ENVIRONMENTAL HAZARDS IN ASIA

CONFERENCE ABSTRACTS

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ABSTRACT BOOK

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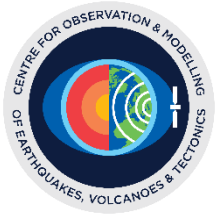

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Contents

Environmental Studies of Mongolia Using Advanced Remote Sensing Techniques

D.Amarsaikhan*, D. Enkhjargal, E.Jargaldalai, G.Tsogzol

Institute of Geography and Geoecology, Mongolian Academy of Sciences

Remote sensing (RS) is a substantial discovery, which moved the possibilities of scientists and researchers to a new era. The prospects of this technology are unlimited, because of their wide applications in a variety of different fields. Regarding the environment, RS technology refers to the technologies used to acquire, process, analyze, display, and disseminate space or spatial information. The aim of this study is to demonstrate how modern RS techniques and technologies can be used for the improved environmental monitoring and management. For this purpose, several studies conducted for different applications in Mongolia have been highlighted.

The aim of this study is to apply some advanced space techniques and technologies based on RS, GPS, and GIS for environmental studies in Mongolia. For this purpose, studies conducted at national and regional levels have been highlighted. The studies at national level describe the studies related to monitoring of pasture conditions of Mongolia using multitemporal NDVIs as well as snow cover distribution and yellow dust spread in the country. The studies at regional level highlight monitoring of pasture conditions in Mongolia using multitemporal high resolution images as well as GPS and GIS datasets.

Forest is a very important natural resource that plays a significant role in keeping an environmental stability, ecological balance, environmental conservation, food security and sustainable development in both developed and developing countries. The aim of this study is to conduct a forest resources study using interferometric SAR images. For this purpose, a forest-dominated site around the Lake Khuvsgul located in northern Mongolia has been selected. As RS data sources, multitemporal ALOS PALSAR L-band HH polarization data were used. To produce a reliable land cover map from the multisensor images, a novel refined maximum likelihood classification based on the spectral and spatial thresholds were applied and for the accuracy assessment an overall accuracy was used.

The aim of this research is to show how urban land cover information extracted by the use of an advanced classification methods could be used to support sustainable urban development in Mongolia. As the input information to the classification, the features derived from optical and SAR data sets as well as GPS information were used. To extract the reliable urban land cover information from the multisource features, rule-based, machine learning, and deep-learning classification algorithms were applied. The results of the methods were compared with the result of a standard classification technique and they indicated higher accuracies. Overall, the study demonstrated that the multisource data sets can considerably improve the classification of urban land cover types and the extracted information could be successively to support sustainable urban development in Mongolia.

In recent years, processing of hyperspectral data has attracted many researchers dealing with RS image processing. Unlike the traditional multispectral data taken in the optical range of electro-magnetic spectrum, the hyperspectral data deals with a great number of bands and many attempts are being made to reduce the dimensionality of the data and extract reliable information needed for various decision-making processes. Especially, for classification applications, hyperspectral data sets provide enormous potential for an improved discrimination between the land cover types or features having very similar spectral characteristics. The aim of this study is to classify land cover

types using Hyperion hyperspectral data sets. To evaluate the performance of the hyperspectral data, the result of the Hyperion image classification was compared with a result of Landsat ETM image.

Multi instrument observation of magnetic field

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We show the high-resolution observations of the temporal and spatial evolution of the convection flow and polar cap patch of magnetic field made by the Super Dual Auroral Radar Network (SuperDARN), the Global Positioning System (GPS), respectively. We also show the particle precipitation in the cusp ionosphere observed by the EISCAT (European incoherent Scatter) UHF (ultrahigh frequency) radar.

In this work we studied multi-instrument observation the geomagnetic storms on 17 March 2015 and 12 June 2012. We show the high-resolution observations of the temporal and spatial evolution of the convection flow and polar cap patch during geomagnetic storms made by the Super Dual Auroral Radar Network (SuperDARN), the Global Positioning System (GPS), respectively. SuperDARN radars that look into Earth's upper atmosphere beginning at mid-latitudes and observe the motion of charged particles (plasma) in the ionosphere and other effects that provide scientists with information on Earth's space environment. The knowledge gained from this work provides insight into space weather hazards including radiation exposure disruptions to communication networks, navigation systems (GPS), and electrical power grids.

Building disaster risk resilience with satellites and AI

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We are in the midst of several exciting technological revolutions in the space sector, from satellite launch and miniaturisation to cloud computing and Artificial Intelligence (AI). The cross-roads of these revolutions potentially hold many of the innovations needed in building disaster risk resilience for both natural and anthropogenic hazards. The capability of satellite remote sensing to 'go back in time' highlights the significant role EO technologies can play in bridging gaps in missing data. For instance, we can go back all the way to the 1970s with the first civilian EO satellite Landsat-1 and even back to the 1960s with previously unavailable data from spy satellites that have been made publicly available. Therefore, the key question is, what can we do with this rich data?

In this talk, the opportunities for building disaster risk resilience using latest satellite technology and AI will be discussed alongside case studies on:

- Approaches to disaster management through a satellite-AI-based early warning for the collapse of mine infrastructure. This research has received several international awards, including an award in the category of Data science and AI at COP28.

- Environmental monitoring and mineral exploration– identifying most vulnerable areas. examples for reconstructing the state of the natural ecosystems, so that this data can be used in modelling and simulations to identify communities most exposed to hazards. The research has resulted in several scientific publications, alongside media coverage from e.g. The Economist.

Opportunities to build resilience through EO/AI supporting the financial institutions that ultimately drive the long-term sustainability of the services, through examples in carbon accounting, natural capital and sustainable finance.

A Study of Urban Community Preparedness for Earthquake in Mongolia

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Mongolia is situated in a seismically active zone within Central Asia and has historically experienced significant earthquakes, including four occurrences exceeding Magnitude 8 and about 20 with more than Magnitude 7 in the last century. The frequency of earthquakes measuring magnitude 3.5 and above has shown a consistent increase. In 2021, Mongolia recorded 254 earthquakes, a sixfold rise compared to the average of the previous decade.

Simultaneously, Mongolia has experienced rapid urbanization, with urban population growth escalating from 6.1 percent in 1933 to 70.7 percent in 2023, marking a substantial transfer from nomadic husbandry to urban settlement lifestyles. This urban expansion has increased the exposure of communities to earthquake hazards, particularly in cities vulnerable to earthquakes.

Effective community earthquake preparedness, particularly in urban areas plays a critical role in mitigating potential earthquake loss and damage. This study assesses urban community preparedness through an online survey conducted on voluntary participation. It covers the contents of knowledge, awareness, and practical skills on disaster risk reduction; disaster preparedness habits and behavior change; and readiness for earthquake early warning signals for community disaster preparedness. The findings show that only 23.5 percent of respondents rated their preparedness as "Very High" or "High." There is a big gap in urban community disaster preparedness in Mongolia, highlighting the need for measures to build community resilience to earthquakes.

Tectonic Modeling and Hazard Risk Assessment in the Almaty Region

K. Bekkarnayev, V. Junisbekova*, Sh. Makarenko

The Almaty region in southeastern Kazakhstan is marked by complex tectonics and significant seismic activity. The region's seismic history includes notable events, such as the 1887 Verny earthquake with an estimated magnitude of 7.3, which caused extensive damage. To better understand the seismic risks of the region, tectonic modeling experiments were conducted. These experiments aimed to simulate the stress and deformation patterns resulting from tectonic forces. The methodology involved creating a physical model using a clay-based material to represent the upper crustal section of the region. Horizontal compressive stress was applied to mimic tectonic forces, with variations in stress direction tested. Observations focused on uplift, subsidence, and

strike-slip displacements. The experimental results highlighted the tectonic movements across various blocks within the model. For example, certain blocks showed consistent uplift, indicating significant vertical displacement due to compressional forces. Other blocks exhibited a mix of uplift and downward movements, suggesting a dynamic stress environment with complex interactions at fault intersections. Central blocks experienced significant uplift, indicating zones of stress concentration. Overall, the experiments provided valuable insights into the region's tectonic behavior, revealing specific areas with higher probabilities of tectonic movements. These findings contribute to a better understanding of seismic risks in the Almaty region, offering important information for future seismic hazard assessments.

Local Hazard Mapping for Disaster Risk Reduction Plans and Action – Experiences from Farming Communities in Natural Resources Management and Livelihood Promotion Projects, India

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India is one of the most disaster-prone countries in the world. The locational and geographical features render it vulnerable to a number of hazards and disasters. Long term planning for disaster mitigation form part of process of development planning in India. As the country has been facing hazards over centuries, the local communities have developed own indigenous coping mechanisms. The rich store house of this knowledge is country's proud inheritance. At the time of emergencies, spontaneous community action supported by Non-Governmental Organizations adds strength to national capability in disaster management. However, the areas where efforts made and results achieved does not commensurate with magnitude of the problem are forging linkages between disaster reduction and development, training and education, participation at community level, enlisting people's participation in integrating social and human science inputs in vulnerability assessment and appropriate resource allocation against competing demands.

The paper describes the process, outcomes and learning’s from LWR-IDF’s transitional TBR-TP (Trans-boundary Resilience–Transitional phase) project, Saupal, Bihar, India. The project supported, trained and mentored Change Agents both men and women from village-based institutions; Community Disaster Management Committees (CDMCs) using participatory approaches and engaging stakeholders in-

a) Identifying and mapping potential hazards both at community level and within and around their watershed boundaries
b) Finalising Disaster Risk Reduction (DRR) plans in consultation with State and Non-State stakeholders
c) Taking actions as per DRR plans for prevention, mitigation, resilience and adaptation for self-reliance

The lesson learnt from the project has been disseminated for wider outreach and actions.

