SUPARCO

ADB

NDRMF

19 SEPTEMBER 2024

Round Table Discussion on

PROBABILISTIC SEISMIC HAZARD ASSESSMENT FOR RISK TRANSFER IN PAKISTAN

Limitations and Way-forward

19 September 2024

BACKGROUND AND RATIONALE

The Round Table on Seismic Hazard Assessment and Earthquake Preparedness, held at NDRMF on 19th September 2024, aimed to bring attention to the seismic risks faced by Pakistan. The event focused on the need for enhanced methodologies in hazard assessment to better predict and prepare for potential earthquakes.

Key stakeholders, including representatives from NDRMF, SUPARCO (Pakistan Space and Upper Atmosphere Research Commission), PMD (Pakistan Meteorological Department), and GSP (Geological Survey of Pakistan), engaged in discussions on improving the nation's resilience against seismic events. The session highlighted the importance of inter-agency collaboration to refine data collection, modeling, and early warning systems, ensuring greater preparedness in mitigating earthquake hazards.

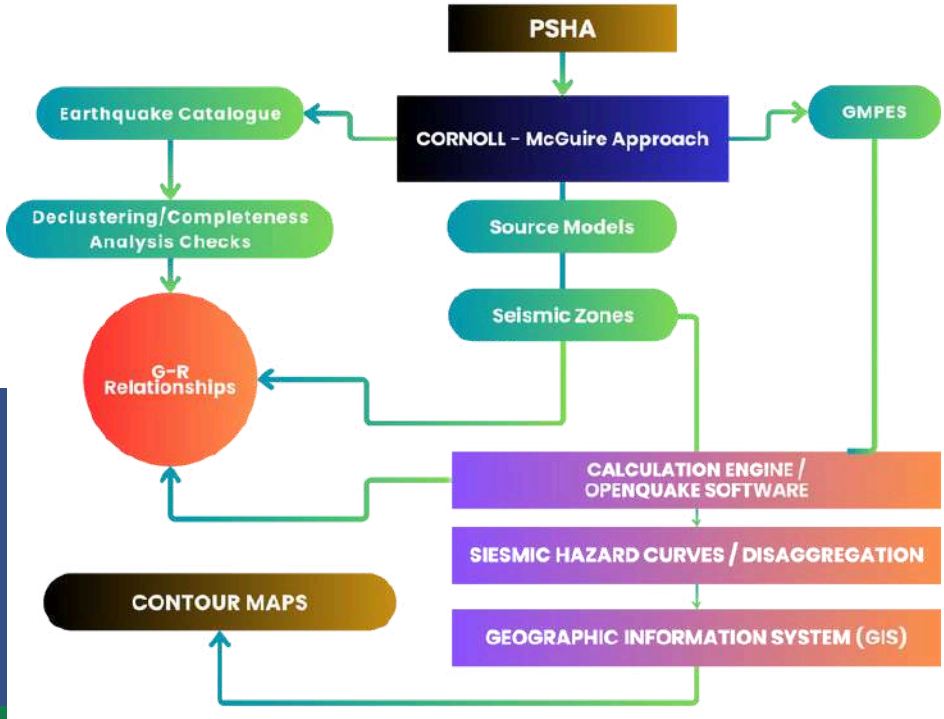

FIG 1.0 - THE SCHEME OF PROBABILISTIC MODELLING

LIMITATIONS

01 The Sources zones delineation is user subjective and may impact results of the study.

02 Type of uncertainty is known as epistemic uncertainty (i.e. modelling uncertainty) in hazard assessment.

03 Ground motion prediction equations developed for regions outside Pakistan were considered applicable in Pakistan due to the absence of the indigenous equations for Pakistan.

04 Ground motions for deep earthquakes were estimated using GMPEs developed for subduction region which may over or underestimate seismic hazard in this work. Results of this study were estimated using flat engineering bedrock site conditions and need to be integrated with site specific amplification factors to obtain the site-specific ground motion parameters.

QUESTIONS

Q1

How the earthquake catalogue on national level may be developed and updated regularly?

Q2

How Geological Survey of Pakistan (GSP) may update active faults database/locations on national scale to provide new insights into the seismic hazard assessment studies.

Q3

How to the Ground Motion Prediction equations can be developed on local strong motion data. How the National Seismic Monitoring Centre newly deployed PCSN strong motion instruments and seismic waveform datasets can be made available so that indigenous ground motion equation can be developed.

