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Modelling Exposure Through Earth Observation Routines (METEOR) for Developing Countries: Increasing Availability and Access to More Robust Risk Information

*Shubharoop Ghosh (presenting author), Charles K. Huyck, Ronald T Eguchi, Dr. Colm Jordan,
Dr. Kay B Smith, Dr. Vitor Silva, Mhairi O'Hara and Dr. Claire Simon*



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Overview



- Project Summary
- Earth Observation (EO) based national scale exposure for 47 countries
- Network of stakeholders
- Standards for Exposure in Risk Assessment
- Project impacts and Sustainable Development Goals
- Project sustainability

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DISASTER / CLIMATE RESILIENCE

Modelling Exposure Through Earth Observation Routines (METEOR)

Project summary

The escalating impacts of natural hazards are caused mostly by increasing exposure of populations and assets. It is estimated that the world will see the construction of 1 billion new dwellings by 2050 and this growth may lead to rapid increase in risk.

A major challenge when making Disaster Risk Management (DRM) decisions in ODA countries is poor understanding of the distribution and character of exposure to these hazards. METEOR takes a step-change in the application of Earth Observation exposure data to allow quantitative assessment of exposure, leading to better-informed DRM decisions.

Working with partners in Nepal and Tanzania we will test and validate the process of producing and utilising exposure data. Co-designing results internationally will help improve response to hazards and promote welfare and economic development. Country-wide, openly-available exposure data will be rolled out for the 48 least developed ODA countries.

The project objectives are to:

- Increase the resilience of Nepal and Tanzania to natural hazards through integration of robust and open building exposure data derived from satellite data.
- Improve capacity for stakeholders in the use of exposure data in Disaster Risk Reduction (DRR) and DRM in Nepal and Tanzania.
- Deliver robust and open protocols for exposure development.
- Deliver open-source, national-scale building exposure data for all 48 countries on the DAC list of least developed ODA recipients

Satellite solution

METEOR will improve upon existing Earth Observation methods for characterising the built environment. Working in unison with our partners and end users, we will develop and share protocols to produce robust exposure information and promote its use to strengthen the resilience and adaptive capacity of Nepal and Tanzania (in particular) to natural disasters. The application of EO data allows us to utilise the same robust process across borders, which is a critical issue when using traditional census data that tend to have different classification systems and protocols. EO tools offer the most effective way to produce consistent and open exposure in data poor countries, many of which have rapidly-expanding urban areas.

Project impact

- To substantially increase the availability of (and access to) more robust disaster risk information for all 48 countries on the DAC list of least developed ODA recipients.
- To strengthen the resilience and adaptive capacity to natural disasters of Nepal and Tanzania.
- A network of stakeholders better placed to act as leaders of DRM/DRR in their geographic region.

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*"IPP seeks to **maximise the practical impact on the lives** of those living in **developing countries** by **partnering with developing countries** to use **space solutions** to solve their **specific development challenges**, and in doing so **increase their capacity**."*

METEOR: NATURE OF THE PROBLEM AND SOLUTION



- Escalating impacts of natural hazards are caused mostly due to increasing exposure of populations and assets
- Poor understanding of the distribution and character of exposure in ODA countries is a major challenge when making Disaster Risk Management decisions



