February 2006

How Can Economists Contribute to Mine Action?

Dan Marsh

University of Waikato

Follow this and additional works at: http://commons.lib.jmu.edu/cisr-journal

Part of the Defense and Security Studies Commons, Emergency and Disaster Management Commons, Other Public Affairs, Public Policy and Public Administration Commons, and the Peace and Conflict Studies Commons

Recommended Citation


This Article is brought to you for free and open access by the Center for International Stabilization and Recovery at JMU Scholarly Commons. It has been accepted for inclusion in Journal of Conventional Weapons Destruction by an authorized editor of JMU Scholarly Commons. For more information, please contact dc_admin@jmu.edu.
Millions of emplaced mines in 2 countries cause over 15,000 civilian casualties per year, mostly in rural areas of developing countries. This is one example of the human suffering caused by mines. Table 1 in this paper lists the countries with the highest numbers of landmine casualties. The expectation that there will be a significant reduction in the numbers of casualties after the entry into force of this Convention for that State Party. 11

The idea that limited funds should be concentrated on the areas with the greatest need is widely accepted. Methodologies are well-developed and, with appropriate modifications, can be applied to mine action. The Geneva International Centre for Humanitarian Demining was the lead agency in this study. The theoretical necessity of broader measures of the value of life is recognized by Harris, but because no estimates exist for countries with landmine problems, the outdated, foregone earnings method was used. 4

As a result, saved lives and disutilities are a small part of Harris' calculated benefit of landmine clearance, whereas the value of statistical life often provides the largest benefit from environmental standards and other risk-reducing activities in developed countries. This foregone earnings approach is no longer popular in developed countries because it generally understimates the value of life. Instead, researchers and policymakers now use estimates of the value of statistical life, calculated from reports by survey respondents of how much they would be willing to pay to avoid a certain risk. M

Should Landmines be Cleared? The number of mine action machines in use and under development is very high. Inadequate collection of information on the cost-effectiveness of alternative methods of mine clearance makes it difficult to decide the appropriate modifications, can be applied to mine action. Such information can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effectively. Second, more widely available and standardized data on the effectiveness of mine clearance can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effectively. Second, more widely available and standardized data on the effectiveness of mine clearance can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effectively. Second, more widely available and standardized data on the effectiveness of mine clearance can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effectively. Second, more widely available and standardized data on the effectiveness of mine clearance can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effectively. Second, more widely available and standardized data on the effectiveness of mine clearance can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effectively. Second, more widely available and standardized data on the effectiveness of mine clearance can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effectively. Second, more widely available and standardized data on the effectiveness of mine clearance can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effectively. Second, more widely available and standardized data on the effectiveness of mine clearance can serve at least two purposes. First, a greater understanding of the limitations of mine clearance machines in use and under development may help demining agencies use their existing resources more effective...
In the “Costs Data Entry Menu,” users are asked to enter data on actual or projected costs of the mine clearance project. The costs in the model are grouped into four categories: staff salaries, staff allowances, consumables and running costs, and capital equipment. Within each of these cost categories, there is no restriction on how many cost items are specified. Thus, the model can handle analyses of both past costs, based on detailed budgets, as well as projected costs, for which there might be rather less detail available. For each cost item, the user is asked to specify a name or description for the item, the number of items used, the unit-cost per item per year. For each cost item, the user is asked to allocate the number of units across various cost categories (e.g., management and administration, mine survey, medical support, manual mine clearance teams, dog teams and individual machines). This allocation of the number of units of each cost item allows the user to provide a breakdown of the costs for different clearing methods.

