDRR).

REFINE BY

CLEAR FILTERS

Enter Keywords...

Collections: Risk Data Library

54 results

Sort By: Most Relevant

10 Per Page

- Afghanistan buildings exposure**
Exposure of buildings in Afghanistan for different occupancy types: urban and rural structures, residential, non-residential, and industrial area. Values expressed as replacement cost (USD), area (m2), or number of elements (count).
Last Updated: Feb 24, 2023 • Classification: Official Use Only
- Madagascar extra-tropical cyclone pluvial flood hazard scenarios**
Pluvial flood hazard triggered by extra-tropical cyclones over Madagascar measured as the maximum water depth for six return periods.

Climate & Disaster Risk Screening Tools

A collection of scripted tools developed to inform risk analytics for the the World Bank's **Country Climate and Development Report** risk screening activities (2022/2023).

The tools collected in this repository allow to:

- Perform spatial analytics of disaster risk for the present period (**baseline**) based on global datasets
- Combine risk and poverty information into **bi-variate maps**
- Produce **climate risk outlook** based on CMIP6 idnices
- Present results into an interactive **dashboard**

As an example of the output produced using these tools, check some of the risk screening reports produced (2022/2023):

- Cambodia**
- Senegal**
- OECS countries**

Countries that have been covered by the risk analytics:

Completed

THE GFDRR DISASTER & CLIMATE RISK DATA FELLOWS 2023

The fellowship program offers a 6-month placement for climate and disaster risk professionals from selected climate-vulnerable countries to work with the Risk Data Library Standard to **access, create and communicate climate risk knowledge with their communities.**

The GFDRR team received **114 applications** for the Fellowship and **20 World Bank project submissions** from World Bank Project Task Teams.