Local Decentralization, Ethnic Empowerment and Environmental Governance in Postsocialist China

Chao-Yo Cheng

Birkbeck, University of London and London School of Economics

With a focus on postsocialist China, the project critically engages with the notion of community-led development, which has supported many global development initiatives aimed at empowering local indigenous groups to foster bottom-up sustainable development in the Global South. In particular, this project will address the following question: How can local indigenous communities contribute to better environmental governance, even within an authoritarian context? I propose using a variety of innovative computational and quantitative techniques. The study aims to lay the foundation for future grant applications involving in-depth qualitative knowledge co-production with local researchers and policy stakeholders in China. Examining local environmental regulations will reveal the timing, substance, and impact of legislation related to natural resources and broader environmental governance. Comparing the syntax and topics of national and local regulations using natural language processing techniques such as topic modeling and text similarity will identify policy learning, diffusion, and collaborations among EATs and between EATs and the central government in Beijing. Quantitative analysis of Chinese Land Use/Cover data (CNLUCC) from the Chinese Academy of Science will identify changes in local land use and economic activities related to natural resources before and after relevant regulations were implemented.

Application of Stacking-InSar and satellite Gravimetric Data for estimation of earthquakes in Marocco (M 6.8), Afganistan (Herāt, M 6.3), China (Aykol, M 7.0)

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Satellite radar interferometry is an effective tool for seismicity research [1]. Based on a joint analysis of the Stacking-InSAR for the period 2019-2023 and satellite gravimetry for the period 2000-2023, a significant decrease in the volume/weight of aquifer adjacent to the faults on both sides of the Atlas Mountains was identified. This decrease contrasts with the effect of reservoir filling, which involves an increase in water mass. Previous studies have highlighted the correlation between reservoir filling and heightened seismic activity in various regions globally, as noted in [2]. Using Koina and Varna reservoirs as case studies, this research demonstrates that the location and size of areas of induced seismicity are determined by the size and localization of areas of increased stress caused by the mass of reservoirs.

In the case of earthquakes that occurred on the territory of Morocco in 2014 and 2023, aquifers played a role contrary to reservoirs, where rapid depletion was observed. This depletion occurred from 2012 leading up to the earthquake on August 31, 2014, and then from 2015 to the earthquake on September 8, 2023. These long-term trends of decreasing the water equivalent thickness detected by GRACE/GRACE-FO satellite gravimetry data, were further compounded by seasonal variations in water resource replenishment attributed to mountain snowmelt. The reduction in aquifer water volume can be attributed to intensive water usage in reclamation projects, in addition to climate change-induced temperature rises and subsequent heightened water consumption and evaporation, especially during the summer months.

As a result of the substantial decrease in the level of underground reservoirs, a stress-strain state emerged along the boundaries of these aquifers, aligning with the main faults in the earthquake-prone region under study in Morocco. This phenomenon acted as trigger for seismic events, including an earthquake with a magnitude of Mw = 6.8, which occurred on September 8, 2023, and another earthquake with a magnitude of Mw = 4.8 on August 31, 2014.

Similar studies have been performed for earthquakes in the Herat province of Afghanistan and in the southern Tien Shan in China.

Geotechnical Research and Training at MUST

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Over the past 30 years, Mongolia's mining sector has seen substantial growth, with a surge in open-pit and underground mines for gold, iron ore, copper, and coking coal. In response to the escalating need to manage risks and hazards in this expanding sector while protecting the environment and local communities, the School of Geology and Mining at the Mongolian University of Science and Technology (MUST) has launched a pioneering program in Geotechnical Engineering in Mining. This program leverages the extensive expertise of the faculty, which has been training mining engineers since 1970, and is supported by major industry players such as Rio Tinto Mongolia and Oyu Tolgoi.

The program saw its first cohort of undergraduate students graduate in 2024, and a master's curriculum is currently being implemented. Our research focuses on managing geotechnical hazards and risks, utilizing advanced laboratory facilities and collaborative ventures with mining corporations. The laboratory is outfitted with state-of-the-art equipment capable of analyzing the physical and mechanical properties of rocks under high pressure and deep underground conditions.

Current investigations include studies on mine tailings storage, the enhancement of rock mass characterization of underground mines through high-resolution strength measurement, and the development of methodologies for assessing the impacts of surface subsidence in underground mining operations. Future research endeavors will prioritize safeguarding mining operations from natural hazards such as earthquakes. Additionally, the research agenda will address critical issues such as the impacts of mining activities, earthquake-induced risks, tailings dam stability, and surface water management—concerns particularly pertinent to residents in mining regions.

National Disaster Risk Assessment of Mongolia

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Due to climate change, natural disasters have been increasing in Mongolia. Thus, disaster risk reduction planning is an essential component of the development plan and implementation. A conventional method of disaster risk assessment had gaps in data completeness, quality, and timing. An evidence-based national disaster risk assessment (NDRA) has been developed through data processing on the national census data of population and housing, livestock, enterprises, herder population, and agriculture. The study covered multiple hazards and elements at risk, as follows:

- 10 major hazards that affect Mongolia: earthquake, dust storm, windstorm, snowstorm, drought, dzud, flood, flood, wildfire, lightning, and zoonotic diseases.
- 26 types of elements at risk in 10 categories: communities, households, population, residential buildings, critical facilities, networked infrastructure, agricultural and husbandry lands, crops, livestock, and enterprises.
- Provincial capacity on four dimensions of disaster risk reduction: disaster risk data and information, disaster risk governance, disaster preparedness, and budgeting for Disaster Risk Reduction.

The result summarized the key findings from Mongolia's disaster risk assessment, consolidating over 185 exposure and vulnerability databases and 560 maps, a national disaster risk assessment report, methodology reports and training materials, available for stakeholders across Mongolia.

Human health and ecological risk assessment from heavy metal concentrations in some centre of the provinces of Mongolia

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Heavy metal concentration become environment degradation resource in residential areas. We studied Uliastai, Khovd, Darkhan provinces for heavy metal concentration and to use the risk modelling for estimate the ecological and human health risk based on the geo-accumulation index and enrichment factor analysis. Our result showed that the concentration of the heavy metals did not exceed the Mongolian National Standard (MNS 5850:2019), except for element arsenic, lead, etc. However, pollution indices values are signified “uncontaminated” values.

In terms of the assessment of potential health risk, there was a particular or different level of ingestion, dermal contact, and inhalation exposure pathway for human health. Among these three different pathways, the ingestion was estimated by the main contributor for health risk. Each value of HQ and HI indicated that soil heavy metals of studied cities were at a safe level (<1) or had the absence of a significant health risk there. In addition, the potential health risk for children was greater than for adults, where heavy metal values of HI for children had a high value compared to adults. We estimated carcinogenic risks through the inhalation exposure, and as a result, there were no significant risks for human health in the studied cities from three elements (As, Cr, Pb and Ni).

Seismic site effects assessment of Chitwan Dun Valley

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Like the effects of 2015 Gorkha earthquake in Kathmandu valley, sediment-filled valleys like the Chitwan Dun valley is anticipated to sustain similar damages in future earthquakes due to strong but localized seismic effects. Due to rapid and haphazard urbanization in Chitwan Dun valley, the impending earthquake may cause considerable damage. Therefore, a seismic site effects assessment of the valley is carried out. The ground motion of Mw 7.8 Gorkha Earthquake (2015) measured at rock site was used as an input motion. A nonlinear ground response analyses approach was adopted in one dimensional domain for the assessment of seismic site effects.

Seventy-one spatially located borehole data collected from different governmental and nongovernmental organizations are the basis for this study. The freely available Deepsoil (v 6.1)

code was adopted for simulation purposes. Different parameters like peak ground acceleration, peak spectral acceleration, natural period, predominant period and peak spectral acceleration at 0.3s and 0.5s were computed at east and west of Chitwan Dun valley. Higher values of peak ground acceleration and peak spectral acceleration is contributed due to sand and clayey dominated layer whereas the sites dominant of gravel gives rise to low values of peak ground acceleration and peak spectral acceleration. The response spectra computed in the valley mostly show short period motion unlike of Kathmandu Valley. This is probably due to shallow depth to the basement rocks in the valley. The maximum amplification is identified around 0.4s in general but some places like Dandagaun showing maximum amplification around 1s.

Pre-historic fault Monostoy in Eastern Mongolia

Javkhlanbold Dorjsuren, Bayasgalan Amgalan, Banzragch Vaanchig

The active tectonics of Mongolia is explained by the India-Asia collision and the Baikal rift extension. At the eastern part of Mongolia called Amurian plate has lower seismic intensity comparable western part that has experienced four great earthquakes in the last century. The Monostoy fault in central-southern part of Khentii range has been newly discovered within the frame work of “Deep seated fault” state budget project, which identifies the need for detailed research in eastern area. Remote sensing data, drone imagery (orthophoto and DEM), geophysical profiling (RAP), field observations, trenching and dating (radiocarbon) has been carried out during the project. The Monostoy fault oriented NEE-SWW, has three separated segments called west to east Monostoy, Davaat, Bereeven, has a clear expression on Esri satellite map displays non-systematic modifications of the drainage system (deflections, offsets and sediment traps). Monostoy segment is traced 25-30km along the front of Monostoy mountain range, upslope steep facing normal fault over stepped in a left hand, has a vertical slip 0.5-1.72m on measurements of DEM. The Davaat segment continuous SW Khar zurkhnii huh nuur to northeast 58km left hand stepped graben features. The Bereeven segment may has left lateral component while small cracks like tension-gash revealed along the fault trace. It continuous Khangal nuur a 40km to Jargalant gol river in northeast. Diameter of tree grown in tension gash like hollow is around 50-55cm. We excavated one 2.5-m-deep trenches across the Monostoy fault along a NW-SE direction where the scarp, though smooth. Trench is 8 m long and located at the edge of a small stream; 5 samples (radiocarbon dating) were collected from trench to determine the age of paleoseismic events. The trenches expose two events of deformation may associated with paleo-earthquake.

