Y17 Geospatial Analysis of Canadian Drowning Locations

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Learning Overview: After attending this presentation, attendees will better understand how geospatial tools can be applied to identify environmental risk factors associated with fatal incident locations.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing how new geospatial techniques can be used to enhance current practices in risk mitigation of aquatic landscapes.

This presentation will assess coroner and medical examiner data of fatal drowning accident propensity and Emergency Medical Services (EMS) access in Canadian waters from January 2006–December 2016 (an 11-year period). The Response Time (RT) between when a call is made to EMS and EMS arrival is known to be a strong indicator of patient survivability. Studies have shown that when the initial call cannot be made or there are lengthy delays that result in an RT past four to six minutes, chances of favorable neurological outcomes diminish dramatically.[1] It is for this reason that stable cellular reception plays an important role in fatal drowning risk reduction and for the purpose of contacting EMS when accidents near and within water take place. In Canada, there are many attractive, pristine lakes without commuter road networks that can be readily accessed, yet many of these areas do not have cellular coverage. The aim of this study was to identify the strength and type of cellular network available at Canadian drowning locations using geospatial analysis tools as a means of identifying areas of heightened risk due to unstable or limited cellular reception.

In this study, the geospatial coordinates of drowning locations were collected by the Lifesaving Society and based on coroner and medical examiner files from across Canada. Case demographics were assessed to identify risk factors associated with individual characteristics and environmental, geographic features. The spatial perimeters of lake systems and ocean fronts were then identified in this study using the Abacus Dataverse Network in the form of Canadian maps produced by DMTI Spatial. Cell towers were then identified for all locations, along with information on the number of cells per tower and the approximate range and strength of the signal based on ideal weather conditions through Statistics Canada. The network type and generation of broadband cellular network technology, such as Global System for Mobile Communications (GSM), Code Division Multiple Access (CDMA), Universal Mobile Telecommunications System (UMTS), and Long Term Evolution (LTE), was also used to analyze the type of coverage available. Results show that a hierarchical processing of identified fatal drowning locations can successfully be categorized through an assessment of EMS access of these locations. There are certain lakes that pose a higher risk because of limited cell reception, and their risk can be categorized based on the number of reported incidents, as well as the type and amount of reception that exists at each site.

Reference(s):

1. Ono, Y., Hayakawa, M., Iijima, H., Maekawa, K., Kodate, A., Sadamoto, Y., Mizugaki, A., Murakami, H., Katabami, K., Sawamura, A., Gando, S. (2016). The response time threshold for predicting favourable neurological outcomes in patients with bystander-witnessed out-of-hospital cardiac arrest. *Resuscitation, 107*, p. 65-70.

Risk Assessment, Drowning Fatalities, GIS

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