



# THE JOURNAL

OF ERW AND MINE ACTION

July 2015 | Issue 19.2

## Risk Education

**Cultural Factors  
Measuring Success  
Reaching Children  
...and more**

## Focus on Colombia

**Preparing for Demining  
Victim Assistance  
Non-technical Survey**

**Special Report**  
Mine Action in Myanmar

**In Every Issue**  
Notes from the Field  
Research & Development



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A woman in Somaliland holds explosive remnants of war (ERW) that were cleared from her property after she discovered contamination while building a fence. ERW-risk training teaches civilians how to stay safe when explosives are found.

Photo courtesy of William Vest-Lillesøe, Danish Demining Group.

### Contributors

Marc Bonnet	Sebastian Kasack
Kjell Ivar Breili	Robert Keeley
Carl Case	Cameron Macauley
Roly Evans	Pablo Parra
Roger Fasth	Nguyen Thanh Phu
Russell Gasser	Ken Rutherford
Ngo Xuan Hien	Pascal Simon
Tycie Horsley	Kevin Thoma
Abigail Jones	Matthew Williams

*The Journal of ERW and Mine Action* is a professional trade journal for the humanitarian mine action and explosive remnants of war (ERW) community. It is a forum for landmine and ERW clearance best practices and methodologies, strategic planning, mine risk education and survivor assistance.

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**Please direct all submissions, queries and subscription/CFP requests to:**

Jennifer Risser, Managing Editor  
Center for International Stabilization & Recovery  
James Madison University  
800 S. Main Street, MSC 4902  
Harrisonburg, VA 22807 / USA  
Tel: +1 540 568 2503  
Email: [cisr-journal@jmu.edu](mailto:cisr-journal@jmu.edu)  
Website: <http://www.jmu.edu/cisr>



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Photo courtesy of Missouri State University Photo Services.

## Director's Message

It's an exciting time here at CISR. As we approach our twentieth-year anniversary, CISR maintains an active role in reducing the negative effects of conflict around the world. By building capacity abroad and strengthening the mine action community's access to information, we're proud to be a part of a field that helps communities reduce the effects of war. This year, we will create a Geographic Information System (GIS) for the global conventional weapons destruction (CWD) community. Developed using the Esri ArcGIS platform and mobile apps to collect real-time CWD data from countries with contamination, the system will analyze data to create an online library of maps, infographics and other data products at no cost to the CWD community.

Moreover, CISR staff are currently in Vietnam planning our next Regional Senior Managers' Course for ERW and Mine Action to be held from 21 September to 9 October 2015. The course, open to candidates from Burma (Myanmar), Cambodia, Laos, Sri Lanka, Thailand and Vietnam, includes two weeks of classroom instruction in Hanoi and one week of field visits in Quang Binh and Quang Tri.

In our continued quest to disseminate information to the wider MA community, the *Journal* turns its attention to Colombia, one of the most mine-affected countries in the world due to decades of conflict with non-state armed groups. In our Focus section, Carl Case from the Organization of American States examines Colombia's ongoing clearance progress in "Preparing for Humanitarian Demining in Post-conflict Colombia." In addition, Pablo Parra and Marc Bonnet from the United Nations Mine Action Service present the case for a national assessment on landmine contamination through non-technical survey.

In our Feature section, we look at the progress and evaluation of global mine and ERW risk education programs. Abigail Jones (Gender and Mine Action Programme) and Kjell Breili (UNMAS) discuss implementing culturally-sensitive risk education in Somalia. In addition, Sebastian Kasack looks at UNICEF's MRE certification courses in Mali, Sri Lanka and Tajikistan while Robert Keeley's (Danish Deming Group [DDG]) article, "Counting the Unaccountable" encourages discussion on how best to measure the benefits of mine risk education.

Also in this issue, we have a very timely special report from Roger Fasth and Pascal Simon (DDG), examining DDG's and Danish Refugee Council's Landmine and ERW Victims Survey in the Kachin and Kayah states of Myanmar.

This past May, I attended the 2015 Mine Action Country Planning Workshop for Iraq in Istanbul. As witnessed at the conference, national and international attention to stockpile management is not only timely, but vital. In this issue, Matt Williams and I look at the role of urbanization in the decreasing distance between populations and ammunition stockpiles and how past unplanned explosions within the United States serve as an unique but prime example of the dangers of improperly stored munitions.

As we look to future issues, our focus turns toward Afghanistan, the use of mobile technologies in the field and best practices in CWD, as well as Sub-Saharan Africa and disaster response planning in Eastern Europe and Asia. As always, we invite industry experts, government bodies, NGOs, and researchers to submit their articles and case studies. We depend on your voice and we look forward to hearing from you.

Ken Rutherford



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# Post-clearance Inspection: How Much is Enough?

Post-clearance inspection serves to check contamination of land on a per square meter basis. Although inspection does little in the way of explaining the quality of the work done in demining operations, it can be important in providing an incentive for deminers to produce higher quality work.

By Russell Gasser [ GICHD ]

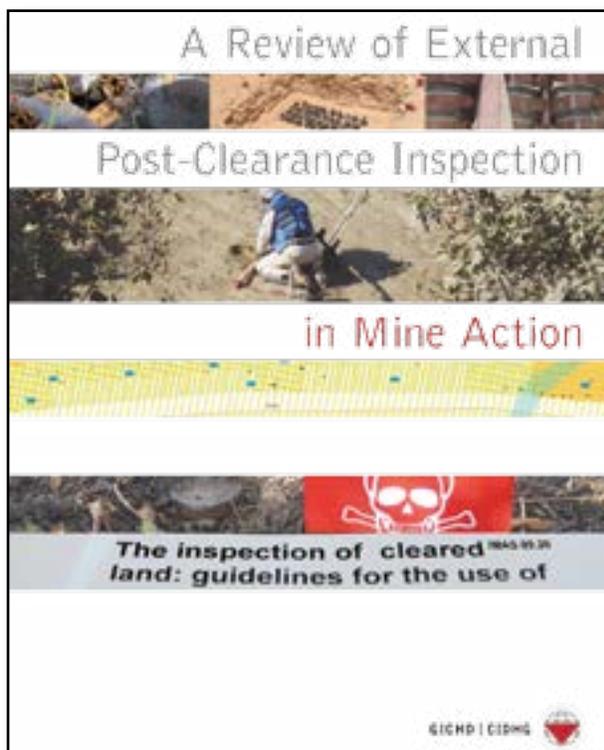


Figure 1. Front cover view of GICHD's report on post-clearance inspection.  
Figure courtesy of GICHD.

Post-clearance inspection for quality control has a significant impact on the overall cost of mine clearance operations. Post-clearance inspection is part of a zero sum game—spending more resources on inspection may give project managers satisfaction that the cleared land is safe, but what it really means is that resources are being diverted away from clearing more land that is still hazardous. Every dollar spent on unnecessary inspection increases the chance of an accident on land remaining to be cleared by increasing delays. For those waiting on the land to be cleared, the risk of

an accident is greater than any benefit of reduced risk from spending a large amount of money on post-clearance inspection. A 2012 study showed one missed mine is found for every one million dollars spent on inspection. The net effect of high percentages of inspection will be higher costs and more casualties overall as less land is cleared.<sup>1</sup> As part of its technical support to IMAS, the GICHD has been reviewing IMAS 07.30 (accreditation), 07.40 (monitoring) and 09.20 (post-clearance inspection); this article is based on this review.

## How Much Inspection is Enough?

International Mine Action Standard (IMAS) 09.20 has played a part in creating confusion about sampling for post-clearance inspection. The complex calculations included in this standard can mislead inspectors that sampling 10 percent of the cleared area can give 90 percent confidence of finding a missed mine. In actuality, sampling 10 percent of a cleared area can give up to a 10 percent chance of finding a missed mine.<sup>2</sup> The calculations in IMAS 09.20 are derived from an International Organization for Standardization method for sampling industrial production that is not applicable to demining. If you look carefully at the calculation in IMAS 09.20 you will see there are two important, but usually overlooked, entries in the equation that are concerned with how many errors are allowed before the batch of products is rejected.<sup>3</sup>

This makes sense when inspecting a machine's output in a factory that is producing thousands of copies of the same item every day. In the factory, a few items that don't reach the quality standard will be acceptable in return for cheaper or faster production. If an item from the factory isn't good enough then it's simply thrown away. However, there is no equivalent in demining; a square meter of land that has not been cleared properly cannot be removed by simply throwing it away. The land remains a potentially hazardous area that can kill or injure someone in the future.

Post-clearance inspection uses a measure of **contamination per square meter**, so a missed target is equivalent to one square meter not properly cleared. The calculations in IMAS 09.20 permit a missed item for every 300 m<sup>2</sup> (3,230 sq ft) cleared, and also state that in post-clearance inspection, the first missed item can be ignored before the land clearance is rejected as unsatisfactory. The missed item discovered during post-clearance inspection might be no more than a small metal fragment, but it could be a missed mine. By allowing missed mines without rejecting the mine clearance work, IMAS 09.20 is non-compliant with IMAS 09.10.

Factory quality control by sampling is based on the principle that most non-conformities are due to a problem in the process, e.g., a machine that is out of adjustment or needs maintenance. In demining, individual, one-of-a-kind errors are the more common causes of missed mines.

Industrial health and safety uses four types of error to explain some important differences:

- **Slips** are unintended or unplanned actions, e.g., pressing the wrong button on a metal detector by mistake. It is usually a one-off error that occurs unintentionally.
- **Lapses** are missed actions or omissions when somebody has failed to do something due to short-term lapse of memory or lack of attention.
- **Mistakes** are when somebody does something believing it to be correct when it is in fact wrong. Typical causes are an error in training or an error in assessing the situation.
- **Violations** sometimes appear to be human errors but are different from slips, lapses and mistakes because they are deliberate, illegal actions. A violation is when somebody does something intentionally despite knowing it is against the rules, e.g., deliberately failing to follow proper procedures to save time or effort.

Post-clearance inspection cannot help us to understand if the cause of a problem is a slip, lapse, mistake or violation. Unless the cause is known, then procedures cannot be changed to avoid repetition of the problem. Quality management needs more information than the results of post-clearance inspection.

On a large site, a deminer cannot be compared to another deminer who was working at the other end of the site months earlier, with different weather, soil and vegetation. One deminer might be suffering from a personal crisis—perhaps a family member has died, and added to his grief, he is now seriously in debt from paying for the funeral. Such a person might have a moment of inattention that leads to poor clearance. Both deminers could have been well trained and supervised



Will inspection after the vegetation grows back make any improvement to the deminer's quality of work?

*Photo courtesy of Helen Gray, GICHD 2013.*

or badly trained and supervised; however, this information is indiscernible from a single inspection after the end of clearance. Demining does not operate like a machine in a factory doing a repeated task.

When a square meter of land is inspected after clearance and is found **not** to contain any hazard, the square meter of land in question likely never had any explosive contamination. The percentage of land with explosive hazards is low in a mined area, usually well under one percent. When the inspection declares the land is free from metal particles or explosive hazard, the land may not have been contaminated but was indeed thoroughly checked to a suitably high standard. Another possibility is that the land was never contaminated and was inadequately cleared due to poor training and supervision. At worst, the square meter sampled by post-clearance inspection was never processed but overlooked by a tired deminer at the end of the day, or by an unscrupulous team leader wanting to turn in better clearance data. In this case, nothing more was done other than declare the land cleared without any clearance work. Post-clearance inspection tells us nothing to help

separate these completely different outcomes. However, quality management relies on being able to tell the difference between good and bad quality work.

Is post-clearance inspection completely worthless? In terms of defining the quality of clearance on a site, it has little value. The extensive survey by the GICHD illustrates this. Independent statistical experts contributing to this review wrote in 2012 "... the optimal sampling plan is ...not to perform sampling at all."<sup>1</sup>

But post-clearance inspection can have real value and should not always be discarded. Statistical data about the quality of work aside, there can be value when inspection provides an incentive to do higher quality work. Even as a small percentage, inspection can produce an overall increase in the quality of work in repetitive tasks.<sup>4,5</sup> This is a reverse lottery effect. In a lottery, many people will buy a ticket provided the prize is large enough even though their chances of winning are small. In sampling we have the opposite situation in which people improve their work because they feel there is a real risk of being caught, even when the sampling rate is very low. If this is linked to serious sanctions for nonconformity, then deminers, team leaders and site managers are motivated to provide higher quality. IMAS 09.20 always allowed for no post-clearance inspection where quality assurance showed it was not necessary.

Once the purpose of post-clearance inspection is understood to be improving people's motivation and attention to their work, and not as a statistical sample, it's easy to see how it should be done.

- Everyone on site should be told that unannounced sampling will take place, and that the consequences could be severe if a missed mine is found and an investigation finds there has been negligence.

- Sampling is best done in a way that will attract the attention of everyone on site and make them take the risk of a missed mine seriously. Areas should be sampled in full view during working hours for clearance teams by expert professionals who can show how carefully they are covering the land and how unlikely they are to miss anything that has been overlooked during clearance operations. The inspection body needs to show seriousness of purpose and rigorous attention to detail.
- The chosen areas should be unpredictable.
- Information about sampling should be recorded and reported.
- Where possible, inspection should be done as part of monitoring missions during clearance to reduce costs and allow prompt release of cleared land.

#### How Much Sampling is Enough?

The key question is, of course, how much sampling is necessary?

The lottery effect works with odds of millions to one against. One percent sampling should be far more than enough to motivate a reverse lottery effect. If inspection is reduced to one percent or less, how will it be possible to provide assurance that the clearance has been done properly?

Quality assurance has always been about implementing a system of efficient and effective methods in addition to processes, training, supervision and good documentation. This is done so that mine clearance organizations can demonstrate they are competent, have the right people and tools, and complete the work at a high standard. Post-clearance inspection tells us far too little about the quality of the work done in demining operations to be useful. Effort spent on checking that a demining

organization has its own internal quality management system, and that this system functions and is well documented will be far more effective and efficient in terms of the overall quality of clearance than any amount of sampling by post-clearance inspection—even 100 percent sampling. Inspection that finds nothing does not indicate that high quality clearance was done.

By the time this article appears in print the IMAS may already have been updated as this has been the topic for revision for some time by the review board. The IMAS review board will also consider a thorough overhaul of the IMAS quality standards that incorporate a new approach to post-clearance inspection. This brings post-clearance inspection into focus as one part of an overall quality management system that is based on getting things right the first time rather than on making mistakes and then trying to find them later. ©

*See endnotes page 65*



Russell Gasser joined the GICHD in 2013 as advisor on quality management systems and results-based management. An engineer by training with a Ph.D. in mine action technology, he became interested in landmine issues while working in Nicaragua in the 1980s where he met mine survivors at an International Red Cross prosthetics workshop.

Russell Gasser  
Advisor, Quality Management Systems  
and Results Based Management  
Geneva International Centre for  
Humanitarian Demining (GICHD)  
Chemin Eugène-Rigot 2C  
P.O. Box 1300  
1211 Geneva / Switzerland  
Tel: +41 (0)22 730 93 19  
Fax: +41 (0)22 730 93 62  
Email: r.gasser@gichd.org  
Website: www.gichd.org

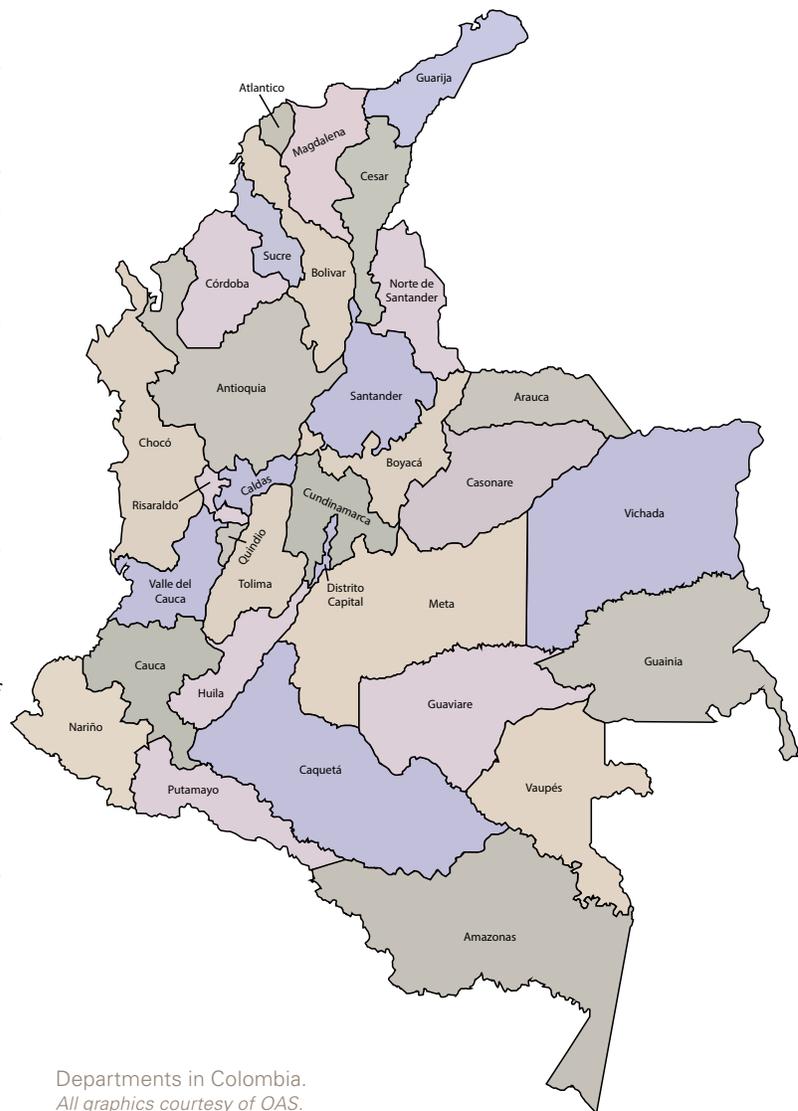
# Preparing for Humanitarian Demining in Post-conflict Colombia

Nearly a decade after launching an effort to build national capacity to clear landmines from its territory, the Colombian government still faces significant challenges in addressing the country's mine problem, which has claimed more than 11,000 victims since 1991.<sup>1</sup> Although the overall number of new landmine victims significantly decreased over the past eight years, survey and clearance work has been limited to more secure zones of the countryside because of the threat from nonstate armed groups to deminers and people living in conflict areas. Meanwhile, the risk to civilians living in parts of the country where demining activities have not taken place has not changed significantly, and Colombia remains among the countries with the highest number of mine casualties each year.

by Carl Case [ Organization of American States ]

In recent months, the advance of direct talks between the government and the Revolutionary Armed Forces of Colombia (*Fuerzas Armadas Revolucionarias de Colombia* – FARC) raised optimism about a near-term negotiated settlement to Colombia's decades-old conflict that would open most parts of the country to mineaction interventions. The key task that the government needs to accomplish in order to eliminate the threat of landmines in the shortest time possible is to define the scope of mine contamination clearly in order to facilitate effective prioritization of areas and efficient use of available resources.

Prior to 2015, the Colombian government's planning of humanitarian demining activities was limited to midterm programming of operations in municipalities considered secure. The three-year plans presented by the Colombian government, in conjunction with its 2010 request to extend its clearance deadline under Article 5 of the *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction* (APMBC) and again at the Convention's Third Review Conference, provided little detail on the scope of the problem, projecting mine clearance work in secure



Departments in Colombia.  
All graphics courtesy of OAS.

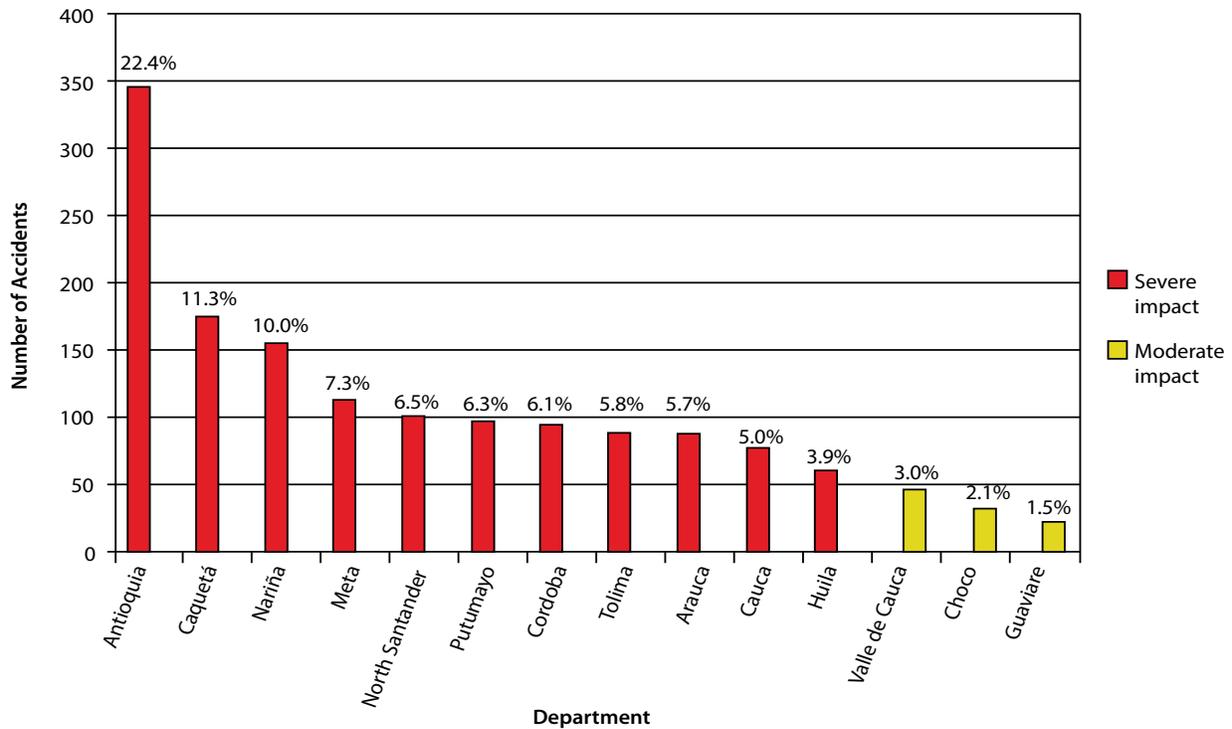


Figure 1. Landmine accidents by department, 2010–2014.

parts of the country only. Insufficient information on the extent of mine contamination is problematic for the planning and mobilization of resources for humanitarian demining, and remains the single most significant issue the government faces in tackling Colombia’s mine problem.

Beginning in early 2015, however, the dynamics of mine action in Colombia changed significantly. Since the initiation of direct talks between the government and FARC in 2012, the peace process has yielded substantive agreements on the road to achieving a negotiated end to the 50-year conflict. Although several issues remain to be resolved before a comprehensive settlement is complete, agreements on land restitution and rural development, political participation, and a way forward confronting the illicit drug trade have raised optimism that the remaining agenda items can be rectified. Ending the fighting and beginning the disarmament, demobilization and reintegration of insurgent combatants remains a key point.