Land-Use Changes and Urban Heat Island Effect as an Urban Disaster: Insights from City of Kandy, Sri Lanka

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Urban Heat Island (UHI) effect has emerged as a critical environmental disaster in Sri Lanka, significantly impacting urban communities, particularly in Kandy City. This study investigates the extreme heat effects as an urban disaster caused by UHI and explores conservation and mitigation practices. Rapid urbanization in Kandy has led to significant land-use and land-cover (LULC) changes, primarily the expansion of impervious surfaces (IS) at the expense of natural vegetation. The findings indicated that IS areas grew from 529 hectares (2.3% of the total land area) in 1996

to 1514 hectares (6.7% of the total land area) by 2006, and further increased to 5833 hectares (23.9% of the total land area) by 2017. This expansion occurred at an annual growth rate of 11.1% per year between 1996 and 2006, and 12.2% per year from 2006 to 2017. From 1996 to 2017, IS areas contrabass to elevated land surface temperatures (LST) and exacerbating the UHI effect. The urban heat island phenomenon has dire consequences for the urban community, including increased health risks such as heat stress, respiratory issues, and higher energy consumption for cooling. To mitigate these impacts, conservation and green-oriented urban planning practices are essential. Additionally, sustainable urban design that promotes better air circulation and reduces heat absorption through reflective materials can mitigate the UHI effect. This case study of Kandy City underscores the urgent need for comprehensive urban planning strategies that incorporate environmental sustainability to combat the UHI effect.

Integrated monitoring of hazardous geological processes in the territory of the Baikal rift

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The Baikal Rift System (BRS) is one of the most seismically active territories in Russia. In addition to earthquakes, the BRS is characterized by manifestations of a variety of dangerous geological processes, such as debris flows, floods, collapses and landslides, avalanches, and karst.

A network of test sites for complex monitoring of hazardous geological processes is located along the main rift structures of the central part and southwestern flank of the BRS in the territory of the Irkutsk region and in the territory of the Republic of Buryatia. This position of the measuring points allows observations of the central part of the rift system. Complex monitoring sites are equipped with modern high-precision equipment for monitoring rock deformations, radon emanations, rates of movement and deformations of the earth's crust using GPS geodesy, the Earth's magnetotelluric field, meteorological parameters, soil temperature conditions for depths of up to 10 meters, seismic regime and ambient noise variations.

In 2022, together with the Institute of Computational Mathematics and Mathematical Geophysics of the SB RAS (Novosibirsk), a special digital platform was developed for visualization, analysis and primary processing of complex monitoring data. The platform allows to display data from different types of monitoring for a selected period of time on a single tablet, carry out initial processing of the signals and save them in digital and raster form for subsequent analysis.

Technological Innovations for Flash Flood Prediction and Response in Asia

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Flash floods pose a significant threat in Asia, causing extensive damage to infrastructure, agriculture, and human lives. With climate change exacerbating their frequency and severity, innovative technological solutions are crucial for enhancing prediction and response capabilities. This presentation explores recent advancements in remote sensing, Geographic Information Systems (GIS), hydrological modeling, artificial intelligence (AI), and communication technologies

reshaping flash flood management in Asia. The role of remote sensing and GIS in flood prediction is highlighted, utilizing high-resolution satellite imagery and ground-based sensors for real-time data and accurate forecasting. GIS applications improve situational awareness by mapping flood-prone areas and integrating diverse data sources. Advanced hydrological models, incorporating remote sensing data, precisely simulate flood scenarios, as demonstrated by case studies across Asia. AI and machine learning analyze hydrometeorological data, identifying patterns to enhance flood predictions and continuously refine models for more accurate warnings. Innovative communication technologies, including mobile apps and social media, play vital roles in early warnings and emergency response coordination, alerting communities with critical evacuation and safety information. Additionally, the presentation covers the use of drones and UAVs for rapid damage assessment and aid delivery in inaccessible areas, showcasing practical applications through case studies. By demonstrating successful implementations and best practices, this presentation underscores how technological innovations can bolster Asia's resilience to flash floods. Experts from diverse fields are invited to collaborate on comprehensive strategies integrating these innovations into flood management practices.

Assessing Flood Hazards in Quinali A Watershed, Albay, Philippines: A Watershed Approach Integrating Probabilistic Risk Assessment and Participatory Methods for Disaster Management

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Albay, Philippines is lauded locally and internationally for its disaster risk management, yet recurring flooding remains a pressing issue, causing loss of life and extensive damage. Given the persistent flood risks and the potential amplification of these risks due to climate change, it warrants a comprehensive assessment of the vulnerability and risk levels in the region to guide adaptive strategies across a range of future scenarios. This study introduces an innovative method for assessing flood hazards in the Quinali. A Watershed, Albay, Philippines, blending participatory approaches and probabilistic modeling. Upon evaluating the impacts of flood hazards, the study identified an increasing trend exacerbated by climate change. Despite the notable exposure to flood hazards, communities within the watershed demonstrate commendable levels of adaptive capacity, effectively mitigating the overall flood risk. These findings emphasize the importance of adopting science-based, risk-informed strategies and implementing integrated watershed management practices to enhance community resilience and support sustainable development amidst growing climate risks.

By embracing the insights provided in this research and implementing proactive, collaborative measures informed by its findings, stakeholders can effectively mitigate the adverse impacts of flooding and advance sustainable development efforts within flood-prone regions like the Quinali

A watershed. This study offers valuable insights for policymakers, practitioners, and researchers involved in disaster risk management and climate adaptation, highlighting the necessity for proactive measures to address adverse impacts and promote sustainable development in flood-prone areas like the Quinali A watershed.

Strong-motion Evaluation near Surface Fault Rupture

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For over two decades, we have diligently collaborated with the Headquarters for Earthquake Research Promotion to assess seismic hazards in Japan. Our primary focus lies in evaluating strong ground motions, particularly those associated with near-surface fault ruptures – a crucial aspect of understanding potential earthquake impacts. The 2016 Kumamoto earthquake served as a stark reminder of the critical need for detailed analysis in strong-motion evaluation. This event highlighted that accurate assessments demand not only precise data on surface fault geometry and near-surface slip but also a refined understanding of the subsurface structure surrounding active faults. By integrating these factors, we can achieve a more comprehensive and reliable evaluation of potential ground shaking near fault ruptures. This, in turn, leads to the development of superior preparedness and mitigation strategies, ultimately enhancing community resilience in the face of seismic events.

Historical earthquakes along the Silk Roads – challenges and perspectives for archaeoseismology in Samarkand, Uzbekistan

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Time-limited instrumental earthquake catalogs, together with sparse and incomplete historical and/or geological records pose significant challenges for seismic hazard modeling. Through the analysis of deformations in ancient architectural structures, archaeoseismology offers insights into significant seismic events of the past. Consequently, it could play a crucial role in filling the gaps in historical earthquake records, thereby enhancing seismic hazard assessments. Despite successful applications of the archaeoseismological approach worldwide (mainly to stone and/or brick edifices), the earthen architecture of Samarkand historical monuments presents a unique challenge. These specific conditions require different methodology, which has not yet been defined.

Reconnaissance archaeoseismological studies were conducted in selected historical monuments in Samarkand, including the Gur-e Amir Mausoleum, Registon Square, Shah-i-Zinda, Bibi-Khanym Mosque, Ishratkhona Mausoleum, and the archaeological site of Kafir Kala, located southeast of Samarkand. These sites have all been affected by earthquakes, notably the 1897 event, which caused significant damage to the Bibi-Khanym Mosque. Additionally, they exhibit deformations that could be categorized as Earthquake Archaeological Effects (EAEs). However, upon detailed analysis of archival documents, we discovered that some of the observed deformations were evident in photographs, drawings, or paintings predating the mentioned earthquake. Moreover, the state of preservation of these structures was generally poor due to neglect.

Therefore, while the potential of archaeoseismology is evident, demonstrated by the abundance of historical architectural monuments, various factors such as the building material, problematic dating, poor preservation conditions prior to earthquakes, and sparse historical records documenting past earthquakes, significantly hinder the application of archaeoseismology in Samarkand.

Wildfire Significance and Hazard Assessment in Eastern Mongolia

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Wildfires are often considered to be natural disasters. However, they can also be viewed as a natural process of self-regeneration and a characteristic of nature itself. The objective of this study is to monitor fire occurrences using Sentinel-2 satellite imaging technology, classify the burned areas to determine burned severity, and observe extraordinary natural phenomena during the recovery process. The study area is in the eastern part of Mongolia, which experiences a high frequency of wildfires each year. Specifically, the sampling was conducted near the Shiliin Bogd mountain in the natural steppe zone and in the Bayan-Uul soums in the forest-steppe natural zone. The normalized burn ratio (NBR) method was utilized to map the fire sites and classify the burned areas. The Normalized Difference Vegetation Index (NDVI) was employed to analyze the recovery process from April to October during the summer season. The results will demonstrate time-series maps depicting burn severity and vegetation recovery processes following wildfires in eastern Mongolia. All results have been validated through field measurements. Therefore, this work scientifically explains the reason why fire is not a natural disaster in Mongolia. This research is expected to be highly beneficial for emergency workers, researchers, and environmental specialists.

Building resilience to hazards: a psychological perspective

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The last decade has seen advances in our understanding of disaster response, but the models adopted by international agencies often fail to acknowledge important psychological and historical factors in framing these responses. In this paper I briefly trace some of the key processes that might be relevant during any emergent disaster in Asia.

Even before a disaster, different communities have established histories and relations with local and national authorities as well as different psychological resources, many of these also influenced by previous events in a region. During a disaster much may depend on the ambiguity of an event as well as proximity to the disaster and how media portrays the risk. Frequently poorer, older, and less educated communities receive less help, as do some ethnic minority groups. While the great majority (approx. 2/3rds) of people will not suffer long-term distress after a disaster coping at both individual and community levels is likely to be influenced by resources and the ability to respond flexibly over time, and the possibility to monitor and adjust the efficacy of responses. In the longer term how individuals and groups respond to emergencies can then influence both intrapersonal and intergroup relations, the perpetuation or adoption of specific beliefs, values and behaviours, and further distal consequences, including an array of potentially risky behaviours. Effective interventions therefore need to be carefully tailored, must recognise the importance of trust at community and state level, and carefully consider the long-term impact of actions following an event, such as community relocation.

