Journal of Conventional Weapons Destruction

Volume 18
Issue 3 *The Journal of ERW and Mine Action*

Article 3

November 2014

Harnessing Geospatial Data to Enhance ERW Clearance in Pacific Islands

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Harnessing Geospatial Data to Enhance ERW Clearance in Pacific Islands

Since World War II, the prevalence of explosive remnants of war has persisted in the Pacific Island nations. Supported by the Office of Weapons Removal and Abatement in the U.S. Department of State's Bureau of Political-Military Affairs (PM/WRA) and partnered with the Pacific Islands Forum Secretariat, iMMAP seeks to improve the region's safety through lōōm, a geospatial information management system.

by Jessica Dell [iMMAP]

In what former U.S. Secretary of State Hillary Rodham Clinton termed "America's Pacific Century," security and economic stability in the Pacific Islands are rapidly becoming U.S. foreign policy priorities.[1] Battles between U.S. and Japanese forces in the Pacific Islands during World War II (WWII) left the islands contaminated with explosive remnants of war (ERW) and the continued threat hinders safety, security and economic development. Accordingly, the Office of Weapons Removal and Abatement in the U.S. Department of State's Bureau of Political-Military Affairs (PM/WRA) has prioritized the safe removal of these hazards in the East Asia and Pacific region. To ensure ERW hazard removal activities are guided by comprehensive and up-to-date information, PM/WRA collaborated with the Pacific Islands Forum Secretariat (PIFS) to fund iMMAP (Information Management and Mine Action Programs, Inc.) and establish a regional information management support mechanism to enhance the Pacific Islands Regional ERW strategy.

A Need for Information

When PM/WRA began providing support for conventional weapons destruction assistance in the Pacific Islands in 2009, it discovered that ERW clearance efforts in the region suffered from a lack of sufficient information. Reliable geospatial data on the location of ERW is a critical component in coordinating effective ERW clearance activities and making critical resource allocation decisions. However, limited information exists on lingering ERW contamination in most of the Pacific Island region, making the task of properly prioritizing and implementing clearance projects in this expansive area challenging. The Pacific Islands' regional geography renders traditional technical and non-technical ERW surveys impractical for developing a comprehensive picture of contamination. Since the islands are small and widespread, it is difficult to deliver people, equipment and supplies to them to conduct surveys.

While several ongoing efforts focus on reconstructing the historical ordnance use records in the Pacific during WWII, they are uncoordinated and relatively incomplete; time and resource constraints demand a more effective approach to identify the scope and nature of ERW contamination.

In 2012, PM/WRA began supporting iMMAP's collaboration with the Pacific Islands Forum (PIF)—an intergovernmental organization consisting of 16 independent and self-governing states created to strengthen regional cooperation—in a geospatial information-management project that aims to produce a comprehensive picture of WWII ERW contamination and clearance activities in the Pacific Islands.[2] The project focuses on enhancing ERW data sharing and coordination, provides actionable and visualized information, and enhances collaboration between ERW designated implementing partners and PIF member states. This project provides PM/WRA, PIF and other stakeholders with a better understanding of how ERW contamination affects the Pacific Island nations and of how all implementing partners can better leverage resources to address this complex challenge.

Figure 1. Map showing contamination of the Solomon Islands.
Map courtesy of the Office of Weapons Removal and Abatement in the U.S. Department of State's Bureau of Political-Military Affairs (PM/WRA).

Information Management Tools

By employing a three-phased approach of assessment, collection and analysis, iMMAP engages in critical research to identify ERW contamination areas, clearance activities, and actors and organizations in the Pacific Islands. Concurrently, iMMAP manages a comprehensive spatial database to house and organize all relevant ERW contamination and clearance data, as well as a web-based information management tool called **lōōm**, which transforms this spatial data into actionable information. Through lōōm, the information gathered through iMMAP's research can be delivered in an easily consumable format that provides ERW clearance stakeholders with a comprehensive overview of the ERW contamination problem, facilitating the development of more effective strategies for prioritizing and coordinating ERW cleanup activities.