Discussions in early 2015 focused on measures designed to decrease the intensity of the conflict as a prelude to a possible ceasefire and eventual agreement on demobilization. In March 2015, government and FARC negotiators agreed upon a confidence-building process to establish safe conditions for residents of high-risk areas contaminated by landmines and other explosive remnants of war. The parties agreed to implement a pilot clearance project within the framework of

conflict de-escalation, prioritizing sites where the population is at greatest risk.<sup>2</sup>

#### Preparedness for a Broader Effort

Elevation of the mine issue in the peace talks not only served to launch the pilot effort to begin survey and clearance of areas where mine risk is greatest, it also gave renewed urgency to preparedness for quickly identifying and clearing a much broader part of the country. The reorganization of the presidential cabinet following the re-election of President Juan Manuel Santos included the designation of a Minister for Post-Conflict who is tasked with land restitution, victims’ rights and landmine issues under a coherent implementation strategy. Bringing these interrelated elements together poses a significant challenge for the Colombian government. In many cases, land restitution and resettlement of displaced populations were impeded by many factors, including the ongoing conflict and the limitations in the government’s efforts to define the extent of the landmine problem in the countryside, as well as by its still relatively modest capacity to clear hazardous areas once they are identified.

With at least 400 government deminers from the Colombian military and another 160 from The HALO Trust deployed for clearance and survey work in four of the country’s 32 administrative departments, Colombia faces a huge task in



Colombian deminer training for clearance operations.

moving quickly to address mine contamination. Landmines affect as many as 11 departments severely, and have at least moderately impacted another three. Underlying the degree to which the task will grow as the peace process progresses is the fact that of these 14 departments that account for more than 97 percent of all landmine accidents in Colombia in the past five years, only one, Antioquia, is currently the site of mine

clearance or survey activities. Moreover, government data also shows that 75 percent of the accidents in the past five years occurred in departments where no humanitarian demining operations were ongoing.<sup>3</sup>

In February 2015, the government announced a new plan to expand its institutional clearance capacity by projecting the conversion of up to 10,000 military personnel to

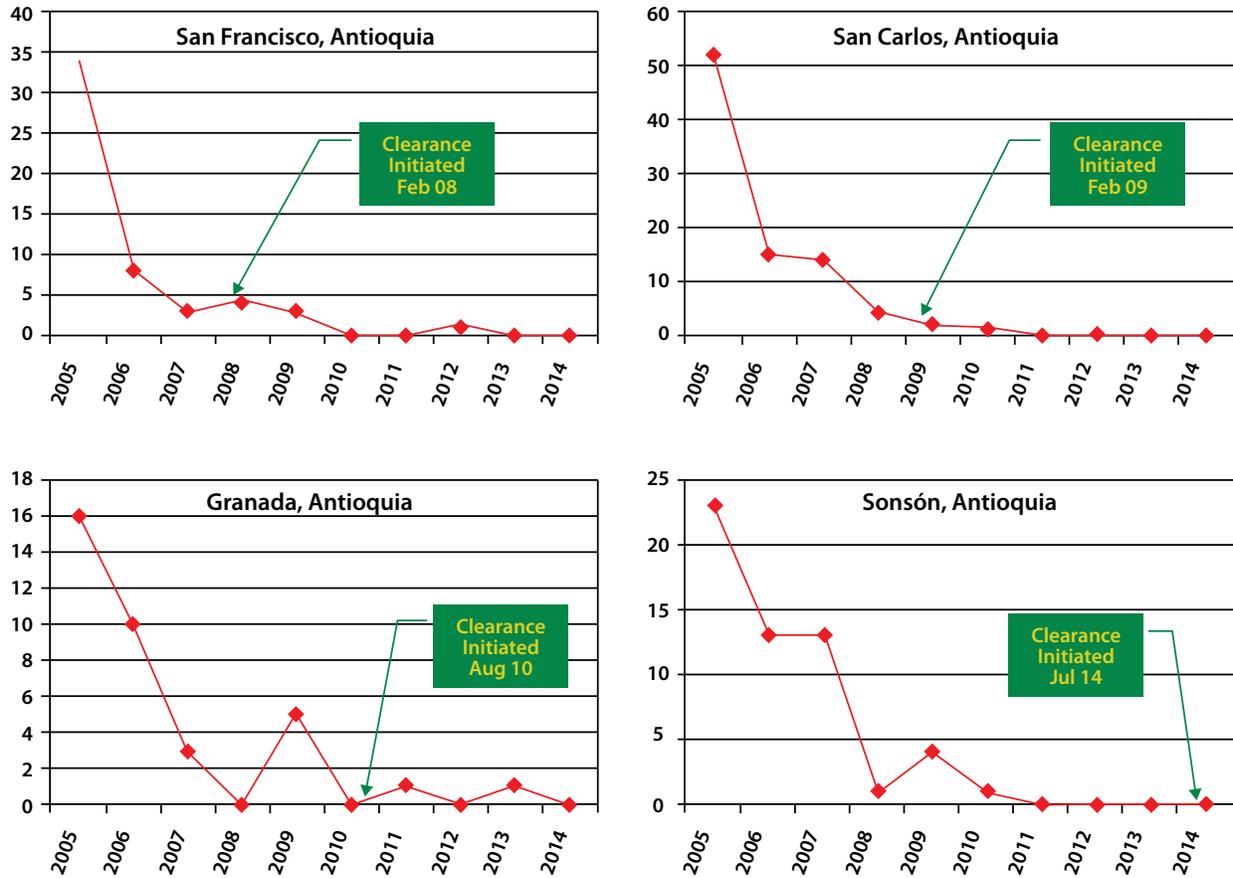


Figure 2. Landmine accidents versus clearance status in selected municipalities.<sup>5</sup>

humanitarian demining tasks by 2017. Also announced was an effort to speed up the accreditation process for civilian demining organizations to no more than six months duration before the end of 2015. The key question about the viability of these projections lay in the lack of funding to train, equip and deploy large numbers of deminers without major external funding and technical support. The government's own projections cited the need for US\$151 million from international donors for the first year following the signing of a peace accord in order to carry out these plans, representing a more than 30-fold increase in the annual amount of external financing that has been available over the past five years. Funding requirements needed to execute the expansion and clearance efforts through 2021 were set at more than an additional \$308 million.<sup>4</sup> While some increase in international support could be expected following the signing of a peace agreement with the remaining nonstate armed groups, funding will most likely not reach the levels needed to support Colombia's projections.

### Defining the Problem

Given the urgency of survey and clearance work in parts of the country where the mine problem is most severe but poorly defined, an approach is needed that clarifies the extent and scope of contamination in order to prioritize efforts for the next two to three years while military and civilian demining capacities expand. To date, security has been the overarching consideration in assigning municipalities for demining operations. However, in a post-conflict context, areas with the greatest risk to the local population should be considered highest priority. Thus far, little evaluation has been conducted using risk as the principal criterion for survey and clearance prioritization.

The government has a huge volume of statistical information related to landmines, but to this point, has had little success in trying to catalogue and analyze some 30,000 indicators or "events" involving landmines that occurred since 1991. Events include accidents, mine clearance during

military operations, improvised mine and explosive cache discoveries, and reports on suspected mined areas. Many of these data points lack specific geographic location data. Efforts to eliminate the least useful data have thus far been met with only limited success, and the database is not particularly useful in either defining the extent and scope of mine contamination or in setting priorities for humanitarian demining activities. One of the means used in the past to clear events from the system has been the use of non-technical survey (NTS) by teams operating in municipalities approved for demining operations. However, experiences in municipalities where NTS was used to confirm or cancel suspected hazardous areas (SHA) indicate that only a small percentage of events in the national database resulted in confirmation of mine contamination. For example, in San Carlos, Antioquia, an extensive survey effort in 2011 resulted in the cancellation of about 90 percent of the events investigated as SHAs.

Accident statistics found within the database could, by themselves, provide a more useful tool for prioritizing areas for countrywide demining operations. A review of accident data points shows the mine problem to be more concentrated in fewer areas of the country than the national totals would seem to indicate. As the overall number of landmine accidents decreased significantly over an eight-year period, a limited number of municipalities exist where the rate of mine casualties remains high. Twenty-one municipalities, registering an average of at least four mine accidents per year between 2010 and 2014, accounted for 54 percent of all accidents nationwide, and a total of 50 municipalities reported more than 75 percent of all accidents in the same period. All of these cases were concentrated in the 13 most severely impacted departments: Antioquia, Arauca, Caquetá, Chocó, Córdoba, Guaviare, Huila, Meta, Nariño, Norte de Santander, Putumayo, Tolima and Valle del Cauca.

In most clearance operations conducted by the Colombian military's humanitarian demining units, the density of mined areas was found to be extremely sparse. Analysis of the San Carlos case shows that 63 improvised mines and six pieces of unexploded ordnance (UXO) were found when clearing nearly 160,000 sq m (1,722,224 sq ft) over a period of almost three years. Similar results are characteristic of all mine clearance operations in Colombia to date, despite marked improvement in amount of SHAs canceled through NTS. In all clearance operations in civilian communities since 2007, the density of mines and UXO has been one unit for every 1,710 sq m (18,406 sq ft) of land cleared.<sup>3</sup>



Typical construction of an improvised landmine in Colombia.

Before the start of extensive demining activities in San Carlos, the incidence of mine accidents began to drop precipitously. According to *Dirección para la Acción Integral contra Minas Antipersonal*, which is responsible for the coordination of the Colombian government's mine action program and is the Technical Secretariat for the National Mine Action Authority, the number of accidents fell from a high point of 52 in 2005 to 15, 14, four and two in subsequent years before extensive survey and clearance operations began there.<sup>5</sup> In every other municipality where sustained demining interventions have taken place since 2009, mine accident figures followed a similar trend.

### Improvised Mine Life Span

Another critical factor in determining where to focus efforts in a post-conflict context is the impact of mine functionality over time. A rigorous, scientific study of the impact of aging on various types of improvised mines used in Colombia has not yet been conducted, limiting conclusions to those drawn from anecdotal observations. However, the downward trend in the number of mine accidents in municipalities considered secure, or consolidated, shows a more significant correlation between the point when a municipality is sufficiently secure to begin humanitarian demining activities than when survey and mine clearance operations are actually initiated.

The historical case of El Salvador holds some useful insights about the impact of mine aging and functionality that could be applicable in Colombia. Following the peace agreement that ended El Salvador's internal conflict in 1992, a

limited effort was made to mark and clear mined areas that were installed by government forces. Use of improvised landmines by the Salvadoran insurgency was widespread, causing roughly half of the Salvadoran military's casualties in the final seven years of the conflict. The mines were similar in construction and function to those currently being used by nonstate armed groups in Colombia. When the fighting ended in El Salvador, the number of mine accidents quickly declined. In 1992, there were 579 victims of accidents with mines and UXO. The following year, the number fell to 259, and only one of these was attributed to an improvised landmine.<sup>6</sup>

Improvised mines used by nonstate armed groups in Colombia vary in size and construction, but they most often use 9-volt alkaline batteries to initiate detonation. Although mines are usually emplaced using plastic bags and other material to limit vulnerability to moisture, battery life is critical to determining whether a mine will continue functioning. Commercially sold, alkaline batteries advertise a shelf life of no more than five years under ideal storage conditions and can probably function for a shorter period of time when employed in improvised mines that are fully or partially buried, particularly given the damp, tropical conditions found in most parts of the country.

#### **Prioritization of Work**

Considering the probable limited life cycle of improvised mines, the concentration of the most serious mine problems in 50 of Colombia's 1,119 municipalities, and the limited existing survey and clearance capacity, the government should avoid undertaking a dispersed, unfocused nationwide clearance effort and instead prioritize its strategy and planning based on severity of impact. Accident data since 2010

provides the best evidence for bringing areas of greatest risk into focus to help define clearance priorities. This information can best determine when and where to deploy clearance assets. NTS teams will be key in reducing the amount of surface area requiring clearance in priority zones.

Other municipalities that fall outside this high-priority category also need to be addressed. Of particular importance is land release to displaced and dispossessed populations across a broader part of the country. In these municipalities, NTS teams can play an important role in canceling areas that remain in Colombia's database because of mine events that occurred in previous decades. SHAs that cannot be canceled will still require clearance assets before being released through technical survey demining. However, survey teams marking these areas, accompanied by prevention campaigns, will greatly reduce the risk to nearby communities until clearance is carried out.

#### **Conclusion**

Colombia will face many challenges in the coming years as it deals with its longstanding mine problem. A peace agreement between the government and nonstate armed groups would likely open most of Colombia for humanitarian demining activities, but the country's size and geography demand a strategy that will prioritize areas of greatest need first for survey and clearance while national capacity is expanded. Understanding the extent, severity and nature of mine contamination is critical to developing future intervention plans, and the information to develop this awareness is available now to begin preparations for work toward a mine-free Colombia. ©

*See endnotes page 65*



Carl E. Case is the general coordinator of the program Comprehensive Action against Antipersonnel Mines at the Organization of American States (OAS) and has worked in the program for more than 18 years. In 2008, he worked for the Office of Weapons Removal and Abatement in the U.S. Department of State's Bureau of Political Military Affairs (PM/WRA) as senior adviser for conventional weapons destruction in Iraq. Prior to joining OAS, he served more than 26 years in the U.S. Army as an infantry officer. He graduated from the U.S. Military Academy at West Point, New York, and holds a master's degree in Latin American studies from Tulane University, New Orleans.

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Carl E. Case  
General Coordinator  
Comprehensive Action against  
Antipersonnel Mines and Assistance  
for Control of Arms and Munitions  
Department of Public Security  
Organization of American States  
Tel: +1 202 370 4680  
Mobile: +1 202 297 8711  
Fax: +1 202 458 3545  
Email: [ccase@oas.org](mailto:ccase@oas.org)  
Website: [http://oas.org/dsp/  
espanol/cpo\\_desminado.asp](http://oas.org/dsp/espanol/cpo_desminado.asp)

# The Case for a National Assessment on Landmine Contamination through NTS in Colombia

With a majority of Colombia's municipalities reporting landmine or ordnance incidents since 1990, there is an urgent need to perform non-technical survey (NTS) in the country to determine the remaining threat. Assuming liability for risk, however, slows the process. The authors make a case for proceeding with NTS

by Pablo Parra and Marc Bonnet [ United Nations Mine Action Service Colombia ]



Directions to a suspect hazardous area in Nariño (Antioquia).  
Photo courtesy of UNMAS.

In December 2009, the mine action world turned its attention to the city of Cartagena, on Colombia's northern coast, host city for the Second Review Conference of the *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-personnel Mines and on Their Destruction* (APMBC). In this idyllic setting, with the second highest number of new mine and explosive remnant of war (ERW) victims in the world, high level representatives of over 100 States Parties to the APMBC, the United Nations and other organizations came together to discuss the issue of landmines.<sup>1</sup>

## Colombia Requests Assistance

Amidst commitments to ending the suffering caused by mines came a request from the Colombian Vice President for international support in addressing the mine and ERW contamination that affects 30 out of 32 of the country's administrative departments.<sup>2</sup> The United Nations Mine Action Service (UNMAS), established in 1997 to serve as the U.N. focal point for mine action, was called upon for help. Since opening its doors in Bogotá in 2010, UNMAS has assisted the mine action sector and worked alongside the national capacity to fulfill its mine action responsibilities in line with the APMBC. Nonetheless, a critical concern remains: The true scope and impact of landmine contamination in Colombia remains unknown.

## Reported Contamination Incomplete

Since 1990, 771 of Colombia's 1,122 municipalities (69 percent) have reported incidents involving mines, improvised explosive devices or other explosive ordnance. At present, less than 20 municipalities have been examined through NTS under the guidance of the National Mine Action Coordination Center, also known as *Dirección para la Acción Integral contra Minas Antipersonal*. The incomplete data currently contained within the Information Management System for Mine Action (IMSMA) database effectively hinders public investment and national initiatives such as the Colombian Land Restitution



The non-technical survey team interviews a local villager in Nariño (Antioquia).  
*Photo courtesy of UNMAS.*

Program (*Programa Restitución de Tierras Despojadas*), relocation of internally displaced people and development projects in rural areas, affecting vulnerable communities across the country.

### **The Solution: NTS**

UNMAS identified an urgent need for a national assessment of landmine contamination (phased, if needed, to address security concerns) and believes NTS should be used to establish this baseline. NTS is a low-impact, non-intrusive, community-based activity where small teams of trained and accredited Colombians visit villages inquiring about landmine concerns. The information gathered is mapped and can either confirm existing suspicions, cancel information where suspicions were unfounded or uncover previously unknown threats. Areas can be marked accordingly and communities informed of the exact location of hazardous areas.

Based on experience in other countries, UNMAS advocates for NTS in Colombia to gather information about landmine contamination and facilitate prioritization of demining assets to affected areas. Because the scope of contamination is unknown, current assignment to demining operators can result in clearance of areas low in socioeconomic and

humanitarian impact. As of today, the historical data contained in the IMSMA database (single events, not areas nor polygons) has been flawed, fostering the need for an urgent update with accurate and verified information. A national diagnostic assessment through NTS would establish the necessary baseline for informed and prioritized task assignments for operators, aligning them with the government's strategic priorities. Furthermore, the international community would be more interested in funding projects that will have high impact on affected communities.

UNMAS also advocates strongly for a NTS that would reduce the frequency of mine accidents by providing accurate information about the location of hazardous areas to government planners and affected communities. Indeed, NTS would enable effective risk-mitigation measures such as the demarcation of minefields and delivery of mine risk education (MRE) to populations living close to contaminated spaces.

There is a difference in the speed with which NTS can be performed relative to manual clearance. The HALO Trust estimates that with current regulations, their NTS teams have the capacity to survey between five and 10 municipalities in 2015 (and with more efficient regulations, perhaps 15 to 20), yet the organization may not be able to clear all hazardous

areas in more than one municipality immediately after the survey due to capacity constraints and the time-consuming nature of manual demining.

From August 2013 through October 2014, with funding from UNMAS and the European Union, The HALO Trust conducted NTS in five municipalities of Antioquia department, finding that 78 percent of records in the IMSMA database should be cancelled and that 87 percent of the 61 hazardous areas found resulted from new information gathered during survey, previously unknown to the national authority. The Colombian Humanitarian Demining Battalion has reported similar findings. These results demonstrate that NTS has the potential to eliminate suspected landmine contamination, enabling the government and communities to release large swaths of land previously blocked for investment and development, while precisely defining the extent of the threat.

### Risk Responsibility

Two contradictory legal arguments surfaced recently, challenging the idea of establishing a national baseline through NTS. The first suggests that knowing the location of landmines in areas where clearance cannot follow NTS immediately would increase the liability of the State and hold it responsible should an accident occur (*posición de garante*—as outlined in the Colombian constitution). Essentially, this notion assumes that ignorance of the precise coordinates of landmine contamination is preferred unless mines can be destroyed immediately. The second position argues that civilian demining organizations would be liable for any accidents in hazardous areas identified during NTS before clearance can occur. Both of these legal perspectives prevent the establishment of a baseline and sup-

port the view that not knowing about the contamination is best.

### A Step Forward

UNMAS recognizes that Colombia has demonstrated its goal of extending all reasonable efforts to mitigate and destroy landmine threats to civilians. The government established a comprehensive framework on humanitarian demining led by a national authority based on respect for the APMBC, the International Mine Action Standards, national standards and best practices known internationally. Colombia is adopting a thorough accreditation process and quality management system; seeking assistance from international agencies with experience such as UNMAS, the Organization of American States and international demining organizations with recognized expertise. UNMAS also understands that though liability is a legitimate concern, further efforts at identifying hazardous areas based on NTS; warning communities through demarcation of confirmed hazardous areas and provision of MRE; prioritizing demining activities; affording maximum impact; and reducing the number of new victims offer a great opportunity for improved efficiency and effectiveness of mine action efforts within Colombia and is certainly more legally defensible than selective ignorance.

With a need to release land previously barred from public investment and development due to a lack of understanding of the mine threat, UNMAS asks that current legal opinions be reconsidered by the government and practical solutions supportive of NTS be developed, ultimately helping Colombia maintain its commitment to the APMBC and rid it of the scourge of landmines and ERW. ©

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Pablo Parra joined the United Nations Mine Action (UNMAS) team in Colombia in August 2014 as Mine Action/Quality Management Officer. Parra is a civil engineer with advanced studies in project management and economics and has worked on formulating and implementing development projects in Colombia. He began in mine action in 2006, leading the creation of Colombia's Mine Action Centre, known as the Presidential Program for Mine Action (PAICMA). Parra also started Colombia's humanitarian demining program, which he led for a period of eight years.

Pablo Parra  
Mine Action/Quality Management Officer  
United Nations Mine Action Service  
Office of Rule of Law and  
Security Institutions  
Department of Peacekeeping Operations  
Av. 82 # 10 – 62  
Bogotá D.C. / Colombia  
Tel: +57 1 488 9000 Ext. 437  
Mobile: +57 318 415 6084  
Email: pablop@unops.org  
Website: www.mineaction.org



Marc Bonnet became Program Manager at the United Nations Mine Action (UNMAS) office in Colombia in June 2011. He worked in India and South Asia as head of international NGOs including Handicap International and Norwegian People's Aid. Specializing in the management of humanitarian mine action programs, he then worked in Angola (Senior Technical Advisor, Mine Action UNDP), Sri Lanka (Country Director, *Fondation Suisse de Deminage*), South Lebanon (Program Manager UNMAS/DPKO/UNIFIL) and Colombia. Marc currently works with GICHD where he is the head of risk management.

Marc Bonnet  
Programme Manager  
United Nations Mine Action Service  
Office of Rule of Law and  
Security Institutions  
Department of Peacekeeping Operations  
Av. 82 # 10 – 62  
Bogotá D.C. / Colombia  
Tel: +57 1 488 9000 Ext. 429  
Mobile : +57 310 272 1958  
E-mail: marcbo@unops.org  
Website: www.mineaction.org

# Healing and Reconciliation for Survivors of War in North Central Colombia

Between 2009 and 2011, a project was implemented to help survivors of war in a small Colombian community learn how to help each other recover from their trauma. Twenty local residents received extensive training on how to lead peer groups to help survivors come to terms with the past and co-exist peacefully with ex-combatants. The project concluded with the construction of a memory wall to honor victims of armed violence.

by Cameron Macauley [ Center for International Stabilization and Recovery ]

Since the mid-1960s, Colombia has experienced violent internal conflict in which more than 220,000 people have died.<sup>1</sup> Fighting was restricted to remote areas in the south of the country until the 1990s, when armed insurgent groups moved into the prosperous agricultural communities of Antioquia in the central north, forcing local populations to abandon their land. Guerrillas operating with the Revolutionary Armed Forces of Colombia (*Fuerzas Armadas Revolucionarias de Colombia* [FARC]) and the National Liberation Army (*Ejército de Liberación Nacional* [ELN]) created a climate of insecurity that drove many communities to form paramilitary defense groups, most of which were self-financed by drug trafficking.<sup>2</sup>

Although the paramilitary groups claimed that they defended communities from the guerrillas, many abused their position of authority and established a vast system of extortion while engaging in brutal “social cleansing.” The main paramilitary group, the United Self-Defense Forces of Colombia (*Autodefensas Unidas de Colombia* [AUC]), took control of much of central Colombia in 1998, perpetrating massacres, assassinations, kidnappings, rape and torture as well as causing hundreds of thousands of Colombians to flee.<sup>3</sup>

## San Francisco, Antioquia

The rural farming community of San Francisco, about 60 miles southeast of Medellín, was one of many affected by these events. By 1999, San Francisco’s population of around

20,000 dwindled to a little more than 6,000, and agriculture was severely hampered by landmines and booby traps laid by FARC and ELN guerrillas as well as by the Colombian military. San Francisco’s population experienced the mass execution of men, women and children in the streets, and the destruction of homes belonging to those accused of supporting the guerrillas. Between 2000 and 2005, the community was captured and recaptured several times, and it became the scene of bloody house-to-house fighting. Injured civilians could not seek medical attention outside the town due to mines and ambushes.

