The Global RApidpost-disaster Damage Estimation Approach









The day after, Government grappled with questions such as:

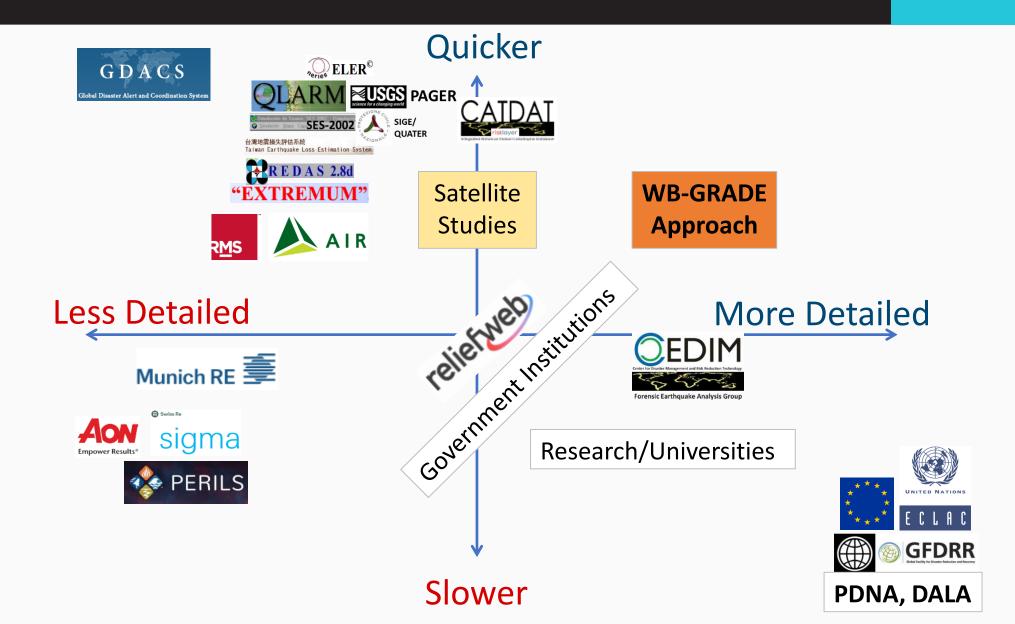


How do we assess damages?

Where are the damages distributed?

What is the socio-economic impact?

Existing Post-Disaster Tools



The Solution:

Global **Rapid** Post disaster damage assessment (GRADE)

Existing Methods



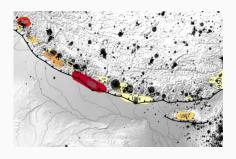
2 months

GRADE





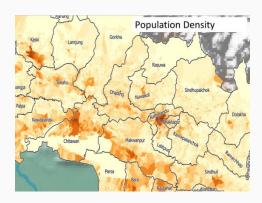
GRADE Skill is in its Analysis



Historical damage data

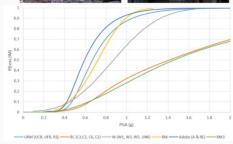


Event scientific data



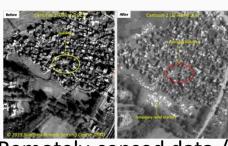
Census data



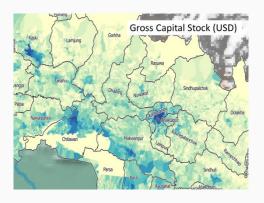


Vulnerability/Built Data





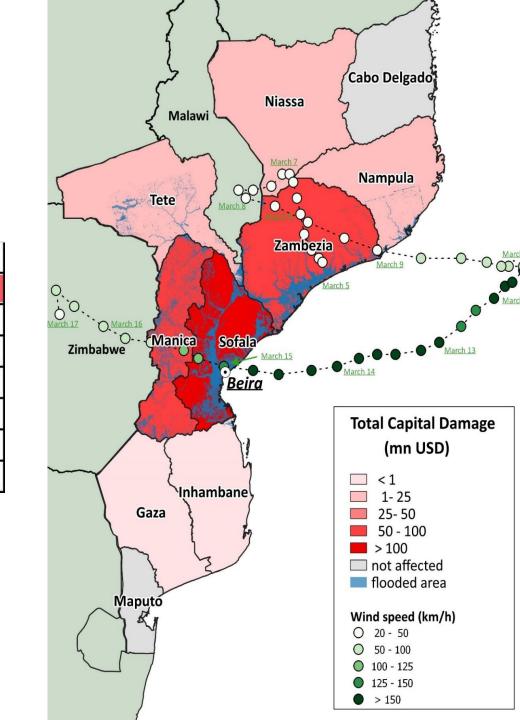
Remotely-sensed data / Social Media



Socioeconomic data

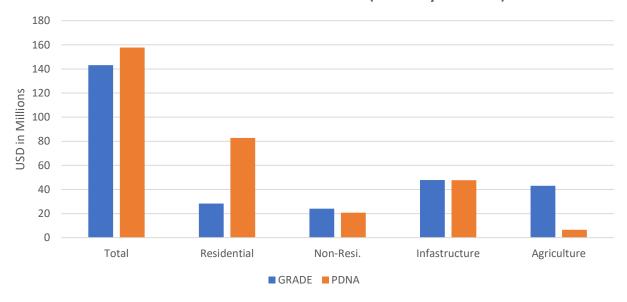
Cyclone Idai Mozambique (Mar. 2019)

