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Could Local Agricultural Machines Make a Country ‘Impact Free’ by 2010?

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Conclusions

Land release systematically captures several current but isolated activities and clarifies how each of them is related. A structured assessment of these relationships can lead to improved efficiency. Consistent use of the term and all its facets has the potential to improve the quality of the individual components. It will inevitably take some time before land release is universally understood, as there is no one uniform method for its application. Land-release methodology is, however, a useful instrument to better define and subsequently resolve the landmine problem. Ottawa Convention States Parties may find this tool particularly useful when assessing their own compliance with the Convention or when there is a need to prepare extension requests.

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Many countries affected by landmines are also facing food crises, underscoring the necessity of cost-effective mine removal. Converting agricultural machines already available in many mine-affected countries for use on mine-action projects saves not only time but also money by speeding up the removal process and turning the land back into an agricultural resource.

A
n important milestone for the mine-action community was reached in March 2009: the first deadline for the mine-affected countries that signed the Ottawa Convention in 1997 to complete clearance. Unfortunately, two-thirds of them did not meet their obligations. Fifteen countries, including Bosnia and Herzegovina, asked for deadline extensions of one to 10 years, leaving a large percentage of their territories unsafe, and forcing their weak economies to support expensive mine-action activities for longer periods of time.

The year 2009 also saw many people around the world starving due to a global food crisis that started two years before. Different sources estimated, for example, that almost one-third of Tajikistan’s 6.7 million inhabitants would not have enough to eat last winter.1, 2 More than landmine-affected countries, such as Burma (Myanmar), Egypt, Mozambique and Somalia, are also facing famine. The need for quick land release of suspected or mine-affected land for agricultural and grazing use is now an imperative.

As often happens, during crises, solutions arise. In fact, we are currently witnessing a dramatic change in mine action: the acceptance and standardization of persistent residual risk after clearance and opposition to the traditional requirement under the Ottawa Convention of removal and/or destruction of all mine and unexploded-ordnance hazards from the specified area to a specified depth.3

General and Technical Survey

In light of the need to fulfill Ottawa Convention obligations and the pressing need to return cleared land to local populations, the land-release concept aims to use current resources more efficiently by better managing information and defining the actual size of minefields so that expensive resources and equipment can be devoted to high-risk areas. Clearing is generally limited to only 3 percent of the entire Suspected Hazardous Area processed. The remaining area that is released through General and Technical Survey is not physically cleared, or at least not completely, and therefore contains an element of risk that explosive hazards may remain. Full clearance activities will not guarantee that an area is completely free of mines, and land released after area reduction is generally considered to contain a higher residual risk.

Nevertheless, area reduction through General and Technical Survey is increasingly being used in many programs around the world, such as Cambodia and Mozambique. This important shift toward the acceptance of a residual risk after clearance allows for treatment of the problem in terms of risk management and the substitution, at least partially, of full clearance activities with a combination of cheaper and less thorough (and thus less reliable) methods to lower the risk to a tolerable level. A tolerable risk is defined as a risk that is accepted in a given context based on the values of the society being assisted, and a re-definition of the problem from a global to local scale.

Cepolina and Zoppi: Could Local Agricultural Machines Make a Country Impact Free by 2010?

by Emanuela Elisa Cepolina | Small-Aid-Technology for Development | and Matteo Zoppi | University of Genova |

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This redefinition might be the first step toward the achievement of a more efficient and sustainable solution for area reduction, leading to a higher respect for local traditions and biodiversities that is already occurring in many fields outside of mine action.

Demining Machines

According to the Mechanical Demining Equipment Catalogue,* produced by the Geneva International Centre for Humanitarian Demining in January 2008, there are fewer than 650 demining machines working in mine-action programs around the world. The market for humanitarian-demining mechanical technology is small and driven by donors rather than program coordinators. Machines are marketed in the same way as military equipment, and prices are often part of packages that are negotiated in private. Therefore, cost and number of units are not comparable to those of other demining technologies directly bought by programs, such as sensor technologies.7

The performance test described by Comité Européen de Normalisation Workshop Agreement 15044 estimates that a single machine can withstand 450 landmine explosions in the same trial. Machines to be employed in Technical Survey mainly need to verify the absence of mines in the given area. If they encounter an explosion, the area needs to be re-categorized and fully processed by proper clearance. This means that machines used in Technical Survey must be able to process the ground and to resist—or not be severely damaged by—only one explosion at a time, while keeping the operator safe. Thus, the specifications to which dedicated demining machines are designed are unnecessarily strict for Technical Survey.

Stringent requirements for demining machines, including being able to withstand hundreds of explosions in one trial, are the main reason for high prices and limited use. As production is also limited, demining machines have to address the widest variety of scenarios possible, resulting in highly complex mechanics and poor local maintainability. They represent a solution to the problem that is more global than local; therefore, while a demining machine’s cost and robustness can justify its use where full clearance is needed, other less expensive and more widely available machines need to be developed for gathering the information required to release land through Technical Survey.

Local Agricultural Technologies for Land Release

In this context, it is important not to introduce newer technologies dedicated to demining, but to use locally available ones whenever possible. Machines developed or re-adapted locally have lower initial costs, shorter downtime and lower repair costs. It stands to reason that machines produced outside a local area would also be underutilized due to the lack of spare parts or the expertise needed to fix them.

Local machines are also much more sustainable than imported technologies, which are often designed with little consideration for local conditions and thus not able to withstand the harsh environments they will encounter.