Evidence for an upper crustal melt lens beneath Baekdu/Changbaishan Volcano

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Mount Bakedu/Paektu (also known as Changbaishan) located on the border of China and the Democratic People's Republic of Korea (DPRK) is famous for intense volcanism in Cenozoic. Many studies show evidence for partial melt beneath the volcano, but details on the structure of the magmatic system are lacking due to a lack of data in the region. In this study, using ambient noise tomography and receiver functions at a new dense seismic array, we obtained a high resolution crust and upper mantle shear wave velocity (Vs) model beneath the volcano. The absence of velocity anomalies beneath nearby Wangtian'e and Namphothe volcanoes suggest a lack of magma within the crust. However our models show two low velocity anomalies coinciding with the location of TCV in the upper crust. The shallow one (<4km depth) overlaps with petrological estimates for the rhyolite magma reservoir, involved in recent eruptions and also depth inferred for hydrothermal reservoir from recently MT study. This may be associated with saline fluids and/or a magma reservoir. The deeper anomaly is located at depths between 7 and 14 km with a lateral extent of ~30 km. This low velocity anomaly is interpreted to be the main magma reservoir with an estimated melt fraction of ~4%-12% that could feed the surface volcanism and hydrothermal activities. This double layered low velocity anomalies is in agreement with the observations of volcanic seismicity, ground deformation and volcanic gas geochemistry in 2002-

2006 volcanic unrest. Underlying the deeper low velocity zone in the lower crust is a region of faster velocity compared to the surrounding region. In the bottom of lower crust and uppermost mantle, our Vs model shows low velocities close to the Moho beneath TCV. This is likely the source of partial melt that supplies the volcano. We proposed that magma from the mantle continues to intrude into the lower crust, where through reactive transport it migrates to form a basaltic magma reservoirs beneath CBVF, leaving behind a chemically differentiated crust with faster seismic velocities.

Seismic velocity changes observed on a dense array of nodal seismometers reveal soil moisture changes in the Critical Zone

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The Critical Zone (CZ) is the "living skin" of our planet, extending from the bottom of the water table to the top of the tree canopy. Processes occurring in the CZ are subject to a complex and dynamic interplay between soil structure, temperature, pressure, precipitation, and water content. Geophysical methods can be used to image the subsurface portion of the CZ but typically offer a point-in-time snapshot view which does not constrain changes over time. The development of ambient noise seismology allows us to exploit continuous recordings of the seismic wavefield to detect small changes in seismic velocity over time, which may be indicative of changes in the subsurface. In December 2022, in partnership with Stryde, we deployed a "large-N" array consisting of ~1600 seismic nodes at spacings between 5m and 10m for one month at a site in Dumfries, southwest Scotland. The site was chosen as it hosts a Critical Zone observatory, recording real-time data on soil moisture and temperature along with other meteorological data. Ambient noise recordings from this array are cross-correlated to retrieve the Green's function. We perform coda-wave interferometry to detect velocity changes across the array are able to observe relative seismic velocity changes of < 1% at a temporal resolution of 30 minutes. The time series of relative velocity variation are compared with measurements of soil moisture and temperature to establish relationships and correlations between changes in seismic velocity and environmental factors, and constrain the extent to which external hydrological factors influence seismic velocities. Our study shows the strongest correlations are with soil moisture content (r ~ 0.6-0.7). Heavy rainfall events leading to soil saturation temporarily disrupt the correlation trend, which then recovers as water content returns to field capacity. The correlations between velocity and soil moisture are negative, with velocity decreasing as water content increases. We attribute this to a change in the properties of the soil, whereby the density increases with added water content but the shear modulus remains the same. Other environmental factors such as soil temperature show a weaker correlation with soil moisture; however, the relationship between various factors is complex and cannot be considered in isolation. This study shows the potential benefits of newly developed nodal seismometer technology in the emerging field of Critical Zone seismology.

The comparative analysis of climate change impact on environment of Mongolia and Azerbaijan

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This research studies the comparative analysis of climate change impact on environment of Mongolia and Azerbaijan. In the last three decades, there has been growing interest to investigate the negative consequences of the accelerated climate change on environment (e.g, Dietz, et al. 2020; Verner, 2010; Pielke, et al., 2005; Stehr, et al., 1995). The findings show that there is a gap in conducting complex research on climate change impact on environment of Asian countries and upcoming adaptation processes. Research highlights the adaptation processes and proactive measures to be taken for sustainable future of Asian countries using comparative methodology of the countries such as Mongolia and Azerbaijan. Considering all these facts, this research will contribute to shed light on negative sides of climate change impact on environment of Mongolia and Azerbaijan and propose solutions to adapting policies of governments, international organizations, regional or local communities in combating with predictable adverse effects as well as the Asian countries' development goals.

Evaluating Disaster Resilience Strategies for Electric Utilities in Japan

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Disruptions in the power supply, notably in Japan, have heightened due to the increasing intensity of natural hazards like typhoons and tsunamis. Over the past six years, several significant power outages impacting millions of households have been triggered by these extreme weather events. As a result, the demand for electricity resilience has surged, placing substantial pressure on electric utilities to maintain stable power supplies.

This study aims to reevaluate the current resilience measures undertaken by these utilities, scrutinizing both the strengths and the investments in grid-hardening and business continuity plans. It will also explore the potential roles of consumers in enhancing resilience, particularly their preparedness and response capabilities. By examining the effectiveness of existing strategies through a mixed-method approach combining quantitative and qualitative analyses, the research seeks to identify any gaps and suggest possible improvements.

Furthermore, the investigation will consider the broader implications of shared responsibilities between utilities, consumers, and government entities in ensuring stable electricity during natural disasters. This could lead to a paradigm where maintaining electricity stability is seen not only as a task for utilities and governments but also as a consumer-driven initiative.

The findings may suggest that while substantial investments in resilience are already in place, there are opportunities for enhancement, particularly in consumer involvement. This study will also outline the need for future research on how responsibilities should be allocated among different stakeholders to optimize resilience against natural hazards.

How earthquake influence shallow aquifer system? Lessons learned from the coseismic liquefaction-induced deformation following the 2019 Mirpur earthquake, Pakistan

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The Mirpur city and surrounding villages were severely damaged by extensive coseismic liquefaction within 6 km of the epicentre of the Mw 5.8 Mirpur earthquake on 24 September 2019. The earthquake-induced coseismic deformation on the ground surface included sand blows, ground failure and lateral spreading, whereas subsurface coseismic signatures were observed in the form of elevated groundwater table, fractures, water-filled zones, sand dikes, and lenses of high conductivity. The geology of the study areas is dominated by the Quaternary alluvial deposits overlying a liquefied sandy soil. The inverted electrical resistivity models reveal three regional geoelectric layers having thickness ranging from 2 to 8 m characterized by resistivity values from about 25 ∧m to >100 ∧m. The fractures and elevated groundwater table were mapped on the resistivity and ground penetrating radar measurement (GPR) sections. The subsurface detection of sand dikes produced by transported liquified sand into the shallow subsurface layers and other liquefaction features (conductive clay pockets, and water enriched zones) provide unequivocal evidence of coseismic deformation/unstable ground conditions. Coseismic deformational patterns were found within the area of ground shaking intensity of VI where residential buildings and critical infrastructure (e.g., the Upper Jhelum Canal, bridges, and the main Jhelum–Jatlan road) were severely damaged. ERT and GPR surveys assisted in the reconstruction of these structural and hydrogeological features in the near-surface. Geophysical results were found in agreement with the field observations (sand blow, fissures etc.). Based on geophysical and geological measurements, we infer that the Mirpur earthquake-induced changes in the shallow aquifer system and associated deformation were primarily controlled by the local geological setting and groundwater table amongst other factors.

The characteristics and geological slip rate of the Quaternary fault in Mogod, Mongolia

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Paleoseismology not only aims to understand the coseismic characteristics of faults but also investigates how landforms created by the interplay between tectonics and surface processes driven by climate, studying how these processes affect slip rates over geological timescales. In 1967, a magnitude 7.1 earthquake occurred in Mogod, Mongolia. This fault consists of three segments—two strike faults and a reverse fault spanning from north to south. Recent research revealed a 25 ka cycle in the reverse fault located in the south segment (Bollinger et al., 2021).

To understand two remaining faults, four excavation surveys (T1, T2, T3, T4) were conducted along the two northern segments. Optically Stimulated luminescence (OSL) was used to track the most recent earthquake periods. An additional excavation survey was conducted near the river crossing the fault (at location T4) to determine the thalweg for evaluating geological slip rate.

The excavation results revealed Quaternary surface ruptures in three trenches from 51 OSL samples. The Quaternary sediment layers have been deposited since the Last Glacial Maximum (LGM), around ~20 ka. Excavation sites intersecting the fault line (T4) identified several thalwegs.

In summary, we found surface ruptures in the northern two segments around at least 20 ka, indicating more frequent earthquakes occurred than the reverse fault. Furthermore, with the completion of identifying the thalweg and age dating result, it is expected to reveal the slip rate over geological time scales.

Geophysical Observation of Mining Hazards in southern Korean Peninsula

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We have observed underground mine collapses. In Korea, to avoid environmental problems and civil complaints, mining companies frequently excavate limestone from undergrounds. It has been reported roof falls as main causes of accidents in underground limestone mines. There happened 3 underground mine collapses that have been accompanied by large roof falls. These events have generated seismic and infrasound signals that could be detected in regional distance. By analyzing seismic and infrasound signals and we could estimate source parameters of the accidents

Dualistic Bubble Formation during 946 CE Plinian Eruption at Baekdusan volcano

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Volatile exsolution and consequent gas bubble formation in subvolcanic magmatic liquid induce explosive volcanic eruptions. The liquid fraction of ascending magma bodies progressively loses volatile contents in response to ambient pressure drop. Exceptionally, some trapped in phenocrysts as melt inclusions preserve volatiles as long as their crystal traps remain undamaged. The difference in volatile preservation potential between the two mechanically separated magmatic liquid domains infers that the path of syn-eruptive magma degassing is fundamentally dualistic. Hitherto, the duality has been neither properly evidenced nor conceptualized. Here, we present direct evidence showing the dualistic nature of magma degassing in explosive silicic volcanism. Investigation of pumice deriving from the A.D. 940s Millennium eruption at Baekdusan volcano reveals that a considerable volume of gas bubbles has originated from melt inclusions in spatial and temporal separation from the host domain of magma. Common near-spherical bubble pockets containing jigsaw-fit crystal fragments therein indicate instantaneous and simultaneous total decrepitation of melt inclusions in response to drastic decompression shortly before or coincidently with magma fragmentation. The distinctive compositional zonation of Millennium

pumice coupled with bubble pockets evince a magma mixing event, possibly the trigger of the Millennium eruption as well as the inducer of mass entrapment of melt inclusions.