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Bangladesh



Bradley Riley
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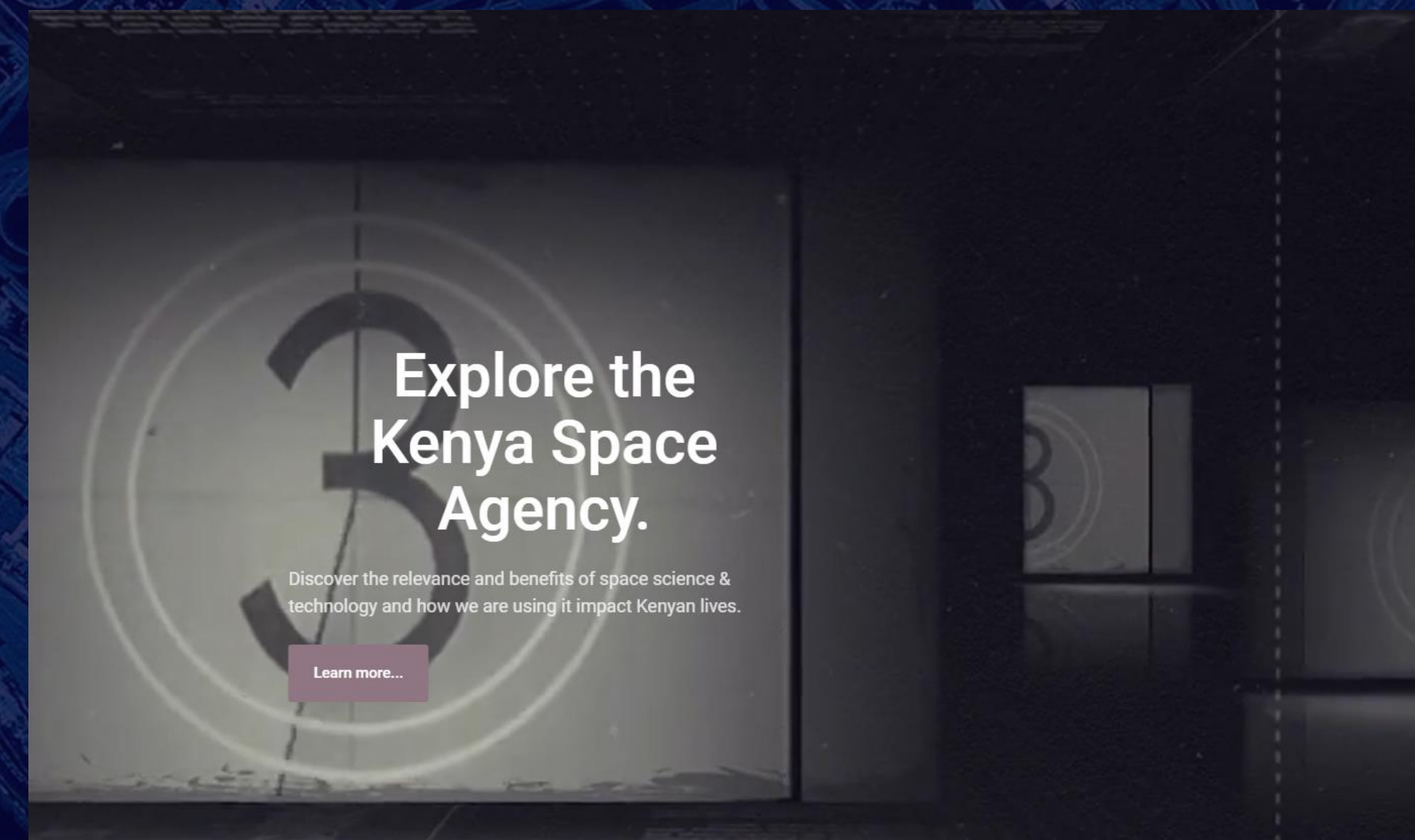
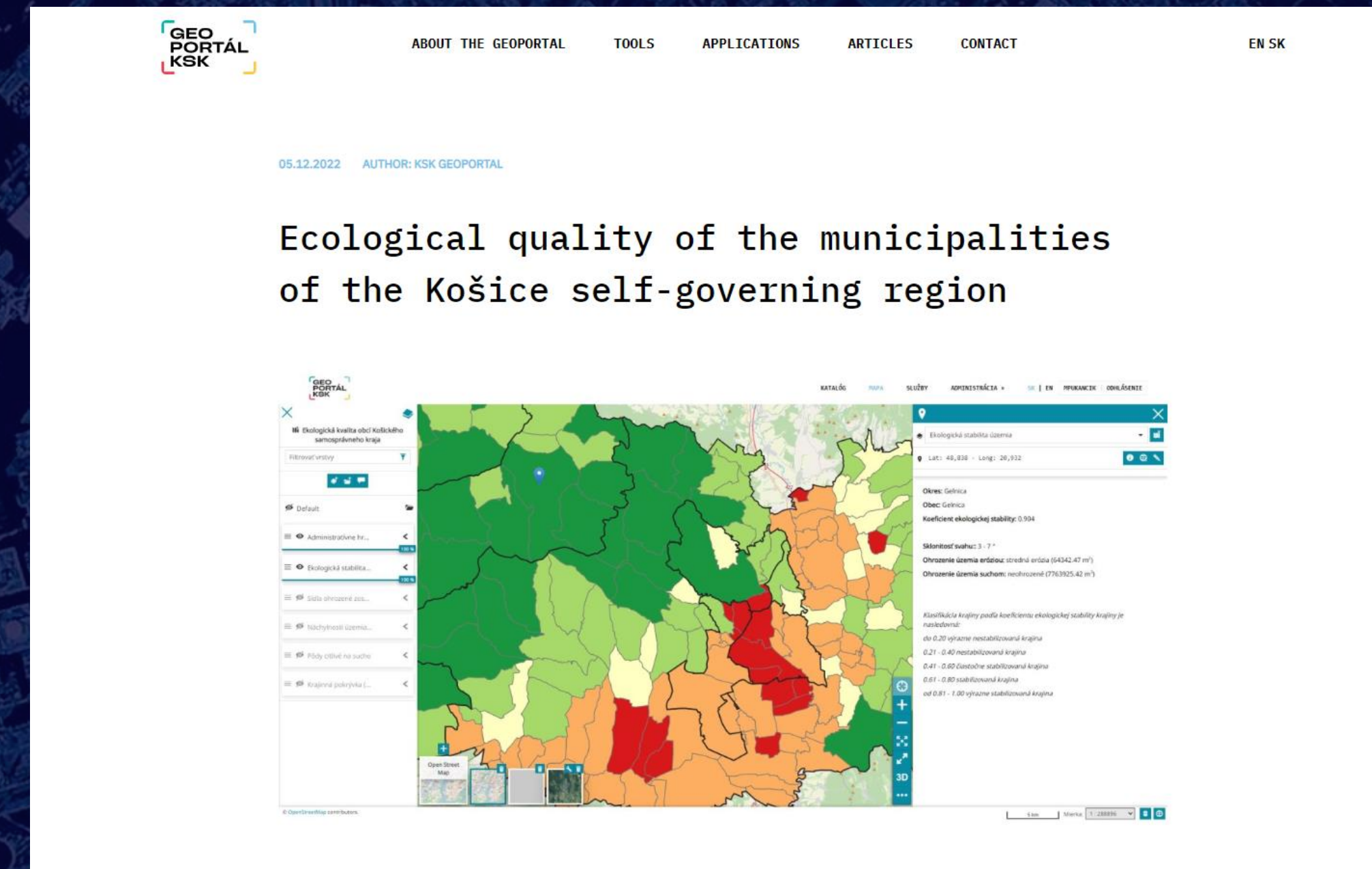


Mohammad Fadli
Indonesia

GEOSPATIAL & SPACE AGENCIES

Support establishment and long-term operation of agencies

- Geospatial Capacity Assessment
- Risk Data Inventory
- Technical support to institutional arrangements, people, systems and data
- Cost / benefits and funding model analysis
- Cross-support to IPF with a GIS component or to DPF/CAT DDO by adding a GIS policy prior action





THANK YOU

THE DIGITAL EARTH TEAM



GFDRR
Global Facility for Disaster Reduction and Recovery



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