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Explosive Hazards in the Aftermath of Natural Disasters: Lessons Learned

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Explosive Hazards in the Aftermath of Natural Disasters: Lessons Learned

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Natural disasters have posed problems for demining operations in the past; the heavy flooding in Bosnia and Herzegovina was one recent example of many. Over the past 20 years, natural disasters have impacted countries affected by landmines or other explosive remnants of war (ERW), causing renewed danger. Figure 1 lists the main challenges faced in situations such as these. Despite reoccurring in recent years, these events continue catching the international CWD community by surprise, while experience and lessons learned from previous disasters in one country must be relearned in other regions.

With the flooding in Bosnia and Herzegovina, experts realized that 15 years of clearance progress could be effectively washed away in a matter of hours. As shown in Figure 1, a disaster in an area contaminated with explosives can affect everything from trade routes to peoples' lives and livelihoods. The issues at hand include how to reassess the ERW threat, how to minimize loss of life and cost, how best to educate the public and relief workers of potential dangers, how to reprioritize the deployment of ERW-clearance assets, and when and how to determine if areas are safe for displaced populations to return. With such high stakes, it is imperative that we as a community do our best in planning for the possibility of a disaster disrupting normal operations.

Hurricane Mitch (1998)	**Honduras and Nicaragua**
• Demining operations halted for roughly a month while resources were diverted to emergency relief • Infrastructure (roads, bridges, etc.) destroyed • Mines shift, clearance requires more time and resources • Demining equipment lost[1]	
Massive Floods (2000)	**Mozambique**
• Mines migrate from marked areas to those previously deemed safe • Over 200,000 people lost their homes • Additional resources needed • New national plan needed to identify and prioritize new hazards[2,3]	
Flash Floods (2010)	**Pakistan**
• Floods carry mines from mountains to nearby tribal area • Individuals unaware of dangers touch explosives, causing injuries[4]	
Heavy rains cause floods (2011)	**Sri Lanka**
• Landmines/ERW previously buried dislodged and moved • Resurveying needed to assess hazard areas and severity[5]	
Heavy rains flood border area (2012)	**Peru/Chile**
• Border closed when mines surface on the roadway be-tween the two countries, halting all trade along this route[6]	
Flooding (2013)	**Cambodia**
• Due to the sheer number of mines,, fears that migrated mines would resettle in new areas before all could be found[7]	
Floods / landslides from extreme rain (2014)	**Bosnia and Herzegovina**
• Tens of thousands of mines displaced • Reports of mines and ERW shifting from marked areas to unknown locations • Safe roads for relief and debris clearance teams to travel not immediately clear[8,9]	

Figure 1. Major challenges of past natural disasters in ERW-affected areas.
Figure courtesy of authors.

ERW in the Immediate Aftermath of Natural Disasters: A Complex Problem

Following flooding in Bosnia and Herzegovina in 2014 that some experts feared would significantly set back the country's ERW clearance program, the Office of Weapons Removal and Abatement in the U.S. Department of State's Bureau of Political-Military Affairs (PM/WRA) asked the Center for International Stabilization and Recovery (CISR) to research the issue. The main purpose was to incorporate the findings into a training module for CISR's Senior Managers' Course in ERW and Mine Action to help CWD program managers understand and prepare for the issue of natural disasters interrupting their operations.

Landmines and other ERW affect the lives and livelihoods of people in more than 60 countries or territories worldwide.[10] Lingering conflict and renewed hostilities in unstable parts of the world mean that new threats from landmines, unexploded munitions and improvised explosives often continue to arise. Natural disasters similarly pose grave risks to people's lives, communities and societies. An average of 388