Landmines and improvised explosive devices (IEDs) severely affected the community. Between 1990 and 2011, 409 people were killed or injured by landmines in Antioquia—more than any other department in Colombia.<sup>4</sup> A few strategically placed mines intimidated farmers from plowing fields or planting gardens, and guerrilla-deployed IEDs often contained feces, glass and plastic scrap, which cause infections due to fragments undetectable by X-ray.<sup>5</sup>

By early 2005, peace talks with guerrilla groups were progressing, and steps were taken to demobilize major paramilitary groups. Approximately 44,000 former combatants returned to civilian life, often in the same communities in which they had perpetrated violent crimes. The people of San Francisco faced the challenge of coexisting peacefully with young men who, only a few months earlier, had raped, murdered and tortured with impunity.



Beatriz Montoya provides training for peer groups.  
Photo courtesy of Nate McCray.

### The Partners and the Project

In 1991, the Colombian nongovernmental organization (NGO) *Cooperación Conciudadania* (Citizenship Cooperation) was established to provide psychosocial support to victims of war-related violence. Psychologist Beatriz Montoya offered services to female survivors of the conflict in San Francisco, believing that training local residents to provide counseling would promote an intimate, familiar healing process, wherein support and encouragement would come from a person who grew up in the community and personally experienced the anguish of war there. Starting in 2001, *Conciudadania* began using a unique psychosocial recovery approach called *Pasos y Abrazos* (Steps and Embraces), a series of survivor group meetings intended to cultivate an intellectual understanding of psychological trauma (*pasos*) and to relieve unresolved grief (*abrazos*). This approach was applied to women who lost loved ones, witnessed atrocities, or survived rape and torture. A number of these survivors were taught to lead support groups in their home communities.<sup>6</sup>

In November 2007, *Conciudadania* was invited to collaborate with a Colombian peacebuilding foundation, *La Fundación para la Reconciliación* (the Foundation for Reconciliation) and with Survivor Corps, an international NGO working with war survivors. The foundation worked for many years in the field of conflict mediation and resolution through its Schools of Forgiveness and Reconciliation (*Las Escuelas de Perdón y Reconciliación*), a systematic

training program that prepares mediators known as Peace Leaders to help opposing sides in any type of conflict reach a state of coexistence without animosity and—at best—forgive each other for past transgressions.<sup>7</sup>

Survivor Corps (formerly Landmine Survivors Network) used peer support to promote psychological recovery. Founded by Jerry White and Ken Rutherford, two landmine survivors who personally experienced the benefit of peer support, Survivor Corps had established peer-support programs for survivors of conflict in Bosnia-Herzegovina, Burundi, El Salvador, Ethiopia, Jordan, Mozambique, Rwanda, Uganda and Vietnam by 2010.

The three organizations collaborated to combine their distinct areas of expertise to foster recovery and reconciliation in a community traumatized by violence. San Francisco was chosen due to Beatriz Montoya's close relationship with its people, and the need for healing and reconciliation expressed by the inhabitants. The United States Institute for Peace (USIP) generously provided funding.<sup>8</sup>

### Eight Months of Training

Starting in the fall of 2009, 22 local residents, both men and women, were selected to train as community counselors (*promotores*) who ranged in age from 18 to 54 and included two former paramilitary combatants, survivors of rape and kidnapping, and eyewitnesses of atrocities. All of the participants had lost family members to armed violence.



Cameron Macauley provides peer-support training for the *promotores*.  
Photo courtesy of Nate McCray.

*Promotores'* training occurred over an eight-month period in one-and-a-half day sessions held on alternate weeks to allow time for participants to digest emotionally intense material. The preparation is conceived as a continuum, starting with sessions designed to promote healing and instill confidence, eventually moving on to building skills in counseling and reconciliation. Each *paso* is a combination of discussion, contemplation and learning, in which the participants relive their traumas and listen to the stories of others, accompanied by an *abrazo*, an emotional catharsis and bonding intended to relieve the inner pressure of regrets, fears and anger. The training utilizes art, literature, poetry and music to evoke an atmosphere of introspection and ceremony. Having come to terms with their own feelings, the participants then learn the basics of peer counseling: how to listen actively, probe gently, understand and validate the feelings of others, and build a relationship of trust. Finally, the nature of forgiveness and reconciliation is explored with a focus on opening the survivor's mind to the possibility of reconciling with those who committed acts of violence.<sup>9</sup>

A key part of this training involved teaching the *promotores* to work with survivor groups to elicit discussions of their experiences of violence and abuse. Years of oppression taught survivors to remain silent for fear of drawing unwanted attention

if they expressed anger or grief. These repressed emotions produced depression, insomnia and emotional numbness that led to alcoholism and often suicide. Bringing survivors together in small groups to discuss their experiences and express their feelings was greeted with enthusiasm by the local residents.

As they became more experienced in leading these groups, the *promotores* attempted to bring former paramilitary members together with their victims. This proved difficult and led to accusations and threats in some cases. Participants felt that it was too early to expect progress in this area; however, they will continue to work on promoting reconciliation in the years to come.

Of the 22 participants who started the course in San Francisco, 20 completed it in mid-2010. When the project closed, many of the *promotores* continued working informally as counselors in the community. At least one of the younger *promotores* went on to study at a university and another was elected to the San Francisco City Council.

### The Memory Wall

Another important component of this program was the construction of a "memory wall" in the neighboring community of Santa Fé de Antioquia, some 20 miles northwest of Medellín. The wall bears the names of citizens killed or



The Memory Wall.  
Photo courtesy of Cameron Macauley.

missing in Colombia's civil conflict between 1990 and 2008. The original wall displayed 133 names, but in June of 2011, the Center for International Stabilization and Recovery donated funds to add space for another 98 names on two flanking wings. The wall was also repainted, and a banner at the top of the wall declares "No mas...Nunca mas... Ni una victima mas!" ("No more...never again...not one victim more!"). The wall stands near a church in a small park where survivors can place wreaths and flowers.<sup>10</sup>

### Conclusion

Recently many residents started to return to San Francisco after spending years as displaced persons in camps around Medellín. On 7 March 2015, FARC agreed to contribute to demining efforts by removing mines it placed during the conflict (the Colombian Army already removed its mines).<sup>11</sup>

This project provides a model by which war-affected communities can begin healing and live peacefully with ex-combatants from both sides. Rebuilding communities free of grief and bitterness is a key step toward ending long-running conflicts, as violence is often re-initiated by survivors with unresolved psychological trauma who are unable to live with former adversaries. The participants of this project hope it will be replicated in other post-conflict communities. The full training manual is available free online courtesy of USIP at <http://bit.ly/1SDgh8x>.<sup>9</sup> ©

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Cameron Macauley, MPH, joined CISR in August 2010 as its peer-support and trauma-rehabilitation specialist. He holds a Master of Public Health and degrees in anthropology and psychology. He became a physician assistant in 1983. He has worked in a refugee camp on the Thai-Cambodian border, a district hospital in Sumatra, Indonesia, as a Peace Corps volunteer in Guinea-Bissau, in Mozambique where he taught trauma surgery on landmine injuries, an immunization program in Angola and a malaria-control program in Brazil. Between 2005 and 2010, he taught mental health courses for Survivor Corps in Bosnia and Herzegovina, Colombia, El Salvador, Ethiopia, Jordan and Vietnam.

Cameron Macauley, MPH  
Peer Support and Trauma  
Rehabilitation Specialist  
Center for International  
Stabilization and Recovery  
James Madison University, MSC 4902  
Harrisonburg, VA 22807 / USA  
Ph: +1 540 568 4941  
Email: maculcx@jmu.edu  
Website: www.jmu.edu/cisr

# Mine Action in Myanmar

In two Myanmar states, Danish Demining Group and Danish Refugee Council recently conducted a landmine victims survey that helped to document the epidemiology of landmine accidents and the situation of landmine victims more efficiently as well as recommend improved services to landmine survivors and persons with disabilities.

by Roger Fasth and Pascal Simon [ Danish Demining Group ]

**D**ue to several protracted armed conflicts that started immediately after independence in 1948, Myanmar is perceived as one of the most mine-affected countries in the world. Landmine and explosive remnants of war (ERW) contamination is the result of decades of conflict between the Myanmar Armed Forces (also commonly called *Tatmadaw*) and numerous, armed nonstate actors (NSA) affiliated with the ethnic minorities. Myanmar is not a state party to the *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction* (APMBC). Recent progress observed in the negotiations of a National Ceasefire Agreement (NCA) and the coming of legislative elections at the end of 2015 should significantly change the political landscape, and will hopefully facilitate the conduct of more robust humanitarian mine action activities in the country.<sup>1</sup>

## Mine Action in Myanmar

In 2012, the Myanmar Mine Action Center (MMAC) was established within the Myanmar Peace Center (MPC). During spring 2013, MMAC took leadership of drafting national mine action standards with support of international mine action organizations present in the country. However, once the national standards were completed, MPC focused on taking part in the negotiation of the NCA and stated that signing the agreement was a precondition for marking, survey and clearance operations.

The two mine action pillars that can effectively be implemented in Myanmar at this stage are victim assistance and mine risk education (MRE). The Department of Social Welfare in the Ministry of Social Welfare, Relief and Resettlement set up a Mine Risk Education Working

Group in April 2012, bringing together government departments, U.N. agencies in Myanmar, and national and international organizations conducting MRE and victim assistance in country.

Landmine/ERW contamination is confirmed in approximately 50 townships (from a total of 325 townships in the country) in 10 states and regions.<sup>2</sup> Suspected hazardous areas were identified mostly along borders with Bangladesh, China and Thailand as well as in Bago East in southern central Myanmar.

In January and February 2015, Danish Demining Group/Danish Refugee Council (DDG/DRC) conducted a Landmine and Explosive Remnants of War Victims Survey in the Kachin and Kayah states of Myanmar. Survey objectives were to document victims' conditions, and collect quantitative and qualitative data on opportunities for the reintegration of landmine/ERW victims in those particular states in order to better tailor and deliver future interventions.

## Lack of Victim Information System in Myanmar

The research reviewed and analyzed information provided from DDG/DRC's landmine-accident and victim database, which covers the Kachin, North Shan and Kayah states where the organizations are implementing MRE and victim assistance, as well as from the draft Knowledge, Attitudes, and Practice (KAP) survey report and the draft Rapid Needs Assessment (RNA) report recently conducted in north and southeast Myanmar.<sup>3</sup> Field visits were conducted in Kachin and Kayah to interview landmine survivors and their families as well as to meet representatives from official and nongovernmental institutions and organizations providing services to landmine victims and persons with disabilities.

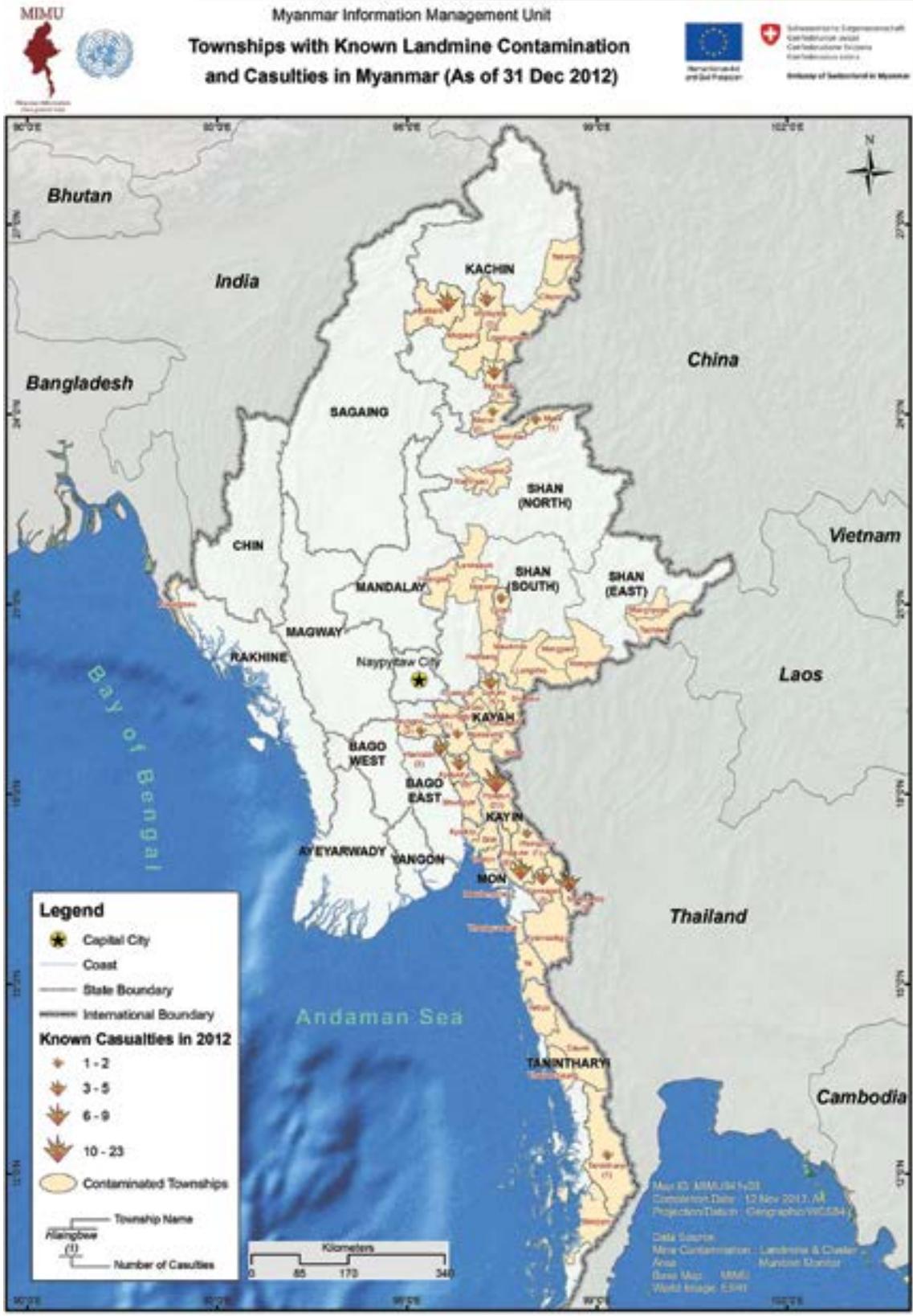


Figure 1. Townships in Burma affected by landmines.  
 Figure courtesy of Myanmar Information Management Unit.



Landmines believed to have been used in Myanmar.  
Photo courtesy of Peace Myanmar Aid.

The study managed several complications and limitations, the most important being the absence of a systematic and organized victim information system (VIS) in Myanmar. Information collection has been sporadic and inconsistent throughout the country, and providing reliable figures on the impact that landmines have on society is impossible. Due to the continuation of armed hostilities between national armed forces and some of the NSA groups, mine action is still a very sensitive issue, and information about victims remains touchy. The absence of a victim-surveillance mechanism is detrimental to the assessment of the contamination and the accurate documentation of its humanitarian consequences. This unavailability also hinders the planning and implementation of victim assistance programs that could provide the required support to survivors and their families.

The 2014 *Landmine and Cluster Munition Monitor* reported a total of 3,450 landmines and ERW victims in Myanmar since 1999.<sup>2</sup> However, mine action professionals in Myanmar believe this figure is underestimated and that a high number of accidents are not reported. The *Monitor* estimates that landmine/ERW victims exceed 40,000, with annual casualties around 1,500 to 2,000; however, no concrete data can support this assumption.<sup>2</sup>

The recent RNA and KAP surveys provide useful information about landmine survivors as well as for the mine action sector in general. The main findings are consistent with those of the DDG/DRC research and will provide important data for MRE activities. The most relevant findings from these projects indicate the following:

- Landmines continue to be a sensitive issue in the country. Landmines are still associated with security, ceasefire, conflict, protection and military issues.

- Contaminated areas have a low level of warning signs and villagers generally do not mark when they identify a dangerous area.
- As often observed in mine-affected countries, landmines/ERW are not the most important problem encountered by villagers, but a large proportion of respondents still declare that landmines/ERW represent a problem in their daily life.

A report published by the International Committee of the Red Cross (ICRC) indicated that 44 percent of prostheses delivered in 2013 in Hpa-An and Yen-an Thar rehabilitation centers were delivered to ERW victims (761 prostheses out of a total of 1,741 amputees) which seems to indicate a strong proportion of landmine/ERW survivors among persons with disabilities in need of prostheses.<sup>4</sup> In 2014, this proportion was even higher (49 percent), as a total of 502 prostheses were delivered to landmine/ERW survivors out of a total of 1,027 amputees. Interviews with ICRC personnel in charge of the physical rehabilitation program suggest that the proportion of war amputees and landmine survivors should probably reach 60 percent of all patients receiving a prosthesis in Hpa-An and 40 percent in Yen-an Thar Hospital. Survivors represent a very important quota among the population of amputees, and it would be interesting to examine the rehabilitation statistics in all states affected by conflict to have a better idea of the number of survivors.

#### Landmine Victims in Kachin and Kayah

Former studies, existing data and field observations indicate that a large majority of landmine victims, at least in Kachin in northern Burma and Kayah in eastern Myanmar, are adult males who engage in dangerous

behaviors, such as hunting or traveling to the forest or their former villages (for displaced people). In most cases, people travel to dangerous locations out of economic necessity and collect basic livelihood products such as bamboo, roots, flowers, mushrooms, etc. Some of the victims were wounded while conducting military activities in government forces or various NSA groups, but most of the victims identified during the ERW Victims' Survey are civilians.

In Kayah, military operations decreased, since a ceasefire was declared between the armed groups and the government in 2012. Although not well documented, landmine accidents largely decreased in the recent past according to witness and victim interviews. Most victims encountered during the survey were wounded a long time ago. Kayah is the smallest state in Myanmar with a population of approximately 250,000 people. According to landmines victims' estimates in Kayah, there are around 250 individuals, nearly all male; 70 percent of these victims are believed to be civilians.<sup>6</sup>

In Kachin, the trend appears to be the opposite, although concrete data is not available. The state experienced an increase in landmine accidents; 90 percent of the recorded accidents occurred in the last four years, while 60 percent occurred in the last two years. Nearly three times the number of accidents were recorded in 2014 in comparison to 2013 (32 versus 13).<sup>5</sup> Several accidents were already documented in 2015. In 2011, the ceasefire in Kachin broke down after 17 years and resulted in large-scale displacements. The fighting was more severe in 2011–2012 than in 2013–2014, but more landmine accidents were recorded during this later period. The reason for this increase is debatable, but the recent fighting likely forced people into more uncertain areas, abandoning their place of origin in haste and leaving behind essential livestock as well as agricultural land. From the limited data DDG/DRC collected in a small and unstable area, 50 percent of the recorded victims are internally displaced persons (IDP), which indicates that to make a living, IDPs must return to their place of origin to nurture their land and tend to their animals.

When examining landmine accidents, Myanmar has a remarkably high lethality rate of 30 to 35 percent, higher than neighboring countries such as Laos (26 percent) and Cambodia (20 percent).<sup>2</sup> The Cambodian Mine and ERW VIS reported an even lower lethality rate of 16 percent for the period of January 2013 to November 2014.<sup>6</sup>

The remoteness of accidents and poor transportation infrastructures partly explain Myanmar's high mine-lethality rate. The number of victims dying from landmine accidents is likely underestimated, as it remains too sensitive or technically complicated to report landmine/ERW accidents officially, especially if victims travel alone and remain stranded because of severe injury. Another aggravating factor is the significant use of artisanal or handmade landmines, which are potentially more lethal than traditional industrial blast-effect devices.

Until recently, MRE documentation in Myanmar was limited and poor, and most survivors indicated that they did not benefit from proper risk education before their accident. In addition, marking of hazardous areas is limited to nonexistent, except under electricity pillars in Kayah, which have unreliable and inconsistent marking.

#### Physical Rehabilitation and Socioeconomic Reintegration Services

As in most developing countries, assistance to persons with disabilities is very limited in Myanmar, in particular in the states bordering China and Thailand. Access to rehabilitation services can be complicated and often requires long and expensive travel, making maintenance and repairs of assistive devices difficult. In 2015, the Ministry of Health, in cooperation with ICRC, will build a rehabilitation center in Myitkyina that will facilitate access to rehabilitation services and orthopedic devices. Operated by one of the former NSA groups, a rehabilitation facility already exists in Kayah. This center is an important asset and plays a useful role in the country's rehabilitation system. However, the staff needs retraining and lacks internationally standardized technical qualifications. The facility's building would also benefit from refurbishment, cleaning and more modern equipment.

Most survivors and victim assistance organizations interviewed during the survey suggest that the greatest needs relate to psychosocial support, livelihood assistance and socioeconomic reintegration. Victim assistance cannot be conducted in isolation and should be integrated in the larger disability and rehabilitation sector. Assistance to disabled persons should be sustainable and conducted in the long term. In Myanmar, persons with disabilities are generally poorer than the rest of the community and have a lower level of education. They are also more isolated and less integrated into local society, facing discrimination and stigma.

Small business opportunities and self-employment remain limited, with little access to funding and business-management guidance.

To be effective, long-term assistance should be provided through networks of persons with disabilities and peer groups rather than to individuals. Development of disability resources centers in Kachin and Kayah can provide services such as mapping job placement, legal information and reference to vocational training as well as business-management and peer-to-peer assistance. The survey repeatedly mentioned educational support for children of persons with disabilities (school fees, uniforms, bags and books) as items that are desperately needed. For people with disabilities, facilitating physical accessibility to basic community services, such as schools, township administrations and community buildings, is also recommended.

### Future of Mine Action in Myanmar

Mine action is a humanitarian imperative in Myanmar. Moreover, humanitarian mine action will be a key component of the ceasefire agreements and is a requirement to support resettlement of IDPs and refugees displaced by the conflict. Large infrastructure projects undertaken or planned by national authorities will need to be accompanied by mine clearance activities for successful implementation.