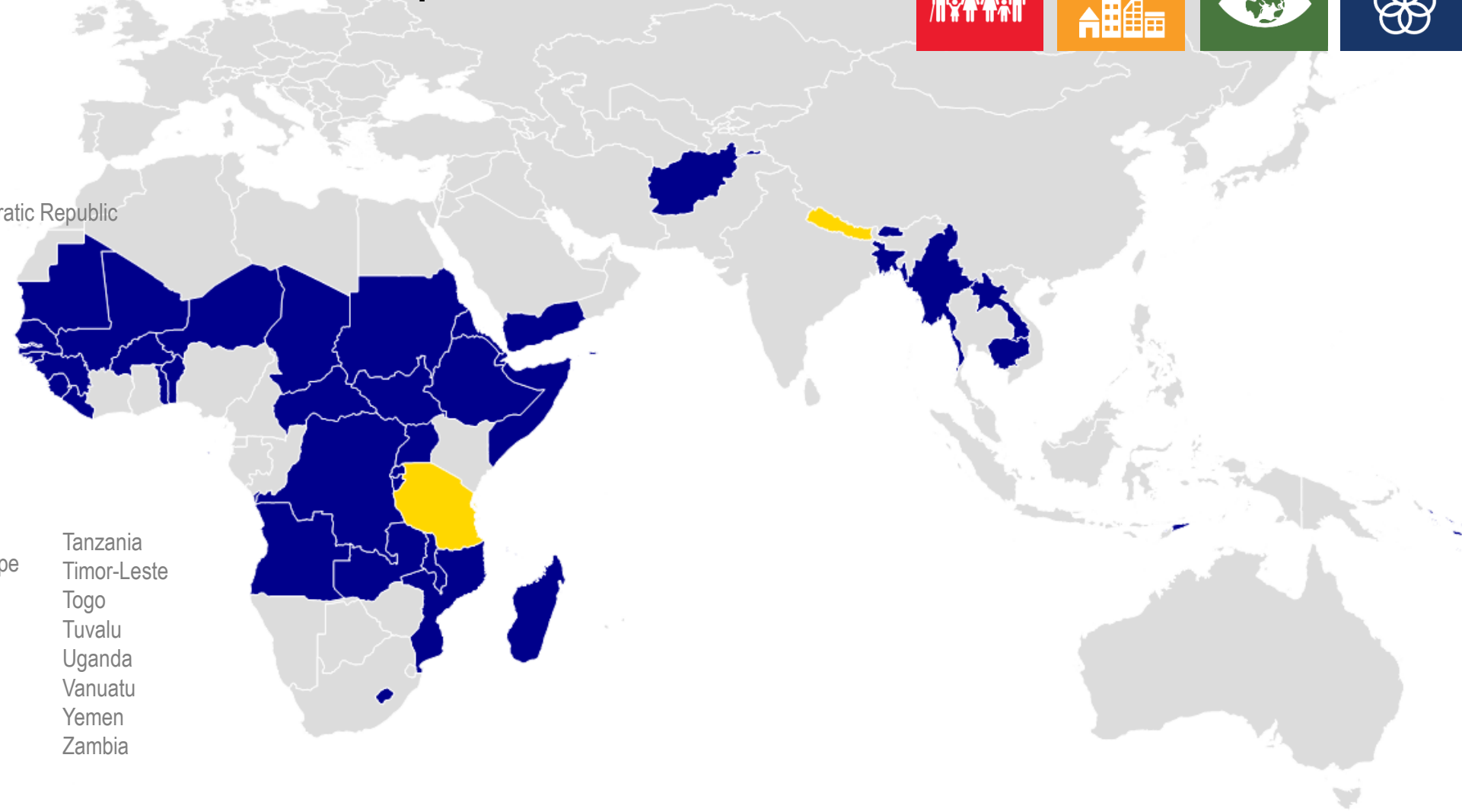
- Make a step-change in the application of robust EO exposure data by developing and delivering rigorous open protocols and standards to allow qualitative and quantitative assessment of exposure with explicit uncertainties
- These protocols and standards will be developed for broad application to 47 ODA countries and will be tested and validated for 2 pilot countries Nepal and Tanzania to assure they are fit-for-purpose
- METEOR will deliver countrywide exposure data for 47 countries (Level 1- global) and more refined exposure for the 2 pilot countries (Level 2/3 – country level with improvements at sub-national scale)
- Develop processes of building capacity and co-delivering new consistent data to promote welfare and economic development in 47 of the least developed countries, and demonstrate the applicability of the techniques elsewhere globally
- Better-informed DRM decisions that meet the demands of international drivers (e.g. SDGs, Sendai Framework) will be underpinned by the national-scale exposure data

