Home Page

**Modeling the cascading impact on food security due to debris flow induced disruptions in mountainous road network**

**A research initiative assessing debris flow-induced road disruptions in the Eastern Himalayas and their effect on food security.**

**Project Overview***Modeling the Cascading Impact on Food Security due to Debris Flow-Induced Disruptions in Mountainous Road Networks*

Mountainous regions like the Eastern Himalayas face recurring threats from debris flows—rapid movements of water, soil, and rock—that often damage critical road networks and disrupt food supply chains. This project aims to assess and model the cascading impacts of such disruptions on food security.

By integrating debris flow hazard modeling, transportation network vulnerability analysis, and machine learning-based food security impact assessment, the project develops a three-stage framework for resilient infrastructure planning. Using Google Earth Engine and AI algorithms, it offers a dynamic web-GIS solution to support emergency response, supply prepositioning, and risk-informed development.

The research contributes practical tools and insights for enhancing community resilience, improving road network reliability, and safeguarding food systems in hazard-prone mountainous regions.

**Contribute to our research**

|  |  |  |
| --- | --- | --- |
| **Debris Flow** | **Road Network Disruption** | **Impact on Food Security** |

**Project Phases**

|  |  |  |
| --- | --- | --- |
| **Phase I**  **Debris Flow Hazard Modeling** | **Phase II**  **Road Network Disruption Modeling** | **Phase III**  **Assessing impact on Food Security** |

**Meet our Research Team**

|  |  |
| --- | --- |
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**Partner Institutions**

|  |  |
| --- | --- |
| **Supported and funded by:**  A black and red text with a light bulb and a light bulb  AI-generated content may be incorrect.  **Coalition for Disaster Resilient Infrastructure (CDRI), New Delhi** | **Endorsed by:**    **Central University of South Bihar (CUSB),**  **India** |

**Supported under:**

**CDRI Fellowship Programme**

**(Brief Content)**

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About Page

Replace Funding Source:

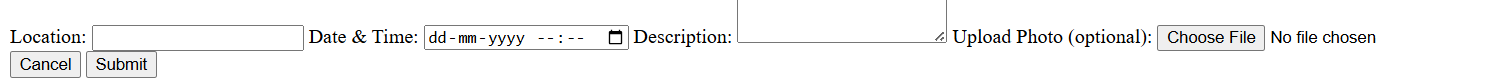
With

|  |  |
| --- | --- |
| Coalition for Disaster Resilient Infrastructure  Brief Details | About Central University of South Bihar, India  Brief Details |

Phase 1:

Contribute to our Research

Have you witnessed or experienced a recent landslide? Help us improve our data by submitting details.



**Inventory**

|  |  |
| --- | --- |
| Interactive Map | Debris Flow Inventory Map |

Conditioning Factors

|  |  |  |
| --- | --- | --- |
|  | Topographical | Elevation |
|  | Aspect |
|  | Slope |
|  | Curvature |
|  | Plan Curvature |
|  | Profile Curvature |
|  | Downslope |
|  | Upslope |
|  | Hydrological | Drainage density |
|  | Distance to drainage |
|  | Stream Power Index (SPI) |
|  | Topographic Wetness Index (TWI) |
|  | Daily avg. rainfall |
|  | Geological  Geological | Lithology |
|  | Lineament |
|  | Anthropogenic and Environmental | Road density |
|  | Distance to road |
|  | Land Use Land Cover (LULC) |
|  | NDVI (Normalized Difference Vegetation Index) |
|  | Soil Properties | Sand |
|  | Silt |
|  | Clay |
|  | Erosivity |

Objective and Methodology

**Text – Content**

**Flow Chart**

**Text Content**

**Output:**

|  |  |  |
| --- | --- | --- |
| **GEE** |  | **GEE** |
| **Text Content** |  | **Text Content** |
| **Initiation Output - Image** | **2 Pie Chart** | **Runout Output- Image** |
| **Text Content** |  | **Text Content** |

**Model Performance**

|  |  |
| --- | --- |
| **ROC & AUC Curve** | **Feature Importance** |
| **Interactive Chart** | **Interactive Chart** |
| **Tect Content** | **Text Content** |

**Validation**

**Field Validation**

**Text Content:**

**Pictures**

**Phase 2:**

**Road Network Disruption Modeling**

**Inventory**

|  |  |
| --- | --- |
| **Interactive Map** | **Road Network** |
| **Interactive Map** | **Road Network Disruptions in the Region** |
|  | **Villages in Sikkim** |

**Objective and Methodology:**

**Output**

|  |  |
| --- | --- |
| **Interactive Map** | **Weak Road Links -1** |
| **Interactive Map** | **Weak Road Links -2** |
|  |  |

**Disruption Scenarios:**

Validation:

**Field Validation**

**Text Content:**

**Pictures**

**Phase 3: Cascading impact on Food Security**

**Inventory**

|  |  |
| --- | --- |
| **Interactive Map** | Centrally Controlled Food Storage Godown |
| **Interactive Map** | State controlled food storage godown |

**Objective and Methodology**

Flow Chart and Text Content

**Outcome.**

Disruption Scenarios Impact Assessment; - Map

Pre-positioning of Food Storage Godown and Corresponding Storage Quantity- Map

Ideal Situation for 3 Months Disruptions - Map

Validation

Field Validation

Final Outcome and Key Takeaways

Contact and Feedback