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Pascal Rapillard
Geneva International Centre for Humanitarian Demining (GICHD)

Maryam Walton
Geneva International Centre for Humanitarian Demining (GICHD)

Humanitarian and Developmental Impact of Anti-vehicle Mines

Anti-vehicle mines negatively impact humanitarian efforts and developmental progress. Key findings from a South Sudan case study show that mine contamination impacts humanitarian efforts directly through casualties, while dangers of agricultural development and hindrance to foreign investment are also primary developmental concerns for the South Sudanese.

by Pascal Rapillard and Maryam Walton [GICHD]

As the international community continues to explore the possible need for further legal regulation of anti-vehicle (AV) mines, a need exists for more rigorous analysis of the impact of AV mines on civilians and developing societies either presently suffering or recovering from conflict.[1] To bridge this gap, the Geneva International Centre for Humanitarian Demining (GICHD) and the Stockholm International Peace Research Institute (SIPRI), funded by Ireland and the U.S., undertook a study to document the humanitarian and developmental impact of AV mines.[2]

The study found that AV mines negatively impact humanitarian, post-conflict recovery and developmental efforts. AV mines laid on roads, roadsides or in fields result in numerous civilian casualties. In addition, the presence of these mines continues to prevent populations from productively using land, effectively using transport and safely building infrastructure.

The study's methodology was based on existing literature and information from mine action centers and operators on the ground in the form of documentation, expert advice, fieldwork, interviews, basic impact surveys and national baseline surveys. The full study features case studies from Afghanistan, Cambodia and South Sudan.

Background

Whereas anti-personnel (AP) mines yield smaller detonations designed to injure or kill human beings, AV mines rely on larger explosive charges to damage or destroy armored vehicles and tanks. Similarly, AV mines use fuzes that require greater amounts of pressure to trigger a detonation in order to compensate for the weight difference between a human and a vehicle. Some AV mines are also manufactured with additional fuzing systems, giving users the option of fitting anti-disturbance and anti-handling devices. Countermeasures (or when someone tampers with the mine or tries to remove it from the ground) trigger AV mines fitted with these devices. AV mines are designed to damage or destroy hardware, and to injure and kill vehicle crews and passengers.

While the technical design of AV mines has changed over time, the underlying concept remains the same: Most are simple, adaptable and can be mass-produced at relatively low cost. First used to combat locomotives, Confederate forces in the U.S. Civil War deployed pressure-activated, AV mine equivalents along railroads. From World War I onward, AV mines were further developed and became more sophisticated in design and function. Their use also became more widespread. To this day, new mines are still actively laid.

Typically, AV mines are placed directly on roads or nearby to prevent road use or access to particular areas. In situations where the terrain may be unsuitable for laying mines, off-road mines can be used to direct explosions into a vehicle's side instead of detonating from underneath. Heavy rain may displace AV mines, causing uncertainty of location and thus increasing the hazard.

Specific treaty provisions and International Humanitarian Law (IHL) rules and principles regulate AV mine use. Rules of customary international law stem from general practice, accepted as law, and are independent of other provisions established in international treaties. They may be applicable in international or non-international armed conflicts, or both, and are binding on states and non-state actors. The most significant principles of customary IHL applicable to AV mines are distinction and proportionality.

Second, the International Committee of the Red Cross recognizes three specific, customary rules that directly address AP and AV mines:[3]

A truck damaged by the blast of an anti-vehicle mine in Angola.
Photo courtesy of The HALO Trust.

- Care must be taken to minimize indiscriminate effects of landmines.
- Parties to the conflict are required, as far as possible, to record placement of landmines.
- At the end of active hostilities, parties to the conflict that used landmines must remove or otherwise render them harmless to civilians, or facilitate their removal.