Following the resumption of armed hostilities in Kachin in 2011, many people left their villages and live in IDP camps located in government-controlled areas (GCA) as well as in nongovernment controlled areas (NGCA). Kachin and North Shan have approximately

150 IDP camps for a total of 100,000 people (79 percent of the camps are located in GCA with a population of 46,700, while 21 percent of the camps are located in NGCA with a population of 49,450 people). Most intense conflicts reportedly took place in the area between

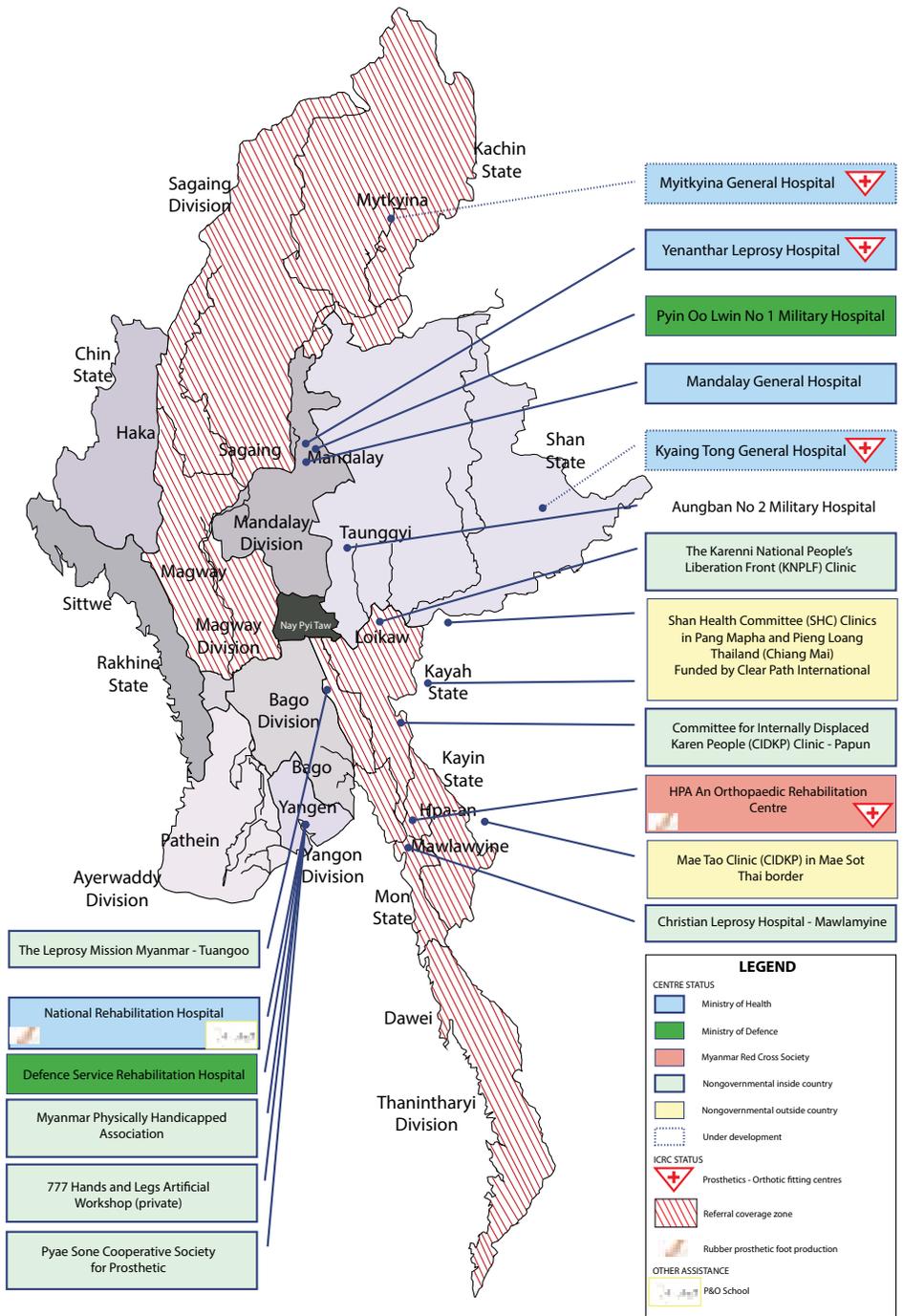


Figure 3. Map of rehabilitation services in Myanmar. Figure courtesy of ICRC.

Myitkyina and Bhamo, in the south of Mansi township and east of Momauk township. The abandoned villages are located along the front line, and those areas are naturally believed to be the most affected by landmine/ERW contamination. In Myanmar, it is important to ensure that humanitarian mine action (including survey and clearance) is conducted to high standards and should be a part of durable solutions that contribute to IDP protection as well as safe and long-term resettlement.

As with any other landmine/ERW-contaminated country, mine action planning is a complex process and should be integrated into all regional and state reconstruction and development plans. Early, participatory- and joint-planning mechanisms will need to be developed with local communities, regional authorities and humanitarian organizations to ensure that mine action has the greatest impact on local development efforts. This is usually a challenging aspect of mine action that less familiar stakeholders often underestimate.

**Recommendations of the DDG/DRC Research**

- Create a simple and ad hoc VIS to capture essential victims' data and inform the strategic orientations of the mine action programs.
- Reinforce MRE for the benefit of affected communities and displaced populations, and integrate MRE into school curricula.
- Provide emergency victim assistance.
- Facilitate access to physical rehabilitation services.
- Refurbish the existing Kayah rehabilitation center and enhance the technical capacities of the staff.
- Increase psychosocial support initiatives in Kachin and Kayah via self-help groups, peer-to-peer services and disability resource centers (these networks can be used to support socioeconomic reintegration activities and increase their chances of success).
- Implement and integrate sustainable socioeconomic reintegration support to landmine survivors and persons with disabilities in the community by providing vocational training and longer term socioeconomic assistance (cash grants, livelihood support, small business, etc.) through communities and disability organizations' networks.
- Provide systematic business service assistance and education for children of survivors (registration fees, school fees, books, uniforms, etc.). ©

*See endnotes page 65*



Roger Fasth joined Danish Demining Group (DDG) in 2002 and has worked in Myanmar since 2013. Before joining the program in Myanmar, he worked as operational manager for DDG in Copenhagen and prior to that in several of DDG's country programs. He completed his Master of Business Administration at Wales University (U.K.) in 2014.

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 Roger Fasth  
 Operations Manager  
 Danish Demining Group  
 Kanbawza Road, Bahan Township  
 Yangon / Myanmar  
 Tel: +95 (0) 9 401588376  
 Email: roger.fasth@drc.dk  
 Website: <http://danishdemininggroup.dk>



Pascal Simon was the UNMAS-DRC program manager until September 2014. A mine action and capacity-development specialist with extensive professional experience, he previously worked in, inter alia, Cambodia, Laos, Senegal and Tajikistan, supporting efforts to develop and reform mine action programs and related institutions. He holds a master's degree in political science and international relations from the Université Catholique de Louvain (Catholic University of Louvain) in Belgium, and he also studied journalism and pedagogy. He is based in Myanmar.

-----  
 Pascal Simon  
 Mine Action Specialist  
 Danish Demining Group  
 Kanbawza Road, Bahan Township  
 Yangon / Myanmar  
 Tel: +95.92 5331 2763  
 Email: [pascal.simon999@gmail.com](mailto:pascal.simon999@gmail.com)

# Implementing Culturally-sensitive Risk Education in Somalia

The Somali Compact 2014 – 2016 outlines the objectives of the Somalia federal government to guide the process of stabilization and peace building. The Compact also recognizes the vital contributions by representatives of women, youth, civil society organizations, traditional elders, religious leaders, diaspora and the business community from all segments in each region.<sup>1</sup>

by Abigail Jones [ Gender and Mine Action Programme ] and Kjell Ivar Breili [ UNMAS ]

The Somalia Explosive Management Authority (SEMA) and the United Nations Mine Action Service (UNMAS) Somalia contracted the Gender and Mine Action Programme (GMAP) in 2014 to carry out a comprehensive gender assessment of its mine action program. The aim of the assessment was to identify strengths, weaknesses, opportunities and threats for gender mainstreaming in core activities of the humanitarian explosive management program, including risk education (RE) activities. Through consultations with staff from the national authorities, U.N. agencies, national nongovernmental organizations (NGO), international NGOs and other stakeholders, the assessment focused on, amongst other aspects:

- The methods that are used to keep women, girls, boys and men alert to the risks of mines, explosive remnants of war (ERW) and improvised explosive devices (IED) when contamination remains over extended periods of time
- The strategies that are used to monitor the effectiveness and evaluate the impact of RE.

The findings of this assessment, as well as ongoing consultations with UNMAS Somalia and other national NGOs carrying out RE in South Central Somalia are discussed in this article.

## Humanitarian Explosive Management in Somalia

As a result of conflict with Ethiopia and two decades of civil war, Somalia is contaminated with ERW, stockpiles of weapons and ammunition. Armed groups increasingly use IEDs, contributing to the threats faced by the Somali population, the federal government and aid organizations. UNMAS became the lead U.N. agency for explosive hazards management



UOS gender-balanced RE teams.  
All graphics courtesy of UNMAS.

in Somalia in 2009 and has since provided support to the Somaliland Mine Action Centre (SMAC), the Puntland Mine Action Centre (PMAC) and SEMA, enabling them to coordinate humanitarian activities that contribute to stabilization.<sup>2</sup> The Federal Government of Somalia (FGS) has also asked the international community for support with weapons and ammunition management, along with helping to enhance RE strategies for small arms and light weapons threats.

## Importance of Culturally-sensitive RE in Somalia

An understanding of the clan system, religion, and other factors such as language, gender, age, geographic location and socioeconomic status is essential to ensure the design and delivery of culturally acceptable community RE in Somalia. This is because the prevalence of religious and clan-based systems, in combination with the impact of protracted conflict and humanitarian crises, have all contributed to creating barriers, preventing access to services for certain demographics of the Somali population.<sup>3</sup> When this is interwoven with other factors such as age, gender, and socioeconomic status, the power dynamics become even more complex. For example, clans in South Central Somalia are typically male dominated and

women have historically been excluded from the arena of clan-based politics.<sup>4</sup> In the clan system, age is also a key determinant of ability to participate in decision-making processes because in many cases it is not acceptable for a younger man to speak up in front of an elder. The interpretation of the Islamic faith in certain parts of the country—for example, those under the control of al-Shabaab and other extremist militia groups—also has direct implications for some community members in terms of their ability to participate in public forums and decision-making processes. However, it is important to keep in mind that South Central Somalia is extremely culturally diverse and that social norms can vary from one geographical location to the next.



Somali women receiving risk education materials.

It should be noted that despite existing barriers, the marginalization of underrepresented groups has resulted in them directing their collective political acumen and agency into the civil society space with some positive results. The protracted conflict and humanitarian crises have also provided opportunities for underrepresented groups to take on non-traditional roles in society. It is a false assumption that only women or men conduct certain livelihoods or household activities, as this varies across clans, geographical locations and individual families.<sup>5</sup> Therefore, national NGOs should complete a gender and diversity analysis as a prerequisite before starting activities to better understand opportunities for and barriers to meaningful participation in RE services. This analysis will enable the design of culturally-sensitive community engagement strategies. Working with district authorities and local communities is also central to gaining acceptance for RE projects in newly accessible areas and districts, and the emphasis should be on working with national NGOs with existing links in the community.

### Culturally-sensitive RE in Somalia

The hiring of RE teams directly from the communities affected by explosive hazards is a useful approach for accessing the local population and building trust while ensuring the delivery of life-saving safety activities to protect civilians from the threat of explosive hazards. Through its grants and contracting system UNMAS has made a significant effort to ensure that the composition of RE teams deployed in Somalia

and Somaliland are gender-balanced and clan-sensitive to ensure women, girls, boys and men can access RE services. This is particularly evident in the current project with Ukroboron-service SC (UOS), which requires the deployment of 20 male and female teams throughout South Central Somalia. Each RE team consists of one male and one female facilitator who deliver sessions at the community level. With the exception of one district, this has now been achieved by working with local authorities and clan leaders to gain acceptance of the RE projects, and also to receive their nominations for community members to be employed on RE teams. National NGOs funded by UNMAS, such as the Somali Humanitarian Demining Organization (SOHDO), and the Somali Youth Development Network (SOYDEN) have also successfully deployed gender-balanced RE teams in parts of South Central Somalia, as have international NGOs with bilateral funding.

Many different techniques were developed in South Central Somalia for the dissemination of RE to ensure that the different age and sex groups remain alert to the threat of mines, ERW and IED contamination. International and national NGOs use a variety of traditional techniques, such as direct RE presentations, radio broadcasts, roleplays, and games. UNMAS and national implementing partners also made an analysis and identified the best forums in which to access the different age and sex groups through direct RE initiatives. For example, men are most readily available in tea shops, clinics, livestock markets and water points.<sup>6</sup> Additional forums and

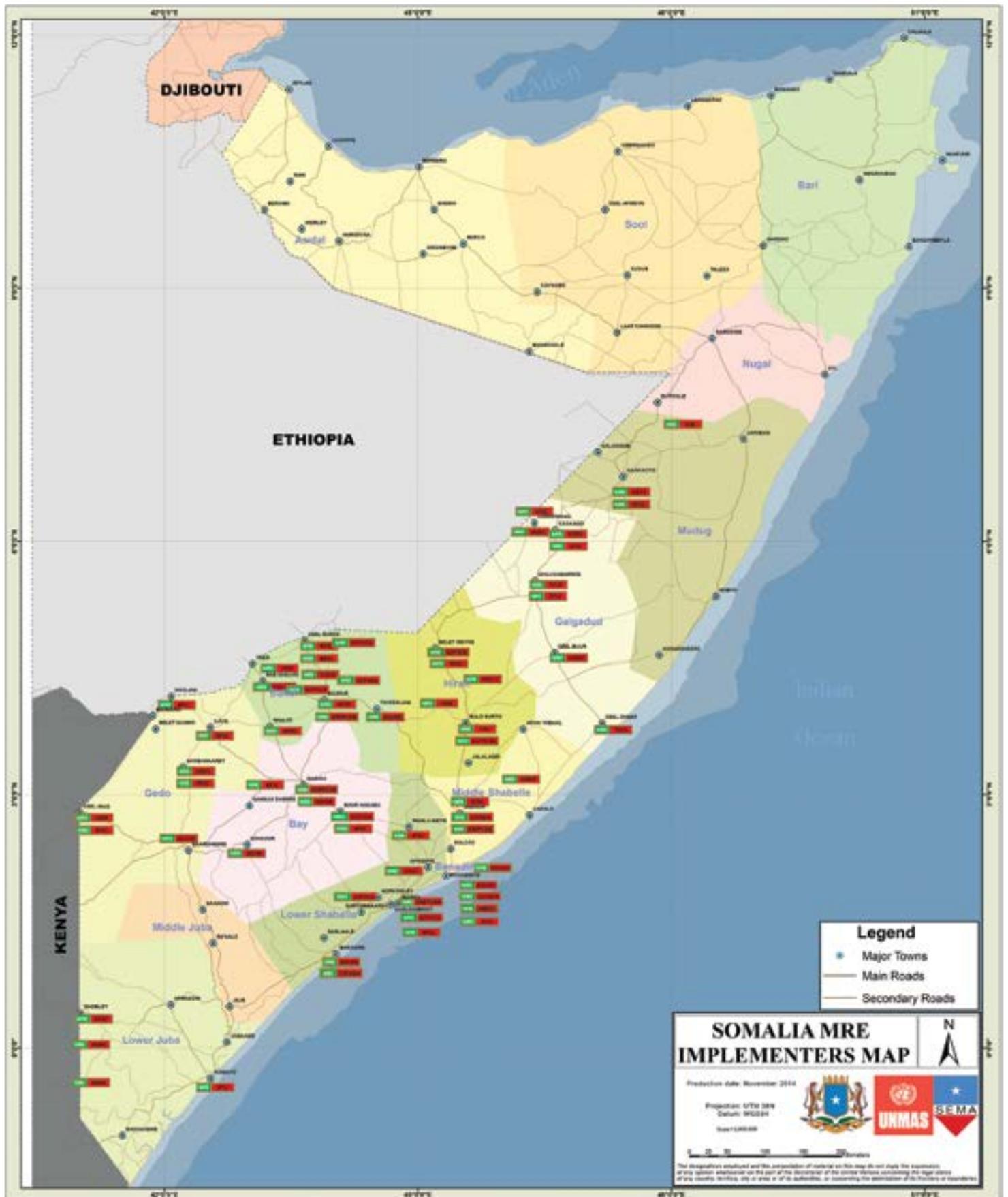


Figure 1. Map showing local NGO distribution in South Central Somalia in 2014–2015.

RE Beneficiaries				Total	Sessions
Girls	Boys	Women	Men		
54,628	69,119	31,266	33,102	188,115	10,545

Table 1. Risk education beneficiaries.

mechanisms identified for targeting high-risk demographics of the population are organized internally displaced persons (IDP)/refugee camps and return points, communities (using the Danish Demining Group (DDG) community safety approach), UNICEF child-friendly spaces, community police dialogue initiatives, and private stockpile workshops (PSW).<sup>7</sup>

To promote the sustainability of RE initiatives, there has been a shift in focus toward training community-based RE facilitators, for example midwives and traditional birth attendants to target women; teachers in schools to access children and adolescents; religious leaders such as the sheikh or moalim (religious teachers) in the madrasas (religious schools) to target non-scholarized children and adolescents; and Imams in the mosque to target men.<sup>8,9</sup> Since Somalia does not have an established government school system the majority of children attend religious schools called madrasas rather than government-established or private schools. The African Network for Prevention and Protection against Child Abuse and Neglect Somali Chapter (ANPPCAN-SOM) has identified the need to integrate RE into community-based structures by establishing RE committees and training pre-existing community education, health, water and teachers' committees in rural villages. In response to the fact that boys and young men between the ages of five and twenty-nine years are considered to be most at-risk of mine/ERW accidents, the ANPPCAN-SOM project supports RE mainstreaming in the formal and informal educational systems in affected communities in the Bay, Lower/Middle Shabelle, Bakool and Hiran regions of South Central Somalia.

To further promote the sustainability of RE initiatives and to support the development of national capacity, UNMAS trained a small number of police explosive ordnance disposal (EOD) teams in Mogadishu to deliver emergency RE in areas where they respond to reports of mines, ERW and IEDs. The concept of developing the emergency RE capacity of the police is based on the model successfully used in Somaliland, where the main provider of RE is the Somaliland Police EOD teams, and it is planned that the full responsibility of RE will be handed over to the Somali police by 2017.

This model is currently being expanded throughout South Central Somalia as part of the RE project with UOS. Under the terms of the project, UOS RE officers will train two male and two female police officers from each district in emergency

RE so that they can disseminate messages in affected communities. According to statistics received from UNMAS Somalia in December 2014, 1,029 male and 97 female police officers from 13 districts participated in the training.<sup>10</sup> This initiative is also linked to broader stabilization and peace-building efforts because training police officers as emergency RE facilitators is a tangible and proactive method for strengthening positive perceptions of policing at the community level.<sup>11</sup>

### Measuring the Effectiveness of Culturally-sensitive Risk Education

In the case of South Central Somalia, the objective is that RE is provided to all communities affected by explosive threats, and the expected outcomes include the following:

- At-risk populations adopt safe behaviors
- The number of landmines/ERW/IED accidents is reduced
- Community perceptions of the police are improved

One positive outcome of stabilization work is that communities, interim administrations and the local security sector that were previously not accessible due to their location within al Shabaab-controlled areas were recovered after the AMISOM/SNA advance in 2014. These communities have now received basic ERW and IED awareness training to increase their knowledge on how to protect themselves from the risks. In addition, local NGOs participated in train-the-trainer workshops for future community-based RE projects in areas that are recovered to the FGS through a partnership with UNICEF and international NGOs.

In terms of monitoring the outputs of RE in Somalia, presently data is collected and disaggregated by age and sex to illustrate participation in RE sessions. Outputs of RE teams operational in newly accessible districts, in line with the national stabilization plan and the United Nations Refugee Agency returnee projects, are included in Table 1.

In addition, there have been efforts to evaluate behavior change and accident reduction. This has primarily been done using Information Management System for Mine Action (IMSMA) data to map RE sessions and casualty data in the areas where RE has taken place since 2010. In the case of Mogadishu, there has been a reduction in casualties, although UNMAS states that other factors, such as clearance of hazards and improved security facilitating operations also contributed



UNMAS teams distribute RE leaflets in the community.

to this outcome. However UNMAS also highlights that evidence suggests that currently the majority of accidents happening in South Central Somalia are in areas where the local population has not benefited from RE initiatives.

There is no strategy currently in place for measuring and evaluating improved community perceptions of the police, but a strategy is under development by rule of law and security institutions. The United Nations Assistance Mission in Somalia and the international community is working with FGS in line with the Somali Compact, which provides an overarching strategic framework for coordinating political, security and development efforts for peacebuilding and state-building activities. Its priorities build upon existing plans and strategies of the government. One of the main goals of UNSOM and

the Rule of Law and Security Institutions group is to give strategic advice and coordination support to the FGS through the Somali Compact and the U.N. Integrated Strategic Framework for Somalia. If the security situation permits, there would be an added value in carrying out a culturally-sensitive Knowledge, Attitudes, Practices and Beliefs survey or a pre- and post-RE assessment in newly accessible areas. This would allow SEMA and UNMAS to evaluate the extent to which RE delivered by national NGOs and emergency RE conducted by the police have contributed to the achievement of the expected outcomes. It would also enable the collection of more qualitative information on the effectiveness of different RE strategies for targeted groups. ©

*See endnotes page 65*



Abigail Jones is a humanitarian mine action professional with significant experience in the development of tools to facilitate behavior change in at-risk groups. Currently the program manager of the Gender and Mine Action Programme, Jones coordinates gender baseline assessments, thematic trainings and strategy development for a number of mine action programs and other stakeholders. Prior to this, she worked for MAG (Mines Advisory Group) in the Democratic Republic of the Congo where she developed and field tested a teachers' training manual in line with the national curriculum strategy for risk education delivery in schools in partnership with UNICEF.

Abigail Jones  
 Programme Manager  
 Gender and Mine Action Programme  
 Chemin Eugène-Rigot 2C  
 P.O. Box 1300  
 1211 Geneva 1, Switzerland  
 Tel: +41 (0)789713046  
 Skype: abigail.jones2010  
 Website: [www.gmap.ch](http://www.gmap.ch)



Kjell Ivar Breili is a humanitarian mine action manager. He works as the project manager for the UNMAS Somalia Humanitarian Explosive Management Project, where he supports the national authorities in coordinating the humanitarian activities within Somalia. Prior to this he worked for international mine action agencies in Ethiopia, Kosovo, Mauritania, Rwanda, Somalia and South Sudan. Prior to working in mine action, Breili served in the Norwegian Army.

Kjell Ivar Breili  
 Project Manager Humanitarian  
 Explosive Management  
 UN Mine Action Service Somalia  
 Email: [KjellB@unops.org](mailto:KjellB@unops.org)  
 Skype: Kjell.ivar.breili  
 Website: [www.mineaction.org](http://www.mineaction.org)

# Child-to-Child Risk Education

Children are especially susceptible to the dangers of landmines. Through its Children Against Mines Program, the Marshall Legacy Institute extends mine risk education through club participation to children, who subsequently spread the valuable information to peers.

by Tycie Horsley [ Marshall Legacy Institute ]



A Children Against Landmines Program student delivers mine risk education (MRE) posters at a community MRE presentation. All photos courtesy of Marshall Legacy Institute.