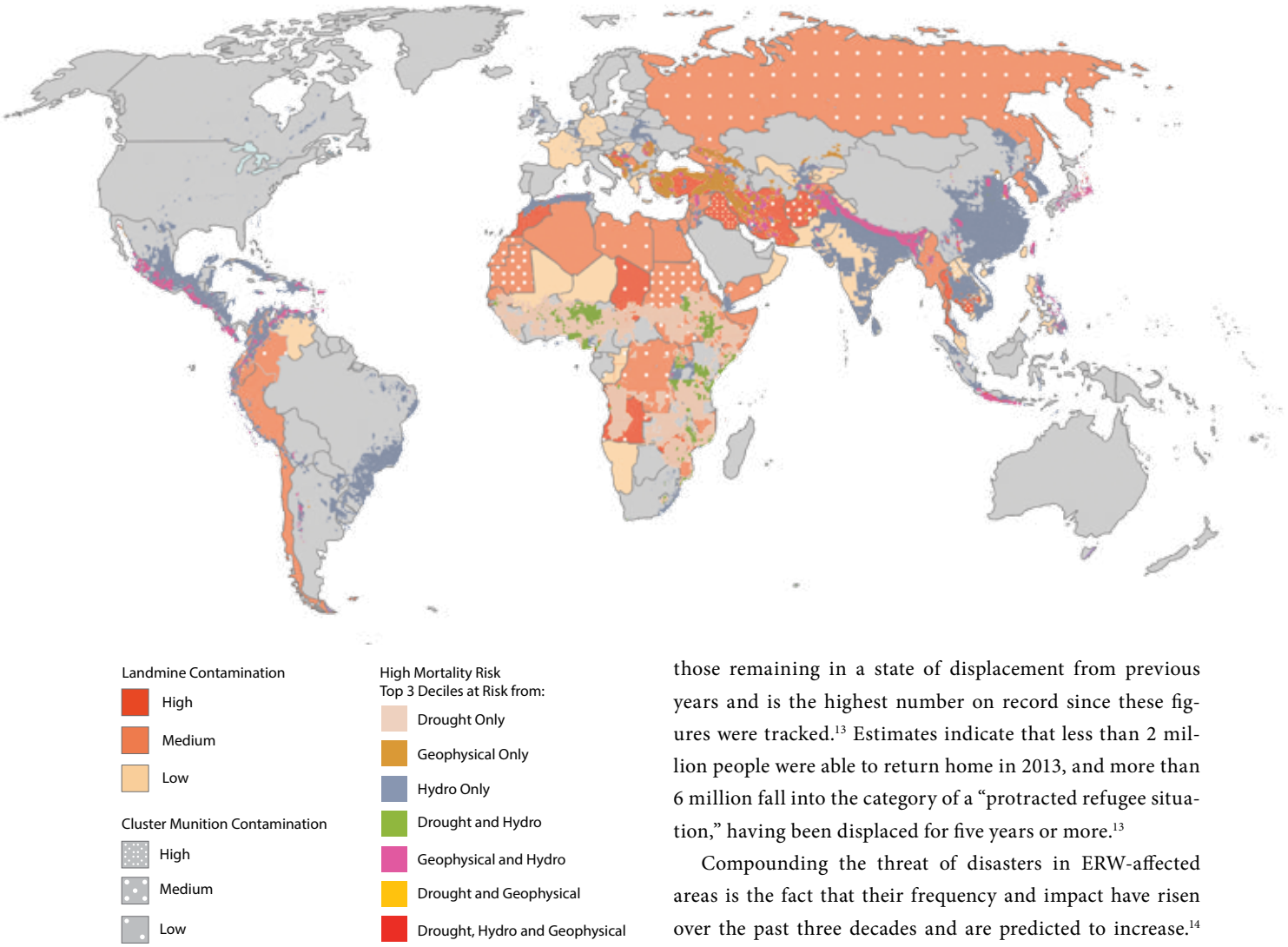

Figure 2. The map highlights countries affected by ERW and areas at risk from natural disasters (includes earthquakes, volcanoes, floods, cyclones and landslides).
Figure courtesy of ICBL, Cluster Munition Monitor, Mines Action Canada, World Bank and CISR.