Finally, AV mines are subject to specific rules in Amended Protocol II (APII) to the *Convention on Certain Conventional Weapons* (CCW). APII regulates use of mines, booby-traps and other devices including "mines other than anti-personnel landmines." It states in particular that "It is prohibited to use remotely-delivered mines other than anti-personnel mines, unless, to the extent feasible, they are equipped with an effective self-destruction or self-neutralization mechanism and have a back-up self-deactivation feature, which is designed so that the mine will no longer function as a mine when the mine no longer serves the military purpose for which it was placed in position."[3]

Humanitarian and Developmental Impact

The humanitarian impact of AV mines is best summarized in two parts: number of casualties and hindrance to relief aid.[4]

Data collected through the basic impact survey gives estimates of casualties in some countries (see Figure 1, next page). Moreover, states noted that the actual level of contamination is likely higher for the following reasons:

- AV mine accidents are not always reported.
- AV mine accidents are sometimes inaccurately recorded as being the result of another weapon.
- In some situations, no data is recorded, or collected data does not differentiate between AV and AP mines.

Data collected from media sources gives an idea of the type of casualties caused by AV mines (Figure 2, page 50).[5] Research of news items revealed 190 incidents and 725 casualties since 2009.[2] Again, actual number of casualties is expected to be much higher for reasons cited previously.

AV mines also affect the work of humanitarian organizations and delivery of humanitarian assistance. AV mines on or alongside roads endanger all users. Humanitarian personnel attempting to reach areas only accessible through contaminated roads risk their lives to do so. In many cases, AV mines force humanitarian agencies to abandon tasks until roads are cleared. In other cases, organizations seek alternative means, such as air travel, to reach said locations. However, alternative methods can be costly and are often not at the disposal of most humanitarian groups.

Developmental Impact

AV mine contamination negatively impacts development in four main ways. First, following a conflict, communities will attempt to rebuild and develop their towns and villages, which involves building infrastructure such as houses, schools, hospitals, roads and bridges. Presence of AV mines

will hamper these efforts to build and rebuild infrastructure for two reasons. Areas must be cleared before construction. Moreover, heavy machinery used in construction will likely detonate AV mines. As such, individuals will either risk their lives attempting to rebuild their communities or they will abandon construction projects until clearance can be carried out, which can take several years.

As societies progress through development, modes of transportation evolve, and use of vehicles increases to move goods as well as people. Increased vehicular use may unveil previously unknown AV mines.

In addition, national and international investors may seek potential business ventures in developing societies. Whereas this is a positive step for development in theory, presence of AV mines has on several occasions discouraged investors from particular areas. Given the high cost of clearance, investors hesitate to bear the cost of land clearance and may consequently abandon the project to search for alternate locations.

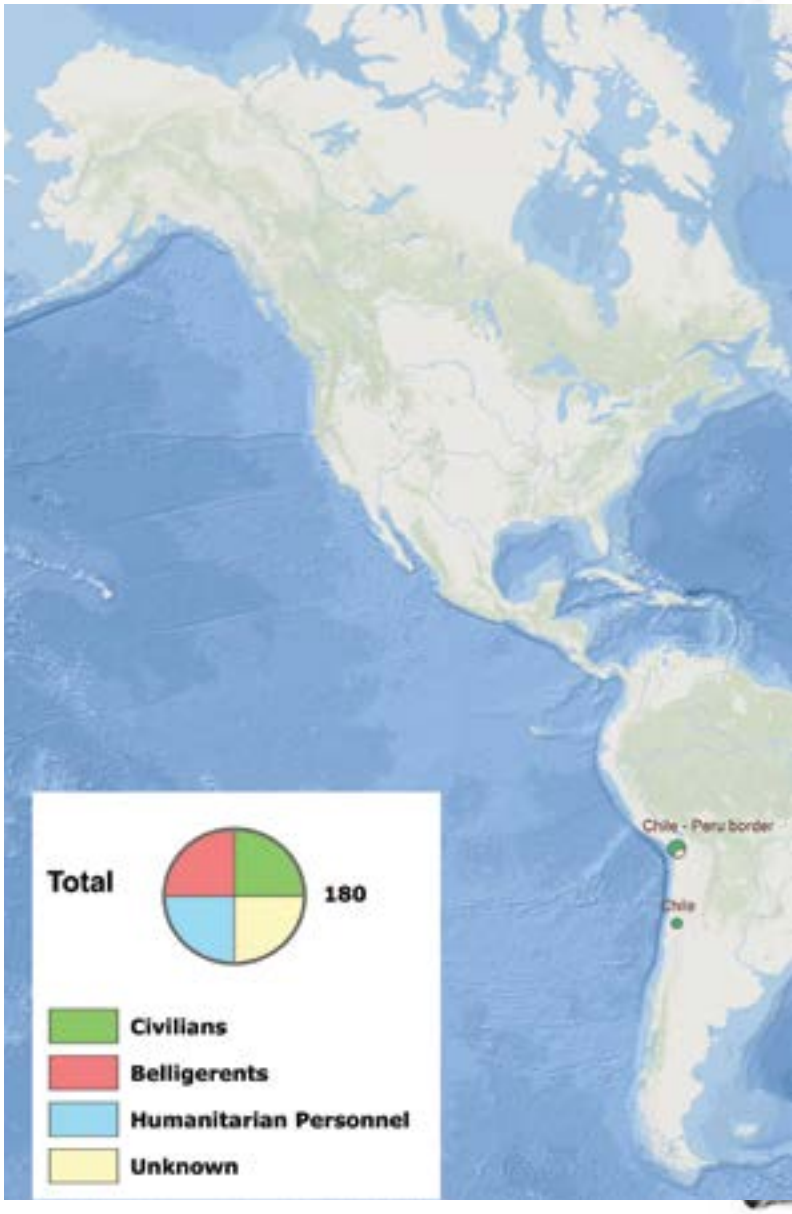
Advancement in farming technology generally results in heavy machinery replacing outdated equipment. Whereas using farm machinery is certainly a positive step for development, its use in contaminated areas poses problems. The weight of the machinery is sufficient to trigger these devices, so communities have two detrimental options: risk their lives in order to cultivate land or await clearance.