In the past decade, dramatic improvements were made in mine clearance, but the U.N. reports that 59 countries remain contaminated by landmines, while many more are affected by unexploded ordnance (UXO) and other explosive remnants of war (ERW) that kill and injure thousands of people and animals each year. According to Jeff Abramson, editor of the *Landmine and Cluster Munition Monitor*, “The rate of 10 casualties per day for 2012 is less than half of what

was reported when the Monitor started recording casualties in 1999 of approximately 25 casualties each day.”<sup>1</sup> Despite progress in mine action, these hidden killers continue instilling fear, paralyzing communities, denying land use and impeding socioeconomic growth. By affecting agricultural and infrastructure development, access to critical resources, and the emotional state of those living in threatened communities, landmines hinder the well-being of millions of people around

## A Valuable Lesson

In Laghman province, Afghanistan, a leader from a neighboring village visited the Children Against Landmines Program (CHAMPS) club at their school to tell them how grateful he was for their work. He described how a group of kids in his village were throwing rocks at a large metal object they found on the outskirts of the village, and one of the children remembered what the CHAMPS club told his class when it visited the previous month. He accurately identified the object as a rocket, and the children agreed it would be wise to stop playing with it.

An explosives ordnance disposal team subsequently removed the object, confirming that the rocket was active and could have exploded. The village leader expressed his community's appreciation to the CHAMPS club during an assembly of the student body.



A CHAMPS student teaches MRE.

the world. Threatened populations, especially children, must be reminded of the dangers.

### The MLI Mission

The Marshall Legacy Institute (MLI) has worked in severely contaminated countries for the past 18 years to aid in eliminating the humanitarian dangers and destabilizing effects of landmines. MLI has donated 200 mine detection dogs since its inception, and has trained local handlers to employ the dogs safely and effectively in landmine-clearance operations in 11 war-torn countries. Additionally, MLI spent the past decade increasingly focused on survivor assistance programs and providing child-to-child mine risk education (MRE). In communities surrounded by landmines, these activities encourage safe behavior by raising awareness and educating communities, particularly children, about the dangers of mines and other explosive devices. Working with local partners, MLI implemented MRE activities in many mine-affected countries including Afghanistan, Bosnia and Herzegovina, Iraq and Vietnam.

### CHAMPS

Children are particularly vulnerable to landmine dangers and MLI has used its Children Against Mines Program

(CHAMPS) to convey mine-awareness messages and promote behavioral changes to instill safe practices among youth in threatened communities. CHAMPS fosters global citizenship and engages students worldwide in the landmine issue, promoting the concept of children helping children and reaching 10,000 to 15,000 students each year. The program engages youth in mine-related, service-learning activities, encouraging the development of leadership skills and helping them understand that they can make a difference in the world and affect positive change.

Through CHAMPS, MLI links U.S. youth with children in mine-affected countries, and by using Internet video messengers such as Skype, these youth can discover more about each other. The resulting empathy between the children promotes a greater sense of cultural understanding. As part of the curriculum, students form CHAMPS clubs, and clubs in mine-affected countries choose young landmine survivors to assist in their community and identify their needs, while the clubs in the United States generate funding to provide for survivors' needs, such as prosthetic limbs and other medical assistance. In 2014, 45 participating schools in the United States partnered with six schools in Iraq, one school in Yemen, and three schools in Bosnia and Herzegovina. In the mine-affected countries, trained MRE instructors teach the CHAMPS clubs

about the existence of explosive devices in their region, how to recognize and avoid the explosives, and other important mine-safety messages. With their MRE instructions, these trained youth share their newfound knowledge about mines and UXO with other children in local schools and community groups.

Each country has particular challenges, e.g., security threats in Afghanistan and Iraq make travel for CHAMPS clubs nearly impossible at times. Despite the difficulties, however, the programs have been successful. In Afghanistan, MLI worked with two schools in the Laghman and Samangan provinces, forming two CHAMPS clubs that traveled to surrounding villages and shared their MRE knowledge with more than 10,000 youth. In Iraq, MLI has had active CHAMPS clubs in Baghdad, Basra and Wassit. UNICEF estimated that nearly 1 million children in Iraq are affected by landmines, while explosives have maimed or killed hundreds since 1991.<sup>2</sup> MRE activities conducted by the CHAMPS clubs are critical in such densely mined regions, and despite security issues that limit travel opportunities, CHAMPS students delivered safety and awareness-raising presentations to more than 7,300 Iraqi youth.

In each country, MLI forms partnerships with local organizations that focus on youth, education and landmines. For example, MLI partnered with Help the Afghan Children (HTAC) and the Organization for Mine Clearance & Afghan Rehabilitation (OMAR) in Kabul, Afghanistan, from June 2010 to June 2012. HTAC organized students into CHAMPS clubs in high-threat areas, and OMAR staff provided students with MRE training and information about landmines when the clubs visited the OMAR Mine Museum as part of their training activities.

#### Child-to-Child MRE

In each of the programs, children used creative methods to communicate with peers, such as acting out skits to engage their audience and raise awareness about mines as well as using media to send safety messages. In Vietnam, MLI formed two CHAMPS clubs in Quang Tri province, and participating students provided MRE to 2,000 other children throughout the region. Many CHAMPS youth had experienced firsthand the dangers of mines/UXO, while several knew people who were killed or seriously injured. The skits were particularly poignant, as the youth writing the plays described being forced by their parents to search for scrap metal in known minefields to help their families earn an income. The skits reinforced the hazards of mines and helped students describe to their peers how to identify, avoid and report mines/UXO.



A mine detection dog aids in the CHAMPS MRE lesson.

#### Other MRE Activities

In Afghanistan and Iraq, MLI engaged local demining partners in its MRE activities and incorporated into the presentations mine detection dogs that American CHAMPS students sponsored. By introducing the dogs to CHAMPS clubs, the youth learned more about demining work in nearby areas and the positive impact the lifesaving dogs have in their country. The dogs and staff from the demining organizations traveled with the CHAMPS clubs to their MRE presentations in surrounding areas, educating community members about clearance operations near their homes. A memorable addition to the MRE presentations, the dogs had the added benefit of attracting the attention of passersby.

In Bosnia and Herzegovina, MLI partnered with the World Champion Fantomi Sitting Volleyball team, which is comprised primarily of landmine survivors who lost limbs, to deliver MRE to children and villagers living in mine-contaminated areas. Using trained MRE instructors from the Mine Detection Dog Center in Bosnia and Herzegovina, MLI



Children in Vietnam perform an MRE skit.

first implemented this program between 2011 and 2012, and the Fantomi team traveled with MRE experts to Brčko, Ilidža, Ilijaš, Mostar, Sapna and Zenica to perform exhibition games. The games preceded MRE classes and served to capture the children's attention, reigniting their interest in the landmine issue.

In 2015, MLI is renewing its CHAMPS program in Bosnia and Herzegovina and connecting students in two American schools with schoolchildren from three different ethnic majority regions within the country. The students will learn about one another and work together in landmine-related, service-learning projects. The Fantomi Sitting Volleyball team will participate in the MRE presentations and visit landmine-threatened communities throughout Bosnia and Herzegovina to play championship and exhibition sitting volleyball games to spur interest and awareness of the mine/ERW situation. Following the Fantomi games, MRE instructors, assisted by CHAMPS students, will deliver interactive

presentations and distribute landmine-awareness materials to the youth and other vulnerable populations within the communities.

#### **MRE Makes a Difference**

The persistent threat of landmines and other UXO lingers, threatening the populations. As these insidious weapons continue ravaging dozens of countries worldwide, MRE efforts are critical to reducing their devastating impact. Creative programs like CHAMPS and interactive or sports-oriented activities have proven effective in reminding children how they can work together and learn from each other how best to live safely in areas contaminated by mines and other explosives. ©

*See endnotes page 66*



Tycie Horsley is Marshall Legacy Institute's development director. She has more than 10 years of experience in nonprofit, humanitarian development work, and holds a master's degree in public policy and peace operations from George Mason University (U.S.). She received her bachelor's degree in government and anthropology from the College of William and Mary (U.S.).

Tycie Horsley  
Development Director  
Marshall Legacy Institute  
2425 Wilson Blvd., Suite 240  
Arlington, VA 22201 / USA  
Tel: +1 703 243 9200  
Fax: +1 703 243 9701  
Email: [info@marshall-legacy.org](mailto:info@marshall-legacy.org)  
Website: <http://marshall-legacy.org>

# Counting the Uncountable: Measuring the Benefits of MRE

The aim of this article is to propose concepts that define MRE in terms of its outcomes and beneficiaries and to open a discussion on developing a means that may then be useful in measuring the efficacy of MRE. This article defines efficacy as the ability to produce a desired or intended result.

by Robert Keeley [ Danish Demining Group ]



A mine risk education session led by Danish Demining Group.  
All photos courtesy of Willaim Vist-Lillesøe, Danish Demining Group.

**M**ine risk education (MRE) is an integral component of mine action and the International Mine Action Standards (IMAS) defines it as

*“Activities which seek to reduce the risk of injury from mines/ERW [explosive remnants of war] by raising awareness of men, women, and children in accordance with their different vulnerabilities, roles and needs, and promoting behavioural change.”<sup>21</sup>*

Under this definition, MRE is (1) an educational process and (2) intended to reduce casualties through behavior modification. This is a simplified version of the comprehensive definition included in IMAS but is useful as it frames some of the concepts necessary for measuring the benefits of MRE, which is commonly measured in terms of its activities (e.g., the number of posters printed) and outputs (i.e., the number of people provided with MRE training).

In measuring the benefits of MRE, there is a set of necessary ground rules. These rules should include a definition of the outcomes of MRE as a part of mine action, and a clear understanding of how the number of beneficiaries (direct and indirect) of MRE interventions will be measured.

The terminology in change modelling, logframe analysis, etc., is sometimes confusing. An **outcome** can sometimes be called a **result** (as in results-based management), and in the development evaluation criteria created by the Organisation of Economic Cooperation and Development (OECD) and commonly used by mine action donors (and sometimes by practitioners) the outcomes are considered under the term **impact**. The term used throughout this article is **outcome**.

This article refers to MRE, but the principles can also extend to all forms of risk education as practiced in mine action, including small arms and light weapons risk education.

### Definitions

The following outcomes are proposed as general definitions of mine action outcomes:

- Outcome one is a reduction in the number of casualties caused by explosive remnants of war (ERW), including landmines and unexploded ordnance.
- Outcome two is an increase in the use of productive land otherwise denied by the perceived presence of explosive ordnance contamination.
- Outcome three is an increase in the ability of survivors of mine accidents to make an effective and dignified reintegration into society.

As an educational process intended to reduce casualties through the modification of behavior, MRE can be expected to contribute to outcome one as set out previously. However, MRE does not contribute to outcomes two and three (except as a potential source of data). Any measurement of efficacy should therefore concentrate on an MRE activity's contribution to a reduction in casualties.

### Outputs

It is suggested that there are three main groups of activities in mine action, namely

- Community-based MRE
- School-based MRE
- Mass media-delivered MRE

This allows the definition of outputs for all MRE activities in terms of people reached—and not, as mentioned previously—based on materials produced. MRE is about people, not t-shirts.



A warning sign illustrating the risk of ERW.

### Estimating the Number of Beneficiaries

Direct and indirect beneficiaries are used to estimate the total number of beneficiaries of mine action activities. While more accurate measurement techniques could be devised, additional calculations would be unwieldy and would result in diminishing marginal returns of information.

**Direct beneficiaries.** There are three kinds of direct beneficiaries:

- Direct beneficiaries for mine clearance or battle area clearance are the end users of the land, measured either in households or if as individuals, estimated at an average of six per household.
- Direct beneficiaries of a single spot explosive ordnance task or a physical security and stockpile management task, which for the benefit of such calculations is treated as a large spot task, are the owners or users of that piece of land, plus the household members of any dwellings in the hazard radius of the weapon.
- Direct beneficiaries of MRE are the number of people attending a school- or community-based session.

**Indirect beneficiaries.** Indirect beneficiaries are those indirectly impacted by mine action activities and include

- All members of a community where the intervention



A handout with pictures of different types of ERW.

takes place are indirect beneficiaries because they either receive the MRE information from those who attended the sessions or their access to cleared land is improved.

- All beneficiaries of mass-media MRE campaigns (including billboards, radio broadcasts and advertising) are considered indirect beneficiaries unless there is clear evidence of behavior change linked to the media campaign.

### Measuring Efficacy in MRE

One of the problems with social science is that accurately aggregating human data is impossible without spending lots of money on big sample sizes, and there is a point in the data sampling that results in what social scientists call **diminishing marginal returns of information**. Alternatively, sampling and studies provide best estimates of behavior that researchers then associate with a certain degree of confidence based on statistical rules. MRE is no different.

Nevertheless, by using the concept of **Theory of Change**, project designers are required to show how an activity links to an output and how an output links to an outcome. As discussed previously, defining and measuring the outputs of MRE is comparatively easy, whereas defining and measuring MRE in terms of its outcomes is more difficult. However, as a

form of behavior change communication, MRE's outcome becomes easier to understand in terms of safer behavior and reduced casualties.

Knowledge, attitude and practice (KAP) surveys are used in MRE, although the effectiveness of the KAP process has varied. Some general principles from the discipline of epidemiology can be used to good effect:

- There must be a scientific method of measuring change (measuring a baseline to identify before and after conditions).
- Studies can be both longitudinal (comparing different groups) and time-based (measuring change in a target group over time).
- Numbers of target populations must include denominators (when we discuss a sample group of say 4,000 people, we must define this number in terms of an overall population size, e.g., "4,000 adults out of a totaled population size of 37,000 people in the county of [country name]").

A KAP survey is limited in terms of measurement efficacy. Rather, KAP surveys (conducted scientifically) are most useful for assessing a population's knowledge while being less useful for assessing attitudes and practices. This is due to the phenomenon of people striving to give the right answer to survey questions.

Economists define survey results as being stated preferences as opposed to revealed preferences, which are determined by other means (counting people entering a public toilet and later measuring the amount of soap used over a week). When measuring the efficacy of MRE, revealed data yields more accurate results than stated data in terms of attitudes and practices, while surveys are the best means of measuring knowledge.

### Measuring Attitudes and Practices

Monitoring and measuring any increase in the reporting rates of landmines or other ERW avoids the problems of diminishing marginal returns of information and stated preference, and is a comparatively simpler way of measuring the efficacy of MRE in terms of attitude. Therefore, if the MRE is efficacious, it will result in more people understanding the need to and the process of reporting items, and will deliver an increase in the level of reporting. This can be easily measured by epidemiological processes, such as the use of control groups (areas that have not been subjected to the same MRE activities). It also allows researchers to recognize that all MRE content is not created equal, and that the content of one MRE package can have different results than another. Furthermore, an increase in reported data is revealed rather than in stated data, and is hence more reliable.

It is difficult to stand at the edge of a minefield and count people conducting unsafe behavior, but we have a measure of efficacy in terms of the casualty numbers. This is a proxy indicator (and does not measure behavior directly); however, given that the intended outcome is a reduction of casualties, this seems a reasonable one to use. The question is then one of results attribution—to what extent is the reduction in casualties attributable to a particular MRE project,

to what extent is the reduction attributable to other MRE activities, and to what extent might a reduction in casualties be attributed to other interventions?

Mine action programs would benefit from the ability to establish casualty rates at a national and provincial level. Using casualty data for the areas where MRE intervention takes place, organizations could make a correlation between the intervention and any reduction in casualties.

This is, however, a best-case estimate because a correlation does not necessarily mean a causal relationship, and there are other things that can significantly affect casualty rates outside of providing MRE. Similarly, poor MRE delivery is unlikely to be responsible for behavioral changes; yet, if there is a reduction in casualties, the poor MRE project is likely to get credit for the reduction. Thus, a survey of landmine casualties is a useful way of determining whether or not victims had received MRE before their accident as well as what MRE they may have received.

In such circumstances, it may be possible to infer a causal relationship using areas that have not been exposed to MRE as a control. For example, in two districts where there was no reduction in casualties, and in a third district where there has been MRE and there was a fall in casualties, it is possible to suggest a relationship between the fall in casualty rates and the provision of MRE.

This is a work in progress and Danish Demining Group is in the process of developing an Efficacy Tool Kit to help measure the efficacy of MRE. The development and use of this tool kit will be the subject of a subsequent article. ©

*See endnotes page 66*



Bob Keeley is a former British Army Bomb Disposal Officer who has worked in humanitarian mine action since 1991. He has worked in a number of countries at both a technical and program management level. His Ph.D. was on “The Economics of Landmine Clearance” and was completed in 2006. Since June of 2014, he has worked as the chief technical advisor for Danish Demining Group, where amongst other projects, such as the design of a mine risk education (MRE) project in Ukraine, he has also been responsible for the re-drafting of DDG’s MRE standard operating procedures.

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Dr. Robert Keeley  
Chief Technical Advisor  
Danish Demining Group  
Division of Emergency Safety and Supply  
DRC/DDG International Department  
Borgergade, 3rd floor  
Copenhagen / Denmark  
Tel: +44 (0)787 999 0700  
Email: bob.keeley@drc.dk  
Website: www.danishdemininggroup.dk

# Influence of MRE Education on Explosive Ordnance Disposal in Quang Tri

In collaboration with local and international organizations, Project RENEW is facilitating comprehensive mine risk education initiatives in Vietnam's Quang Tri province.

by Ngo Xuan Hien and Nguyen Thanh Phu [ Project RENEW / Norwegian People's Aid ]



Project RENEW's explosive ordnance disposal team leader takes notes from Le Thai Phien and Van Dinh Hoa, two ninth graders at Trieu Van School. The boys alerted Project RENEW to their discovery of four different locations littered with more than 500 items of wartime unexploded ordnance. The team spent seven days destroying the munitions. *All photos courtesy of Project RENEW.*

Since its establishment in 2001 as a cooperative effort between the government of Quang Tri province and international nongovernmental organizations, Project RENEW has made mine risk education (MRE) an integral part of its long-term mine action mission. Project RENEW aims to make Quang Tri a safe environment. However, since removing every bomb and landmine in Vietnam is impractical, priority is placed on removing cluster bombs, grenades, mortar and artillery rounds, and other small ordnance on the

ground or just under the surface, as these are the main items that kill and injure children, farmers and other adults.

Cleanup of wartime debris will likely continue for years. However, children and adults can practice safe behavior if educated about unexploded ordnance (UXO) risks and how to react when encountering explosive remnants of war (ERW) at home, in the garden or schoolyard, or by the road. To meet this challenge, Project RENEW, with support from Norwegian People's Aid, carried out the following MRE activities.



Secondary school children from Hai Lang district commune play an indoor game at the Mine Action Visitor Center while attending an MRE session. The activity is part of Project RENEW's MRE outreach to educate children in rural areas on UXO awareness and accident prevention. Project RENEW's data indicates that children make up one-third of the total UXO casualties in Quang Tri since the war ended in 1975.

### Community Reporting Network

In the third week of July 2014, two boys discovered and reported a cache of UXO in an acacia forest in a coastal area of Quang Tri province. The boys, Le Thai Phien and Van Dinh Hoa, discovered the munitions while looking for acacia seedlings for their parents to plant in the family garden. Having recently attended an MRE session conducted by the Youth Union in their village, they recognized their responsibility to report the ordnance to Project RENEW. The explosive ordnance disposal (EOD) team spent seven days removing and destroying a total of 530 pieces of UXO.

Le Thai Phien and Van Dinh Hoa participated in Project RENEW's integrated Community Reporting Network (CRN) in support of EOD operations, currently maintained in the four districts of Hải Lăng, Triệu Phong, Cam Lộ, and Đa Krông. CRN members, consisting of Youth Union officers, are

responsible for reinforcing UXO safety messages and encouraging the local population to report UXO sightings to Project RENEW's teams for timely and safe removal. Their reports notify an EOD team that responds immediately or within 72 hours in non-urgent situations. CRN has become an integral part of Project RENEW's MRE program and is an essential element of EOD team scheduling on a daily and weekly basis.

MRE is also provided to school-age children through extracurricular activities called safety days that include outdoor activities such as singing, role-playing, painting, games and competitions, leaflet distribution, and MRE puzzles. Students receive safe-behavior guidance, and take the messages and supporting materials home to share with family members and neighbors to educate them on safety when encountering UXO.



School children in Dakrong district receive MRE materials at a safety day event in their school, which helps reinforce their understanding about ERW risks and how to report sightings of deadly ordnance.

### MRE Tours Hosted at the Mine Action Visitor Center

Tours bring students from rural and mountainous areas in Quang Tri province to Project RENEW’s Mine Action Visitor Center (MAVC) with the option of also visiting either the Quang Tri Citadel or the Quang Tri Provincial Museum. Students have a chance to learn about Quang Tri’s war and peacetime histories as well as mine action work. Most importantly, they come to understand the need for safe behavior toward UXO dangers. At the end of each MAVC tour, the guide and accompanying CRN colleagues, teachers or Youth Union staff review and summarize the safety messages and practices for the students. These special outings enable children to explore the world beyond the classroom, encourage them to develop their artistic abilities and communication skills, and teach them how to protect themselves, their classmates and their families from UXO incidents.

### Community-based MRE

Traveling MRE shows (musicals, roleplay, dance, leaflets, survivor interviews) help disseminate MRE messages, particularly in communities with restricted education levels and information accessibility. These breaks in the normal schedule help rural community members relax from the labor and stress of a long day’s work. The traveling presentations provide entertainment but also create a comfortable

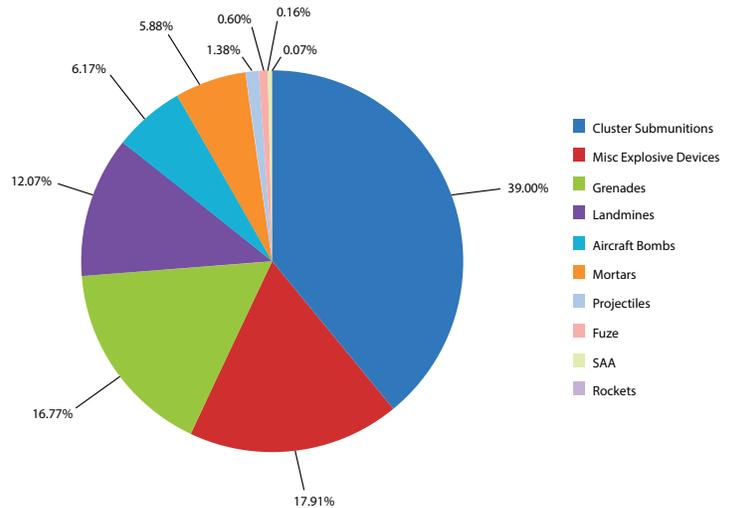


Figure 1. Statistics show that cluster bombs and grenades account for over fifty percent of the total UXO casualties in Quang Tri since 1975. Figure courtesy of Quang Tri Provincial Mine Action Database.

environment for learning safety messages. They also allow for UXO survivors to share their stories. The stories survivors share have a powerful impact on individuals who might otherwise pay less attention to UXO threats. The presentations encourage local residents to avoid touching suspicious items, be very cautious when farming, and report UXO sightings to demining organizations for timely removal.