Built on the information management framework Twine, lōōm is a web-based tool comprised of three primary applications: **Tools, Work,** and **Explore**. The Tools feature provides data-collection capabilities through the use of forms (online or offline) and reports specific to the user's preferred mobile, desktop or hardcopy device. For ERW clearance in the Pacific Islands, forms capture all the information necessary to accurately encapsulate critical information such as ERW hazard areas, past and current clearance activities and implementing partners. Through Work, users receive reports, notifications and to-do lists pertinent to their information of interest; these are triggered by data-collection activity in Tools and ongoing maintenance requirements. Users may then interact with collected data in Explore by selecting indicators of interest in the map view or by analyzing information and generating custom reports. This feature also allows users to interact simultaneously with collected data and information pertaining to other critical components of ERW

clearance coordination such as socioeconomic indicators and the location of key infrastructure. With these capabilities, national authorities, funders and implementing partners can use lōōm as the central repository and tool for data sharing, analysis and visualization.

Information Gathered in Phases

In Phase One, iMMAP worked with PM/WRA, PIFS and implementing partners, including Cleared Ground Demining and Golden West Humanitarian Foundation, to assess existing Pacific Island ERW information, identify gaps in critical information, determine database requirements and develop lōōm capabilities to best support the management of this information. The process began by identifying key actors and organizations performing ERW clearance in the Pacific Islands, and governmental bodies charged with overseeing remediation activities. iMMAP attempted to contact and conduct interviews with past and current clearance operators to gather data on the location and nature of remediation and humanitarian mine action (HMA) work, and to identify other existing ERW hazard location data sources. In Phase One, representatives from six of the nine Pacific Island nations contacted either contributed information or collaborated in the acquisition of information. iMMAP also contacted 80 of the 109 individuals identified as having information to share for the project. iMMAP compiled existing data from identified data sources such as the U.S. National Archives and Records Administration (National Archives), the U.S. Air Force Theater History of Operations database, as well as maps and reports provided by both mine action and non-mine action organizations.

Information gathered through the assessment was then used to guide data-collection activities in Phase Two and effectively identify the location of confirmed and suspected ERW contamination. Data-collection activities heavily leveraged historical military research as a means for identifying areas that were known to contain hazards or had a likelihood of contamination based on activity records (e.g., bombing campaigns or ammunition storage and handling). While much of the information existed in National Archive records, the information came in a variety of formats, making it incompatible and unsuitable for analysis. Through the tools available in lōōm, iMMAP translated the disaggregated information into a uniform, location-based dataset that created a comprehensive picture of ERW and other contamination-related features.

The availability of information gathered in Phases One and Two in lōōm facilitated direct interaction and analysis in Phase Three. iMMAP employed proven spatial multi-criteria

Figure 2. Photograph of Palikulo Airstrip, Espiritu Santo, Vanuatu (September 1945).
Photo courtesy of Whites Aviation Ltd: Photographs. Ref: WA-01031-G. Alexander Turnbull Library, Wellington, New Zealand. http://natlib.govt.nz/records/30632365.

analysis methods to illustrate how information available in lōōm could prioritize ERW clearance activities based on the unique needs of the host nation's government while incorporating considerations such as ERW proximity to schools, critical infrastructure, agricultural land, natural resources and tourist attractions.[3] iMMAP also provided maps that clearly labeled sites of WWII-era battles, a valuable visual tool for understanding where ERW may still exist, what types of ERW are likely to be present and which PM/WRA-funded clearance projects are currently underway in the region. This information supports efficient land release practices, which the Geneva International Centre for Humanitarian Demining describes as, "reli[ant] on solid information, risk management and maintaining a clear record of past achievements and outstanding tasks."[4] Through Phase Three, iMMAP demonstrated how effective information management empowers funders and implementing partners to better understand the problems they seek to address, and more importantly, to adequately address them by better utilizing resources according to location-specific priorities.

Conclusions

Effective ERW information management must be implemented with the flexibility to adequately accommodate the long-term requirements of the host nation. The expansive area of the Pacific Islands is not conducive to traditional approaches to ERW clearance coordination due to its geographical size and lack of logistical coordination, rendering