These factors suggest that the impact of AV mines increases as states progress in post-conflict recovery and development efforts.

Case Study: South Sudan

South Sudan gained independence from Sudan on 9 July 2011 after a civil war that lasted decades and, according to multiple sources, claimed the lives of approximately two million people. Since then, peace in South Sudan has remained fragile, and the situation has recently declined. The economy depends on oil revenues and has suffered from conflicts over use of Sudan's pipelines and facilities for oil exports. In parts of South Sudan, up to 90 percent of households rely primarily on agriculture and livestock for subsistence. Although not the only cause of instability and underdevelopment in South Sudan, landmine contamination adds further challenges to state-building and development efforts.

Contamination from AP and AV mines is widespread in South Sudan. AV mines contaminate all 10 states to various degrees.[6] The United Nations Mine Action Service (UNMAS) is responsible for coordinating demining in South Sudan and regularly finds new tasks to clear. In 2012, the majority of new tasks were AV mines. So far, 22,000 km (13,670 mi) of roads were cleared from landmines, including most major roads. However, smaller roads are still contaminated, and many rural communities remain isolated as a consequence.[7]



Mine Technologies International identified the most likely locations of AV mines to be on or near roads, close to bridges and in landscapes suitable for defensive positions.[8] AV mines were also found at checkpoints and on old, overgrown roads.[9] Demining operators commonly report that mines were seemingly laid arbitrarily and without pattern or records.

Humanitarian Impact

Casualties remain the most direct humanitarian impact of AV mines. As demonstrated in Figure 2 (page 50), 482 civilian casualties from AV mines were recorded between 1999

