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Conferences
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3rd International Conference on
Forensic Research and Technology

October 06-08, 2014   Hilton San Antonio Airport, USA

Forensic pedology and botany for law enforcement training: Applications of archaeological methods and soil/vegetation analysis to discover clandestine operations and recognize criminal behaviour

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Many methods originating from the field of geophysics, such as electromagnetic surveying, ground-penetrating radar, and thermal imaging, has been invaluable tools for forensic investigations by law enforcement. A vast body of knowledge and professional publications already exist for locating clandestine graves for mass murders and clandestine tunnels for smuggling using sophisticated instruments for surveying. However, the equipment is expensive and can only be operated by trained specialists. For the innumerable police and sheriff's departments located beyond major cities, access to such equipment and expertise is financially not feasible. As a result, clandestine operations and criminal behavior may continue to function or remain undetected for decades before discovery. However, many other techniques exist in the field-based sciences, such as archaeology, botany, and pedology, and can be easily adapted and taught to law enforcement officers to discover or verify criminal activity both in the past and while still in progress. Forensic botany has been used in criminal investigations, but its full potential has yet to be realized. Likewise, forensic pedology, or the analysis of soils and related materials, is invaluable not only to archaeology but also to criminal investigations. To date, soil disturbance and the accompanying plant re-colonization have been used primarily to facilitate the location of single or multiple burials. However, both unoccupied or abandoned land as well as inhabited real estate can be easily examined for soil disturbance, soil color, water content, and nutrient levels (e.g., nitrogen/phosphorus) without specialized equipment. If the quantity of water or nutrients available to vegetation is changed, the growth patterns of current vegetation can be significantly impacted and thus help identify human activities at crime scenes. Likewise, being able to identify 'weeds', native plants, versus intrusive plants relevant to the local area can reveal atypical human behaviour. The infamous kidnapping case of Jaycee Dugard provides a tragic example of missed opportunities to reveal criminal activity, if only local law enforcement had some modest training in archaeological methods, forensic pedology, and forensic botany. Improper inspection of the land at Ms. Dugard's hostage site at 1554 Walnut Avenue in Antioch, California, together with a lack of basic knowledge on soil and vegetation irregularities at crime scenes, demonstrate what went wrong in discovering criminal behavior and why this case remained unsolved for 18 years. Training of law enforcement officers in simple and affordable field methods used in archaeology, soil science, and botany is described.

Biography

Linda Ellis is a Professor of Museum Studies & Senior Curator in San Francisco State University, USA. She has studied museums and their collections in Germany, England, France, Greece, Bulgaria, former Yugoslavia, Romania, the Republic of Moldova, Austria, the South Pacific Islands, Canada, and across the USA

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J Forensic Res 2014
ISSN: 2157-7145, JFR an open access journal

Forensic Research-2014
October 06-08, 2014

Volume 5, Issue 6

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