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Myths, Mines, and Ground Clearance

Andy Smith

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Introduction

The following article deals with some common misconceptions about deminers, demining, and demining equipment. It is not an academic paper, but it is rather a discussion prompt. Some of the points are old enough to appear bearded to the field men--sorry about that--but newcomers still need to hear them. A few are contentious. To some extent, I am playing devil's advocate although all of the points raised in this article have arisen during my field work. I believe that they deserve an airing, and I would be interested to hear any well-reasoned, contrary opinions, or any words of support. Please send such comments to me at avs@landmines.demon.co.uk.

Throughout this article, I quote common misconceptions and important factors in bold italics. In some cases, I might not have used quite the right wording, but I think I have caught the intent. Those who know me might recognize some arguments, but their presence here does not have validity, but I would be the first to admit that no single correct answer exists.

Least Helpful Misconceptions

Several myths about demining exist, and these myths tend to irritate me much more than they should. My least favorite is the line favored by politicians:

"If we can send men to the moon, we must be able to do better than a man with a prod!"

Of course, it looks as though it would be easy to improve on the prod, but how do you improve on the person? Anyone who has been engaged in manual demining knows that the deminer gathers data constantly from eyes, hands, and even through the soles of his boots. That information is processed almost instantly, and balanced judgments result. The human eye is actually the most effective detector. It recognizes subtle clues faster than any machine, and the eye is responsible for locating more

devices than any other tool.

Critics often present the "man with a prod" as an unsophisticated cave-man technology. In fact, it is more sophisticated than any artificial device yet available. No matter how many millions of dollars are thrown at robotics, it will be a very long time before machines equal the sophisticated array of data gathering and processing equipment that is a human being--never mind transforming technology into a small, intelligent, and autonomous robot. And as far as prods are concerned, I discuss "improvements" later in this article.

"More mines are being laid than cleared today."

Most of the mines currently in the ground were more-or-less "donated" to support surrogates in Cold War conflicts that were played out on foreign soil. Millions of mines were effectively dumped in ideological conflict regions. Their local use was often profligate and their utility assumed to be proven (partly because of the examples of indiscriminate use set by the US and the Soviets in South East Asia and Afghanistan).

The truth is that since the end of the Cold War, the extensive use of anti-personnel mines appears to have declined rapidly. Meanwhile, the International Committee for the Red Cross, the ICRC, (who propagated the "more mines" myth) has failed to answer the thousands who have asked the crucial question, "Where are the two million new mines being laid each year?"

"Mines have no place in modern warfare."

This statement is true to a point--from a western point of view. If you fight your wars on foreign soil and have every kind of expensive technology at your disposal so that you can anticipate a rapid victory, the prospect of having to clean up your mines later can make them more trouble than they are worth. If, however, you are fighting a protracted civil war, mines are useful--as any foot soldier knows. This utility in drawn-out conflicts is why the Vietcong made mines out of wood and bamboo in their underground workshops and why Improvised Explosive Devices (IEDs) are common in Bosnia and Afghanistan. You cannot ban IEDs, which are usually simple mines. The International Campaign to Ban Landmines (ICBL) has shown that you can make commercially-produced mines more difficult to come by, which I think is good, but they do not have to pretend that this effort will solve the landmine problem. As a military friend recently pointed out, any country with the capacity to put beans in a can or make plastic toys can produce landmines in quantity when it wants to do so.

The truth is that as long as conflicts continue, victim-initiated devices

(mines) of one kind or another will be used.

"Mines are the greatest killers in post-conflict regions."

This statement is a gross oversimplification. In some areas, it is true. In many areas, it is the other detritus of war that claims the most lives. And these incidents are not always "accidents." In countries with a ruined economy and huge number of displaced people trying to grub some kind of a living, a few pennies for scrap metal can seem very attractive. The greatest risk depends upon where you happen to be. For example, some people say that booby traps are the greatest killers in Bosnia, and while the distinction is pretty academic to the victim, it is critical to the men cleaning the ground.

The truth is that, while it lacks the sound-bite ring, the armaments left over after a conflict has ended are the greatest killers in post-conflict regions.