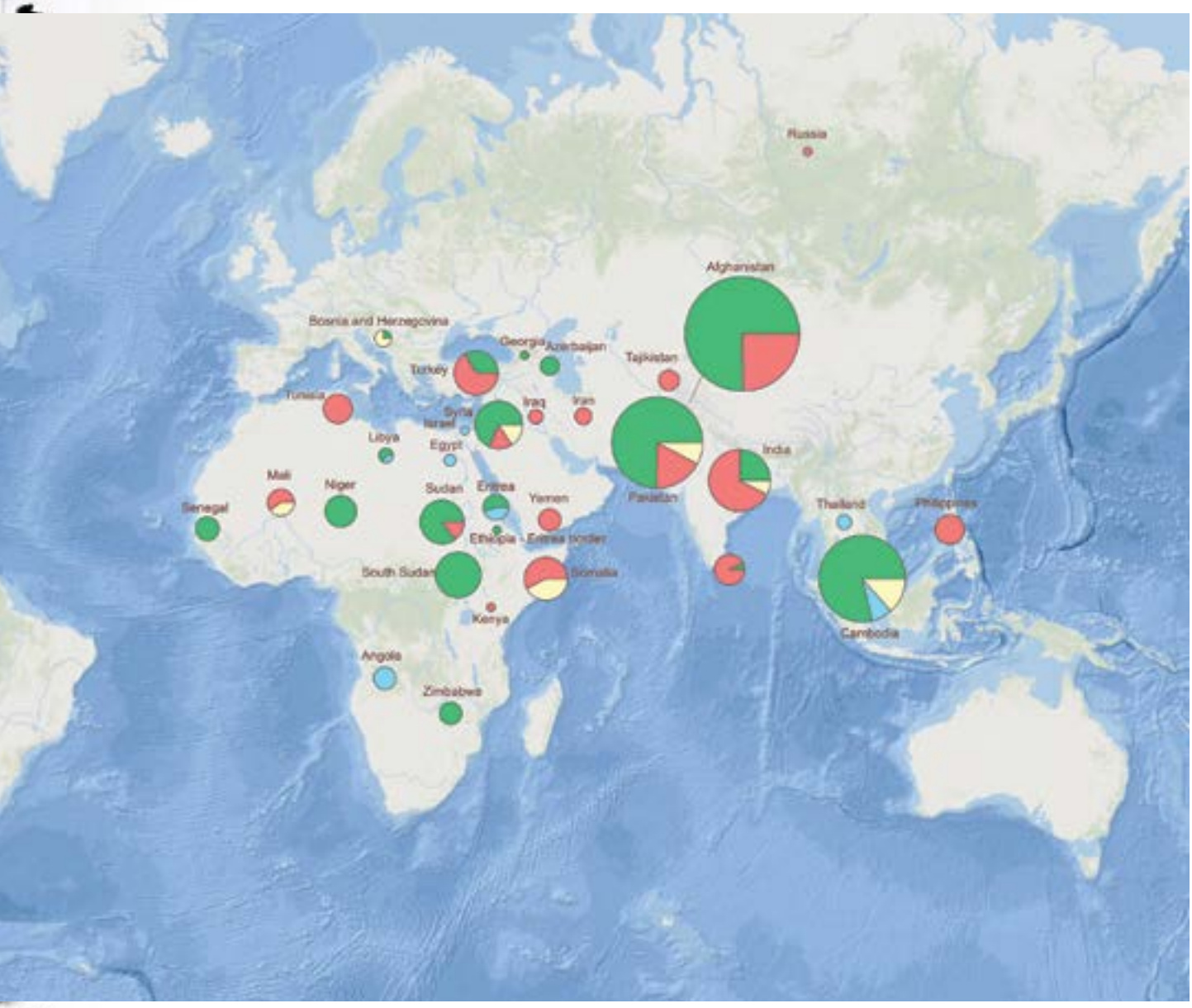


Figure 1. Anti-vehicle mine casualties reported by states and operators in the Basic Impact Survey.
All figures courtesy of GICHD.

and 2011 in South Sudan, which is likely an underestimate of the actual amount of AV mine casualties.[10] Prior to the 2011 independence referendum, the number of reported casualties from AV mines was relatively low in South Sudan when compared to other states with similar contamination levels.[2] The casualty increase in 2011 is due in part to increased migrations across South Sudan after increased tensions from the referendum.

