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Research Article

Efficiency of AlpineQuest navigation application as an alternative for GPS in river engineering field surveying (Case study: Rafsanjan flood on July 2022)

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Extended Abstract

Introduction

With the advancement of technology, field visits by engineers, experts, and researchers have become more efficient and accessible. Tools and applications designed for navigation, orientation, and traffic reduction have proven highly effective for field visits, particularly for river inspections. One such application is AlpineQuest, which provides access to a wide range of topographic maps, allowing users to download and use them offline. This study utilized AlpineQuest during a field visit to investigate the causes of the August 2022 flood in Rafsanjan, Iran. Critical points, such as flood-prone areas and intersecting structures, were marked, and flood entry routes into the city were mapped. The study highlights the application's effectiveness in field data collection and analysis.

Materials and Method

The field visit was conducted using AlpineQuest, a powerful navigation tool for Android. The application allows users to access topographic maps, mark critical points, and record routes. During the visit, flood-prone areas, intersecting structures, and flood entry routes were mapped using point and line features. Polygon layers were also created for flood-affected areas. Descriptive information for each feature was entered into the application. Preliminary analyses were conducted using Google Earth, Google Hybrid, and slope maps available in AlpineQuest. After the field visit, all data were exported to GIS software for further analysis.

Results and Discussion

The results identified several factors contributing to the flood in Rafsanjan:
High-Intensity Rainfall: The flood was triggered by monsoon rains with a return period exceeding 100 years, overwhelming the city's drainage capacity.
Urban Development in Floodplains: Expansion of the city into alluvial fan areas reduced natural drainage paths, exacerbating flood risks.
Critical Intersecting Structures: Poorly designed infrastructure, such as bridges and culverts, hindered water flow and caused backflow into the city.

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Non-Compliant Construction: Unauthorized construction and encroachment on riverbeds reduced the capacity of natural waterways.
Ineffective Flood Control Measures: The flood control structure near the airport redirected floodwaters into the city, worsening the situation.
The use of AlpineQuest facilitated efficient data collection and analysis, enabling the identification of flood entry points and affected areas. The application's ability to integrate with GIS software streamlined the transition from field data to comprehensive flood analysis.

Conclusion

The study demonstrated the effectiveness of AlpineQuest in field visits and flood analysis. The application's features, such as offline map access, route recording, and data export capabilities, make it a valuable tool for engineers and researchers. The findings highlight the need for improved flood management strategies, including better urban planning, redesign of critical infrastructure, and stricter enforcement of construction regulations in flood-prone areas. The integration of modern tools like AlpineQuest into field studies can significantly enhance the efficiency and accuracy of flood risk assessments and mitigation efforts.

Keywords*:* AlpineQuest, Navigation application, Rafsanjan flood, River engineering