### Table 1

<table>
<thead>
<tr>
<th>Method</th>
<th>Total Cost</th>
<th>Cost per sq m</th>
<th>Cost Ratio vs Base Case</th>
<th>Annual Cost Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Only</td>
<td>1,128,742</td>
<td>11.29</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Flail &amp; Manual</td>
<td>1,196,574</td>
<td>5.78</td>
<td>51%</td>
<td>5,009,138</td>
</tr>
<tr>
<td>Flail, Manual, Dogs</td>
<td>1,365,574</td>
<td>3.41</td>
<td>38%</td>
<td>7,615,261</td>
</tr>
<tr>
<td>Veg. Cutter, Manual</td>
<td>365,602</td>
<td>7.31</td>
<td>65%</td>
<td>3,617,597</td>
</tr>
<tr>
<td>Area Reduction then manual</td>
<td>304,352</td>
<td>6.07</td>
<td>54%</td>
<td>4,732,347</td>
</tr>
<tr>
<td>Veg. Cutter, Manual, Dogs</td>
<td>247,085</td>
<td>4.94</td>
<td>44%</td>
<td>5,774,610</td>
</tr>
<tr>
<td>Area Reduction, MP, Manual</td>
<td>587,267</td>
<td>11.75</td>
<td>104%</td>
<td>-416,703</td>
</tr>
</tbody>
</table>

### Table 2: Example of Key Results Report (Courtesy of Dan Marsh/RAMC)

- **Method**: To identify which costs are associated with what machines. By identifying costs with machines and other procedures, it is possible to derive information from a single budget, different costs for different machines, considering the models used. Thus, the allocation of the cost items is a particularly important part of the model. Further details of CEMOD data entry and operation procedures
- **Indicate clearance rates and cost per day**: So, this information on the timeliness of particular machines can be extracted. It is unlikely a standardised model could provide more detail because local factors can dictate what value is placed on timeliness. Second, although cost per square metre seems to be an accepted cost for recording output, there is some argument over the depth of clearance. A hidden advantage of some machines may be that they clear to a greater depth than is possible with other techniques. A comparison solely on the basis of cost per square metre will miss this point and may unfairly indicate an advantage for one machine over another.

### Humanitarian Demining as a Precursor to Economic Development

Using three specific examples—Mozambique, Eritrea and Iraq—the author shows how clearing mines to restore power lines, rail service and agricultural land helps communities become economically viable again.

#### Conclusions

Many of the key issues of mine action are amenable to economic analysis. In this respect, mine action is no different from any other activity that uses scarce resources. Policy in this field has often been strongly influenced by both military and humanitarian considerations and approaches. Mine action agencies have often seen mine clearance as being a technical problem requiring technical solutions. Too often, insufficient or no attention has been paid to cost-effectiveness in determining the best course of action. Humanitarian concerns have brought the impact of mines to the world’s attention, in large part through the signing of the Ottawa Convention. However, the Convention’s requirement that all mines be cleared will not always be the best way of improving the plight of those affected by mines. Likewise, the U.N. standard of 99.6 percent clearance will often be too stringent and will tend to waste funds that might be better spent on other humanitarian activities where more deaths and injuries could be avoided at lower cost.

CEMOD was developed as a practical tool that would be used by managers to assess the cost-effectiveness of alternative mine clearance methods. Feedback received so far has been positive and some managers have started to make use of CEMOD. Given the large sums of money involved, potential cost savings are substantial.

Further uptake of CEMOD may be achieved if appropriate follow-up activities are carried out. Some managers will require advice and support before being convinced of the benefits of cost-effectiveness analysis. There may also be areas where managers will require input from a trained economist (e.g., in some complex cost-allocation decisions). There is also scope to further develop the model based on feedback on the first version.

This article has demonstrated the importance of economic analysis if scarce funds are to be used efficiently to assist the development of mine-affected areas. The key questions to be addressed are:

- **Should mine-affected areas be cleared?**
- **What is the appropriate standard of clearance?**
- **Which areas should be cleared first?**
- **Which methods should be used?**
- **Better answers to these questions can only help the millions of people who live and work at risk of death or injury from mines and UXO.**

This paper describes work done for the GICHD based on their Mechanical Mine Action Study that was carried out jointly with John Gibson, University of Canterbury and GSL Engineering and includes material from Marsh, Boe-Gibson, and Gibson 1998 and Barns, et al. 2003.