Monitoring Aeolian Dust Generation from Surface Coal Mines in the Mongolian Gobi Using Remote Sensing data analyses

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Surface mining in the S.E Gobi generates large coal piles, leading to significant environmental impacts, primarily due to aeolian processes that create mineral dust. We employed spaceborne remote sensing, drone observations, and numerical simulations to understand these impacts.

As the primary observation tool, we exploit Interferometric Synthetic Aperture Radar (InSAR) data from Sentinel-1 images (2018-2024), interpreting phase coherences as well as phase angles in the Small Baseline InSAR time series framework. Then, severe aeolian erosion was identified at coal mine piles in S.E Gobi. It appeared that such erosion and consequent dust generation were exacerbated by inadequate management, such as the lack of water spraying and surface covers. Our study also revealed the detrimental impact of coal dust on natural vegetation evidenced by multispectral data and an iterative classification scheme. Furthermore, numerical simulations using a particle trajectory model demonstrated the long-distance transportation of coal dust affecting N.E Asia. The reliability of the space remote sensing data and simulations was validated by 3D drone observations conducted around coal mines.

Our study highlights two key points: 1) the establishment of monitoring methods for coal piles as significant environmental hazards only utilizing public domain remote sensing data, and 2) the identification of coal dust generation processes from surface mining activities affecting local communities in the Gobi desert and surrounding regions. We propose a constant monitoring network combining spaceborne data and in-situ observations by unmanned sensing platforms to manage the extensive dust generation from surface mining activities.

Slope Movement Hazards in Afghanistan: Causes and Vulnerability Assessment

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Afghanistan, due to its geological structure and geomorphological characteristics, is exposed to slope movement hazards particularly landslides and rock falls. A calamitous example is the huge landslide occurred in 2015 in Argu of Badakhshan which killed more than 2000 people and as well as the recent deadly rock falls on highways. The reason behind the high casualties and destructions of slope movements in Afghanistan, is the failures of required measurements and appropriate action of controlling and mitigating of mass movements.

In this paper, we precise slope movement hazards in Afghanistan based on causes in the ground and preparedness on behalf of the responsible sides. The context of the paper is based on available data regarding susceptibility of areas, background of events, and visiting some areas in the field.

According to this paper, a suite of specific factors triggering occurrence of slope movements in Afghanistan such as Geological-seismotectonic status, presence of loose formation, high relief, high level of annual precipitation in some areas and sometime anthropogenic activities.

While there are some governmental organizations such as environmental geology department of AGS search for vulnerable points of rock falls and landslides (along the Salang high way, Takhar, Bamyan and Kabul city based on local people's application or after a reported event), a systematic and updated study of slope movements in Afghanistan has not been done yet. The cooperation of previously active international institutions has also been cut after collapse of the republic of Afghanistan. Over all shortage of funding, war, political changes and deficiency of expertise are the main barriers of controlling and mitigation of these events.

Considering the causes and controlling capacity of the institutions, hazard level in north-eastern and central areas of the country has been approximated high-medium, northern areas medium-high, southeastern and southern areas low – medium and western and southwestern areas low. Slopes vulnerability predominantly recorded in southeastern, central and northern parts of the country.

It is recommended to study all the territory of the country and a slope movement's hazards map must be prepared containing hazard zonation. In addition, a call for international cooperation and funding must be raised.

Recent Earthquake Ruptures Along the Philippine Fault: Insights Into Its Seismic Behavior

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The Philippine Fault, a significant left-lateral strike-slip fault running through the Philippine archipelago, has been accountable for producing destructive earthquakes. The rupture dynamics of these seismic events shed light on the along-strike variations in slip and seismic behavior of the Philippine Fault. Since 1973, seven surface rupturing earthquakes have occurred along the Philippine Fault. These include the 1973 ML 7.0 Ragay Gulf, the 1990 MS 7.8 Luzon, the 2003 MS 6.2 Masbate, the 2017 MW 6.7 Surigao del Norte, the 2017 MW 6.5 Leyte, 2020 MW 6.0 Masbate and the 2023 MW 4.7 Leyte earthquakes. Geological factors such as stepovers and creeping zones have influenced the initiation or limitation of the Mw ~6 surface rupturing earthquakes along the central segment of the Philippine Fault. Despite its relatively low magnitude, the 2023 MW 4.7 Leyte earthquake produced a surface rupture along the known creeping segment of the fault. In 2022, a MW 7.0 earthquake struck northern Luzon, believed to be associated with a branch of the Philippine Fault, but no surface rupture evidence was observed. Historical and instrumental data indicate that major earthquakes (M>7) occurred along the northern and southern branches of the fault, while moderate to strong earthquakes (M4 – M6) were more common along the central segment. Seismic gaps have been identified, particularly in the northern and southern sections of the Philippine Fault. This study provides insight into the intricate dynamics of this fault, highlighting the critical necessity for updated seismic hazard assessments.

Geodetic Data Contributions to Understanding the Active Tectonics of the Iranian Plateau

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Active tectonics of the Iranian plateau is dominated by the continental convergence between the Arabian and Eurasian plates except along the Makran oceanic subduction zone in the southeast of the plateau. This makes Iran one of the countries with the largest number of victims due to earthquakes and this will continue, as large population centers in Iran are located close to active fault zones. The availability of geodetic measurements, particularly interferometric SAR images, presents an opportunity to gain a deeper understanding of earthquake processes and seismic cycles, including interseismic, coseismic, and postseismic phases. Our knowledge of the active faulting slip rates across Iran has arisen through geodetic studies over the last twenty years. The comparison between long- and short-term fault slip rates has implications for both using decadal measurements to represent long-term strain distribution and using long-term fault slip rate measurements to assess present-day earthquake hazards. Moreover, observed geodetic coseismic surface deformation can be used to estimate the earthquake fault plane geometry and evaluate the slip distribution on the coseismic causative fault plane. This study highlights the challenges and potential biases in earthquake parameter modeling using geodetic data when the tectonic setting is not taken into account. It examines earthquakes across various tectonic settings within the Iranian plateau over the past two decades. Finally, the accessibility of geodetic data presents an opportunity to observe both long-lasting aseismic postseismic deformation and short-term seismic postseismic displacement following the earthquakes that occurred in Iran.

Landslide hazards in Mongolia

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The Altai Mountain range in Mongolia consists of the Mongolian Altai range and the Gobi-Altai range, distinguished by its unique tectonic settings. These tectonic settings have developed due to transpressive regimes associated with the Indo-Eurasian collision. On December 4, 1957, one of the strongest intracontinental earthquakes (M8.3) occurred along the Valley of Lakes in the Gobi-Altai range, specifically on the eastern segment of the Bogd fault. This region is known for several large faults and their segments, namely Chandmani (Mmax7.8), Ikh Bogd (Mmax8.1), and Tsagaan gol (Mmax7.8). Along these faults, many different sizes and types of landslides have developed. In the region, Philip & Ritz (1999) reported a gigantic paleolandslide below the Baga Bogd massif (3790m) along the Bogd fault, which occurred in the early Quaternary age. It is recognized as one of the largest paleolandslides, approximately 50 km^3, occurring within an intracontinental territory. Moreover, another massive paleolandslide was observed just below the Burhan Buudai Mountain (3765m) in the western part of the Gobi-Altai range. This landslide has a width of approximately 17.5km and a length of approximately 16km, with a main scarp slope angle of approximately 37°, and an estimated volume of approximately 56km^3. The formation of these young mountains is associated with the occurrence of these gigantic and massive landslides. Therefore, urban areas and nomadic families living near the mountains face geohazard dangers from alluvial deposits and landslides.

Seismic Hazard Study in Mongolia

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The Institute of Astronomy and Geophysics, established in 1957, has continuously updated seismic hazard study in Mongolia. This study introduces the development of seismic hazard study in Mongolia. The first seismic zoning map was created in 1958, following the 1957 Gobi-Altai earthquake with a magnitude of 8.1, through collaboration between Mongolian and Russian scientists. An official seismic zoning map was later developed in 1983 and incorporated into the building code. The first microzoning map of Ulaanbaatar developed after the 1967 Mogod earthquake. By 1990, seismic microzoning maps had been developed for nine provincial centers. In 2010, the building code was updated to use probabilistic seismic hazard maps. Since then, seismic microzoning maps for 13 provincial centers, including the capital city Ulaanbaatar, have been developed. In 2019, the seismic zoning map of Mongolia was updated using a probabilistic seismic hazard approach. Additionally, we conduct seismic hazard studies for strategic constructions in Mongolia, such as power plants, hydropower plants, and mining dams.

Natural hazards on the North-South alternative highway (Kyrgyzstan)

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To support the economic sector of the Kyrgyz Republic, the state is launching new investment projects in the field of hydropower, renewable energy sources, as well as in the development of transport networks. One such major project in the country is the construction of an alternative North-South highway with a length of 433 km, which began in 2014 to improve regional connectivity and stimulate economic growth. This study assesses natural risks on a new alternative highway that connects the northern and southern regions of the republic. The main natural risks in the study area depend on the characteristics of the geological and geomorphological structure, seismicity and climatic factors. The road passes rough terrain and faces many geological challenges such as landslides, rockfalls and landslides. This study is based on an assessment of natural risks in highway buffer zones using statistical analysis and GIS assessment. Geological hazards within a 2 km road buffer zone were selected to study their spatial distribution characteristics and risk assessment methods. Several factors are given to assess natural risks, including temperature, precipitation, topography, slope, slope orientation, vegetation cover and rock lithology. Based on the assessment of geological and geomorphological features and climatic indicators, we assessed sections of the road that are prone to rockfalls, landslides and floods. Based on the above criteria, more than 100 areas that are prone to rockfalls, landslides and flooding were previously discovered using remote sensing.