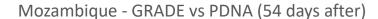
Provinces	Residential	Non-Residential	Infrastructure	Province Total
Sofala	131.2	88.2	140.8	360.1
Zambezia	11.5	21.9	21.9	55.3
Manica	22.6	18.2	12.6	53.4
Nampula	8.0	15.4	1.5	25.0
Tete	4.1	4.8	8.4	17.3
Other Provinces	0.2	0.4	3.2	3.7
Sector Total	177.6	148.9	188.4	514.8

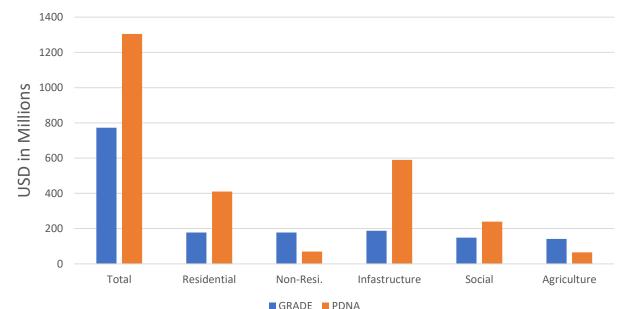


Comparison of GRADE and PDNA Cyclone Idai – Malawi and Mozambique

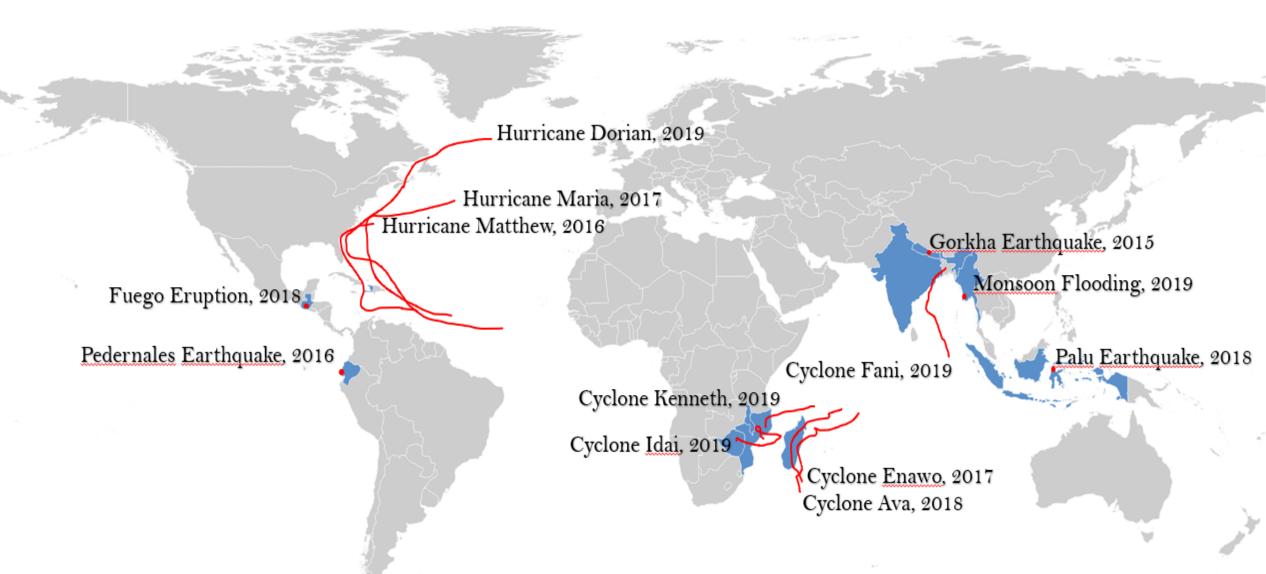
Malawi - GRADE vs PDNA (28 days after)