natural disasters was observed annually from 2003 to 2012 with more than 106,000 people killed by natural disasters on average each year during the same time period.[11] Economic damages of disasters average tens of billions of dollars per year globally.[11] Conflicts and disasters cause people to flee their homes: A 2014 report on effects of natural disasters states "almost 22 million people were [newly] displaced in at least 119 countries [in 2013], almost three times as many as were newly displaced by conflict and violence."[12] The number of people newly displaced by conflict is only a small piece of the picture, as conflicts often linger for long periods. In 2013, the United Nations High Commissioner for Refugees estimated that more than 51 million people were considered forcibly displaced globally—an aggregate figure that includes those remaining in a state of displacement from previous years and is the highest number on record since these figures were tracked.[13] Estimates indicate that less than 2 million people were able to return home in 2013, and more than 6 million fall into the category of a "protracted refugee situation," having been displaced for five years or more.[13]

Compounding the threat of disasters in ERW-affected areas is the fact that their frequency and impact have risen over the past three decades and are predicted to increase.[14] A 2011 Oxfam research report posits that the increase in the number of disasters is partially attributable to global climate change, and escalated impact is tied in part to population growth.[14] Vulnerability, defined as being "affected by economic, social, physical, environmental or political conditions, which increase the susceptibility of a community to the impact of hazards," also plays a role in exposure.[14] Clearly countries devastated by war and still recovering from the effects of leftover explosives would fall into the "vulnerable" category. A 2014 report by the Norwegian Refugee Council further details the overlap of conflict-affected regions with natural disasters in recent years: "In 33 out of 36 countries affected by armed conflict between 2008 and 2012, there were also reports of natural hazards forcing people to flee their homes."[12] Further, the displaced may be forced to move to areas that expose them to additional risk, magnifying their vulnerability.[12]

Countries in these situations often have limited capabilities at the national level to respond to either their residual ERW problem or the aftermath of a natural disaster as

an isolated problem—let alone the combination of the two.[15] Nations heavily affected by ERW are typically highly reliant on international support (at least in terms of funding and sometimes technical capacity), and international recovery efforts for disasters in developing countries function in much the same way—led by external donors and relief workers. Unless previously engaged in operations under conditions involving ERW dangers, external actors entering to provide aid following a natural disaster may be unaware of the potential hazards. Figure 2 illustrates the large amount of overlap between countries vulnerable to disasters and those affected by ERW contamination.

Disaster Management: A Framework for Addressing Risk

A robust history of planning and implementing responses to mine/ERW cleanup and natural disasters exists; the two are largely separate fields, but each can inform the situation that occurs when the two overlap. The literature on natural disasters identifies four phases of disaster management: prevention (or mitigation), preparedness, response and recovery (see Figure 3).[15] Experts believe that governments and organizations should address all four phases to adequately tackle natural disaster risk.[15] At issue are matters such as gathering information, coordination, prioritization, redefining impact and needs, roles of different actors, providing appropriate training, interruptions to operations, cost, emergency public information campaigns, international assistance, ensuring the safety of relief workers vis-à-vis explosive hazards, and integrating CWD programs with larger relief efforts. In addition to these concerns of preparedness and response is the possibility that some risks could be avoided or prevented.

Figure 3. The four phases of disaster risk management.
Figure courtesy of http://securipedia.eu/.

Additionally, aspects of disaster preparedness can assist in understanding ERW emergencies related to natural disasters. Such topics as immediate relief mobilization, lines of authority, information gathering, interorganizational coordination and public information campaigns/educational aspects can be overlaid with the explosives issue, as similar concerns are in both areas. Since a strong history of disaster planning and preparation is evident in various countries worldwide, this topic not only helps us understand the problem at hand but also provides potential solutions to mirror in the field of CWD within the context of natural disasters. The U.N.'s International Strategy for Disaster Reduction provides a useful framework for considering the relevant issues based on its stated goals for disaster and risk reduction in which it strives for increased public awareness of risks, commitment by public authorities to risk reduction, engaged involvement of the public in risk reduction, and reduced economic and social losses due to natural disasters.[16] These areas can be translated to the issue of ERW hazards in the wake of natural disasters to provide a holistic response to ERW in the aftermath of a catastrophic natural event.

