



## A58 Mass Grave Localization Prediction With Geographical Information Systems in Guatemala and Future Impacts

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**Learning Overview:** After attending this presentation, attendees will have a better understanding of the application of easily available cross-disciplinary techniques involving data collection, geographic information systems, and statistical analyses. These techniques are combined to help narrow search areas for potential mass graves to enable the process of recovery and reunification of remains.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by exploring and presenting how open-source programs and known data can be used to help predict search locations of mass graves. This investigation focuses on known data from previous exhumations in Guatemala and the use of open-source geographical information systems and data to pave the way for further research on and uses of this approach.

Conducting physical searches for mass grave locations based on anecdotal evidence is a time-consuming and resource-intensive endeavor in circumstances that often pose a threat to personal safety. The development of tools and procedures to speed such searches can greatly reduce the risk involved, increase the number of individuals whose remains are recovered and identified, and, more importantly, reunite these remains with their loved ones to provide them with a proper burial. Open-source Geographic Information Systems (GIS) software, which can analyze and manipulate the spatial characteristics of known mass grave data, represents a powerful tool that can be used to predict new mass grave locations and increase the speed and efficiency with which they are investigated.

This presentation will discuss the use of the open-source Quantum Geographic Information Systems (QGIS) project, existing mass grave locations in Guatemala from their internal armed conflict (1960s–1980s), and statistical analysis. The studied patterns were based on distance from the mass graves and change in elevation relative to roads, streets, waterways, points of interest, and possible villages/towns. Additionally, the statistical analyses performed were able to detect relationships among the variables that resulted in patterns that warrant further study and can be used to further narrow areas of investigation. The research conducted with available data in Guatemala yielded the prediction of 69% of known mass graves used for the prediction, and the search area was narrowed by eliminating 90% of the country's landmass. The patterns that provided the most predictive variables were distance of roads from mass graves, water ways, and points of interest. The methodology used in this research could provide human rights researchers, criminal investigators, and families seeking justice a powerful new set of tools, which can be deployed from the safety of a workstation.

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**Mass Graves, Open Source, Anthropology**