

Report on the Mission to Validate the Pilot County Mine Action Plan for Croatia

Summary

The initial proposal to prepare a pilot County Mine Action Plan (CMAP) proved overly ambitious because a great deal of work was required to systematically re-survey the areas suspected of landmine contamination and to compile socio-economic and physical planning data from a variety of sources. The initial proposal did not envisage the use of Multi-Criteria Analysis (MCA). MCA (specifically, the PROMETHEE method) was added about six months after the start of the pilot CMAP exercise, but then became the core methodology used both to structure the priority-setting problem and to analyse the data. The pilot project experienced significant delays, but these were not due to the MCA approach. The principal delay stemmed from the need to systematically re-survey all suspected minefields in the county, but this effort also brought significant benefits by reducing the area suspected of contamination in Sisacko-Moslavacka County from about 800 km² to about 200 km².

The MCA methodology eventually was used to address two distinct decisions. First, which municipalities or cities should receive priority? Second, which of the suspected minefields (defined by GIS polygons) should receive priority? For the second decision, two priority rankings were formulated: one from the perspective of county politicians and the other from the perspective of municipal politicians.

The pilot CMAP using MCA methodology achieved only partial success. The effort to rank municipalities and cities in terms of priority appears to have been successful, but that for ranking specific polygons appears to have been flawed. The problem in the latter case stems from the difficulty in defining 'homogeneous' polygons that can be compared in a valid manner. This led to the identification of the largest polygons as the priorities, with the result that more than half the total contaminated area in the county was defined as priority; an area that appears to be 15-to-20 times larger than will be certified as safe in 2003 through technical survey and mine clearance. Therefore, CROMAC had to use its traditional processes to determine the specific areas within each polygon that will be technically surveyed and, where necessary, cleared in 2003.

The pilot CMAP effort also failed to incorporate cost considerations explicitly into the priority ranking exercise using MCA, or to incorporate community participation to any significant degree. As a result, the pilot effort in using MCA methodology can only be adjudged as a very partial success. At the same time, the MCA approach appears to be very promising. In particular, it can cope with the 'hierarchical' structure of the decisions on mine action priorities in Croatia: one decision on how to allocate the national budget among counties; the next on how to allocate a county mine action budget among cities and municipalities; the third on which polygons should be priorities. It also can cope with large amounts and different types of data, and with input from a variety of groups (civil society organisations; interest groups; etc.). By structuring the problem carefully and by making the

criteria and indicators explicit, MCA also has the potential to increase transparency. The PROMETHEE MCA method that was utilised also can cope with large amounts, and many types, of data, which would facilitate the analysis of the socio-economic impacts of mine contamination and mine action. In brief, the MCA approach is relevant and offers very significant potential benefits. The pilot project realised some but not the bulk of these potential benefits, which is not a surprising result considering the complexity of priority-setting for mine action. A good deal was learned in the pilot and the validation team believes many of the shortcomings can be addressed in the next iteration.

Introduction

This report covers the findings, conclusions, and recommendations of a mission from the Geneva International Centre for Humanitarian Mine Action (GICHD) on behalf of the UNDP-Croatia and the Croatian Mine Action Centre (CROMAC) undertaken from 11-15 November 2002. The purpose of the mission was to assess the relevance and effectiveness of the methods used to develop the pilot County Mine Action Plan (CMAC) in Croatia. The mission team comprised Eric Filippino, Head of the Socio-Economic Unit at GICHD, and Ted Paterson, an independent consultant.

