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**"Advancing Geoscience  
Research, Promoting  
Sustainability, and Delivering  
Expert Consultation for a  
Resilient Future."**

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## **CAREER OBJECTIVE:**

As a dedicated geoscientist with extensive experience in fluvial and tectonic geomorphology, active fault identification, and 3D subsurface modeling, I seek to contribute to advanced geological research and geohazard assessment in an academic environment. My research interests focus on seismic hazards, landslides, remote sensing applications, and the development of innovative methodologies to address climate adaptation and sustainable urban planning challenges.

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## **RESEARCH INTERESTS:**

- Fluvial and Tectonic Geomorphology
- Mountain Hazards (Landslide, debris flow, GLOF, Flash Flood etc.)
- Landslides and River Bank Erosion
- Geohazard, Active Fault Identification and Seismology/Paleo Seismology
- Applications of Remote Sensing and GIS in Hazard Assessment
- Morphometric Analysis and relation to active tectonics
- Paleo-depositional Environment
- 3D Geological Modelling

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## **STRENGTHS**

- **Analytical Expertise:** Strong interpretation of geological, geospatial, and remote sensing data.
- **Adaptability:** Effective under pressure and adaptable to new challenges.
- **Field & Lab Proficiency:** Skilled in borehole logging, geotechnical studies, seismic data interpretation, and DEM analysis.

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## **EDUCATION:**

### **M.Sc. in Engineering Geology**

University Kebangsaan Malaysia (UKM), Malaysia | 2013–2014 | Grade: B

Thesis: *Landslide Density Analysis in Cameron Highlands Using GIS*

- Key courses: Geohazard Investigation, Soil Engineering, Engineering Geophysics, Engineering Geology, Rock Engineering, Environmental Management System, Research Methodology, Hydrogeology etc.

### **M.Sc. in Petroleum Geology & Geophysics**

University of Dhaka (DU), Bangladesh | 2005–2006 (Exam 2009) | 2nd Class

- Key courses: Pollution and Waste Management, Stratigraphy and Reconstructing Quaternary Environment, Petroleum system and Basin Evaluation, Petroleum Reservoir Geology, Exploration Geophysics etc.

### **B.Sc. (Hons) in Geology**

University of Dhaka (DU), Bangladesh | 2001–2005 (Exam held in 2007) | 2nd Class

- Key courses: Geophysics, Engineering Geology, Geomorphology, Physical Geology and Optical Remote Sensing Geology, Stratigraphy, Sedimentology, Hydrogeology, Petrology and Mineralogy, Paleontology etc.

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## **Technical Skills**

- **Geospatial Data Collection & Analysis:** Expertise in gathering and processing various geospatial data types, including satellite imagery, topographic maps, and climate data. Proficient in creating geomorphological maps, conducting land use classification, assessing climate risks (e.g., inundation mapping), and detecting river course changes to support sustainable urban planning.
- **Terrain Morphometry & Basin Analysis:** Skilled in hydrological analysis through watershed and basin delineation, channel network analysis, and calculation of geomorphometric indices (e.g., Hypsometric Integral, Basin Height Ratio, Drainage Density) linked to active tectonics using Digital Elevation Models (DEMs).
- **Landslide Susceptibility Modelling:** Proficient in applying the Analytical Hierarchy Process (AHP) and Weighted Overlay Method for landslide susceptibility mapping.
- **Lineament Mapping & Structural Trends Analysis:** Experienced in using high-resolution satellite imagery, DEM, and rose diagrams for mapping and analyzing structural trends and lineament features.
- **Land Cover Mapping:** Expertise in supervised and unsupervised classification techniques for land cover mapping using remote sensing data.

- **Geomorphological Mapping:** Skilled in geomorphological mapping through aerial photo interpretation, satellite images, and DEM analysis to assess landscape evolution and active tectonics.
  - **River Change Detection & Mapping:** Proficient in river change detection and mapping using aerial photos, satellite imagery, and techniques like the Normalized Difference Water Index (NDWI) for assessing changes in watercourses.
  - **Remote Sensing Indices Calculation:** Experienced in calculating key remote sensing indices, including NDVI, NDWI, MNDWI, NDBI, SAVI, NDMI, among others, for environmental analysis.
  - **Land Surface Temperature (LST) Analysis:** Proficient in calculating LST from optical satellite images to assess thermal properties and environmental conditions.
  - **Geostatistical Analysis & Interpolation:** Expertise in geostatistical methods, including Kriging and other interpolation techniques for spatial data analysis and predictive modeling.
  - **3D Subsurface Lithological Modelling & Depositional Domain Analysis:** Proficient in 3D subsurface modeling for lithological analysis and understanding depositional environments.
  - **Fieldwork & Geological Surveying:** Experienced in geological fieldwork, including geological mapping, drilling (Standard Penetration Test - SPT), soil sampling, borehole logging, and geotechnical site investigations.
  - **Laboratory Testing:** Skilled in laboratory testing of soil samples, including grain size distribution analysis, Atterberg limits (liquid, plastic, shrinkage limits), moisture content determination, and determination of cohesion and friction angle using direct shear tests.
  - **Project Database Development (ISEG):** Experienced in developing engineering geological project databases using the "Information System for Engineering Geology (ISEG)" spatial database to manage geospatial data, geological logs, and related analysis.
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## **SOFTWARE SKILLS:**