Developmental Impact

AV mines in South Sudan impact its development in a number of ways. First, AV-mine contamination hampers agricultural development. Agriculture is the backbone of the South Sudanese economy. Around 80 percent of the population lives in rural areas where agriculture, forestry and fisheries provide the primary source of income for most households.[2]

In cases where access to mechanical farming machinery is available, presence of AV mines impedes agricultural production. In Eastern Equatoria, AV mines hampered the development of tea plantations and impeded expansion of the timber sector in South Sudan. In addition, former sugarcane plantations were not put back to use due to contamination from AP and AV mines.[10]

In addition to vehicles and farming equipment, heavy cattle can also detonate AV mines. Cattle herders in the north,

Country	Total number of recorded civilian casualties due to anti-vehicle mines	Time period of records
Afghanistan	1,233	1979-2013
Bosnia-Herzegovina	158	1992-2013
Cambodia	968	1979-2013
Croatia	184	1991-2013
Lebanon	332	1948-2013
South Central Somalia	46	1991-2013
South Sudan	482	1999-2011
Sudan	147	1966-2012

Figure 2. Media coverage of AV mine casualties.

many of whom rely on livestock for income, repeatedly voiced their concerns over AV mines in the area.[11]

Second, the presence of AV mines deters foreign direct investment. Investors need verification from the national mine action authority that an area of interest is landmine-free before project planning begins. Known contamination affects building of roads and power lines as well as the extractive industry.

AV mines deter smaller foreign investment projects from being carried out, due to budgets that cannot sustain clearance costs. For example, an Indian company expressed an interest in developing a sugar field together with a refinery in the border area of Eastern Equatoria and Jonglei; however, the investors pulled out due to landmine contamination that included AV mines.[12]

Third, the presence of AV mines affects rebuilding of infrastructure. In the early years of clearance, emergency humanitarian demining standards called for all main roads connecting major towns in the emergency phase to be cleared to an 8-m (9-yd) width only. In 2004–2005, UNMAS clearance standards changed to a 20- to 25-m (22- to 27-yd) width in order to support increased development.[13] A number of accidents near roads cleared to an 8-m (9-yd) width were recorded. Furthermore, demining operators frequently find more AV mines next to cleared roads. For example, Norwegian People's Aid responded to a clearance request when a road construction company's bulldozer detonated an AV mine when paving a new road.[14] In addition, Denel Mechem staff witnessed an AV mine detonate a bus in Unity in August 2011. The main road had many smaller side roads leading to villages. Local communities were aware of the contamination but had no choice except to use the road, as alternate routes were not an option.

As a country with limited public infrastructure and a great deal of subsistence farming conducted by hand, South Sudan has not yet experienced the full impact of its AV-mine contamination. Remaining contamination will likely obstruct future infrastructure development projects and agricultural expansion.

Conclusion

Findings from this study's basic impact-survey process and case-study investigation show that the negative humanitarian and development impact of AV mines have the potential to increase in the aftermath of a conflict as a state attempts to recover. AV mines inhibit the return and resettlement of populations, gradual introduction of a greater number of civilian vehicles for transportation and farming, and new state infrastructure projects that use heavy equipment.

The significance of the negative impact of AV mines on stability and development should not be understated. While AV mines are not the biggest impediment to humanitarian and development efforts, they contribute to problems associated with fragile post-conflict societies.

See endnotes page 66

Pascal Rapillard is head of the external relations and policy division at GICHD. Prior to joining GICHD, Rapillard worked at the Swiss Department of Foreign Affairs, first in Bern with the humanitarian policy section, then in Geneva as assistant to the commissioner of the 30th International Conference of the Red Cross and Red Crescent. In 2005, he worked as a research assistant for the French National Commission on Anti-personnel Landmines in Paris. He holds a degree in international relations from the Geneva Graduate Institute for International Studies (Switzerland) and a master's in public international law from the University Panthéon-Sorbonne (France).

Pascal Rapillard
Head, External Relations and Policy
Geneva International Centre for Humanitarian Demining (GICHD)
Chemin Eugène-Rigot 2C/ P.O. Box 1300
1211 Geneva 1 / Switzerland
Tel: +41 (0) 22 730 93 31
Fax: +41 (0) 22 730 93 62
Website: www.gichd.org

Maryam Walton was most recently a junior program officer in the external relations and policy division at GICHD. Prior to joining GICHD, Walton was engaged with the Refugee Services of the British Red Cross and Middle East department of Geneva Call, where she researched issues relating to armed groups, international humanitarian law and demining in the region. She holds a bachelor's degree in politics and French from the University of Warwick (U.K.) and a master's in development studies from the Graduate Institute of International and Development Studies (Switzerland).

Maryam Walton
Email:walton.maryam@gmail.com