Flood Study Cases Using Sentinel-1 Satellite Images in Mongolia

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Flash floods affect residents in a dangerous way particularly in developing countries, and flood hazard maps should be available and updated. The floods produce significant financial loss so that a flood assessment model should include the estimation of economic damages. Utilization of recent technologies, such as the geographic information systems (GIS) and remote sensing (RS), in developing flood hazard maps is gaining increasing attention in the last couple of decades. A reliable estimation of floods in an urban area is crucial for efficient flood management and urban residential area planning.

In this study, we describe accurate and robust processing that allows real-time flood extension maps to be obtained, which is essential for risk mitigation. Evaluating the different Sentinel-1 parameters, our analysis shows that the best results on the final flood mapping for this study area were obtained using VH (Vertical-Horizontal) polarization configuration and Lee filtering 7 × 7 window sizes. Two methods were applied to flood maps from Sentinel-1 SAR images: (1) RGB (Red, Green, Blue color model) composition based on the differences between the pre- and post-event images; and (2) the calibration threshold technique or binarization based on histogram backscatter values. Sentinel-1 images as baseline data for the improvement of the methodological guide is appreciated, and should be used as a new source of input, calibration, and validation for hydrological models to improve the accuracy of flood risk maps. Sentinel-1 SAR Data Synthetic Aperture RADAR (Radio Detection and Ranging) is a powerful active remote sensing technology used for several applications, including flood monitoring.

The results of this study demonstrate that for the future, floods can be managed in a more efficient way. Nowdays the availability of SAR data (through Sentinel-1 satellite mission), permits the monitoring of flood situations and obtain spatial information about the stages of the floods. This methodology can be easily implemented by any municipality and due to its open source character can be developed free of cost. It can represent a useful tool in the flood risk assessment and intervention plans.

Volcanism in Mongolia and its evolution through space and time

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Volcanism is a natural hazard with multiple effects both in the natural and man-made landscapes. Volcanic eruptions can cause lava and/or mudflows destroying infrastructure, individual property, livestock and wildlife, while volcanic ashes can disrupt aerial traffic and even affect the local/global climate.

Evidence for volcanism in Mongolia goes back hundreds of millions of years. The largest part of this volcanic activity was the result of active subduction in the area, as various oceanic domains or intracontinental oceanic basins closed, leading to the amalgamation of the Eurasian continent. However, after the closure of the Mongol-Okhotsk Ocean, around 170 – 120 million years ago, Mongolia lies in the interior of the Eurasian continent, far away from tectonic environments that usually cause volcanism. During the last 107 million years volcanism in Mongolia has been near-continuous, but the cause of its origin is still debated.

In our study, we have compiled available geochronological data of the last 107 million years from the various volcanic fields in Mongolia in order to investigate the spatial evolution of this volcanic activity with time. Through this compilation we were able to identify the areas where the youngest volcanic activity in the country occurs. As the processes causing the volcanism in depth are still ongoing, these regions also show the most potential to experience a volcanic eruption in the future.

Geomorphic and paleoseismic features of the Makilala-Malungon Fault and Tangbulan Fault in southern Mindanao, Philippines

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Recent efforts on geomorphic and active faults mapping in Mindanao, Philippines show the existence of northwest- and northeast-trending faults in southern Mindanao. The Makilala-Malungon Fault (MMF), which is the north-northwest segment of the Cotabato Fault System (CFS), and the Tangbulan Fault (TB) are some of the longest active faults in the region. Based on their length, these faults have the potential to generate M>7 earthquakes.

Geomorphic features of the MMF provide evidence that the deformation is oblique with a predominant dip-slip mechanism. Tectonic bulging, fault splays, and parallel faults exist where the MMF steps to the right. The TB also shows an oblique mechanism, with left-lateral displacement

most apparent on its midsection. A parallel fault is also observed in the northern section. Cumulative vertical displacement is about ~15 meters where the TB transects Holocene deposits. Paleoseismic trenching at two sites along the TB reveals much smaller vertical displacements, ranging from 0.10 to 0.60 meters for a single surface-rupturing earthquake event.

In 2019, the northern segments of the CFS generated five M>6 earthquakes within three months. The Coulomb stress model of these earthquakes suggests a cumulative stress increase of 2-3 bars on TB, promoting the fault closer to failure. This study highlights the importance of further understanding these faults and their hazards to the rapidly growing cities in southern Mindanao.

Landslide Hazard, Vulnerability, and Risk Assessment (HVRA), Tamakoshi Rural Municipality, Dolakha, Nepal

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National Society for Earthquake Technology-Nepal

The present study has undertaken landslide hazard, vulnerability, and risk assessment of the Tamakoshi Rural Municipality of Dolakha district located in Lesser Himalayan. The area consists of 7 wards consisting of 5,038 buildings with 23,511 populations. Among several approaches, the most efficient technique for decision-making is the Analytical Hierarchy Process (AHP), which has been used for landslide hazard assessment. The field verification and inventory map of the area have helped to give acceptable prediction rates for the landslide hazard mapping. The analysis indicates that the Municipality area along the riverbank exhibits the maximum area falling under the high and very high landslide hazard zone. In contrast, the Central part of the municipality exhibits a greater part of the area in the low and very-low hazard zones. Based on 9 element area i.e., Barren land, Bush Cliff, Cultivation, Forest, Grass, Pond, Sand, and Waterbody, 19% of the area is at very high and high vulnerable, 21% moderate, and 39% of the area is in low to very low vulnerable and high and very high vulnerable are located in the western and eastern part of the municipality mainly because of the steep slope and higher habitation with anthropogenic activities. Finally, risk map prepared intersecting hazard and vulnerability maps exhibit that the municipality has less part of the area (19%) of 5% of the population falling in the high and very high-risk zones. Overall, 1,274 individuals residing inside 275 houses are prone to high and very high landslide risk.

Small but terrible: Impacts of a moderately-sized earthquake generated by a creeping segment of the Philippine fault

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At 12:28 UTC, on 15 January 2023, a shallow, moderate earthquake with a magnitude (MW) of 4.7 hit the northern part of Leyte Island, Philippines. The strongest ground shaking felt was PHIVOLCS Earthquake Intensity Scale (PEIS) VI (very strong) equivalent to Modified Mercalli Intensity (MMI) VI. Generated by the northern end of the Leyte segment of the Philippine fault, a well-documented creeping fault, the earthquake caused significant geologic, infrastructure, and socio-economic

impacts. Our field assessment revealed an ~8-km-long discontinuous surface rupture along the Leyte segment, with a maximum left-lateral displacement of 2 cm. This is the first documented surface rupture with a magnitude less than 6, associated with the Philippine fault and unusual with other known active faults, particularly along creeping segments. A high peak ground acceleration (PGA) of 0.407 g was measured, equivalent to PEIS VIII (very destructive) (MMI VIII), and was attributed to local site amplification influenced by subsurface geology. Limited landslides and liquefactions were also documented. The uniqueness of this event is attributed to the shallowness of the earthquake source, and local site conditions, including geology, geomorphology, and soil properties, contributed to the severity of the impacts. With regards to socio-economic impacts, there were 18 persons injured and structural damages worth 500 thousand US dollars including damage to 434 residential houses and 23 public infrastructures. This event emphasizes the importance of documenting earthquake impacts as a tool and guide for medium- and long-term earthquake risk assessment and resiliency, even for low-magnitude earthquakes.

Local Hazard Mapping for Disaster Risk Reduction Plans and Action – Experiences from Farming Communities in Natural Resources Management and Livelihood Promotion Projects, India

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India is one of the most disaster-prone countries in the world. The locational and geographical features render it vulnerable to a number of hazards and disasters. Long term planning for disaster mitigation form part of process of development planning in India. As the country has been facing hazards over centuries, the local communities have developed own indigenous coping mechanisms. The rich store house of this knowledge is country's proud inheritance. At the time of emergencies, spontaneous community action supported by Non-Governmental Organizations adds strength to national capability in disaster management. However, the areas where efforts made and results achieved does not commensurate with magnitude of the problem are forging linkages between disaster reduction and development, training and education, participation at community level, enlisting people's participation in integrating social and human science inputs in vulnerability assessment and appropriate resource allocation against competing demands.

The paper describes the process, outcomes and learning’s from LWR-IDF’s transitional TBR-TP (Trans-boundary Resilience–Transitional phase) project, Saupal, Bihar, India. The project supported, trained and mentored Change Agents both men and women from village based institutions; Community Disaster Management Committees (CDMCs) using participatory approaches and engaging stakeholders in:

a) Identifying and mapping potential hazards both at community level and within and around their watershed boundaries

b) Finalising Disaster Risk Reduction (DRR) plans in consultation with State and Non-State stakeholders

c) Taking actions as per DRR plans for prevention, mitigation, resilience and adaptation for self-reliance

The lesson learnt from the project has been disseminated for wider outreach and actions.

Local Hazard Mapping for Disaster Risk Reduction Plans and Action – Experiences from Farming Communities in Natural Resources Management and Livelihood Promotion Projects, India

Experience in management of an Organic Zone in central highlands in Sri Lanka

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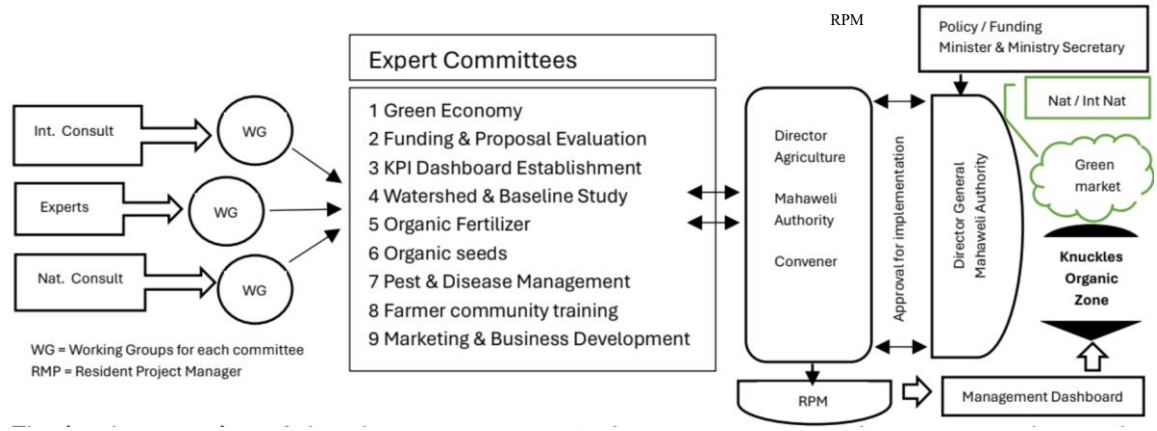
Application of Agrochemicals and synthetic fertilizers is considered as environmental hazards due to the consequence health issues, detrimental effects to sensitive ecological balance and soil stability globally.

