

Community-Centric Design of Flood Evacuation Route Suggestion Engine for Rathnapura District, Sri Lanka

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Hydrometeorological hazards have claimed many lives and destroyed assets and livelihoods in Sri Lanka. Amid such disasters, the lack of situational awareness exacerbates the damage inflicted. Civilian evacuation, coordination of rescue operations and medical services, planning supply chains, and ameliorating the living standards of evacuees require situational awareness to effectively minimize further damages to society. This study develops a conceptual framework that can be deployed as a web application that suggests the shortest route avoiding flood-prone roads, with simplified versions for general users and full functionality to create situational awareness. The district of Rathnapura was selected based on several factors such as the socio-economic conditions of urbanization and the population density, and the mode of flood occurrence frequency in Sri Lanka during the period of 2009-2018. Data was sourced from the Disaster Management Centre (DMC) of Sri Lanka which included soil profiles, land use/land cover, slope, and rainfall. These were used as parameters for flood susceptibility analysis along with topographic data. Historic flood data records from DMC were also used in identifying inundation patterns of past floods through SAR-enabled satellite imagery. Finally, the Dijkstra's algorithm was used to suggest the optimum route from point A to B, factoring in areas prone to flooding. OpenStreetMap API was used as the base for this engine, with emergency evacuation centres in Rathnapura. This was developed as a web application, which is currently deployed on a local server with improvements underway to better serve the public and authorities. As a Decision Support System, it will help civilians to evacuate to the nearest shelter circumventing roads inaccessible due to flooding, and help authorities coordinate their operations in rescuing stranded civilians using multiple transportation modes.

Keywords: Disaster resilience, Evacuation, Flood susceptibility analysis, Route suggestion, Situational awareness