Risk Management and Organizational Continuity: Managing Large-scale Disruptive Events

Working with CWD personnel means working with managers who routinely try to accomplish their organizational goals in high-risk environments or situations. On a regular basis CWD employees may face physical danger from unexploded ordnance, political instability, hostile environmental elements or sudden loss of funding. Handling large-scale disruptive events (i.e., crises) is an additional complexity for managers and other personnel who already cope with unique challenges in their work environment. The primary goal of incorporating risk management into the managerial training component of CISR's Senior Managers' Course is to help managers develop the knowledge base and skill set that allow them to achieve the mission of their organization regardless of disruptions that happen along the way.

The concept of **organizational continuity** is borrowed from **business continuity** literature and modified to fit non-business entities. Continuity management is an approach that identifies potential disruptive events and provides a framework for building resilience, which is an organization's ability to withstand the impact of a major disruptive event. Effective response to such an event means that an organization has the capability to respond in a way that protects key stakeholders,

"Understanding risk is the starting place for organizational continuity and the effective management of disruptive events."

value-creating activities, the environment, and organizational integrity and reputation. Organizational continuity and risk management are closely linked and mutually dependent. Risk management tends to be more preventive in nature and provides important inputs for managing organizational continuity. Managing continuity goes beyond risk management to include in-depth planning on how to deal with events and their consequences.

Understanding risk is the starting place for organizational continuity and the effective management of disruptive events. A key principle underlying risk management is that risk cannot be eliminated but can be controlled. The amount and type of control exerted depends on the likelihood of the event occurring and the magnitude of impact (or loss) associated with the risk. Although risk can sometimes be quantified, often the information needed to do so is either unavailable or too expensive to collect. Risk analysis is the process of identifying events, determining causes, and estimating probabilities and impacts. It includes the following steps:

- Identify **significant threats** to critical operations.
- Identify and evaluate current **controls**.
- Estimate event **probabilities**.
- Estimate **impacts**.
- Utilize a **risk measure** combining impact and probability
- **Prioritize** risks and determine **treatment**.

The organizational continuity approach ties crisis management more closely to an organization's overall strategic plan. To effectively manage disruptive events and build resilience, managers must understand how these events impact the activities critical to the organization's mission. An organizational impact analysis addresses three critical questions:

- What are our primary objectives?
- What deliverables are critical to our organizational purpose?
- What resources are critical to our ability to continue producing those deliverables?

Disaster Risk in ERW-affected Areas: Identifying Risks

In order to adequately address the risk of disaster in ERW-affected areas, protocols are needed to deal with risks in a systematic way. Using the disaster-management framework in Figure 3, managers in CWD programs should think about resolutions in each phase to address risk. Consider what questions you, as a manager, need to ask in order to prepare for a disruptive event. Some of the recommended questions to consider within each of the four phases are outlined here.

Prevention/Mitigation. In the area of prevention/mitigation, remember that disasters typically cannot be prevented, but their impact can be mitigated. Managers should keep this fact in mind as they expand the use of this framework to other types of risk as well, since opportunities may arise to lessen the effects of a risk rather than prevent it entirely. Mitigation should not be ignored, even if prevention is out of the organization's control.

- What can be done in advance of a disruptive event to lessen the impact of its effects?
- Can clearance prioritization take into account which areas disasters are likely to impact?
- Can important buildings and equipment be better protected from damage?
- How can we prevent loss of data/ensure uninterrupted access to data during a crisis?

Preparedness. Preparedness requires managers to consider what is needed to guarantee that the organization is prepared for response to a disruptive event. Preparations could involve information, plans, resources, tools, training or people.

- Who are the existing internal organizations for emergency response? Who is the focal point? Is ERW response represented?
- Do those coordinating the response know of PM/WRA and its implementing partners as a resource for explosive hazards that may be encountered in the field?
- What international organizations are likely to be involved in the response? Who are the counterparts in neighboring countries?
- Would you know what to do in a disaster situation? Would staff know what is expected of them?
- What is the current clearance strategy, and how is it (or would it be) impacted?
- What is the disaster risk profile of the country (if available), and where can this information be found?