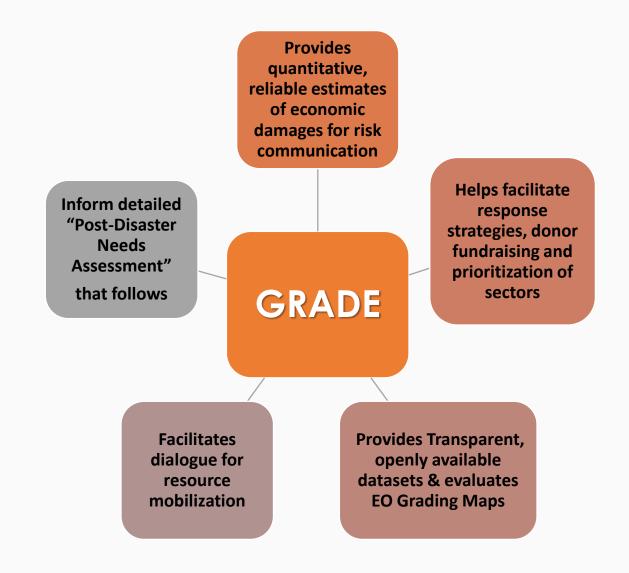




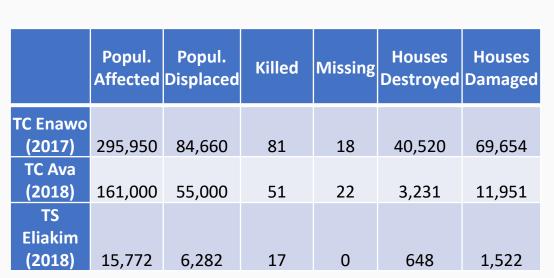
In the last 5 years, GRADE applied in 15 countries, covering earthquakes, cyclones, floods and volcanic eruptions



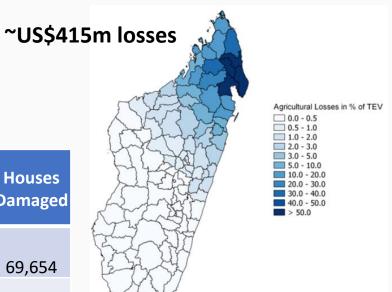
The uses of GRADE approach

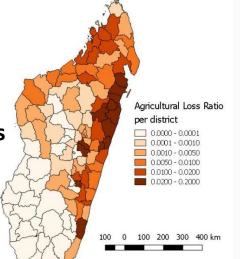


GRADE Product (Cyclone Enawo and Ava)



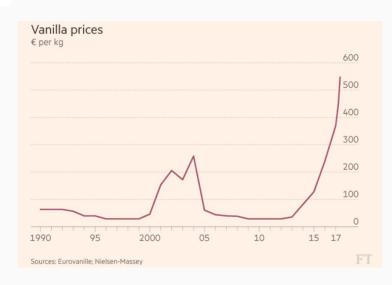
~US\$195m losses







vanilla counted for 40% of losses



Central Sulawesi Earthquake and Tsunami Global Rapid Post Disaster Damage Estimate (GRADE) Report

Main Findings

- The **total economic damages** are estimated at over US\$500 million (approximately IDR 8 trillion):
 - Housing US\$180 million (~IDR 2.7 trillion);
 - o Commercial/industrial buildings US\$185 million (~IDR 2.82 trillion);
 - o Infrastructure US\$165 million (~IDR 2.5 trillion).

Province	District	Housing	Non-Residential	Infrastructure	Total
Central Sulawesi	Palu	106.7	134.8	94.9	336.4
Central Sulawesi	Donggala	41.1	35.7	45.6	122.4
Central Sulawesi	Sigi	19.8	8.7	16.2	44.7
Central Sulawesi	Parigi Moutong	8.5	3.8	5.4	17.7
West Sulawesi	Pasangkayu	3.4	1.5	2.3	7.2
Central Sulawesi	Poso	1.3	0.5	0.3	2.1
	Total	180.8	185.0	164.7	530.5

- **Example 2 Key affected sectors** include housing, commercial and / or industrial buildings, and infrastructure.
- The high impact on commercial / industrial buildings could affect operations and recovery in the **retail and tourism**, **education and health sectors**. Government public buildings were also affected. The impact on education buildings was also considerable.

Losses to equipment external to these assets (e.g., cars) and impacts on economic flows (e.g., business interruption) are not included in this assessment.



Next Steps

- Provide findings to GoI, contributing to more detailed damage, loss and needs assessments; identifying the sectoral recovery needs; and informing recovery planning.
- Carry out asset-specific assessments to inform recovery/reconstruction investments.

The GRADE process

Hazard Modeling

Seismic ground motion map

Wind field map

Flood extent map due to excess rainfall during storms, riverine, flash flooding

Storm surge inundation map

Tsunami inundation map

Exposure Modeling

Mapping population and asset values

Global housing census data

Gross capital stock data

Residential buildings by structural type, age, height

Non-residential buildings by use, structure

Infrastructure (roads, bridges, ports, airports, etc.)

iURBAN tool for spatial distribution

Urban/rural consideration

Exposed Values by Asset Type & Resistance Class Vulnerability Modeling

Global database of building damage data

Damage vs. hazard severity by structure type

Real-time event data from social media (photos, video, drone footage)

Remote sensing data

Post-disaster analytical structural vulnerability tool

Damage Estimation

Cost of direct damage to buildings, critical infrastructure

Cost of direct damage to crops

Human casualties due to building collapse

Estimation of direct and indirect damage to other important economic sectors

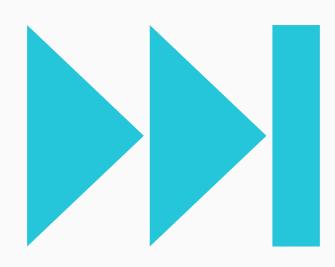
Potential impacts on GDP and the economy

Vulnerability
Curves by
Resistance Class

GRADE Event Report

Event Footprint Generation

Next steps:



- Regional experts
- CEDIM repository of data
- Training workshops
- Collaboration with Private sector

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