



Grave mapping in support of the search for missing persons in conflict contexts



Derek Congram^{a,*}, Michael Kenyhercz^{b,c}, Arthur Gill Green^d

^a Global Justice Lab, Munk School of Global Affairs, University of Toronto, 315 Bloor St. West, Toronto, ON M5S 3K7, Canada

^b Department of Defense POW/MIA Accounting Agency, Central Identification Laboratory, 590 Moffet Street, BLDG 4077, Joint Base Pearl Harbor-Hickam, HI 96853, USA

^c Department of Anatomy, University of Pretoria, Private Bag x323, 0007 Arcadia, South Africa

^d Department of Geography, University of British Columbia, 1984 West Mall, Vancouver, BC V6T 1Z2, Canada

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ABSTRACT

We review the current and potential uses of Geographic Information Software (GIS) and “spatial thinking” for understanding body disposal behaviour in times of mass fatalities, particularly armed conflict contexts. The review includes observations made by the authors during the course of their academic research and professional consulting on the use of spatial analysis and GIS to support Humanitarian Forensic Action (HFA) to search for the dead, theoretical and statistical considerations in modelling grave site locations, and suggestions on how this work may be advanced further.

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1. Introduction

Rodrigo Guerrero Velasco, the mayor of Cali, Colombia from 1992 to 1994 (re-elected in 2011), is an epidemiologist. As mayor of a city that was at the time plagued with a homicide rate of 124 per 100,000 residents, he adopted an approach to fighting crime that the local press labelled “urban acupuncture” – sticking pins in a map to mark crimes, particularly homicides. This “hot spot” mapping (which is now routinely digital and GIS-based) allowed the municipal authorities to focus resources on the “sick” areas of the city [1]. Guerrero Velasco understood the value of visualisation and of data-driven inquiry. During his tenure as mayor and for two years following, the homicide rate in Cali dropped significantly [2].

One of several maps that were exhibited in the genocide trial of General Ratko Mladic at the United Nations International Tribunal for the former Yugoslavia highlighted the spatial relationship of schools with mass execution sites (Fig. 1). The relationship might seem contrived unless you know that up to 8000 men and boys from in and around Srebrenica were detained for several days before being executed. Because most of the buildings in the area had limited capacity, the detentions were mostly in schools, an agricultural warehouse, and a cultural centre. Some of those who were held prisoner and survived the killings were able to testify about the mass executions at and around these detention centres.

In most cases, victim bodies were transported in trucks from execution sites to nearby burial sites. Understanding the spatial dynamics and logistics of detentions, which includes knowing the boundaries of the area under control of those responsible for the subsequent killings (the area marked “RS” in Fig. 1), was important in the eventual discovery of victim burial sites [3].

When mass fatalities occur due to natural disasters or armed conflict, official resources for interring the dead and investigating the missing often become overwhelmed, forcing improvisational treatment of both statutory and customary treatment of the dead and missing. In cases including illegal killings, burial customs may be deliberately violated either as a means of concealing evidence (i.e., victim bodies) of crimes or as a means of disrespecting the victims and their communities. In these scenarios, the bodies of the dead are often buried anonymously, transforming them into “missing persons”. For those seeking the missing, understanding situational variability in burials and deviations from customary and statutory burial practices is paramount. Knowing the circumstances of disappearance and death as well as those responsible can help us deduce where we ought to be looking for the bodies of those who are missing.

In this article, we emphasise the utility of spatial thinking and analysis, things typically eschewed in favour of oral testimony and written documentation. Spatial analysis, in this context, involves visualising an area of investigation and assessing spatial relationships among variables that influence how and where bodies are buried (or otherwise managed). We introduce some Geographic Information Science (GIScience) tools that enable more effective

* Corresponding author.

E-mail address: derek.congram@utoronto.ca (D. Congram).