- **Subsurface Viewer** | 3D Subsurface Geological Modeling
  - **ArcGIS, QGIS, SAGA GIS** | Geological Mapping, Geomorphological Analysis
  - **ENVI, Geomatica** | Remote Sensing and Image Processing
  - **Global Mapper** | Data Visualization and Mapping
  - **Rockworks, Starter** | Lithology and Modeling
  - **Python** | Basic Programming for Geoscientific Analysis
  - **SNAP software** | for preprocessing of satellite images
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## PUBLICATIONS:

1. Sattar, A., Cook, K. L., Rai, S. K., Berthier, E., Allen, S., Rinzin, S., Vries, M. V. W. de, Haeberli, W., Kushwaha, P., Shugar, D. H., Emmer, A., Haritashya, U. K., Frey, H., Rao, P., Gurudin, K. S. K., Rai, P., Rajak, R., **Hossain, F.**, Huggel, C., ... Bhat, S. Y. (2025). The Sikkim Flood of October 2023: Drivers, Causes, and Impacts of a Multihazard Cascade. *Science*. <https://doi.org/10.1126/science.ads2659>
2. **Hossain, F.**, Kamal, M. A., & Afrin, T. (2024). Fluvio-geomorphic Change of the Padma-Meghna River Course Using NDWI and MNDWI Techniques. *Water Science*, 38(1), 293–310. <https://doi.org/10.1080/23570008.2024.2344752>
3. **Hossain, F.**, Akter, S., & Ahsan, A. (2018). Digital Elevation Modeling of Saint Martin Island, Bangladesh: A Method Based on Open-Source Google Earth Data. *International Journal of Advanced Research*, 6(2), 379-389. <http://dx.doi.org/10.21474/IJAR01/6449>
4. Kabir, M. A., Hossain, K., **Hossain, F.**, & Khan, M. O. F. (2018). Hydro-Geochemical Evaluation of Groundwater and Aquifer Characteristics: A Case Study from Sadar Upazila of Chapainawabganj District, Bangladesh. *International Journal of Advanced Research*, 6(4), 584-598. <http://dx.doi.org/10.21474/IJAR01/6893>
5. Ekram Ali, R. M., Rahman, M. A., Talukder, A., Kabir, M. A., Akter, S., **Hossain, F.**, & Habib, M. A. (2024). An Investigation of the Dauki Fault Rupture during the 1897 Earthquake: Trench Investigation at Majer Tila, Taherpur Upazila, Sunamganj District, Bangladesh. *2nd National Seminar on Geology for Sustainable Development of Bangladesh*, 09-10 May, 2024, Dhaka, Bangladesh, ISSN 2958-616X, pp. 180-193.
6. Faruqa, N. N., Scadhe, S., **Hossain, F.**, & Kamal, M. A. (2024). Voxel Model: A Sub-Surface Visualization and Analytical Tool for Geoscientific Analyses and Decision Making – Case Study of Satkhira Town and Surroundings. *2nd National Seminar on Geology for Sustainable Development of Bangladesh*, 09-10 May, 2024, Dhaka, Bangladesh, ISSN 2958-616X, pp. 203-220.
7. **Hossain, F.**, Faruqa, N. N., & Kamal, M. A. (2025). Three-Dimensional Shallow Subsurface Lithological Modelling of the Ganges Delta: A Case Study of Khulna City, Bangladesh. *3rd National Seminar on Geology for Sustainable Development of Bangladesh*, 3-4 May, 2025, Dhaka, Bangladesh. (Under review)

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## CURRENT RESEARCH ACTIVITIES (Ongoing)

1. Fluvial and Tectonic Geomorphology of the Lovachara Region, Northeastern Bangladesh: A Study of the Interplay Between River Dynamics and Dauki Fault-Driven Tectonic Uplift.