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* Above and opposite page: Examples of agricultural machines that could be employed in Technical Survey operations with only minor adjustments. All photos courtesy of the authors.
Survey. They could develop the modifications required to effectively address the demining problem locally, then acquire these machines and provide assistance.

Agricultural machines have long existed and can be repaired in every developing country in local workshops. The adaptability of agricultural technologies is another advantage; the same tools can be mounted on different tractor units and replaced by dedicated agricultural tools when demining operations are over. Involving local technicians in the redesign of new or improved technology also helps reduce dependency of local communities on donor assistance, as well as facilitates local human development—satisfying basic human needs and capabilities.11

Empowerment is an integral part of many poverty-reduction programs. It is essential not only for the state to provide resources and opportunities, but also for citizens to take responsibility for self-improvement. It is desirable and necessary for local entities to assume mine-action activities so that a local capacity may be developed for the use of agricultural technologies in land-release activities.

Adapting Agricultural Technologies to Technical Survey

Agricultural machines need to be adapted to the demining task. Special tools for ground processing at the required depth might be attached to standard linkages, such as three-point linkages on tractor units. In many cases, the explosive threat a SHA poses will be known before operations start. Information collected from local sources can help define the specific threat an area might contain. Even if not designed to withstand anti-tank landmine explosions, machines must keep the operator safe. This aim can be achieved in two ways: by operating the machine remotely or by isolating the operator from the machine structure when driven manually. While a simple remote-control system can be realized in a modular way, relatively inexpensive12 and semi-autonomous machines are considered a key element in improving total quality management in mine action.13 To keep the operator near manual machines, either on board or driving it by handling...
it from behind, it is necessary to install shock isolators between the handler or driving wheel and the machine structure. If supporting an on-board operator, the seat must also be isolated from shock waves caused by explosions.

Another key issue in adapting agricultural technology to Technical Survey is armoring. If the machine is equipped in a way that supports tools at the front, only a light shield may be needed to protect the delicate parts. Otherwise, if the machine is originally conceived to support tools at the back, as is frequently the case, then a system to protect the undercarriage from possible damage caused by the explosion of mines must be implemented. A good approach in this case is to design special blast-resistant wheels that do not transmit the shock associated with an explosion to the chassis either by deforming flexibly or by releasing energy through frictional pins. Research on blast-resistant wheels, shock isolators and modular remote-control systems, if flexible enough to be adapted to different agricultural machines, would benefit Technical Survey processes enormously.

The Case of BiH

According to the Landmine Monitor Report 2008, 170 square kilometers (42,000 acres) of land were released to public use through area reduction in Bosnia and Herzegovina in 2007, using 21 accredited demining machines. The estimated area that still needs to be cleared consists of 1,738 square kilometers (430,000 acres). If we look at the number of agricultural tractors in the country, approximately 30,000 units, and we imagine temporarily equipping 300 of them, i.e., 1 percent of all units available, with low-cost ground-processing tools and light armoring for assessing the presence of landmines, assuming that each one could have the same productivity of one of the 21 machines used for area reduction in 2007 (around eight square kilometers [three square miles] per year), the problem of landmines in BiH could be potentially solved or drastically reduced to small, confined, highly contaminated areas in less than one year.

Conclusion

As under-developed countries continue to be affected by the world food crisis, the need for arable land is increasing. Research into more responsible agricultural practices is also becoming an imperative to fight the dramatic consequences of climate change. Investing in the redesign of local agricultural technologies can both speed up mine clearance and improve the future for mine-affected countries by addressing these other challenges simultaneously. By approaching the issue on a local instead of global level, more appropriate, sustainable and reasonable solutions can be achieved while fostering the empowerment of local populations.

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Emanuela Elisa Cepolina recently completed her doctorate in mechanical engineering. She has been researching technologies for humanitarian demining since 2003—first at the University of Genova, and recently as president of the nascent nonprofit association Snail Aid—Technology for Development. Emanuela Elisa Cepolina Snail Aid—Technology for Development Via Cadore 15710, 16132 Genova / Italy Tel: +39 010 6661 919 Mobile: +39 333 1605 089 E-mail: emacepo@dimec.unige.it Web site: http://www.snailaid.org

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Reflections from the Field: Lao PDR, Surveys And Land Release

by Stephen Pritchard | NPA–Laos and UXO Lao |

With an example and a discussion of Norwegian People’s Aid’s work with UXO Lao in Lao PDR, the author explains how choosing the right tasks and performing the tasks correctly can allow land to be released safely and confidently.

In mid-September 2008, the Lao National Unexploded Ordnance Programme’s Operations and Quality Management units joined a survey team in Khammouan, a province in the middle of the Lao panhandle.

A farmer had written a letter requesting the clearance of unexploded ordnance for his land. It was a typical dry rice-doughy afternoon at the end of the rainy season: muggy, drizzly, heavily rutted roads and crops at full growth ready for harvest. Recent floods, the worst since recording began in 1922, had devastated the agricultural output of the Mekong basin. Fortunately, the farmer’s corn crop was safe from the rising waters; his corn had avoided the fate of the thousands of acres of immature rice that had fallen prey to the floods the previous month.

An Unusual Discovery

Looking at a map, one would assume that the farmer’s land would also be free from another common risk, UXO. The nearest bombing was over five kilometers (three miles) away, and, although the available data is incomplete and inaccurate, it generally gives a positive correlation among accidents, contamination and poverty. UXO Lao’s management team at Tha Khakh, the provincial capital of Khammouan, thought this land would have a negligible threat of UXO and suspected that the farmer’s fear was based on vague “rumors” that circulated among the locals.

On meeting with the survey team, the farmer pointed out the boundaries of the land and explained why...