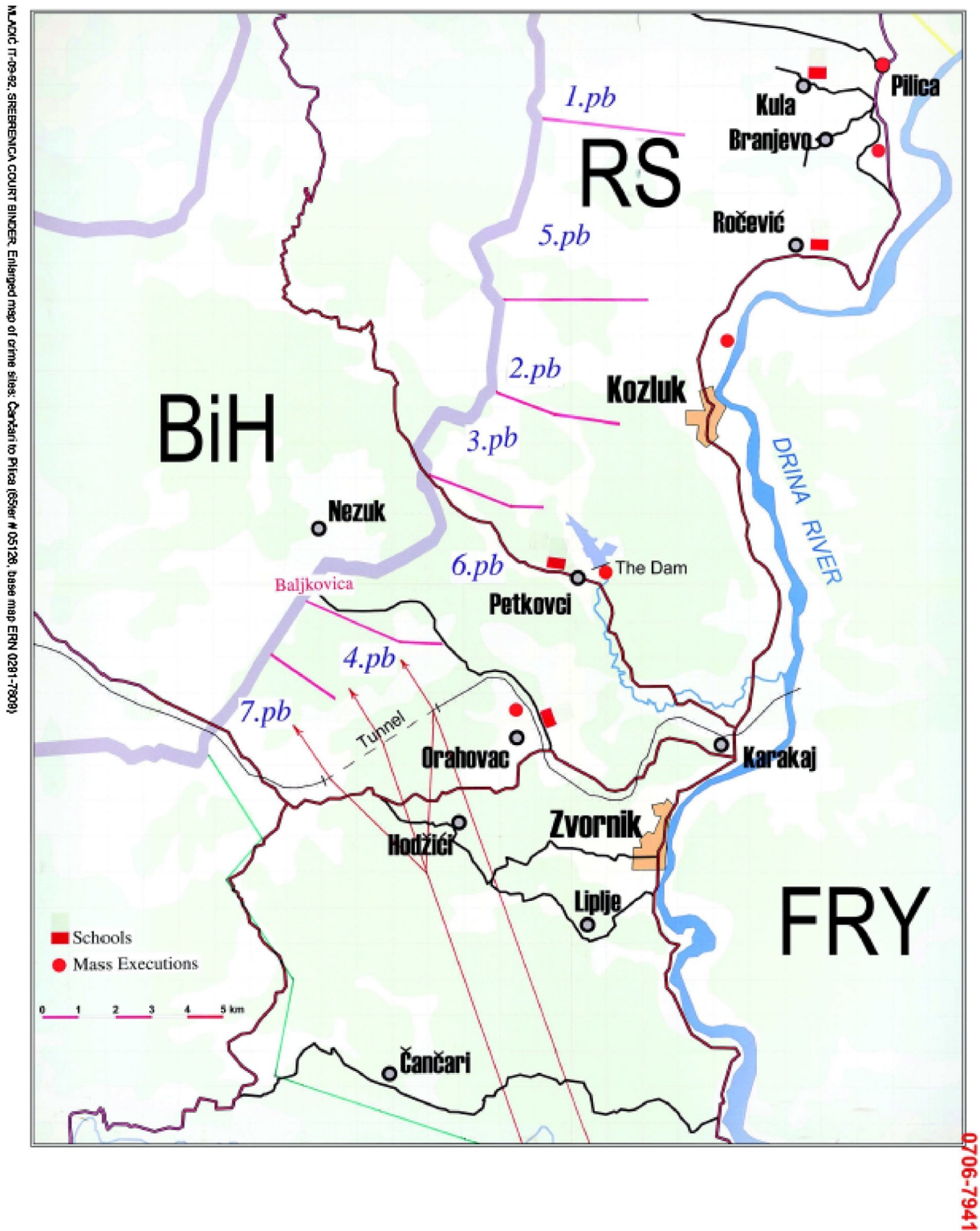


Fig. 1. Map submitted as evidence in the trial of Ratko Mladic, Bosnian-Serb General, showing territorial boundaries, schools used as detention sites and mass execution sites. Evidence Reference Number 0706-7941 in Prosecutor v. Mladic, IT-09-82.

investigation of the missing, presumed dead. We illustrate these concepts and methods with several cases from our applied research. The aims of our research are to: (1) supplement traditional investigative efforts and (2) explore new means of investigation using GIScience. More than simply introducing concepts and tools, however, we advocate spatial analysis as a more informed way of preparing for disaster to mitigate the social,

psychological, and material cost of not knowing the whereabouts of those who have disappeared and are believed to have died.

1.1. Background

Typically, those who investigate missing persons cases seek out witnesses. Witnesses describe what they saw, turning memories,

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