Know Your Deminer

"You can meet deminers and find out about demining at conferences."

Briefly, a deminer is not someone you will meet at a conference or someone who is paid a UN salary. Those people might be Demining Supervisors, but they do not actually clear mines themselves. I can think of only three ex-pats who regularly demine among the many hundreds I have met in my travels, and these ex-pats do so out of an obsessive personal commitment, not because they are paid to do so. The ex-pat is far more economically occupied in training and management tasks (often, 20 local deminers can be employed for the same daily salary of one ex-pat, not to mention other costs).

This fact is not to say that ex-pats do not take risks--they often do when unusual circumstances occur, and they occasionally do just by being in the unstable countries where they are working. These experts frequently have to put up with a level of management frustration that would drive lesser men to murder, while they must also juggle more balls than any circus act and do so while in conditions of considerable physical hardship. But, on the whole, these individuals do not demine.

The truth is that, in most cases, ex-pats are contractually prohibited from actual demining, and some of these individuals have never looked for and found a mine in a real situation. Also, many of the speakers at

conferences are self-professed "experts." With notable exceptions, very few of these persons have much experience at demining on the ground with a prod.

Ex-pat Explosive Ordnance Disposal (EOD) men usually do get their hands-on experience, but they are specialist EOD people rather than deminers, and when EOD is taken seriously its equipment needs can be much more sophisticated. Of course (apologies to Andy MacAndrew), there is a sense in which all demining is EOD, but for the time being it is simplest to continue to recognize a difference between the two.

I define a "humanitarian deminer" as someone whose principal day-to-day activity involves using their eyes, dogs, detectors, prodders, or other means to physically clear areas believed to be mined. The man who makes sure that person is trained, equipped, and works according to the rules is not a "deminer." By my definition, he is a "demining supervisor."

Deminers

"Demining is a specialist activity that takes a long time to learn."

In many developing countries, most field deminers are local men. They might have a military background, but this background is rarely one that involved much in-depth training in mine detection and removal. Some organizations have new deminers working in a live area within ten days of starting their training. These deminers will then work alongside a more experience person for up to six months of further "on-the-job" training (often done at reduced pay).

Around the world, most demining organizations give no more than six weeks of training before putting local deminers in a live situation. These organizations argue that it is not economical to spend large sums of money on training when deminers might leave to work with another organization at any time (the "poaching" of experienced people is a problem wherever commercial demining is established). The fact that a trained deminer is usually only paid around US$5 a day is also relevant.

At first glance, this level of training seems inadequate: certainly, it is very different from what would be considered essential in Europe and in the USA. But in this case, the training is not for a career in sophisticated EOD work. It is for a deminer to be able to reliably (and safely) find devices (not just mines).. Often, these deminers do not even have to set an explosive charge--the team leader will perform that activity. How long does it take to learn how to use a particular detector, carefully clear undergrowth, and prod the ground at the correct angle? Five days? Ten days? Even then, most of the time is spent on repetition so that what is deemed "good practice" becomes a habit--a habit that is then reinforced

by supervision in a live area.

This system works, and from the incomplete information I have gathered about accidents, it looks as if the highest risk time among deminers is not their first weeks or even their first year of work. While many details in accident reports are "suspect," I cannot think of any reason why "length of service" should be one of them.

Before criticizing the length and the scope of training, remember to place it in the context where it is applied. In some countries, there are more deminers injured in road accidents than while working; in many cases, the risk of an early death from violence and sickness is very high. There is often no realistic health care, no effective police force, and an openly corrupt administration (no water supply, no telephone system, and a currency so worthless that Mercedes-owning government ministers keep their savings in $US while rural children die of common intestinal parasites). Is it then appropriate to apply western standards to deminer training when these standards are absent from any other aspect of local life?

The truth is that while demining is a specialist activity, it does not take long to learn.

(That said, I still want to see standards rise, and I have been involved in the local production of protective gear and hand tools for that purpose. After all, the situation in the post-conflict country is supposed to be improving, and standards across the board should be rising.)

West is Best

"The rules of humanitarian demining must be set by western specialists."