In order to promote toxin free agriculture, the Sri Lankan government declared an organic zone [Extraordinary Gazette No 2181/25 dated 26.06.2020] in the central highlands called the “Knuckles” mountain range, a UNESCO world heritage site and part of the largest watershed for 103 river basins in Sri Lanka. Approximated 5000 hectares were demarcated as toxin free region under Mahaweli system F, an agro-ecological region managed under the Mahaweli Authority, an organization established under the purview of Ministry of Irrigation of Sri Lanka to manage agricultural lands, water and watersheds for the innovative agriculture, renewable energy and conserving environment.

The Technical Advisory Committee appointed by the ministry to advice the ministry on management of the organic zone, proposed a comprehensive management plan with multidisciplinary expertise and training plan on toxin free agriculture for farmer communities in the zone including climate resilient agriculture. The proposed management plan is outlined in the following diagram.



The implementation of the above management plan was not a complete success due to the bureaucratic constraints within the managing authorities and the scarcity in funds experienced by the authorities. Based on the experience of the authors who were members of the technical advisory committee recommends a watershed based management plan for toxin free agriculture in Sri Lanka.

Projections of Mongolia Drought and Climate Drivers Using CMIP6 Model

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The risk of natural disasters, fluctuations in precipitation, and drought due to climate change is increasing. This is an environmental problem that affects the society and economy of the region and is not only a regional issue but also a major global environmental and ecological concern. In this study, based on data from phase 6 of the Coupled Model Intercomparison Project (CMIP6) and data from Mongolia from 2000 to 2021, we developed a standardized precipitation index (SPI) for drought conditions, duration, and future trends in Mongolia from 2022 to 2100. The SPI is intended to be produced from three observational datasets. Drought conditions in most parts of the region are expected to become more severe in the future, as estimated using the Theil-Sen slope and Mann-Kendall trend test methods for trend analysis, with modest decreases in precipitation and continued increases in temperature under the CMIP6 models. This study contributes to projecting future drought conditions and increases the use of the latest CMIP6 climate models and scenarios.

Landslide of Tsambagarav Mountain (Western Mongolia)

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Local people lived in the area Tsambagaray mountain are listened very roaring sound at 02:00 AM on the night of July 27, 2021 in village Erdeneburen in Province Khoyd. At that time, the local families were in a situation where they were tought loud noises due to the strong wind. At 9:00 AM in the morning, a herdsman who went to his cattle saw the aftermath of a huge natural disaster. The landslide of Mount Tsambagarav, caused by the melting of the snow in the front edge of the permafrost and the flood caused by the heavy rain caused the accumulation of water in a series of lakes, causing water infiltration into the surrounding soil. As a result, the water level of the lowest part of the lake, where the series was established, increased, and the embankment, weakened by years of water infiltration, was breached. Disasters are likely to be repeated over many years due to the increase in lake water level, annual increase in soil water infiltration, and severe flooding. Total: Distance long 28.0 kms, field 85.4 sq.kms (8540 ha). Landslide field: 42.0sq.kms, 4200 ha, region's forest and animals: 62.0 ha, A forest total destroyed by the disaster: 20.0 ha. The landslide of Mount Tsambagaray is one of the natural disasters caused by the infiltration of water accumulated over many years and caused by floods. In the future, it can be considered that the possibility of floods and landslides depending on the height difference remains. Disasters related to rising lake levels, annual increases in soil water infiltration, and severe flooding are likely to recur over many years. Main researching area is field in landslide area small river "Ganga" in Bayangol Erdeneburen village in Khoyd province. Main goal is clarifying the causes of landslides in area Tsambagarav evaluating geological processes, establishing disaster standards, and conducting comparative studies.

Enhanced Environmental Public Health Surveillance in Ulaanbaatar, Mongolia: A Model for Resilient and Health-Focused Environmental Management Across Asia

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The rapid urbanization and environmental challenges in Ulaanbaatar, Mongolia underscore the critical need for effective environmental public health surveillance systems. This presentation will discuss how the National Center for Public Health (NCPH) of Mongolia has integrated health-focused environmental surveillance to address the city's severe air pollution crisis, presenting a model adaptable for resilience building across Asia.

Ulaanbaatar experiences significant air pollution due to indoor solid fuel use, urban migration, and outdated technologies, severely impacting respiratory and circulatory health. Despite interventions like the ban on raw coal and continuous monitoring of PM2.5, PM10, and sulfur dioxide, pollution levels frequently exceed safety guidelines, posing persistent health risks.

Our presentation will detail the establishment and enhancement of Ulaanbaatar’s environmental public health surveillance system. We will discuss the public health impacts of air pollution, the

necessity for sustained surveillance, and the effectiveness of recent interventions. Current data analysis will highlight the health implications of high pollutant levels and evaluate the coal ban's partial success.

Additionally, we will explore the role of advanced technologies and data analytics in air quality monitoring, essential for identifying pollution trends and high-risk areas to improve public health responses. Emphasizing multi-disciplinary collaboration among health authorities, environmental agencies, researchers, and communities, we aim to develop evidence-based strategies applicable across Asia.

NCPH seeks to showcase innovative approaches and promote collaborative efforts to enhance resilience and safeguard public health against environmental risks, contributing significantly to the global narrative of health-focused environmental management in rapidly evolving urban landscapes.

Waste Water Hazards in Nepal

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The occurrence and distribution of bacterial isolates along with their resistance determinants in various wastewaters and rivers of Kathmandu, Nepal is high. Water surveillance of pathogens can inform public health responses. Implications of monitoring microbial pollutants in wastewater is essential for understanding transmission risk of pathogens (feco-oral/air-borne droplets), indication of high risk pathogens circulating in wastewater, environmental dissemination pattern of antimicrobial resistance (AMR), wastewater based epidemiology to inform public health. Few study indicate that hospital wastewater and untreated municipal sewage could be the potential reservoirs for the carbapenem resistant bacteria (CRB) and carbapenem resistance genes (CRGs). Researchers show that the dominant bacteria isolated were *E. coli* and *K. pneumoniae*, with a significant proportion of CRGs including blaNDM-1, blaKPC, blaOXA and intI1 genes. Furthermore, the study highlights the higher prevalence of CRGs in hospital wastewater compared to untreated sewage water and river water, particularly in winter season. The co-occurrence of multiple CRGs along with the intI1 genes in hospital wastewater indicates that there might be potential transfer of resistance genes among bacterial isolates and can act as a principal starting point for the dispersion of CRGs into the environment. More importantly, the increase in minimum inhibitory concentration (MIC) of meropenem was significantly associated with the detection of CRGs in bacterial isolates. Since there is limited treatment of hospital and municipal wastewaters in Nepal, results are expected to sensitize the policy makers and concerned authorities to properly treat and manage the wastewater to reduce the bioburden of antibiotic resistance in the environment.

Surface breaking Main Frontal Thrust (MFT) in the Nahan Segment, Western Himalaya

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The Sub-Himalayan range front between the left-lateral Sabilpur Active Fault (SAF) and the right-lateral Black Mango Fault (BMF) corresponds to the ~30 km long Nahan Segment of the Western Himalaya. This segment is a blind spot on a paleoseismological map with no data available on surface ruptures from past earthquakes. However, for earthquake hazard assessment it would be necessary to examine if the potentially active faults eg. MFT in this region/segment has caused surface ruptures during past earthquakes. Although there is no such data to characterize this segment, it is notable that the range front displays a linear morphogenic character typical of surface rupturing active faults. We present the details of this linear morphogenic anomaly which have been picked on satellite imageries and Digital Elevation Models. The linear morphogenic anomaly spatially corresponds with series of discontinuous scarplets and discernible topographic break that offset young landforms and modifies stream behaviour along the range front. The present investigation is supported by shallow sub-surface profiles across sites which reveal active faulting features along the identified sections. Paleoseismic Trenching at the identified sites could capture the fault rupture propagating all the way and breaking the surface. Detailed outcrop-scale structural geometry and stratigraphic association of deformed and undeformed units within the trench show a clear dip slip earthquake event. Dating of the young sedimentary layers associated involved in faulting/thrusting is in process and we hope to bring out some important insights on the past earthquakes from the Nahan segment.

To the problems of the religious beliefs of Mongolians about environment: modernity and tradition

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Ecological issues like land and area pollution are getting crucial under human wrong relation to the nature and inadequate environment policy. Our paper's, named by "To the problems of the religious beliefs of Mongolians about environment: modernity and tradition"main philosophy is that all ecological problems which are related to the environment depend on human consciousness. Its emphasis is on people: where they are, what they are like, how they interact over space, and what kinds of landscapes of human use they erect on the natural landscapes they occupy. Core of the human reasonable behavior is the environmental ethics. Ethics is the main branch of the philosophical sciences. The main hypothesis of our intended paper that the Mongolian environmental tradiotional knowledge based on their good humanistic and also ecological ethics and beliefs. Specific character of that beliefs is the sense of nature as a subject who has a right to live. But in modernity Mongolia has now serious problems related to the environment. There are problems such as drought and soil lost and water ecosystem under the

climate change, eco social problems such as toilet and garbage problems of the tourist regions, inadequate environment policy, urbanism et cet. So, to solve those environmental problems, Mongolian society and government need to attend and consider as a main factor or Mongolian traditional ethics and belifs about the environment and civil society's members should manage and act for the both human's and nature's rights.