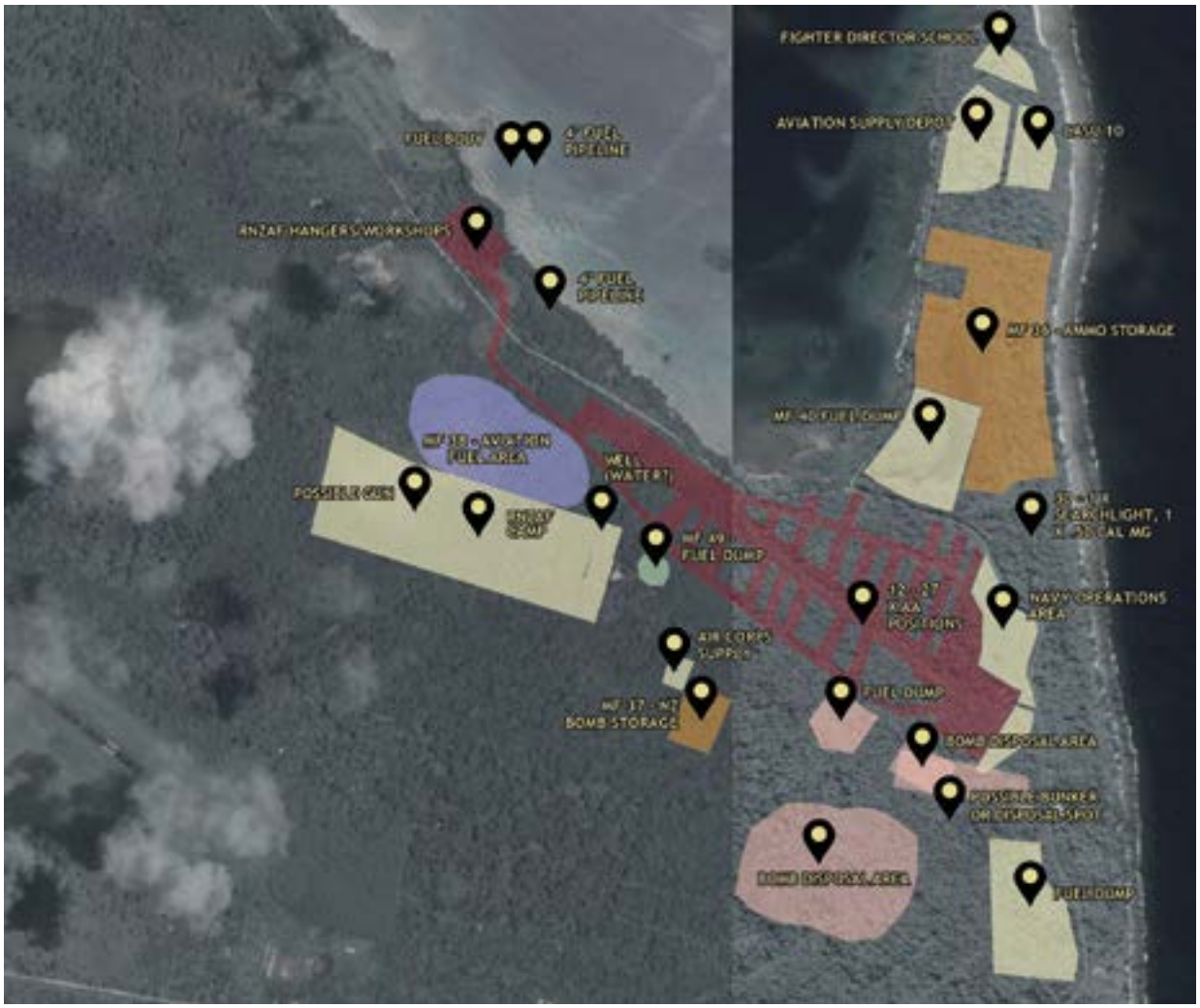

Figure 3. Palikulo Field, associated and subsidiary areas.
Figure courtesy of iMMAP.

traditional information management systems insufficient. The implementation of systems that focus on capturing data through traditional technical and non-technical surveys would be inefficient for the incorporation of alternative ERW location methods such as historical military research. Additionally, the state of national mine action authorities for many Pacific Islands nations indicates that country-level ERW information management systems could not be supported or sustained. The lōōm system provides a fully customizable and scalable solution that works efficiently across all major browsers in the desktop and mobile environment, utilizing existing infrastructure and resources to seamlessly facilitate information sharing across a community of users.

The information management capabilities of the lōōm system allow PM/WRA to bolster its decision-making abilities and enhance the monitoring and evaluation of projects it funds through a customized web-based tool. The implementation of lōōm translated vast amounts of data into actionable information, boosting PM/WRA's capacity to address policy issues, improve internal planning efforts, enhance advocacy messages and effectively allocate resources, ultimately contributing to greater safety, security and economic development for the Pacific Islands.

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