### Child-to-Child MRE Traveling Troupe

Fifteen students between the ages of 14 to 17 audition for the opportunity to be members of the special entertainment troupe which provides child-to-child MRE. Participants learn UXO safety messages and how to disseminate them creatively and effectively. The troupe travels to remote villages to raise awareness of UXO dangers, and to promote safer behaviors among children and adults by performing humorous skits, stage plays, popular songs and dances. Through challenging MRE games and puzzles, the troupe creates a fun, engaging diversion for children while teaching them the dangers of UXO in a safe, comfortable atmosphere.

### TOMS® Shoes

In 2013, Project RENEW launched its TOMS® Shoes Giving Initiative thanks to a generous donation from the international company TOMS®. As part of its One for One® international giving campaign, for every pair of shoes purchased from TOMS®,



Project RENEW combines the excitement of shoe distribution with MRE messages for children, explaining the dangers of UXO and reinforcing the children's awareness of safe behavior.

the company will donate a pair of shoes to a child in need. Since 2013, Project RENEW distributed more than 100,000 pairs of shoes as part of its expansion of UXO safety messages to more than 245 schools in Quang Tri province. By integrating MRE sessions into the excitement of distribution events, Project RENEW not only gives each student a new pair of shoes but also educates thousands of children about the dangers of UXO and how to be safe from accidents and injury.

### Impacts

Today, 185 Youth Union collaborators deliver safety messages and guidelines for safe behavior at the grassroots level. A team of village chiefs, who are part of CRN, support these Youth Union partners. They encourage all members of the community to be fully involved and to report life-saving information to EOD teams.

People living in Project RENEW's areas of operation are more aware of UXO dangers and know how to prevent UXO

accidents. By reporting UXO findings, locals protect themselves and their neighbors from being maimed or killed. From 2010 to 2014, the number of UXO discoveries reported by local persons to Project RENEW's teams for timely and safe removal increased from 92 to 433 (see Figure 2).

When Project RENEW launched in 2001, the previous casualty rate from bombs and landmines in Quang Tri province ranged from 76 to 165 fatalities and injuries every year.<sup>1</sup> In 2013, three accidents occurred: one death and three injuries were reported.

### Challenges

Although UXO deaths and injuries decreased in the past five years, the most recent accidents were mainly related to scrap-metal scavenging. In 2014, Quang Tri province recorded six accidents that resulted in one death and 11 injuries. Five of the injuries occurred in an explosion at a scrapyards as workers loaded scrap material onto a truck.<sup>2</sup>

Sustaining public and school-based MRE campaigns is essential to reinforce awareness of UXO threats. UXO clean-up must continue for years to come in Quang Tri province. In the meantime, Quang Tri residents can be safe if they

understand how to protect themselves and their families from injury and death, and report munitions for safe removal and destruction. ©

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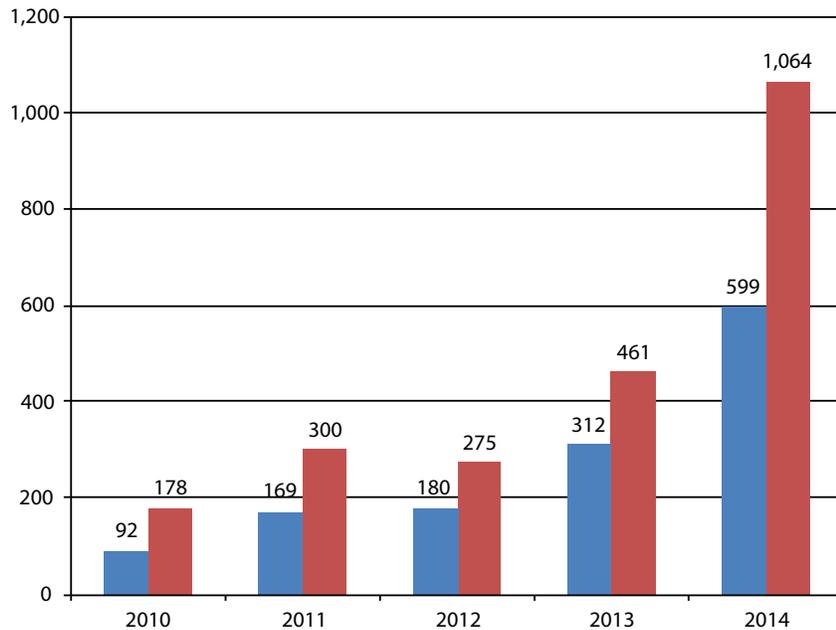


Figure 2. The number of UXO found and safely destroyed as a result of discoveries reported by local inhabitants to Project RENEW teams during 2010–2014. Blue = UXO discoveries. Red = UXO found and destroyed. Figure courtesy of Project RENEW.

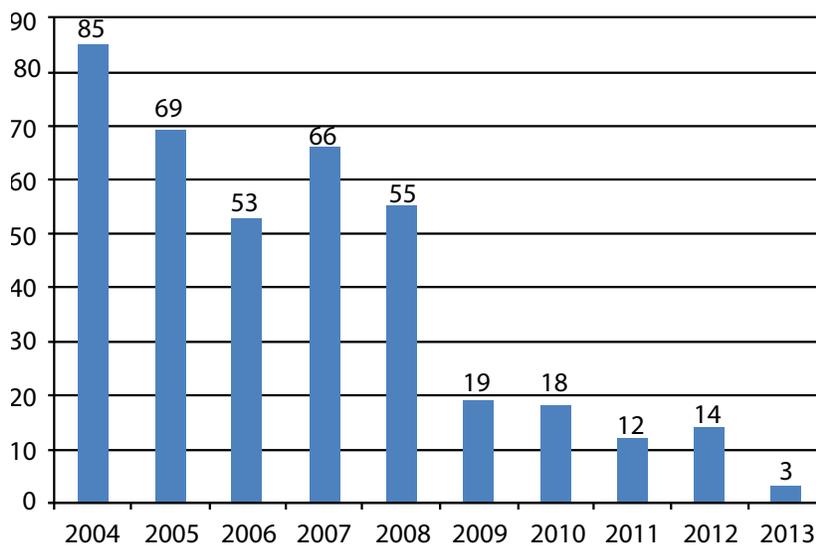


Figure 3. Number of UXO accidents from 2004 to 2013. Figure courtesy of Quang Tri Provincial Mine Action Database.



Ngo Xuan Hien is in charge of communications and development for Project RENEW. Hien provides the initial response to media and public inquiries about Project RENEW'S activities and acts as a primary point of contact for donors, government representatives and visitors. Hien's other tasks include conceptualizing and designing presentations and development proposals for fundraising and other activities. An English teacher for two years in Khe Sanh and then a specialist at the provincial Department of Home Affairs for eight years, Hien joined Project RENEW in June 2008. He holds a Bachelor of Arts in English from Hue University (Vietnam).

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 Hien Xuan Ngo  
 Communications &  
 Development Manager  
 Project RENEW Coordination Office  
 Kids First Village  
 185 Ly Thuong Kiet St.  
 Dong Ha, Quang Tri / Vietnam  
 Tel: +84533858445  
 Email: ngoxuanhien@gmail.com  
 Website: www.landmines.org.vn



Nguyen Thanh Phu, manager of the Mine Action Visitor Center, welcomes Vietnamese and foreign visitors and briefs them about the lingering impacts of the war. Phu also heads Project RENEW's MRE program. Before joining Project RENEW in July 2010, Phu worked as a licensed English-speaking tour guide for nearly four years and has a vast knowledge of former battlefields, areas of military operations, and other historical sites in and around the former demilitarized zone. He holds a Bachelor of Arts in English from Duy Tan University (Vietnam).

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 Phu Thanh Nguyen  
 MRE Officer & Mine Action Visitor  
 Center Manager  
 Project RENEW Coordination Office  
 Kids First Village  
 185 Ly Thuong Kiet St.  
 Dong Ha, Quang Tri / Vietnam  
 Tel: +84 53 567338  
 Email: visitorcenter.quangtri@gmail.com  
 Website: http://landmines.org.vn

# MRE Certification Courses in Mali, Sri Lanka and Tajikistan

UNICEF developed a mine risk education (MRE) certification course to regulate the accreditation of MRE educators. The certification courses have had varied success in Mali, Sri Lanka and Tajikistan.

by Sebastian Kasack [ Consultant ]



Figure 1. MRE materials: An injured boy—this relates to one of the most serious accidents that occurred prior to the MRE emergency campaign in Mali mid-2012.

*All graphics courtesy of UNICEF.*



Figure 2. Beware! As AP mines are not a threat in Mali, UXO is depicted as a shell, mortar and grenade. A skull with crossbones is internationally recognized as a warning sign.

The teaching of mine risk education (MRE) is unregulated. Unlike deminers, explosive ordnance disposal workers or staff dealing with the Information Management System for Mine Action, MRE educators are not required to pass courses with final exams to obtain or maintain their qualifications. Of course, tools are available for guidance: the MRE International Mine Action Standard (IMAS 12.10), the Landmine and ERW Safety Handbook and its training package, and an excellent set of MRE Best Practice Guidebooks published by UNICEF and the Geneva International

Centre for Humanitarian Demining (GICHD) in 2005 accompanied by seven training manuals published in 2009.<sup>1</sup> However, standardized MRE courses are unavailable.<sup>2</sup>

In 2009, the Sri Lankan government asked UNICEF to expand MRE support to the hundreds of thousands of people returning home to a former war zone, where explosive remnants of war (ERW) and landmines still contaminate the areas. Due to a variety of implementing partners, MRE needed to become more regulated. UNICEF developed a national MRE standard with GICHD support, an MRE



Figure 3. Safe behavior! Warn others, stay away and don't touch. Report: Inform parents or local leaders. Take action. Mali has no trained deminers or military forces to report to; therefore, elders are informed.

accreditation mechanism and standard operating procedures with the National Mine Action Centre in Sri Lanka as an implementing partner. The organization also worked with the Sri Lankan Ministry of Education to develop the MRE content in its curriculum for primary and secondary education.

### Developing MRE Certification

A number of questions needed answering. How could it be ensured that MRE would be accurate, complete and professional? How could teaching contradictory information by various implementing partners, mostly by national non-governmental organizations (NGO) but also by the military, be avoided? How could the military be persuaded not to touch mines in front of the class or pass around mines and unexploded ordnance (UXO)?

UNICEF agreed to develop and provide an MRE certification course through the international NGO (MAG) Mines Advisory Group. The National Mine Action Centre

in Sri Lanka agreed that any implementing partner wanting to become accredited for MRE operations as well as community liaison would have to show that sufficient staff had successfully passed the certification course. Certificates would only be valid for three years in order to guarantee refresher trainings for all MRE educators.

The curriculum of a four- to five-day course for 20 participants combines aspects of training with a train-the-trainer model. The first three days focus on inputs discussion, working groups, roleplay, etc., that need tailoring to address the relevant local threats and response mechanisms. A round of introductions and a session on expectations follows the usual opening ceremony. As generic topics are addressed first, participants are asked the following:

- What is the landmine/ERW problem globally, regionally and specifically in our country?
- Why do we need MRE?
- What are the key pillars of mine action, and what is being done in our country?
- What are the main global conventions regulating mine action, including victim assistance?

These generic topics allow the National Mine Action Centre and key implementing partners to present their work or a specific area in which they are skilled. This part of the training should be kept fairly short.

The next portion of training provides an in-depth landmine/ERW safety briefing covering the following

- Risk awareness
- Information and preparedness
- Standard and emergency procedures

Breaking this PowerPoint-based session up with films, group exercises or roleplay can provide a dynamic aspect to the course. A sample scenario could involve a group on foot where one member activates a landmine or UXO depending on the context, and the exercise revolves around how the group reacts. As observers are not allowed to intervene, the class must cooperatively analyze the group's recommended behavior in an emergency.

### Covering All Bases

Risk-taking behavior and groups as well as basics regarding behavior change are specifically covered under MRE. The sessions are tailored for local relevance. Instead of using generic "mines are dangerous" messages, MRE uses stories of accidents from local areas, includes landmine/ERW survivor participation in the sessions, and shows maps and sketches to supplement the lectures. Furthermore, the session covers the pros and cons of various MRE methods by building on the existing



Figure 4. The leaflet portrays more dangerous items including anti-vehicle mines in the north of Mali.



Figure 5. From left to right: Don't poke it! Don't kick it! Don't throw it in the fire! Don't try to break it open! Beware of the results of dangerous behavior!



Figure 6. Safe behavior! Warn others. Stay away, and don't touch. Report and inform parents or local leaders. Take action.

experiences of the participants. Finally, MRE links the participating community members with other elements of mine action through community mapping exercises.

One of the most important sessions discusses the mandatory content of any MRE session, which should include

1. An overview of the local landmine/ERW problem
2. Consequences: mines/ERW kill and injure
3. Dangerous behavior (including dangerous areas to avoid)
4. Safe behavior
5. Summary

The remaining two to three days involve MRE sessions focused on roleplay. Four groups of five persons are formed

and prepare a brief, 15–20 minute MRE session. Target audiences include shepherds, farmers, scrap-metal collectors, students, women's groups or local government staff. Trainees who do not perform serve as audience members. Presentations and roleplaying occur on Day 4 and, if possible, again on Day 5, providing participants a chance to receive feedback and improve their presentations. Those with less time to present during the first session receive more time during the second session.

Participants take an entry test and a final test, which must be passed with a minimum of 60 percent. Questions answered incorrectly in the beginning should be addressed during the course, giving participants the chance to learn



Figure 7. MRE material has no words, as numerous languages are spoken in Mali and many persons are illiterate.

and excel in the final test. During the course, grading depends on participation, while the MRE session presentations are valued higher than the final test. The core facilitators, usually two persons and a group of trusted senior participants grade each participant on seven criteria throughout the week: participation, motivation and interest, resourcefulness (during presentations), teamwork, presentation and communication skills, analytical and problem-solving skills, and negotiation skills.<sup>3</sup> In the afternoon of Day 3 or in the beginning of Day 4, these criteria need to be shared for transparency.

### Importance of MRE Certification

Depending on the country and the level of experience among mine risk educators, participation of acknowledged senior facilitators and trainers is essential for the social acceptance of the instructors by all trainees. In general, trainees were surprised at the importance placed on **certification**, particularly the insistence on a written test and the grading of their performance. By the end of the training, almost all participants passed

the course, but quite a few passed due to strong presentation skills.

UNICEF in Mali and the United Nations Development Programme (UNDP) in Tajikistan also provided MRE certification workshops. The context, however, was quite different to the Sri Lanka case. The knowledge and skill levels of trainees differed from country to country: Sri Lanka was already a host to specially trained, professional MRE staff that were working there for many years.

In Mali, MRE was new, but many staff from Civil Defense and those working for international and national NGOs already had experience providing HIV awareness or other behavioral change-related briefings. The curriculum was adjusted slightly to include small arms and light weapons safety for example but proved suitable for Mali's context as well. In Tajikistan, MRE was provided for many years by teachers and volunteers from the local villages. Despite years of practical MRE experience, the certification course showed that they had received only basic MRE training from the Red Crescent Society and UNDP. A more systematic approach and



Sebastian Kasack has been UNDP's chief technical adviser to the Tajikistan Mine Action Programme since September 2012. Previously he worked as UNICEF mine action specialist in Mali (2012) and in Sri Lanka (2008 to 2010). Kasack started in mine action in 1996 in the areas of mine risk education, victim assistance and advocacy. He worked for the German NGO Medico International, including two and a half years in Angola promoting the Bad Honnef Framework for a development-oriented mine action approach. From 2003 to 2005, he was MRE officer at UNMAS, then became global MRE editor for the *Landmine and Cluster Munition Monitor*, and he consulted for Handicap International, among others. Kasack has a diploma in geography and a post-graduate degree in development issues. He has published on capacity-building, victim assistance and on the Landmine Safety Approach in the *The Journal of ERW and Mine Action*.

Sebastian Kasack  
 Chief Technical Adviser  
 Tajikistan Mine Action Programme  
 121, Ayni Street,  
 Dushanbe / Tajikistan  
 Tel: +992 939 999 542  
 Email: sebastian.kasack@undp.org  
 Website: <http://mineaction.tj>

systematic roleplaying with honest feedback helped to improve their capacities.

In the end, participants from all three case studies appreciated that their skills were recognized and improved. Those who passed were proud to become certified mine risk educators.

The MRE community should agree on standard curricula for basic and advanced MRE courses. While useful in Sri Lanka, accreditation may not be necessary in other countries where well-functioning MRE programs correspond to low levels of threat experienced. In Tajikistan, the certification mechanism should standardize and improve MRE for the coming years. ©

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# The Democratic Republic of the Congo's National Landmines Contamination Survey

The absence of accurate data on the scope and location of landmine contamination negatively affected more than a decade of mine action activities in the Democratic Republic of the Congo. This article discusses the 2013 National Landmines Contamination Survey and its results.

by Pascal Simon [ Mine Action Specialist ]  
and Kevin Thoma [ Former SWISSINT Programme Information Management Specialist ]

In the past, information about landmines and unexploded ordnance (UXO) was often reported sporadically and inaccurately to the United Nations Mine Action Service (UNMAS) office in Kinshasa, Democratic Republic of the Congo (DRC). Nonspecialized organizations or personnel were often confused about the different kinds of explosive threats, i.e., anti-personnel landmines (APL), UXO, abandoned ammunition, etc. As a result, redundant threat reports reduced the efficiency of the database operated by UNMAS by adding thousands of duplicates and unreliable records. Despite several attempts to clear up the database, the quality of the information available to mine action professionals remained poor. While the nature of the available information was deficient, the information-management tools and staff were not. Recently, the program prioritized efforts to improve the quality of information pertaining to the presence of landmines in the DRC.

## First Attempts

From 2011 to 2012, UNMAS initiated several general mine action assessment (GMAA) projects that various international organizations then implemented.<sup>1</sup> However, the country's phenomenal size, lack of security, and poor road conditions limited travel and communication, affecting the quality of the information. In addition, the methodology used during GMAA projects slowed the process and proved to be expensive. Survey teams were required to investigate the landmine and UXO presence along all passable roads in each of the DRC suspect territories.<sup>2</sup> The method was time consuming,

and the cost of surveying the whole country appeared to exceed the cost of clearing all APL in DRC's contaminated areas. These initial complications challenged the DRC's efforts to comply with Article 5 of the *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction* (APMBC).

In 2012, the DRC obtained a two-year extension for its Article 5 deadline to document the scope of landmine contamination and develop a final extension request. GMAA methodology could not provide the necessary information on time to the United Nations and the national mine action center: *Centre Congolais de Lutte Antimines*. Therefore, the methodology needed to be adapted to reflect the size of the country in the limited, remaining time available to complete survey operations.

## The National Landmines Contamination Survey

In 2013, with Japanese funding and in agreement with national mine action authorities, UNMAS DRC launched the National Landmines Contamination Survey (NLCS), adopting a more suitable methodology in line with the latest non-technical survey (NTS) standards. As APL contamination is believed to be relatively modest in the DRC compared to the country's size, the new approach focused on surveying locations where the suspicion of contamination could be documented. To avoid redundant efforts and to save time, territories already visited by GMAA would not be resurveyed. Since the DRC is in the process of acceding to the *Convention on Cluster Munitions*, UNMAS DRC also collected information on possible cluster munitions.

The survey complied with the International Mine Action Standards by adhering to the usual NTS steps as follows:<sup>3</sup>

1. Desk assessments, reviews of existing information (including location of documented mine accidents)
2. Analyses of past clearance operations' results and findings
3. Meetings with key informants in targeted provinces, territories and communes (opinions collection)
4. Physical visits to field locations where contamination is considered credible and probable
5. Reporting of collected data to the UNMAS Information Management System for Mine Action (IMSMA) database operated by UNMAS DRC

In the field, national operators physically implemented the project with the support of international mine action organizations, each of them responsible for a specific geographical area.<sup>4,5</sup> Field operations took place during the last six months of 2013; the data verification and analysis and purging of duplicates, as well as the survey report, were finalized during the first quarter of 2014. International organizations provided quality control, operational support and capacity development for the national operators. In addition, risk education was systematically provided to local populations during the implementation of the project, reaching a total of 27,000 people.

## Results

In the opinion-collection phase of the project, UNMAS DRC

- Surveyed more than 2,400 people in 142 provincial, district and territorial meetings.
- Visited a total of 390 villages representing 403 suspected hazardous areas (SHA), where staff questioned 4,000 people.
- Included a total of eight provinces, 14 districts and 40 territories to be surveyed according to NTS standards.

Final results of the GMAA and NLCS were recorded in the IMSMA database and provide a comprehensive picture of contamination in the DRC:

- A total of 130 landmine-contaminated SHAs were identified.
- Landmine-contaminated areas are estimated at slightly less than 2,000,000 sq m (494 ac).
- Eight provinces contain SHAs, but Equateur, Katanga, Kasai-Occidental and Orientale are the most affected provinces (from most to least contaminated) and include more than 90 percent of the contaminated lands.
- Five cluster munitions contaminated SHAs were identified, four of which are located in the Equator province.

The NLCS report included planning and cost estimates used to document the APMBC Article 5 extension request

submitted by DRC to States Parties during the Third Review Conference on the APMBC in Maputo, Mozambique, in June 2014.<sup>6</sup> Based on past clearance operations, UNMAS DRC and local authorities agreed that logistical and communication challenges will raise demining costs in the DRC and recognized that future technical survey activities would cancel some of the SHAs identified by NLCS. By combining manual demining with mechanical support, UNMAS roughly estimated that the cost of clearance operations would be around US\$15 per sq m, totaling approximately \$20 million.

## Conclusions and Recommendations

Completing NLCS constituted a major success and was a marked improvement for the DRC mine action program. Combined with the information previously provided by GMAA projects, NLCS delivered a country-appropriate methodology that could assess the DRC and laid out a new baseline that will be used in the future to plan clearance operations more efficiently.

Information collected in the DRC suggests that landmine contamination is modest and cluster munition contamination is relatively minimal despite being spread over a large number of SHAs, districts and villages. Previous clearance operations estimate that the DRC can comply with its international obligations sometime within the next six years if provided a budget of approximately \$3 to \$4 million per year. NLCS results assisted DRC mine action authorities in successfully obtaining an APMBC Article 5 extension until the end of 2019.