Response. Response is closely linked to preparedness and requires the manager to consider how to ensure the organization is capable of effectively responding to a disruptive event.

- What lines of communication will be used?
- How can you avoid panic among the general population,

> "... we cannot wait until a crisis happens to figure out what we know or don't know and what to do."

as well as prevent/dispel misinformation or rumor?

- How would an emergency-clearance plan take shape? What mechanisms exist? What is required of assets and resources in the country?
- What information/resources are needed to develop/execute the plan? (e.g., satellite images, community input, etc.)
- What happens if the affected area is in dispute? Is there a neutral third party that needs to be called in?

Recovery. The recovery phase is the process of getting back to normal. In this stage the manager should consider what is needed to shift from the emergency-response phase back to normal operations.

- How can you communicate to the public that emergency-response operations are complete?
- Will ad hoc committees/networks or other groups continue to meet/communicate or disband?
- How can you ensure continued planning for the next disruptive event?

Best Practices and Lessons Learned for Planning

The overarching lesson that came out of this research was that we cannot wait until a crisis happens to figure out what we know or don't know and what to do. Planning ahead for disruptions of any magnitude will help the CWD community better address such issues as they arise. Proaction rather than reaction is imperative when managing risks. With regard to the suggested framework, managers should map out a plan that addresses all four phases, translating the answers to the questions previously discussed or posed into specific protocols and actions to take. Managers need to ensure they have considered all aspects of the organization's operations (personnel, finances, communications, etc.). Also, keeping the plan updated is important. It should not be a static document to develop and then put on a shelf. Managers should review the plan annually or at the start of each new project to guarantee the information is kept up to date.

Our research in examining programs that previously dealt with natural disasters in ERW-contaminated areas brought to light some specific best practices and lessons learned in each of the four areas of the framework, listed below.

In regards to **mitigation**,

- Back up data off-site.
- Make sure data is not just recorded on paper.
- Determine if buildings can withstand a natural disaster, and identify measures to fortify them.
- Have an alternate site in mind as an operations base if structures are damaged.
- Consider prioritizing clearance of land more prone to disasters. Overlay suspected hazardous area maps with those of areas impacted in the past by disasters.

Concerning **preparedness**,

- Identify existing organizations/points of contact for emergency response (national and international levels).
- Become familiar with national laws on disaster response, and any existing national or local emergency plans.
- Understand the resources available for a disaster-response effort (within and outside the organization). Understand local capabilities and challenges or gaps.
- Consider what risk-management strategies could be employed—have a plan in place.
- Train staff and educate those likely to be involved in the response on how your organization can help.
- Consider running simulations to practice for an actual disaster situation (similar to practicing for other emergencies, such as injury in the field).

In relation to **response**,

- Communication and coordination are imperative to successful response with different organizations, international actors and other countries affected.
- Utilize your resources—existing infrastructure, mechanisms and equipment (e.g., schools, community-liaison teams) can gather and disseminate information.
- Know how to request assistance from donors (e.g., PM/WRA provides assistance through its Quick Reaction Force) and what their role is likely to be.
- Use available technologies to assist (e.g., satellite images, drones).
- Ensure donors are aware of how your resources may need to shift to aid in the response.
- Know where you can go to obtain the information you need.
- Write a sample emergency-clearance plan.

Regarding **recovery**,

- Develop a transition plan for gradually moving resources (people, assets) not needed for response back to regular operations.

- Ensure communication occurs as necessary with the public, media, etc., so all are aware that emergency response is complete.
- Assess what worked and didn't work with management plans for disruptive events.
- Ensure lessons learned from the other phases are incorporated into future plans and protocols.

Conclusion

Although this article looked at risk through the lens of disaster management, the framework described can be used in other risk situations encountered by the CWD community. Hopefully this work will encourage managers to think about issues of risk and potential disruptions to their operations. By thinking about these issues, organizations can better address them. Equally important is that the community openly discusses successes and failures from these experiences as well as shares experiences with others to increase general knowledge and improve future efforts.

See endnotes page 66

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