2. Structural Trends, and Morphometric Analysis of Northeastern Bangladesh: Implications for Active Tectonics, Seismic Hazards, and Landscape Evolution.
3. Recent earthquakes and Active Tectonics of the Plio-Pleistocene Lalmai hills, Bangladesh.
4. Three-Dimensional Subsurface Lithological Modelling of the Satkhira, Khulna, Barishal and Faridpur City and Surroundings Using Subsurface Viewer Software.
5. A 50-Year Analysis of Land Use Changes in Gopalganj Town Using Supervised SVM Classification Technique.
6. Erosion and Fluvio-Geomorphic Change Dynamics of the Madhumati River, using geospatial technique.
7. 3D Lithological Modelling and Paleo-Depositional Environment of the Active Ganges-Brahmaputra-Meghna River Delta: a case study of Gopalganj district, Bangladesh.

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### **Scientific Reports (Unpublished)**

1. Rahman, M. A., Talukder, A., **Hossain, F.** (2017). *Liquefaction Susceptibility of Panchagarh Paurashava and Surroundings through Geomorphological, Geological, Engineering Geological Mapping and Seismic Microzoning*. Unpublished Report of Geological Survey of Bangladesh (GSB).
2. Rahman, M. A., **Hossain, F.**, Hossain, M. A. (2017). *Environmental Geology Assessment and Landslide Zoning of Khagrachari Sadar Upazila, Bangladesh*. Unpublished Report of Geological Survey of Bangladesh (GSB).
3. Rahman, M. A., **Hossain, F.**, Habib, M. A. (2017). *Earthquake Probability Assessment of Barek Tila and Adjoining Area of Taherpur, Sunamganj Through Active Fault Identification and Characterization*. Unpublished Report of Geological Survey of Bangladesh (GSB).
4. Rahman, M. A., **Hossain, F.**, Habib, M. A. (2019). *Identification of Active Fault and Earthquake Probability Analysis at Barekertila Surroundings, Taherpur Upazila, Sunamganj District*. Unpublished Report of Geological Survey of Bangladesh (GSB).
5. **Hossain, F.** (2014). *Landslide Density Analysis in Cameron Highlands, Malaysia, Using Geographic Information System*. MSc Thesis.
6. Shamsuzzaman, M., Alam, M. F., **Hossain, F.** (2012). *Coastal Geological and Geomorphological Mapping for the Determination of Terrain Characteristics and Associated Coastal Hazards of the Kutubdia Upazila, Cox's Bazar District, Bangladesh*. Unpublished Report of Geological Survey of Bangladesh (GSB).
7. Rahman, M. A., **Hossain, F.**, Habib, M. A., Akter, S. (2019). *Landslide Zoning and Geoenvironmental Analysis of Refugee Camps (Balukhali, Kutupalong, Nayapara, Chakmarkul) and Surroundings of*

*Teknaf and Ukhiya Upazilas, Cox's Bazar District, Bangladesh.* Unpublished Report of Geological Survey of Bangladesh (GSB).

8. Shamsuzzaman, M., Alam, M. F., **Hossain, F.** (2012). *Coastal Geological and Geomorphological Mapping for the Determination of Severe Erosion Causes along the Kolatali to Inani Sea Beach, Cox's Bazar District, Bangladesh.* Unpublished Report of Geological Survey of Bangladesh (GSB).
9. Khan, S. R., Shamsuzzaman, M., Alam, M. F., **Hossain, F.** (2012). *Coastal Geological and Geotechnical Feasibility for the Establishment of LNG Receiving Terminal at Maheshkhali Island, Cox's Bazar District, Bangladesh.* Unpublished Report of Geological Survey of Bangladesh (GSB).
10. Alam, M. F., Zabin, S., **Hossain, F.**, Afrin, T. (2023). *Engineering Geological Mapping and 3D Modelling for Sustainable Urban Planning in Gopalganj Municipality and Surroundings* (Draft).
11. Alam, M. F., Zabin, S., **Hossain, F.**, Afrin, T. (2024). *Engineering Geological Mapping and 3D Modelling for Sustainable Urban Planning in Cumilla City Corporation and Surroundings* (Draft).
12. Shamsuzzaman, M., **Hossain, F.**, Uddin, M., Hossain, M. I. (2023). *Geological Mapping in the Exposed Eocene Limestone of Geological Heritage Site and Adjoining Area, Jaflong, Goainghat, Sylhet.*