The observant witness in the field will find that published rules are widely ignored, and the command structure is often evaded. The working position, use of tools, and even the thoroughness of searching the ground will vary from site to site. Very little of it will map directly onto the published operating procedures and the glossy brochures that are available at home. In the field, the rules are seen as guidelines, and pragmatism takes over. No one should be surprised by this situation; it happens in many professions -- including the serving military.

In many places around the world, ex-pat staff have told me that the organizations they have established will collapse as soon as foreign expertise is withdrawn. I believe they are often right. Some of them think this collapse is because of a local lack of sophistication or endemic corruption. Both problems are common, but the reason for unsustainability might well be that the Western command structure is

simply inappropriate for the local culture. Do not assume that a command structure suited to local circumstances will be less strict or efficient. Some locally-managed commercial companies involved in demining in Africa are very strict and very cost effective. MineTech and Mechem are obvious examples. And while commercial companies might need to be watched closely to ensure that corners are not cut, we might still be able to learn something about appropriate command structures from them. I do not mean to suggest the widespread adoption of their methods--where discipline and punishment regimes might be brutal--merely their study to see what parts can be usefully adopted.

The truth is that western specialists can usefully provide a starting point, but the actual rules applied will always vary.

Soldiers might argue about which country's training is the best, but they tend to accept the above statement as a fact. Many accept that what they see in the field is not ideal, but it tends to be assumed that a western-style military regime will be the safest and the most efficient way of organizing humanitarian demining in the field, and it is often seen as the only option available anyway.

Humanitarian demining is not just about clearing areas of ground. The management and maintenance of a large ground-clearance program requires very different skills from those of the deminer, and the skills of the ex-pat staff involved reflect these needs.

At this point, it can be useful to separate demining supervisors from demining managers. In general, the supervisor regularly spends time in the field. While the manager might visit the field, he spends the majority of his working life in an office. In general, the higher the military rank, the more likely the ex-soldier is to be a manager, and the more experience he will have in the management role.

Demining supervisors usually have a lower military rank and more hands-on experience. Most of those supervisors that I have met have a maximum of eight weeks of military mine-clearance training somewhere in their past, and many of these individuals recognize that this training is no preparation for the needs of humanitarian demining. To their credit, most of these persons learn as they go, and some individuals have become very good at recognizing the needs of their men and at making incremental improvements to working practice and equipment.

In very few cases does the demining supervisor's background include training in how to train, never mind how to train an unsophisticated technician in a developing country. Yet that factor is usually the most important part of their job. In no case that I know of has the supervisor's background included an in-depth analysis of development issues in the country and the culture in which they are operating (although a few have acquired it).

Given the lack of preparation, it is quite astounding how much Demining

Supervisors often achieve, and that is the main argument I can find in favor of using people with a military background: they might not have the appropriate skills when they arrive, but they tend not to accept failure as an option. Whether they are working against or with the management system, when they achieve things is a moot point in some areas.

One of the most efficient demining Non-Government Organizations (NGOs) I have met is not run by people with military training at all, and it is one of the few run by people who also work as deminers as well as supervisors. As their profile has grown, they have been obliged to get some formal explosives training, and they have taken on ex-pats with military training to meet funder requirements. But their training and staff extension was after the event rather than in preparation for it.

While using ex-soldiers makes sense when emergency rapid action is required, it is not so obviously desirable when the problem is not one that can be solved with a single concerted intervention. To devise and implement a sustainable solution that will continue without foreign intervention requires skills that are not necessarily part of military training. In Cambodia and Afghanistan, the UN has recognized this factor and has appointed people who can see the broader picture to head the Cambodian Mine Action Center (CMAC) and the Mine Action Center Afghanistan (MACA). These individuals are men with a military background, and they are men who have put aside the blinders of their training and accepted the necessary learning curve in the job. More power to them. Give them the power to appoint a support staff with a development background (rather than a fancy degree), and their jobs might become much easier.

The truth is that it is by no means obvious that western military training is an adequate, appropriate, or sufficient preparation for organizing humanitarian demining. Neither is it obvious that an MBA \ or a Doctorate (increasingly UN requirements) from a western university would help in any way at all.