Q4

How the simulation-based ground motion prediction equations may be developed for the regions where strong motion data is sparse?

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PANELISTS

MR. BILAL ANWAR
CEO – NDRMF

Opened the session by emphasizing the importance of the NatCat Model for the organization. With the development of this model, NDRMF now has the ability to assess hazard risks and potential losses using data-driven, scientific approaches. This achievement not only aligns with the Sendai Framework and ADB funding requirements, but also fulfills a key prerequisite for the country's first-ever Disaster Risk Financing (DRF) strategy, which was approved earlier this year.

PROF. MUSTAFA EDRIC
Consultant - NatCat

Explained the Probabilistic Seismic Hazard Assessment (PSHA) conducted for NatCat Model in collaboration with SUPARCO. He discussed certain areas for model improvement and also the way forward for the use the model for earthquake parametric insurance in Pakistan. He insisted, with the development of probabilistic risk modeling, it is the time for NDRMF to initiate efforts for parametric insurance in Pakistan. The policies and premiums for such risk transfer should be set separately for rural and urban areas.

Such a tiered insurance is also opted in Turkia that allow both rural communities and urban businesses to choose coverage based on their financial capacity and exposure to risk. For example, rural communities might opt for basic coverage to rebuild homes, while urban businesses could choose higher-tier policies for business continuity. The NDRMF should seek governments and international donors (e.g., World Bank, ADB) can subsidize premiums or provide initial capital to make the insurance affordable for poorer communities.

MR. NAJEEB AHMAD
Director, National Seismic Monitoring Centre

Explained the possibility of developing local GMPEs for Pakistan, updating the national earthquake catalogue and active fault mapping, and validating them with local seismic waveform data, particularly incorporating data from the newly deployed PCSN strong motion instruments.

Additionally, he elaborated that the center can collaborate with NDRMF and SUPARCO to facilitate new research and enable the effective use of seismic waveform datasets especially for many recent strong earthquakes in and around Pakistan. Besides this, our crustal structure study results can be incorporated into the hazard & risk assessment studies.

DR. FAROOQ
PD NatCat, SUPARCO

Added the Seismic Hazard Assessments will be move forward through taking into account the latest PBS surveys and building typologies. He also welcomed the professionals from National Seismic Monitoring Centre to participate in improving the Probabilistic Seismic Hazard Assessment is Pakistan.
He added that such assessment should be integrated with site specific amplification factors to obtain the site-specific ground motion parameters.

MR MUBUSHAR HUSSAIN
Manager DRR, NDRMF

NatCat offers comprehensive nationwide seismic risk assessments, essential for disaster risk transfer. Leveraging the successful examples set by Turkey and other countries, these assessments are crucial for enhancing resilience and preparedness.

DR. MUHAMMAD IMRAN

Team Lead, NatCat Data Center, NDRMF

Integration with advanced seismic repositories:
Dr. Imran proposed integrating the NatCat database with a live API that streams real-time data from PCSN's strong motion instruments. A Memorandum of Understanding (MoU) was proposed for signing between NDRMF and the National Seismic Monitoring Centre to proceed further.

KEY OUTCOMES

01 **NatCat Model Significance:** Mr. Bilal Anwar emphasized the importance of the NatCat Model, highlighting its role in hazard risk assessment and its alignment with the Sendai Framework, ADB funding requirements, and the country's newly approved Disaster Risk Financing (DRF) strategy.

02 **Earthquake Catalogue Development:** There was consensus on the need for a regularly updated national earthquake catalogue, with collaboration between key agencies to ensure accuracy and consistency.

03 **Active Fault Database Enhancement:** GSP was tasked with updating the national database of active faults, providing critical insights into seismic hazard assessments.

04 **Local Ground Motion Prediction Equations (GMPEs)**: The necessity to develop GMPEs based on local strong motion data was stressed to improve seismic hazard models and enhance predictive accuracy for Pakistan.

05 **Parametric Insurance Proposal:** Prof. Mustafa Edric recommended the initiation of earthquake parametric insurance in Pakistan, using a tiered approach for rural and urban areas, with subsidization from international donors like the World Bank and ADB.

06 **Collaboration on Seismic Research:** NDRMF, SUPARCO, and the National Seismic Monitoring Centre agreed on the need for further collaboration to advance research and improve seismic waveform data integration into hazard assessments.

07 **Incorporation of Local Building Data:** The use of site-specific amplification factors and the latest building typologies from PBS surveys was proposed to refine seismic hazard assessments for more accurate ground motion predictions.