47 Least Developed ODA countries

Pilot Countries: Nepal, Tanzania



- Afghanistan
- Angola
- Bangladesh
- Benin
- Bhutan
- Burkina Faso
- Burundi
- Cambodia
- Central African Republic
- Chad
- Comoros
- Democratic Republic of the Congo
- Djibouti
- Eritrea
- Ethiopia
- Gambia
- Guinea
- Guinea-Bissau
- Haiti
- Kiribati
- Lao People's Democratic Republic
- Lesotho
- Liberia
- Madagascar
- Malawi
- Mali
- Mauritania
- Mozambique
- Myanmar
- Nepal
- Niger
- Rwanda
- Sao Tome and Principe
- Senegal
- Sierra Leone
- Solomon Islands
- Somalia
- South Sudan
- Sudan
- Tanzania
- Timor-Leste
- Togo
- Tuvalu
- Uganda
- Vanuatu
- Yemen
- Zambia





Network of Stakeholders



- 1) Governments/ Policy Makers
- 2) NGOs and IGOs
- 3) Commercial clients - insurance, micro-insurance
- 4) Academic and Research organizations – grants and funding



National-scale exposure datasets for multi-hazard risk analysis for Nepal, Tanzania and global stakeholders



Building Classification Scheme for Risk Assessment

Level 1- Global Data

- Typically global, but can be continental or regional
- Country-specific information available is minimal
- Generated using a global population dataset as basis for building count and location
- Nearby country's construction statistics may be used as proxy

Level 2- Country-level exposure data

- Exposure generated using data collected and reviewed at national level
- Typically building counts are estimated through census population
- Structure type distributions
- Number of people per household
- Building replacement cost per square meter

Level 3- Data improvement at the sub-national scale

- Use of remote sensing data to improve spatial distribution of building stock
- Better characterization of construction patterns within different climate, cultural or economic regions in a country
- Improvement of major urban areas in terms of building counts, and structural mapping schemes

Level 4- Aggregated building-specific data

- Aggregate building level data to obtain accurate spatial distribution
- Apply occupancy and structural distributions to assign proper vulnerability

Level 5- Site-specific data

- Data collected and provided at site level
- Usually available for a smaller region

Impact

Policies, plans, and practice are better informed by Disaster Risk Reduction and Management, particularly disaster loss estimation systems, across public and private sectors, and civil society



Outcome

The governments of Tanzania and Nepal utilise project datasets to improve their national sectoral policies, plans and practice

Improved use by end users of DRR/DRM data in decision-making and practice in Tanzania and Nepal

METEOR Knowledge Products (protocols, datasets, communication products) are used and adopted by the wider DRR community globally

Output

Enhanced skills and knowledge in the use of DRR/DRM protocols and EO-based datasets

Open access to Level 2/3 national scale multi-hazard exposure datasets of Nepal and Tanzania

Protocols for capturing and communicating exposure data uncertainty delivered

Open access to Level 1 exposure data for 47 LDCs

Communication products shared - Policy papers, training materials, publications, conference presentations, case studies

Output Indicators

- 1. Percentage of professionals trained in Nepal & Tanzania reporting increased knowledge and capacity (1-to-10 scale disaggregating males and females)
- 2. Number of professionals trained in Nepal and Tanzania (disaggregating males and females)

- 1. Percentage of Nepalese and Tanzanian territory covered by Level 2 multi-hazard exposure data (aligned with SFDRR Global Target g and Priority Area 1)

- 1. Work plan on track to achieve completion within deadline
- 2. Percentage of approached users reporting a high satisfaction level with METEOR protocols (disaggregating males and females)

- 1. Number of Level-1 datasets for LDCs uploaded on online platforms (aligned with SFDRR Global Target g and Priority Area 1))

- 1. Policy paper on the use of national-scale exposure data for insurance and other risk-transfer mechanisms published and shared
- 2. Number of communication products shared
- 3. Number of conferences or workshops hosted or attended by consortium members at which METEOR's findings are shared or discussed

Project Sustainability



Understanding stakeholder needs



Existing products and markets



Funding models (Government and commercial) for inclusive risk products in ODA countries



Capacity building



Expansion strategy



International
Partnership
Programme

Modelling Exposure Through Earth Observation Routines (METEOR): EO-based Exposure, Nepal and Tanzania



FALL MEETING

Washington, D.C. | 10-14 Dec 2018