Demining Equipment

"The equipment issued to our military guys is the best in the world."

From this statement it is sometimes argued that the same equipment should be used in demining. It rarely is. There are three main reasons why it is not:

- high cost of military equipment,
- it is not designed for use in humanitarian demining, and

- western world's fascination with technology for its own sake.

Equipment designed for a military purpose is made by an industry that often thinks cost is not a major issue, and the final value of a piece of equipment always includes the cost of aggressive marketing. The end product can include features designed for covert combat situations, such as camouflage, infrared invisibility, ultra-light and ultra-small components, multi-function compatibility with other combat equipment, etc. Often designed for occasional use, it frequently cannot withstand the "normal" treatment sustained during humanitarian demining in the field. The Schiebel AN-19/2 mine detector is a fine example of this situation, for defunct units of this model, which is uneconomic to repair, litter the African countryside.

An ideal design specification for humanitarian demining would not include the above features and would stress features that do not rank highly among military needs. The most important are:

- low cost,
- robust in extended use,
- simple operation, and
- easy service or repair in the field.

As far as metal detectors are concerned, the Ebinger 420 series comes closest to these requirements (without meeting them), and so is popular with "deminers" despite lacking the sensitivity of some competitors.

Detectors are an example of the high-tech end of demining equipment. Probes (prodders) are probably the lowest-tech item. The simplest probes I have seen in use have been lengths of reinforcing bar that cost a dollar. The most expensive military probe I have encountered is offered at CAN$700, but the average probe seems to cost around US$100. To justify the cost, most of these detectors have added value designed in to their cost. The producers of the fanciest probe claim that their product can identify the material obstructing their progress through the ground while other fancy probes contract into short handles or extend into two-meter-long sticks. In some cases, these probes are designed with humanitarian demining in mind, but they are not designed with low cost, robustness in extended use, simplicity of operation, and easy service or repair in the field in mind.

Frequently, the designers have also forgotten to carry out an analysis of what is wanted. They appear to move directly from a new high-tech idea to a marketing strategy and rely on modern man's fascination with technology to supply the "need."

The DEW Smart-probe is an example (cost of this fascination with technology: roughly CAN$700). According to the salesman I spoke with, this battery-powered probe can discriminate between stone, wood, and

plastic--so you probe the ground until you hit something, then read off what you have hit. Assuming that the probe can cope with paint, bakelite, or sticky soils, it sounds neat until you think about why anyone would want a smart probe. The only economical or sensible reasons seem to be either to accelerate the mine-detection process or to make the process safer.

In most cases, the Smart-probe would be used to investigate a detector signal. Imagine this scenario: The detector signals, and the deminer narrows the signal down as best he can; then, he lays aside the detector and picks up his DEW Smart-probe. On the first insertion, the probe hits something and the reading says "stone." There could be a pebble in front of the mine, so the user must again insert the probe into the ground. Again, the reading is "stone," but that does not prove that there is not a mine just behind a second stone, so the deminer again inserts the probe into the ground, and again, and again, and again. To be sure that he is not dealing with a mine, the user would still have to probe all around the signal and break up the ground as he went. To meet most clearance requirements in humanitarian demining, the user would then have to remove the soil and find the metal that made the detector signal. I cannot see how it would make that investigation safer, either, but I can see how it might give false confidence if it was misused. (Thanks to Bob Keeley.)

Quite apart from its initial high cost, the DEW Smart-probe's reliance on batteries (expensive and hard to get in remote areas), and its apparently short design life (How many insertions do they think it will make in a year?), the people behind the DEW Smart-probe do not appear to have considered the needs of the market before developing this expensive toy.

The truth is that equipment designed for a military purpose is rarely ideal for use in humanitarian demining.

Do-it-yourself Equipment

"Locally made demining equipment is always of a low quality."

This opinion is rarely stated as bluntly, but it is often a clear assumption behind the attitude of equipment purchasers. It is an attitude that is fostered by suppliers of equipment in the west--suppliers who prefer everyone to source through them. The demining supply industry is a sophisticated, hard-sell extension of the arms supply business, so no one should expect it to have honesty as one of its major aims.