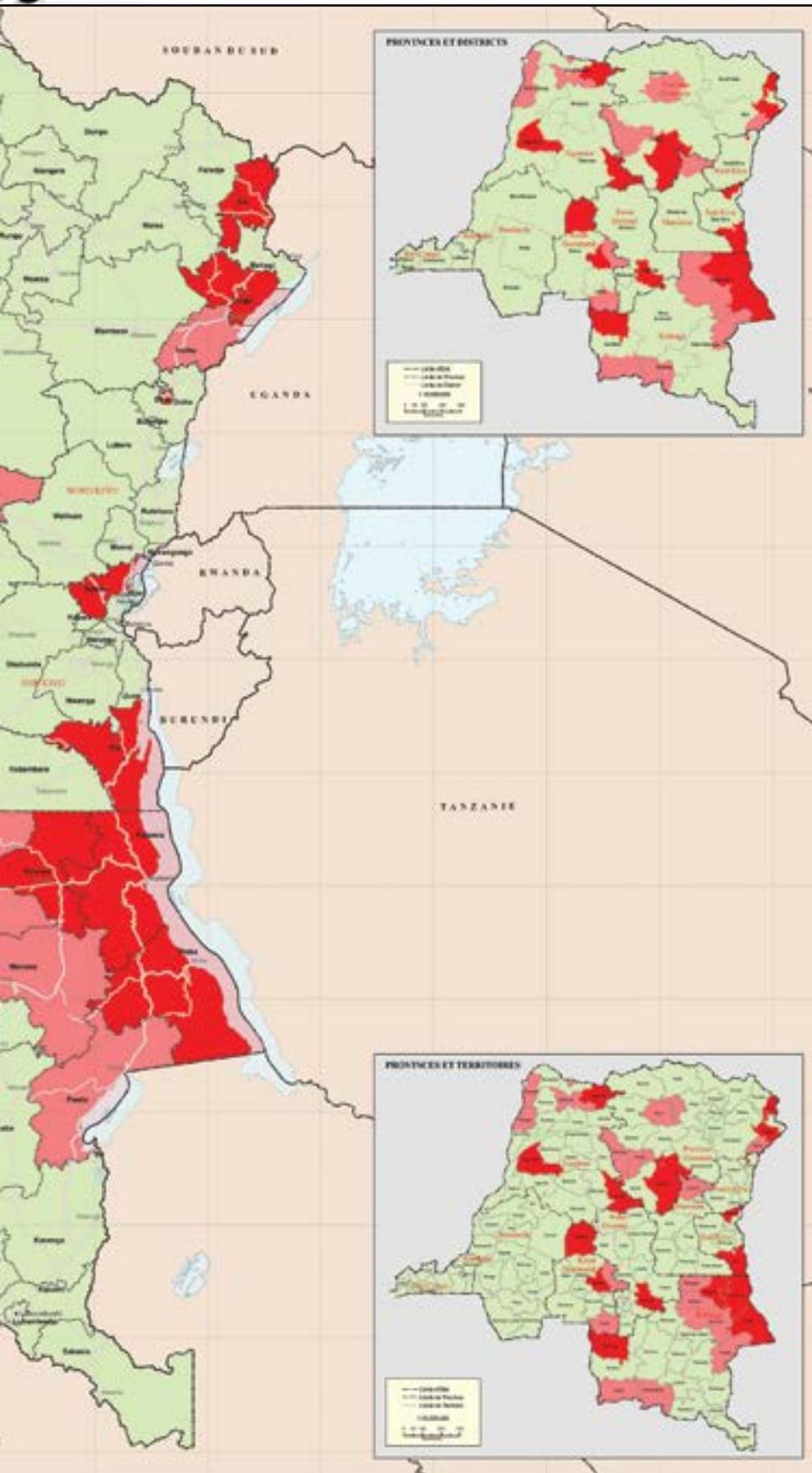
As requested in Maputo by States Parties to the APMBC, the DRC will develop a detailed and precise mine clearance plan, explaining how operations will concretely be organized and outlined, before the second quarter of 2015. This plan will reaffirm the national commitment to eliminate landmine and cluster munition contamination, and will encourage future funding to the program.

Obtaining contributions from donors and the national budget will remain a challenge, but convincing development partners to provide the necessary financial resources to address the problem is considered highly essential. The DRC would benefit from using national military or police capacities to assist the program to reduce clearance costs and develop clearance capacity to address any residual contamination threats over the long term. Thanks to years of international presence and support, many national experts are now available in the DRC, and the emergence of national civilian demining organizations could also be part of the solution. ©

*See Figure 1 next page.*

*See endnotes page 66*





Pascal Simon is a mine action specialist and was the UNMAS-DRC program manager until September 2014. A mine action and capacity-development specialist, inter alia, with extensive professional experience, he previously worked in Cambodia, Laos, Senegal and Tajikistan, supporting efforts to develop and reform mine action programs and related institutions. He holds a master's degree in political science and international relations from the Catholic University of Louvain (Belgium) and he also studied journalism and pedagogy. He is based in Myanmar.

Pascal Simon  
 Mine Action Specialist  
 Yangon / Myanmar  
 Tel: +95.92 5331 2763  
 Email: pascal.simon999@gmail.com



Kevin Thoma has been in charge of information management as a Swiss In-Kind for the SWISSINT Programme in the Democratic Republic of the Congo from November 2012. With several years of experience in investment banking and mine action, he specializes in information management. While serving in the Swiss Army in Bosnia and Kosovo, he learned about the impact of landmines and unexploded ordnance. Thoma holds a bachelor's degree in business administration and information technology from the Zurich University of Applied Science (Switzerland).

Kevin Thoma  
 Information Management Specialist  
 SWISSINT Programme  
 Kinshasa / DRC  
 Tel: +243 82 500 18 39  
 Email: kevinthoma@gmx.ch

# Unplanned Explosions of Munition Stockpiles

Unplanned explosions at munition sites in places such as Nigeria, the Democratic Republic of the Congo and the United States result in mass casualties to civilians and government personnel. Although new ammunition-storage practices in the United States expanded to include a military role, not all countries have evolved their practices as quickly, leaving them more susceptible to continued explosions. The increasing role of urbanization will make ammunition site management even more important in the 21st century.

by Ken Rutherford and Matthew Williams [ Center for International Stabilization and Recovery ]

On 20 January 2015, survivors of one of history's worst unplanned explosions at a munition site protested that international donors raised insufficient disbursement funds for the surviving families. These individuals survived a horrendous explosion 13 years earlier when an ammunition depot in the center of Lagos, Nigeria, exploded on 27 January 2002, resulting in more than 1,100 deaths and 5,000 injuries.<sup>1</sup> Survivors of the explosions find themselves dealing with their wounds and the death of their loved ones without the previously promised assistance to aid in the recovery of their mental and physical wounds.

The Lagos explosion, although a particularly deadly example, is one of many that have occurred across the globe in the past decade. In 2008, an explosion at Gërdec, Albania, resulted in the evacuation of 4,000 people and destruction of 308 buildings. In March 2012, an unplanned explosion at a munition site in Brazzaville, Democratic Republic of the Congo, left nearly 300 people dead and 2,300 wounded. The Brazzaville site's placement in an urban center is typical of countries with security concerns over ammunition site management and a history of coups.<sup>2</sup>

This positioning also highlights the dangerous relationship between urbanization and placement of ammunition sites in urban centers. This practice means that already vulnerable and marginalized populations, typically living in highly-dense urban environments, are at greater risk to face the disproportionate impact of unplanned explosions.<sup>2</sup> Lagos is considered a **megacity**, a result of the booming population and urbanization pressure in Nigeria. With 45 million people

in 1960, Nigeria now has a population of 170 million with projections indicating that the population will reach 400 million in 30 years.<sup>4,5</sup> In the past, much of the world's ammunition stockpiles were erected in unpopulated regions surrounding urban areas. However, demographic pressure caused by burgeoning population growth has resulted in urban populations creeping past city limits. Consequently, the distance between populations and ammunition stockpiles has shrunk.

## U.S. Unplanned Explosions

Unplanned explosions within the United States serve as a prime example of the dangers of improperly stored munitions, with several unplanned explosions resulting in severe casualties, and many of the victims were of lower socioeconomic status. New Jersey's Lake Denmark disaster in 1926 and California's Port Chicago disaster in 1944 mark two key points in the history of unplanned explosions in the United States, serving as an impetus for implementation of safer explosive- and ordnance-management practices, which can be applied to contemporary stockpile management.<sup>6,7</sup>

**Port Chicago.** For the United States, the largest, most violent explosion of World War II did not occur in a conflict zone but in a major U.S. city. On 7 July 1944, at Port Chicago Naval Magazine, the SS Quinault Victory was loaded with ammunition for its first trip as an ammunition carrier. About 45 minutes into the loading process, two explosions killed everyone aboard the vessel and the nearby SS Bryan, which was also being loaded with ammunition. A total of 320 men were killed, 202 of whom were African-American enlisted men working on



Looking eastward in early 1944, the town of Port Chicago is in the upper right corner. Utility and personnel piers extend toward the two sections of Seal Island in the lower left corner. The munitions-loading pier curves to the left beyond 20-odd revetments. Marshy tidal zones separate the munitions pier from barracks near the personnel pier and near the town.

*Photo courtesy of the Port Chicago Naval Magazine National Memorial.*



This view looks south from the Ship Pier, showing the wreckage of building A-7 (joiner shop) in the right of the photo. There is a piece of twisted steel plating just to the left of the long pole, left center.

*Photo courtesy of the U.S. Naval Historical Center.*

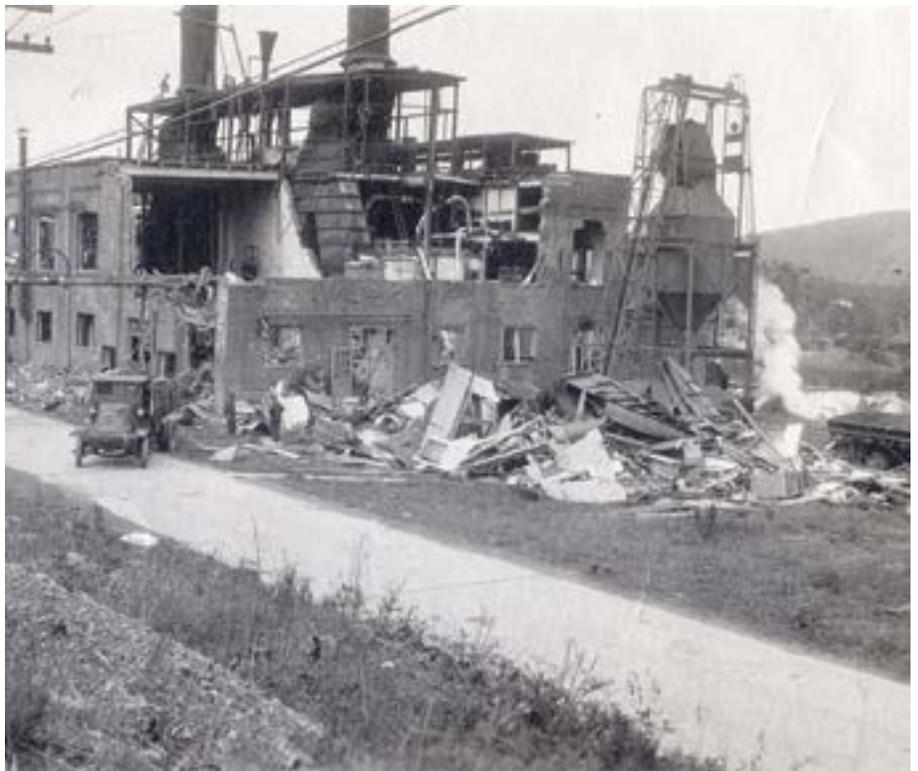


This view looks north, showing the wreckage of building A-7 (joiner shop) in the center and ship pier beyond. A bulldozer and damaged automobiles are seen in the foreground, railway crane at left, and scattered pilings.

*Photo courtesy of the U.S. Naval Historical Center.*

the loading detail; moreover, 390 were injured, 202 of whom were also African-American enlisted men. The military was segregated at the time, and black men were prohibited from combat service. Laboring at munition plants thus became one possible avenue of work. In the case of Port Chicago, the racial divide was evident from the start, as the African-American loaders served under a staff of white officers who held competitions to see whose team could load ammunition onto the ships the fastest. The loaders themselves had no training and had to purchase safety equipment, such as gloves, themselves.<sup>8</sup> The aftermath of the explosion spurred the realization that new management practices, including required training certification for on-dock loading personnel and a munition redesign to include additional safety features, were necessary for safer munitions loading and storage.<sup>7</sup>

**Denmark Naval Ammunition Depot.** The need for safer, long-term storage plans in this new age of military ordnance was apparent decades ago with the 19 July 1926 explosion at the Lake Denmark Naval Ammunition Depot that killed 19 and injured more than 50 civilians. A lightning strike at Magazine Number 8, which was overloaded with leftover ordnance from WWI, caused a fire in the magazine, from which the resulting explosions ignited secondary explosions in nearby magazines. All structures within 2,700 ft (822.96 m) were destroyed. The placement of the magazines exacerbated the effects of the explosion, and a subsequent investigation revealed that one magazine holding 1,691,000 pounds (734,366.05 kg) of TNT was only 80 feet (24.38 m) away from another containing 789,400 pounds (240.49 kg) of TNT.<sup>9</sup> In response to the disaster, the U.S. Government implemented a broad range of ammunition storage management practices, including standardized designs for



These four photos show the destruction at Picatinny Arsenal resulting from the explosions and shock waves at the nearby Naval Ammunition Depot at Lake Denmark, New Jersey (U.S.).

*Photos courtesy of the Dover Area Historical Society.*



magazine. Referred to as an igloo due to its shape, this new structure was a low, arch-shaped building that would later be covered with earth.<sup>6,9</sup>

#### New Stockpile Practices

Over the last few decades, concern has grown regarding surveillance, renovation and demilitarization of stockpiles due to storage, explosion and proliferation threats. Thus, new ammunition storage management practices evolved.<sup>10</sup> Perhaps the greatest change that occurred involved transferring management responsibilities to the private sector for many storage facilities previously operated by the military. In fact, the United States is the largest market for private sector demilitarization services and has a stockpile of 587,000 tons of ammunition in need of demilitarization. The annual funding for the demilitarization of these munitions is about US\$146 million, or around the U.S. Department of State's annual budget for conventional weapons destruction.<sup>9</sup>

These new ammunition management practices allowed the United States to be more fortunate than other countries hosting large amounts of ammunition. Over the past 25 years, there have been reports of more than 400 unplanned explosions at various ammunition sites around the world.<sup>11</sup> In contrast, the United States has only reported 19 unplanned explosions at ammunition sites since 1984, resulting in four deaths.<sup>12</sup>

#### Despite Precautions, Explosions Occur

Using private contractors for stockpile management, however, brings



ammunition storage structures in ammunition plants, storage depots and installations. The United States also adopted distance-spacing guidelines for the placement of magazines. The Lake Denmark disaster resulted in the creation of a modern type of ammunition storage structure: the **igloo** ammunition

other issues, such as conflicting accountabilities and responsibilities among a host of U.S. Federal and State agencies, e.g., the Environmental Protection Agency (EPA), the Department of Defense and the private sector. For example, in 2012, a massive ammunition explosion at Camp Minden

in Louisiana was violent enough that the nearby town of Doyline was evacuated for one week. A subsequent investigation found that the Army and its private contractor, Explo Systems Inc. (ESI) had illegally stored and handled the explosives. Despite continued risks to public health, the explosives were not immediately secured in the aftermath of the explosion because it was unclear which of the many actors involved was responsible for the demilitarization of the explosives. ESI ultimately filed for bankruptcy, and in 2014, the EPA ordered the Army to take responsibility for the explosives.<sup>12</sup>

That the majority of the 19 unplanned explosions occurring in the United States since 1984 were due to “lack of surveillance leading to ammo deterioration” is another cause for concern.<sup>13</sup> This suggests that the United States needs to improve its surveillance and management of ammunition depots as stockpiling and demilitarization remain important tasks. The continuing changes in ordnance brought about by modern technology and new warfighter requirements brings a need for new surveillance and storage procedures for these technologies. Addressing these needs will be a key requirement for U.S. ammunition storage practices. Ensuring transparency with private contractors is also crucial.

There is potential for a nonprofit centered on providing ammunition management, best-practices training, assessment and surveillance of sites, and a response team to possible trouble sites. By endorsing nongovernmental organizations (NGO) that possess established recognition in the area of ammunition storage and transfer, the federal government could add legitimacy to the process of outsourcing ammunition management and provide state authorities and other potential stakeholders

with a range of trusted NGOs, which would ease the accountability concerns seen in Doyline and avoid promulgation of new regulations that cause division of accountability between state and federal authorities.

### The Dangers Continue

Lessons learned from unplanned ammunition stockpile explosions in the United States can be applied to the global community. These incidents indicate a clear need for proper training and certification for personnel who handle ordnance, as demonstrated in the Port Chicago explosion. Spacing guidelines, a procedure taken from the Lake Denmark explosion, are particularly applicable to modern ammunition site management. Incidents in Brazzaville and Lagos highlight the danger to civilian populations in close proximity to ammunition stockpiles. Accountability measures, particularly when dealing with private-sector contractors, will continue to become more important to the international community as the safe disposal and management of ammunition is outsourced to private contractors.

Survivors of the explosion in Lagos, Nigeria, signal the continuing impacts of unplanned explosions on society. By taking steps to ensure modern ammunition-management practices are up to the task of preventing deadly and costly explosions, the international community can help prevent these disasters from reoccurring. ©

See endnotes page 66



Kenneth R. Rutherford is director of the Center for International Stabilization and Recovery and a political science professor at James Madison University. He holds a doctorate from Georgetown University (U.S.) and received his Bachelor of Arts and Master of Business Administration from the University of Colorado Boulder (U.S.). His most recent book, *Disarming States: The International Movement to Ban Landmines*, was published in December 2010. He is also the author of *Humanitarianism Under Fire: The US and UN Intervention in Somalia*, and co-edited two books: *Landmines and Human Security: International Politics and War's Hidden Legacy* and *Reframing the Agenda: The Impact of NGO and Middle Power Cooperation in International Security Policy*.

Kenneth R. Rutherford, Ph.D.  
Director  
Center for International  
Stabilization and Recovery  
James Madison University, MSC 4902  
Harrisonburg, VA 22807 / USA  
Tel: +1 540 568 2756  
Email: rutherkr@jmu.edu  
Website: <http://jmu.edu/cisr>



Matthew Williams is a research associate at the Center for International Stabilization and Recovery. He is finishing his master's in public administration at James Madison University (U.S.) where he has served as an analyst and consultant for several community nongovernmental organizations and public agencies.

Matthew Williams  
Research Associate  
Center for International  
Stabilization and Recovery  
James Madison University, MSC 4902  
Harrisonburg, VA 22807 / USA  
Tel: +1 540 568 2756  
Email: [williamc@dukes.jmu.edu](mailto:williamc@dukes.jmu.edu)  
Website: <http://jmu.edu/cisr>

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# Observations on Cluster Strike Patterns in Laos

Cluster strike footprints are being surveyed and subsequently cleared in Laos. Little information is available regarding the nature of cluster munition strike patterns. If more evidence from different types of strike footprints is collected, analyzed and distributed, operators will be better prepared for future survey and clearance tasks.

by Roly Evans [ Norwegian People's Aid ]

In early 2014, Norwegian People's Aid (NPA) in Laos conducted an analysis of U.S. bombing data from the Theater History of Operations Reports (THOR) database alongside confirmed hazardous areas (CHA) that were identified through a Cluster Munition Remnant Survey (CMRS) and subsequently cleared. This analysis underlined the need to accurately and routinely record all cluster strike evidence during survey and clearance as detailed in IMAS 07.11 Land Release.<sup>1</sup>

Although nonmilitary clearance of cluster strikes has been conducted since the early 1990s, surprisingly little information is available concerning the nature of cluster strike footprints. NPA, *Forsvarets Forskningsinstitutt* (FFI) and Colin King Associates conducted a detailed study in 2007 that analyzed a number of separate M85 Dual Purpose

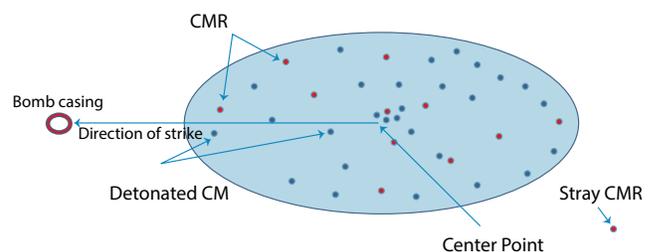
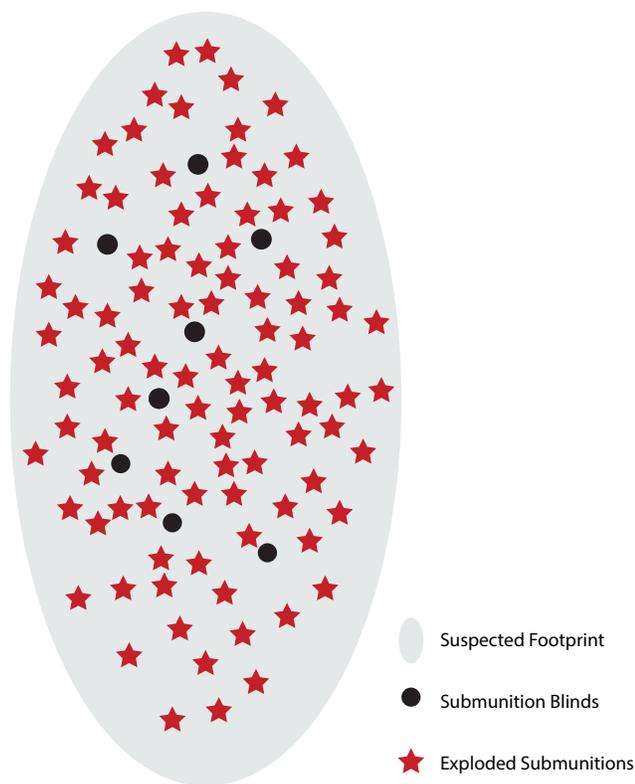
Improved Conventional Munitions (DPICM) strike patterns in Lebanon alongside trials conducted in Norway.<sup>2</sup> FFI has also published a study.<sup>3</sup> However, little research has been done since.

Some operators accurately record cluster strikes during the survey and clearance process. Unfortunately, evidence recording is not standardized, and what is recorded is not widely circulated. More remains to be learnt from recording and analyzing differing cluster strike footprints. What sort of footprint patterns do different cluster munitions make on the ground? What range of footprint surface areas are observed for differing types of cluster munitions? What range of failure rates are observed for differing types of cluster munitions? At what depths do we typically find different submunitions in different soil conditions? How do differing submunitions degrade over varying weather conditions and periods of time? If more evidence from strike footprints was collected, collated and distributed, operators would be better prepared for future survey and clearance.

## Cluster Munition Strike Footprints

Regardless of the delivery means, cluster munitions often form recognizable spread patterns on the ground. These are often referred to as footprints or strike footprints. Whether by means of aerial cluster bomb, artillery projectile, rocket or mortar, cluster strikes were believed to form similar footprint patterns. However, anecdotal evidence from Israeli and U.S. pilots suggests this may not necessarily be the case.