Co-creating a Probabilistic Climate and Disaster Risk and Infrastructure Assessment Framework for the Establishing Safe and Resilient Universities in the Philippines (SAFER-U) Project.

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State Universities and Colleges (SUCs) in the Philippines function beyond their fundamental role of providing education. These institutions, aside from being the primary training grounds for future generations, also serve as repositories of knowledge and history, and as purveyors of climate and disaster-resilient practices. Likewise, SUCs in the Philippines, while sustaining a functioning community within its walls, are parts of the larger communities beyond its grounds which makes them integral to the well-being and development of the whole country. As institutions in the Philippines - a country that is highly at risk from a very wide range of geological and hydrometeorological hazards, SUCs also face the challenge of finding ways to adapt to and mitigate potential disasters. The Establishing Safe and Resilient Universities in the Philippines through Risk- and Climate Change-Sensitive Land Use Development and Infrastructure Planning (SAFER-U) project was implemented to assist SUCs in the Philippines in complying with the Republic Act No. 11396, also known as the "SUCs Land Use Development and Infrastructure Plan Act". While the project delivered various outputs, this poster presentation focuses on the process and significance of bringing together stakeholders in creating a Climate and Disaster Risk and Infrastructure Assessment Framework and the necessity of approaching the assessment of hydrometeorological hazards in a probabilistic manner. This poster presentation hinges heavily on the idea that spaces, including SUCs, do not exist in a vacuum and that the symbiotic relationship between SUCs and their communities heavily highlights the need for a participatory approach.

Geographies of Community Networks and a Missing Link for an Efficient Disaster Response Process: A Case Study on Community First Responder Systems in Japan and Sri Lanka

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Households in a particular census block are considered as the Micro Geographical Network Response Units (MGNRU) which expand to form a Community Network Census-Block (CNCB) in a particular geographic area. Funeral Aid Societies (FAS) (*Maranadhara Sangam*) in a CNCB in Sri Lanka is considered as one of cardinal hubs of social capital mobilization, functioning as self-help voluntary system that has been operating for over three centuries, dating back to the colonial era. FAS provides cash and various forms of assistance to manage traditional funeral rites continuously for up to seven days. Similarly, Bokomi is Disaster-Safe Welfare Community initiated by the Kobe city, Japan and is associated with the fire units of respective wards. Working modality of Bokomi is based on trust, mutual help, voluntarily community welfare, and community disaster prevention activities. The common activities of Japan's Bokomi and Sri Lanka's FAS serve as social capital resources with strong networks that may enhance community resilience through voluntary mutual help as a soft measure in disaster management.

Empirical data on social networking for different phases of flooding disaster events, were collected through semi-structured interviews, focus group discussions, and field observations. A mixed-method research approach was employed for data analysis.

Results reveal that, community resilience is crucial for minimizing the impacts of hazards by enhancing the capacity to absorb impacts, recover from disaster events, and adapt to changing conditions. FAS should be recognized by granting them authority to release disaster relief cash grants to the relevant beneficiaries. Legalizing FAS, developing their capacity, and providing proper recognition as a response governance body at the grassroots level are essential steps.

Main results of hydrogeological studies for the prediction of strong earthquakes in the territory of the northeastern tien shan within the coordinates ϕ=39°- 44°n, λ=73,6 - 81°e

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The results of seismological and Hydro-geological observations conducted by the Institute of Seismology of the National Academy of Sciences of the Kyrgyz Republic to forecast strong earthquakes in the territory of the North-Eastern Tien-Shan are given. Peculiarities of seismicity manifestation and changes in groundwater parameters are investigated. Prospects of predicting the place, strength, and time of strong events based on a complex of seismological and hydrogeological data are discussed.

The results of long-term studies, in the seismic regime of the North-Eastern Tien-Shan there is a regular alternation of periods of activation and quiescence. In 1970, a new stage of activation began in the territory under consideration, there was an increase in seismic activity on the territory of the Issyk-Kul region and border areas of Kazakhstan and China. From 1978 to 2024 there are large 12-year seismic cycles, with destructive earthquakes with M>6.3 at the beginning and middle of each cycle. The end of cycles, is most often, accompanied by a decrease in seismic activity. In addition, there is an intra-annual seasonal cyclicity in the increase of weak and strong shocks in seismic processes. Statistically, three main phases are distinguished: 1. spring - March-April-May with a peak in April, 2. summer - June-July-August with a peak in August, and 3. autumn-winter - November-December-January with a peak in January.

Significant changes in the content of Thermo mineral components and dynamic parameters of groundwater were observed mainly in the preparation of strong earthquakes or near them. The exception was the Uchturfan earthquake 2024 M=7. Changes of hydrogeochemical and hydrodynamic parameters at observation points were observed more than 130 km from the earthquake origin.

Mapping and monitoring slow-moving landslides for multihazard risk assessment

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Landslides are one of the most damaging disasters and have killed tens of thousands of people over the 21st century. Slow-moving landslides (i.e., those with surface velocities on the order of 10^{-2}-10^{1} m a^{-1}) can be highly disruptive but are often overlooked in hazard inventories due to their subtle surface signatures and slow movement. These landslides are important components of many multihazard cascades (including interactions with GLOFs, debris flows, seismic activity, and volcanism), and identifying their location is key to early warning and effective hazard mitigation. Here, we discuss an approach to automatically map slow-moving landslides using feature tracking of freely- and globally available Sentinel-2 optical satellite imagery. We detect slow-moving landslides in complex environments using 10-m resolution globally available satellite imagery, all without any manual intervention. Taken together, this means that our workflow can be applied to

any region on Earth, regardless of the availability of prior information. Improved mapping of the spatial distribution and surface displacement rates of slow-moving landslides will improve our understanding of their role in the multi-hazard chain and can direct detailed investigations into their dynamics. I will discuss the implications of this through several multihazard case studies.

Climate-related transition and physical risks and its impact on small and medium enterprises (SMEs) in Asia Pacific and mitigation strategies

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Environmental hazards and climate-related physical risks are related concepts. For example, physical hazards – extreme weather events, natural hazards – landslides. Especially nowadays, due to climate change, Asia remained the world's most disaster-affected region in 2023 due to weather, climate, and water-related hazards (*WMO Report*, 2024). In addition, one of the most significant, and perhaps most misunderstood, risks that organizations face today relates to climate change. This also has financial implications for many organizations, leading to the understanding that climate-related risks can indeed be financial risks (NGFS, 2019). It also poses current challenges as people from climate-vulnerable areas are forced to relocate due to extreme weather conditions such as heavy rainfall, landslides, and droughts. This results in infrastructure damage (Grippa et al., 2019) and affects businesses, investors, and individuals in various ways, including the financial systems. Small and medium enterprises (SMEs) in APEC account for over 97% of all businesses and employ over half of the workforce (*Small and Medium Enterprises*, 2024.). Asgary et al (2020) said, "Small and medium enterprises, like large corporations, face a significant number of climate-related risks, and their survival and resilience are important for national and global economies. However, SMEs are less prepared to manage these risks". SMEs do not have enough resources and expertise to focus on these activities and, therefore, are more vulnerable to these risks and disruptive shocks. To minimize these impacts, it is important that SMEs become more aware of these risks and prepare how to eliminate and be resilient if their businesses are impacted.

6 February 2023 Kahramanmaraş Earthquake Sequence (Türkiye): State of knowledge before and after.

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On 6 February 2023, a series of earthquakes struck south-eastern Türkiye and northern Syria, causing a death toll of more than 50.000 people and an economic loss of billions of US Dollars. The devastating sequence started with the Mw 7.0 Narlı Earthquake along a subsidiary splay of the East Anatolian Fault which was then instantly followed by the Mw 7.8 Pazarcık Earthquake bilaterally rupturing multiple structural elements in a complex triple junction system. These were followed ~9 hours later by the Mw 7.6 Elbistan Earthquake that took place on the Çardak and the (previously unknown) Yeşilyurt faults. The involvement of multiple fault segments and the immense size of the affected region raise multiple questions such as the controlling factors, the extent of the rupture length, slip distribution, width of the rupture zone, and any potential seismic gaps that were brought closer to failure.

This presentation aims first to summarise our knowledge of the neo- and active tectonics of the region prior to these devastating events, and then to provide information on the post-earthquake (mostly field-oriented) studies, including sUAS imagery and offset measurements, which was acquired along almost the entire rupture zone. Hundreds of offset measurements and a very precise surface rupture map suggest up to ~7 and ~8.5 meters of maximum sinistral displacements for the Pazarcık and Elbistan earthquakes, respectively. These preliminary results simply point out a more complex seismic behaviour for this region and most likely for other continental strike slip faults.

Post-eruptive coastal erosion of volcanic oceanic islands formed by historical eruptions

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Coastlines of island volcanoes are dynamic due to their exposure to ocean waves and consequently hazardous from cliff collapses. Historically erupted island volcanoes are useful for such studies as they offer the opportunity to observe how their coasts have evolved throughout their lifetimes. Commonly their young coasts are eroded rapidly as their cliffs are not protected by wave attenuation due to a lack of a littoral platform. We have derived coastline positions from satellite images, survey maps and aerial photos for 12 volcanic islands formed by historical eruptions located globally (Asian-Pacific regions are prone to such eruptions, e.g., the 2022 Hunga Tonga-Hunga Ha'apai volcano). Post-eruptive coastline erosion rates vary between them as they are subject to different wave regimes. However, results show that in all cases coastal erosion rates were rapid in the early stages following the eruptions but then declined gradually with time. Marine geophysical data collected around the Capelinhos coast reveal how erosion has left a littoral platform. Attenuation of waves crossing such a platform could contribute to the slowing of erosion rates, but modelling suggests that attenuation cannot explain the majority of that change. We suggest that the common slowing of erosion rates is probably due to the outer erupted materials of the cones typically being unconsolidated and erodible, while deeper materials are more consolidated and/or lithified. Consequently, although cliff collapses can become larger with time as cones are dissected by wave erosion, the frequency of cliff collapses hazard due to environmental forcing declines.