The main advantages of demining groups having their equipment supplied from local sources are

- low cost (reflecting local employment rates and no sales hype or R&D),
- continued availability (promoting sustainability in demining),
- easy maintenance or repair, and
- easy inclusion of area-specific design features.

The main disadvantages are

- belief that the equipment is of low quality,
- lack of available designs,
- initial hassle in establishing quality manufacture, and
- problem of guaranteeing availability of raw materials.

With simple manufacturing regimes that include quality assurance checks at all levels, all four of these disadvantages can be overcome by manufacturing in a stable neighboring country--as long as the product is simple or is an incremental improvement on what is already used. No design awards here, just common sense. Most field men can readily suggest improvements to existing tools, and many of them can explain what they want an new piece of equipment to do even if they do not have the familiarity with a sketchpad to draw it.

The truth is that perfectly adequate, locally-made simple tools exist (Norwegian People's Aid (NPA) Mozambique, HALO Cambodia, CMAC Cambodia, etc.). More sophisticated items such as blast visors and body armor can also be made regionally, as has been proven in my own work.

Billion-dollar Equipment

"We need to spend millions of dollars and use our best brains and facilities to develop new equipment for demining."

This assumption seems to rest on the belief that "Incremental changes are too small to count--we need a paradigm leap forward to solve this problem now." This assumption also contains the presupposition that the need could only be met by the "best" brains in western R&D.

Since 1994, I have seen considerable changes to the equipment used on the ground. The changes are largely in two areas:

- deminer tooling and protection, and
- mechanical assistance.

These areas serve the two purposes of enhancing safety and enhancing speed, and the division between purposes maps well onto the division between equipment areas.

None of the recent changes are the direct result of any new expenditure on western research and development. Reasons for this failure of R&D effort range from confused design criteria (mixing military needs with those of humanitarian demining) to plain ignorance of the problems in the field. In many cases, the inappropriateness of the design has been made obvious early in its development, but once the funds have been granted and the developers appointed it seems that the work must go on regardless of the situation.

Commercial developers suffer the same confused design aims. To return to the example of detectors, a Schiebel salesman told me that there are not enough sales in humanitarian demining to warrant the development of a detector for that market, so his company's detectors continue to be designed primarily for the military. These companies, however, know what is wanted (I, among others, have told them), but profit must come first.

Leaving aside the incremental improvement of demining tooling and protection (an area where my interest might make me less than objective), the development of mechanically assisted demining provides an object lesson for those who believe that western-based R&D is essential. While huge sums are being spent on monstrously heavy and strong machines that many believe will never work adequately, some demining groups, such as the NPA in Angola, have taken existing "mine-clearance" vehicles (the Aardvark) and used them in a more realistic role as an area-reduction and vegetation-clearance tool, and these applications have not involved any significant revision of the original machine. While this process is quick, it is also too expensive for most groups to consider. The HALO Trust, Mine Tech, and MACA (amongst others) have all taken existing plant equipment (much cheaper than military equipment) and adapted it for use in the field. Their converted back-hoes, tractors, and road-graders dramatically speed up the process of clearance. These groups have made minimal adjustments (usually armoring) to existing equipment and got on with the job without applying much thought to further developments. MgM, who pioneered the use of mulchers and road-graders in Angola, have gone one stage further. With a pool of scrap mine-resistant vehicles to draw on (in Namibia) and obsessive personal commitment, they have made fundamental refinements and developed dedicated Mechanically Assisted Mine clearance (MAM) systems at a remarkably low cost (mostly from their own pockets).

The success of all the existing MAM systems relies on them being developed in the field, where very expensive or impractical ideas are quickly dropped. Making incremental improvements to what they can get and with an everyday pressure for speed and effectiveness, these groups have already made a real difference to demining speed (in most cases, without compromising safety).

The truth is that MAM systems have been developed in the field at a fraction of the costs being spent on developing unsuitable equipment in safe countries overseas. If some of that cost were dedicated to field refinement, it could be far more effective in terms of speeding up the ground clearance.

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