**Oval pattern.** In clearance circles, many believed that cluster munitions created a rough oval pattern of one form or another. It was thought that any carrier munition that separates from its means of delivery and functions above the ground will usually result in some sort of oval shape or ellipsoid dispersion of submunitions. This is most apparent in ribbon armed, DPICM strike patterns. The height at which cluster munitions open, along with the linear momentum of the carrier munition,



Figures 1 (left) and 2 (right). Examples of oval pattern cluster strikes. All figures courtesy of NPA.



Israeli Air Force (IAF) 107 Squadron Cluster Bomb Units 58 strikes Al Mazzeh near Damascus (Syria) clearly showing the Donut effect, 11 October 1973. Three individual strikes are clearly visible and a further one is discernible just above the two on the left.

All photos courtesy of <http://www.fresh.co.il>.



Two CBU 58s, probably set to open at above 2000 feet, suppressing 57mm anti-aircraft fire during an attack by F4 Phantoms of 107 Squadron IAF on Al Mazzeh near Damascus, 11 October 1973.



Overlapping CBU 58 strikes Dimasqh, Syria, 16 October 1973.



Overlapping CBU 58s dropped near the Suez Canal, 19 October 1973.

affects the dispersion of the submunitions. The dispersion pattern elongates along the trajectory of the carrier munition. Although not the most recent, the most numerous examples of this pattern were observed in southern Lebanon. Spin-stabilized cluster munitions from Cluster Bomb Units (CBU) were also widely believed to form a rough, oval footprint. Fin-stabilized cluster munitions, such as PTAB 2.5Ms or PM-1s, might form a tighter, more circular pattern. The Geneva International Centre for Humanitarian Demining cluster munition resource page illustrates how topography can have an additional, distinct effect.<sup>4</sup>

Observations tend to be anecdotal, since the recording of individual cluster munitions—which is required to accurately map patterns—can sometimes be impractical. This was the case during the initial emergency-clearance efforts in Lebanon in 2006. A number of operators attest that an oval strike pattern of sorts was usually identifiable. If no pattern was identifiable it was assumed that this was a mixture of patterns since targets were often subjected to multiple strikes, sometimes of differing cluster munitions. As a very general rule, DPICM footprint lengths were estimated at 1.5 times the width.

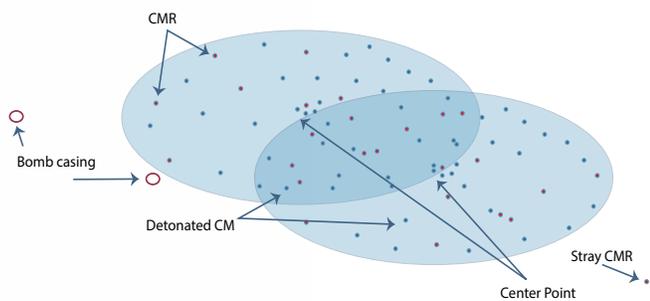


Figure 3. Example of mixed footprints.

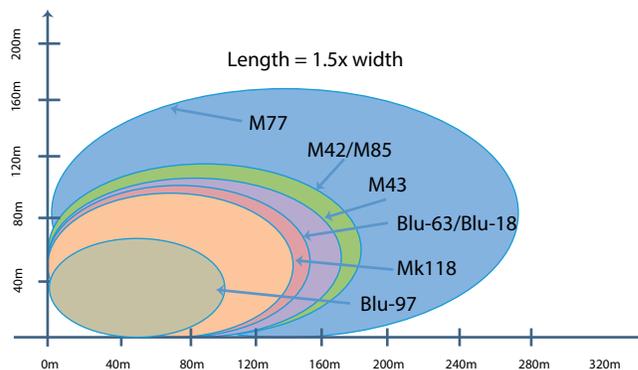


Figure 4. Varying cluster-munition oval footprint sizes.

**Donut pattern.** During research in Laos, many former U.S. pilots provided anecdotal accounts of using cluster munitions. Pilots overwhelmingly claimed that spin-stabilized submunitions, such as the BLU-26, -36, -54, -61 and -63, tended to migrate away from the aiming point after being released from the dispenser. This had the consistent effect of creating a donut pattern on the ground, i.e., fewer submunitions would land in the center of any given cluster strike. This effect was also widely noted by Israeli Air Force pilots using CBU-58s against targets in Syria and Egypt during the Yom Kippur War in October 1973. Moreover, all pilots confirmed that dive bombing was the most common method of delivery because it maximized accuracy.

**Mixed footprints.** Cluster footprints frequently overlap when areas are subjected to multiple strikes. In fact, most CHAs in Laos are from overlapping footprints. Even when not repeatedly targeted, some areas would still sustain multiple strikes since pilots sometimes dropped two CBUs simultaneously, and these could overlap.

Overlapping footprints make donut patterns difficult to discern. The effect resembles a messy Venn diagram. Nevertheless evidence from the 1973 Yom Kippur War suggests that patterns can be discerned in mixed or multiple strikes.

Evidence of the donut pattern is rarely found on the ground during clearance today. Patterns are subject to change during intervening decades, as farmers and scrap-metal hunters move submunitions. While a single footprint in the jungle might show this pattern, such CHAs will likely be a low priority for technical survey and clearance. However, in order to confirm the donut pattern, technical survey and clearance teams will need to record accurately the position of each bomblet found.

**Oval footprint size.** Oval cluster strike footprints vary in size according to the particular cluster munition used. NPA and FFI produced the information in Table 1 (page 63) in 2007 as a rough guide to the comparative, average sizes of some cluster munitions' footprints.

As an oval is roughly 80% of the rectangular parameters given for the size of a footprint, the BLU-63 (CBU-58) footprint in the NPA and FFI diagram is approximately 12,000 sq m.<sup>5</sup> It is reasonable to assume that CBU-24 footprints are roughly the same size as CBU-58 footprints. The United States Air Force Armament Development and Test Center believed CBU-24 footprints were slightly tighter.<sup>6,7</sup> Other sources approximate an oval footprint size of 192,000 sq m.<sup>8</sup> This is almost certainly an overestimate.

### Footprints in Laos

According to THOR's U.S. bombing data, 81.45% of all submunitions dropped on Laos were spin-stabilized submunitions such as the BLU-26, -36, -54, -61 and -63. Moreover, 71.29% of all cluster munitions were either CBU-24 or CBU-29s, meaning submunitions such as the BLU-26 or the BLU-36. The Laos' National Regulatory Authority's Information Management for Mine Action database (as of February 2014) suggests that 78% of all found cluster munitions are spin-stabilized. If items reported as "bombies" are added to this figure, the total exceeds 79%, which is remarkably close to the 81.45% suggested by U.S. bombing data.

So far, the average CHA size surveyed by NPA is about 4.4 ha. The average number of CBU-24 and CBU-29 submunitions used per strike was 5.01. This might point to an average footprint surface area of 8,782 sq m as a rough indicator. Notably, individual footprints often overlap. Therefore if we divide an average CHA size by the average number of dispensers used per strike we could possibly underestimate the individual average footprint size. As more CHAs are surveyed and subsequently cleared, a wider range of evidence will be available to assess footprint sizes. Each CHA should be assessed to estimate whether it is a multiple strike or a single footprint.

### Failure Rates

If all submunitions are recorded when found, and the footprints mapped, an informed assessment can be made of how many cluster dispensers were used from the patterns evident on the GIS map. By knowing the number of submunitions on the ground, and by estimating the number of cluster munitions used, estimated failure rates can be determined. With this information, overall contamination within an area or country can be estimated more accurately, especially if benchmarks exist such as U.S. bombing data or evolving survey information against which the range of failure rates can be calculated. As more CHAs are surveyed and cleared, the range of data and the probability of accurate estimates will increase. Failure rates for spin-stabilized submunitions are believed to still be classified. During testing of CBU-58, a 5% failure rate was expected. There is some evidence it could reach as high as 26%.<sup>9</sup> The Congressional Research Service is only willing to place a very broad implied failure rate when making estimates for Laos. "Estimates of the number of unexploded submunitions from cluster bombs, range from 8 million to 80 million."<sup>10</sup> Without access to complete test data for common dispensers such as the CBU-24, identifying strike footprints in

Example of a completed Task in Kongtayoun village, Thateng District

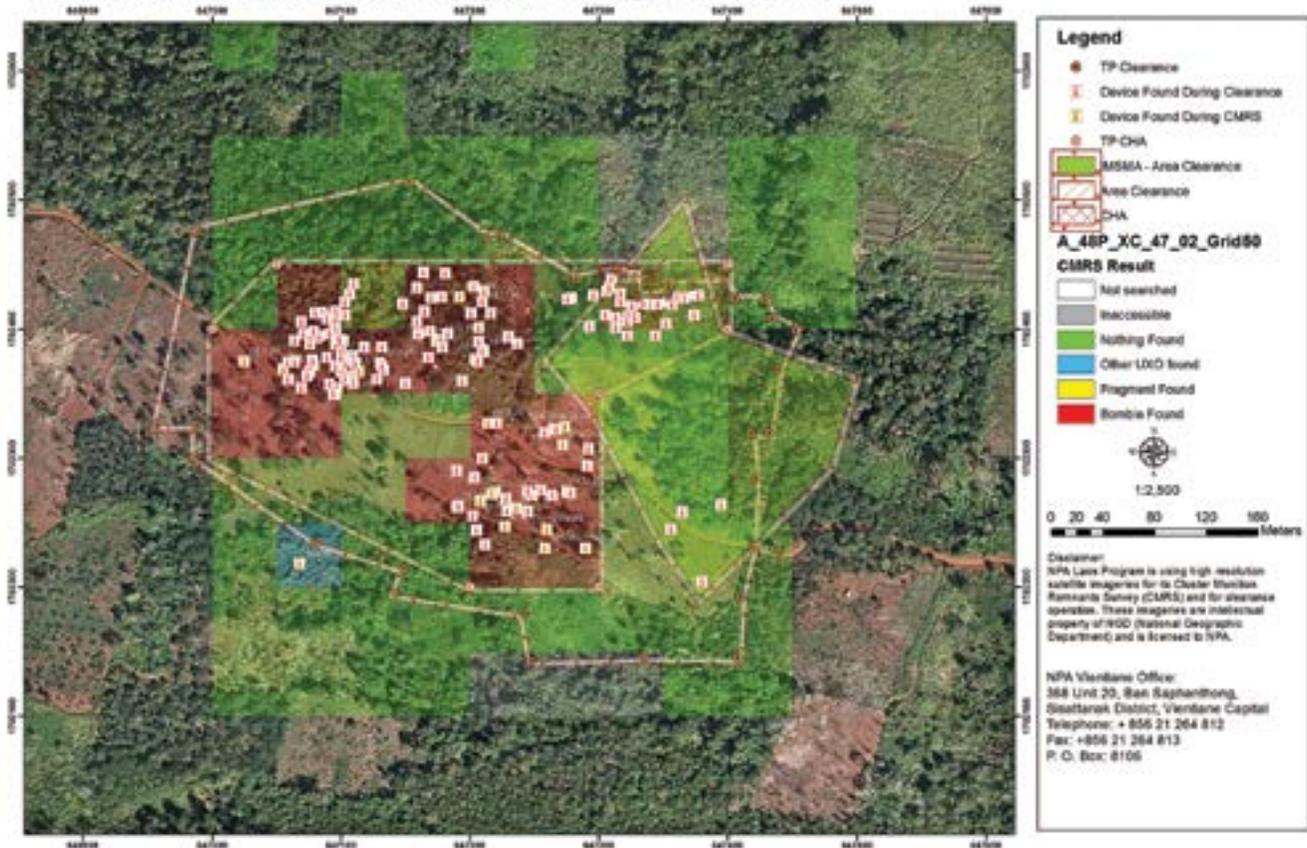


Figure 5. Example of a completed task in Kongtayoun village, Thateng District.

areas without human interference through technical survey, subsequent clearance and by counting the number of unexploded bomblets remains the only means of estimating operational failure rates.

### Laos Case Studies

Since 2011, NPA has surveyed over 2,000 CHAs in the Sekong, Saravan and Attapeu provinces of Laos. Locations of all submunitions were recorded when found. Some of these CHAs were subsequently cleared, providing a clearer picture of ground contamination. Although most CHAs are mixed strikes, deducing individual footprints with at least some degree of assurance is reasonable. Several case studies in Laos point to some interesting initial data.

In 2011, NPA conducted CMRS and clearance of a CHA near Kongtayoun village in Thateng district, Sekong province. A CHA of 71,250 sq m was surveyed during CMRS; 29 items were found at this stage. Almost all were BLU-26s. Another 316 BLU-26s were found during clearance. Figure 5 shows both cluster munitions found during CMRS and clearance. The final polygon was 122,785 sq m. A 50 m fade out was conducted.

The GIS image suggests four possible strike footprints or groups of overlapping footprints in this CHA. The actual area of contamination was significantly less than 122,785 sq m. The four suspected footprints—ranging in size from 4,186 to 10,874 sq m—only cover 27,692 sq m, 22.6% of the final polygon. A CHA near Luckkao in the southeast of

Thateng district, Saravan province, shows strikes that have been subject to prolonged cultivation over decades.

The CHA from CMRS was 72,000 sq m, and a total of 19 BLU-26s were found during this survey stage. Subsequent clearance of a 113,680 sq m polygon found another 180 BLU-26s. The area of the actual footprints totaled 53,786 sq m—47.3% of the cleared area. The CHA probably contained four strikes, perhaps more. Prolonged cultivation of the area likely affected the spread of cluster munitions on the ground.

The patterns observed can also be seen at another CHA near Kongtayoun village. CMRS and clearance were conducted in association with an agricultural development task in August 2011. The initial CMRS found 84 BLU-26s. A large CHA of 159,891 sq m was drawn and was three to four times the average CHA size (4.4 ha) of the areas found by NPA in Laos. Clearance enlarged the polygon by 62.3% to 259,533 sq m when another 760 BLU-26s were found. The total cluster munitions for the final clearance polygon (including CMRS items found) was 844 BLU-26s.

Table 1 (page 63) summarizes key information from the 10 footprints estimated in three separate CHA case studies. While representing a small data sample, the table indicates a range of values that will be improved upon as more CHAs are surveyed through CMRS and subsequently cleared.

The small sample suggests CBU-24 and -29 strike footprints involve surface areas in a range of 2,224–29,480 sq m. Mixed strikes



Figure 6. Confirmed Hazardous Area near Luckkao.

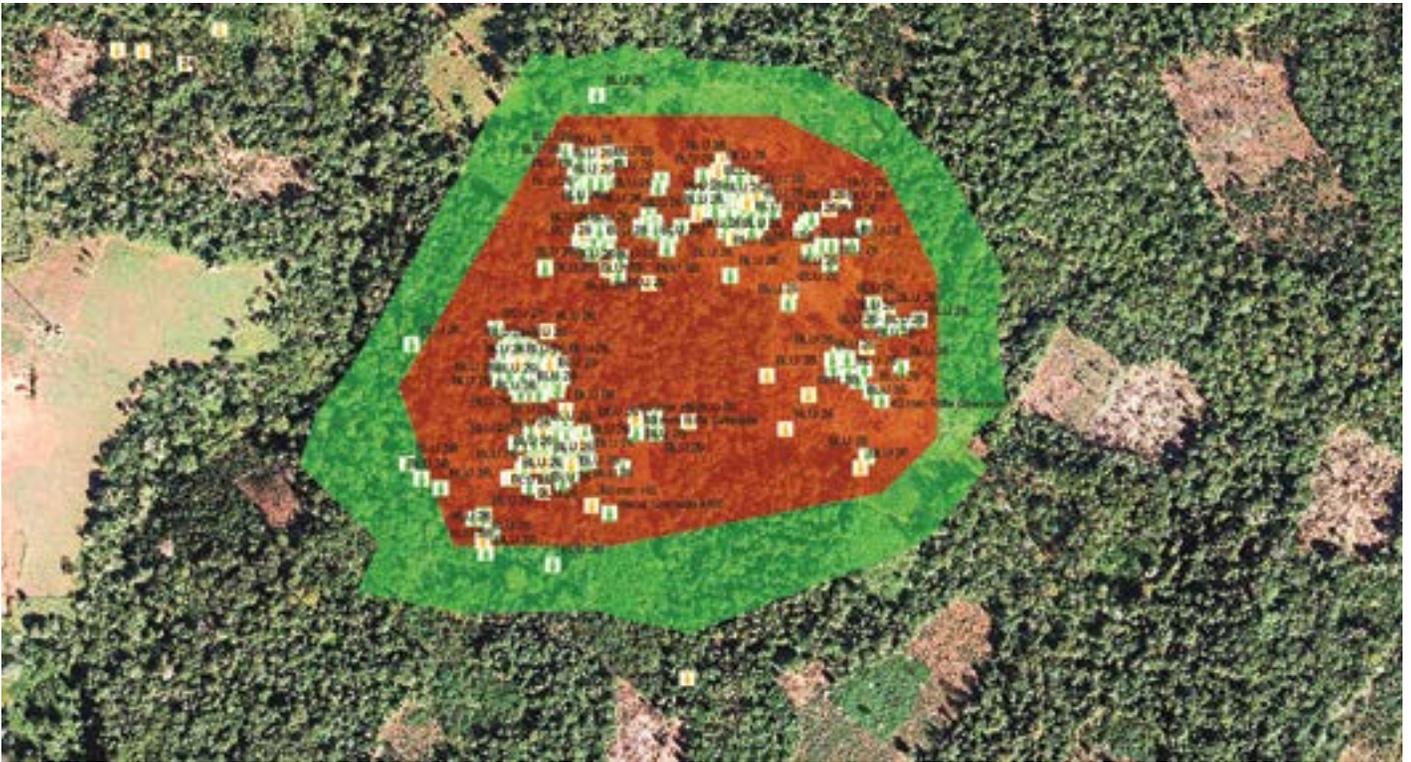


Figure 7. Confirmed Hazardous Area near Kongtayoun village.

CHA Name	CHA Surface Area	CHA BLU 26 Density m <sup>2</sup> /cm	Footprint Surface Area m <sup>2</sup>	BLU 26s Found During CMRS	BLU 26s Found During Clearance	Total BLU 26 Found	Implied Failure Rate %	Footprint Density m <sup>2</sup> /cm
Kongtayoun 1	122,785	391	4,186	2	48	50	7.52	83.72
Kongtayoun 1			10,874	20	44	64	9.62	169.91
Kongtayoun 1			6,317	6	137	143	21.5	44.17
Kongtayoun 1			6,316	7	50	57	8.57	110.81
Kongtayoun 2	259,533	591	11,105	20	185	205	30.83	54.17
Kongtayoun 2			4,544	9	98	107	16.09	42.47
Kongtayoun 2			4,255	20	107	127	19.1	33.5
Luckkao	113,680	534	2,224	1	11	12	1.8	185.33
Luckkao			29,480	8	101	109	16.39	270.46
Luckkao			22,082	9	83	92	13.83	240.02
Average			10,138.3	10.2	86.4	96.6	14.53	123.46

Table 1. Confirmed Hazardous Area case study footprint data.

possibly account for the larger footprints. The estimated average is 10,138 sq m, although the possible mixed strike footprints could be artificially inflating this number.

Inside the footprints, the bomblet densities range from 33.5 to 270 sq m per bomblet. The average failure rate of 14.53% is only an indicator; similarly, these figures represent only estimates. Some evidence suggests that failure rates can be higher. The actual overall bomblet density for the three CHAs in the table are one BLU-26 bomblet per 391 sq m for Kongtayoun 1, one BLU-26 per 591 sq m for Kongtayoun 2 and one BLU-26 per 534 sq m for Luckkao, because clearance between footprints and the 50m fade out distance. Other items such as BLU-3/Bs were found but were not included in these figures.

### Conclusion

This article touches upon a developing field of study, reflecting a small portion of the research conducted to date. Although limited, existing evidence points to some possible trends. Further work remains to be done in order to understand footprints for the CBU-24 and CBU-29 as well as all other submunitions. In Laos, footprints that are surveyed and subsequently cleared, specifically in areas of low human impact (i.e., uncultivated, remote jungle areas), are likely to give the clearest view.

In order to improve understanding of cluster strike footprints, all cluster munitions found during survey and clearance should be

accurately recorded as per IMAS 07.11—some operators already do this. However too much evidence goes unrecorded and is therefore lost. Through informed estimates of the number of cluster munitions used on a given footprint, implied failure rates can be calculated. Other details, such as the depth at which differing submunitions are found, should also be recorded. Better contamination estimates for a given area or country can then be calculated and recalculated as more evidence is gathered.

Hopefully, strike patterns or footprints for a number of different cluster munitions can be shared more in the years ahead. If a detailed database of various cluster strikes found worldwide was available, operators could better prepare for survey and clearance tasks. Improving the collective understanding of cluster munition footprints would surely benefit the sector as a whole. ©

See endnotes page 67

*(This article is derived from a longer research paper detailing observed patterns for a range of cluster munitions found in Laos.<sup>11</sup> The author wishes to thank Mohammed Qasim for his assistance in analyzing data during the research for this paper).*



Roly Evans is the project manager for arms management and destruction for Norwegian People's Aid. He has worked in the EOD and clearance sector since 2005 with experience in Africa, the Middle East, the Far East, South Asia and Southeastern Europe.

Roly Evans  
Project Manager AMD  
Norwegian People's Aid  
P.O. Box 8844, Youngstorget  
NO-0028 Oslo / Norway  
Email: RolyE@npaid.org  
Website: <http://npaid.org>

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Post Clearance Inspection: How Much is Enough? by Gasser [ from page 4 ]

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3. IMAS 09.20 Annex B, section B.3.1.
4. Paragraph 2: Specified Quality Limit is 0.35% for calculations. This is the "maximum fraction of contaminated land" after clearance. Annex B, section B.3.4.
5. In the equation: p is the maximum fraction of land still contaminated after clearance, which should be zero according to IMAS 09.10 and not 0.35%.
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2. UNICEF provides in-country support, but to date, does not offer basic or advanced MRE courses. SWEDEC at some point provided MRE courses but stopped; so did GICHD upon request. Major INGOs that engage in MRE/ Community Liaison such as HI, MAG, DCA, DDG, etc., have their own in-house training or provide training on-the-job.
3. Based on RedR training materials for training trainers, on RedR see <http://bit.ly/1EFKqhX>.

#### Democratic Republic of the Congo's National Landmines Contamination Survey by Simon and Thoma [ from page 48 ]

1. A slightly different methodology was also used at that time called General Mine Action Survey. However, for the sake of clarity, this article only refers to GMAA.
2. DRC's total surface is 2.35 million sq km (907,340 sq mi)—approximately two-thirds of the size of Western Europe.
3. The survey methodology complied with non-technical survey 08.10 and land release 07.11.
4. MAG, HI, NPA, DCA.
5. National Red Cross, Africa for Mine Action (*Afrique Pour la Lutte Antimines*), *Synergie Pour la Lutte Antimines*, *Bureau des Actions de Développement et des Urgences*, *Synergie de la Lutte Anti-Mines en Equateur Sud*, *Actions pour le Développement Intégral par la Conservation Communautaire* and the Monitoring, Database and Information branch of the Department of Disarmament Affairs.
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