See [References and Endnotes](#), page 105

### Dan Marsh

*Senior Lecturer in Economics at the University of Waikato, Hamilton, New Zealand. He has 25 years’ experience working on mine development projects in Asia, the Middle East and Africa.*

#### See: [Journal of Mine Action](#)


** abstract**

This article has demonstrated the importance of economic analysis if scarce funds are to be used efficiently to assist the development of mine-affected areas. The key questions to be addressed are:

- Should mine-affected areas be cleared?
- What is the appropriate standard of clearance?
- Which areas should be cleared first?
- Which methods should be used?
- Better answers to these questions can only help the millions of people who live and work at risk of death or injury from mines and UXO.

This paper describes work done for the GICHD based on their Mechanical Mine Action Study that was carried out jointly with John Gibson, University of Canterbury and GSL Engineering and includes material from Marsh, Boe-Gibson, and Gibson 1998 and Barns, et al. 2003.

**Humanitarian Demining**

by John Lundberg [RONCO Consulting Corporation]

Humanitarian demining programs are often aimed at quickly safeguarding people living in war zones from the threat of landmines. Some of the most beneficial operations RONCO Consulting Corporation engages in, however, are carried out with the least visible, long-term goal of development in mind. While the reputation of clearing fields or a power-line trace may not immediately affect the majority of a country’s population, the ultimate effect of such operations on a country’s economic development can be enormous, and building host-country capacity to continue and expand upon operations ultimately users this effect. Three recent RONCO operations in Mozambique, Eritrea and Iraq all funded by the U.S. Department of State, demonstrate the importance of a demining operation can have on a country’s productivity, economy and quality of life.
to identify which costs are associated with which machines. By identifying costs with machines and other procedures, it is possible to determine from a single budget, different costs for different machines, and different methods. Thus, the allocation of the cost items is a particularly important part of the model. Further details of CEMOD data entry and operation procedures are provided in “Mechanical Mine Action Study: Cost Effectiveness Component, Draft Final Report.”

**Model output and interpretation.** The results are used to view and print the results of the model’s calculations, as well as print the worksheets that contain the input data on area cleared, days used and costs by category.

The “Standard Reports” button lets the user view and print four reports (see Table 1).

The “Key Results” report (Table 2) includes total cost, cost per square meter, cost ratio and annual cost saving. Based on the imaginary data in Table 2, use of a flip, followed by a combination of mine clearance and vegetation-clearance method. Costs per square metre (about 1.2 square yards) are $34.41-$119.25 forcing manual methods (the base case). Use of this method over the whole area to be cleared may result in a cost saving of $7.2 million annually.

It must be stressed that cost per square metre should only be compared where all other factors are equal, i.e., for clearance of mined land of similar characteristics. Differences in cost per square metre may be a reflection of the characteristics of different characteristics, rather than the cost-effectiveness of alternative mine clearance procedures. Factors affecting cost-effectiveness. The cost-effectiveness model is designed to provide consistent calculations of the cost of mine clearance for different areas. Many factors are likely to influence the cost-effectiveness of particular methods of mine clearance in particular settings. Foremost amongst these are the labour cost and machine costs, and the productivity levels of manual-clearance teams, dog teams and mechanical-clearance machines. However, idiosyncratic factors are also likely to be important, and these are not considered in the model, even though they are likely to be relevant to the decisions agencies make about the most effective way to clear a given area.

For example, an agency may use different machines to do a similar task (say, vegetation clearance) but on land with different characteristics. While it would be possible to have a model that considers factors such as slope vs. flat, dry vs. wet, such a model would be quite complex and, it would be more difficult to use the model for planning purposes. Instead, it is expected that when the current models provide cost per square metre to be entered into the system, the user can work out if the higher cost for one machine is justified by the more difficult terrain.

A similar complication comes from the use of mines that is estimated in a given field. Mechanical procedures feasible when working with anti-personnel mines may not be feasible when working on anti-tank mines, and the use of suitably armoured machinery is likely to affect the cost comparisons. Hence, the information provided by CEMOD cannot replace the detailed knowledge of project managers. Instead, it is designed to provide additional information to make meaningful informed decisions about mine clearance.

There are at least two characteristics that should be considered when interpreting the cost-effectiveness data. First, there is no explicit premium for timeliness (the exact time spent in the calcul-