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### **TECHNICAL TRAINING:**

- **3D Subsurface Modelling** | Insight, Germany | 2022 (30 days)
- **Slope Land Disaster Reduction** | National Taiwan University | 2015 (15 days)
- **Earthquake Risk Assessment (HAZUS)** | Geological Survey of Bangladesh | 2015 (6 days)
- **3D Resistivity Survey** | Geological Survey of Bangladesh | 2015 (4 days)
- **Shear Wave Velocity Survey** | Geological Survey of Bangladesh | 2015 (7 days)
- **Remote Sensing & ENVI 5.5** | Geological Survey of Bangladesh | 2018 (10 days)

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### **PROFESSIONAL EXPERIENCE:**

**Assistant Director (Geology)** | *Geological Survey of Bangladesh*

**2011 – Present**

**Urban and Engineering Geology Branch (2020 – Present)**

- Conducted geological and geotechnical field investigations across diverse regions, including coastal, northeastern, and southeastern hilly areas of Bangladesh.
- Participated in a joint technical project between the GSB and the Federal Institute for Geosciences and Natural Resources (BGR), Germany, titled *Geo-information for Urban Planning and Adaptation to Climate Change*. Responsibilities included:
  - Geological data collection and analysis
  - 3D subsurface geological modeling of four project areas
  - Engineering geological database development

- Geomorphological and land use mapping
- River shifting/change detection analysis
- Report preparation

**Key Projects:**

- *Engineering Geological Mapping and 3D Modelling for Sustainable Urban Planning in Gopalganj Municipality and Surroundings*
- *Engineering Geological Mapping and 3D Modelling for Sustainable Urban Planning in Cumilla City Corporation and Surroundings*
  - Responsibilities: Geological and geotechnical data collection, laboratory analysis, 3D subsurface modeling, geomorphological and land use mapping, river shift/change detection using satellite imagery and geospatial techniques, and final reporting.

**Environmental Geology and Hazard Assessment Branch (2015 – 2020)**

- Conducted extensive fieldwork and research on geohazards, including:
  - Landslide and liquefaction susceptibility mapping
  - Paleoseismic investigations through trenching
  - Riverbank erosion monitoring
  - Earthquake cataloguing and epicenter site assessments
  - Data collection from seismic stations and landslide early warning systems
- Contributed to the *GSB–CDMP* collaboration for national disaster management via field surveys, geotechnical analysis, and GIS-based hazard mapping.
- Participated as a supporting member in the *GSB–NGI (Norwegian Geotechnical Institute)* collaborative project focused on establishing landslide early warning systems and seismic monitoring networks across four districts.

**Key Projects:**

- *Environmental Geology Assessment and Landslide Zoning of Khagrachari Sadar Upazila*
- *Landslide Zoning and Geoenvironmental Analysis of Refugee Camps (Balukhali, Kutupalong, Nayapara, Chakmarkul), Teknaf and Ukhiya, Cox’s Bazar*
- *Liquefaction Susceptibility Mapping of Panchagarh Paurashava and Surroundings through Geological, Geomorphological, Engineering, and Seismic Microzonation Studies*
- *Earthquake Probability Assessment of Barek Tila and Adjacent Areas in Taherpur, Sunamganj through Active Fault Identification and Characterization*

**Coastal and Marine Geology Branch (2011 – 2013)**

- Conducted coastal geological and geomorphological mapping to evaluate terrain characteristics and identify coastal hazards.
- Assessed severe coastal erosion and sediment transport along Kolatali to Inani Sea Beach.
- Carried out geological and geotechnical feasibility studies for the proposed LNG Receiving Terminal at Maheshkhali Island.

### **Key Projects:**

- *Coastal Geomorphological Mapping of Kutubdia Upazila, Cox's Bazar*
  - *Assessment of Erosion Hazards along Kolatali–Inani Coastline, Cox's Bazar*
  - *Feasibility Study for LNG Terminal Establishment at Maheshkhali Island, Cox's Bazar*
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### **FIELD WORK:**

- Extensive fieldwork experience, including geological, geotechnical investigation, data collection, geotechnical analysis, and GIS mapping for various geomorphological, geological features.
  - Worked in challenging terrains, producing quality geological, geomorphological maps and data.
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### **PROFESSIONAL AFFILIATIONS:**

- Member, Bangladesh Geological Society
  - Member, IAEG\_BNG National Group
  - Member, IAPG
  - Dhaka University Geology Alumni Association (DUGAA)
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### **ENGLISH PROFICIENCY**



English was the medium of instruction during four (4) years of B.Sc. and M.S. studies at the university

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### **REFERENCES:**

#### **Dr. Kazi Matin Uddin Ahmed**

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#### **Dr. Mahfuzur R Khan**

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