Objectives and Focus of the Mission

As provided by the Terms of Reference (attached in full as Annex 1), *“the objectives of the validation are to:*

- *assess the relevance and effectiveness of the methodology employed*
- *identify any shortcomings in the methodology*
- *based on the findings, to make recommendations for changes to the methodology and improvements that should be included within the advice and guidance to be provided by UNDP ...”*

The following excerpt from the Terms of Reference served to identify critical issues (shown in added highlights) on which the mission should focus:

*“The pilot plan was intended to serve as a model for the staff of all four Regional Centres, to create **decentralised CMAPs**. The model was to be **transparent**, and **incorporate community involvement** and define **priorities that took into account social and economic opportunity costs**.”*

Therefore, in addition to the assessment of the relevance and effectiveness of the Multi-Criteria Analysis methodology, the mission team sought to address the following questions:

- Was the methodology used in the pilot CMAP transparent?
- Does the methodology incorporate community involvement?
- Did the methodology identify priorities based, in large part, on socio-economic considerations?
- Does the pilot represent a model that would be suitable for other CMAPs to be developed in a decentralised fashion by the Regional MACs?

Findings

BACKGROUND

The existing system for developing the national mine action plan and for identifying priority tasks has evolved over time. In the immediate post-war period, mine clearance was seen as an integral part of the reconstruction effort and priorities for survey and clearance were determined by plans for reconstruction, the return of refugees and displaced persons, and special projects to upgrade the national infrastructure, clear the Sava River for navigation, etc. In this sense, mine clearance was ‘demand-led’ in its initial

phases and, in general, the priorities were starkly clear.¹ As is normal, however, the problem of identifying priorities becomes more difficult once the most obviously pressing problems are addressed.

Following the establishment and build-up of CROMAC in 1998, the first county demining plans were prepared in 1999 and the national mine action programme was adopted by the House of Representatives in October 2000. The annual national plans for demining are basically a compilation of (1) the county plans, and 'top-down' priorities derived from the work programmes of (2) the central ministries, and (3) the key state-owned enterprises. To some outside observers, including donors, it was unclear how priorities were being established within each county, whether politicians in the different counties were setting priorities based on similar criteria, and the degree to which socio-economic factors were considered when setting priorities. Accordingly, a project was proposed to "...improve the County Mine Action Plans up to an international standard where socio-economic argumentation is used to set the priorities."

THE PROPOSAL FOR THE PILOT COUNTY MINE ACTION PLAN²

The initial proposal was to develop a CMAP to serve as a pilot for other counties which collectively would form the basis for the national mine action plan. The plan envisaged a January 2001 start with the pilot county plan completed in June, followed by the remaining CMAPs and the national plan by the end of that year.

Six sub-groups were established for the pilot, including one for Socio-Economics that was to "define and execute an impact survey" and one for Survey that was to "define and execute survey level II including area reduction." Both of these tasks are significant undertakings and it should surprise no one that the April completion deadline was not achieved.³ As well, the Socio-Economic Group lacked models for conducting a socio-economic impact survey to support the production of the pilot CMAP⁴ or for analysing the socio-economic data that were collected.⁵

¹ When this is true, priorities often will be 'objective' in the sense that different decision-makers – when presented the same information – would arrive at very similar lists of priority tasks, and outside observers can readily verify that the tasks undertaken were clear priorities, even if the criteria and processes used for selecting these tasks are not completely explicit.

² Quotations in this section are from *Project Plan: County Mine Action Plan*, version 6 February 2001.

³ The Survey Group did not conduct a level II (or technical) survey as it is traditionally understood in the mine action field. Rather, it conducted what might be termed a 'systematic resurvey' to update data on each suspected hazard in the CROMAC database. In doing so, it was able to reduce the area suspected of contamination within Sisak-Moslavacka County from about 800 km² to 200 km².

⁴ The Landmine Impact Survey (LIS) methodology developed by the Survey Action Center is designed to collect socio-economic impact data for setting priorities, but such surveys are major undertakings and beyond the scope and budget of the Pilot CMAP Project. As well, the LIS methodology has not yet been used in a more developed environment such as Croatia, in which very significant amounts of data are available. Other socio-economic studies of mine action have been designed to demonstrate the feasibility and importance of socio-economic analysis for mine action; not to produce a roadmap for systematically incorporating socio-economic data into the planning and priority-setting processes.

⁵ In the end, a socio-economic survey was not undertaken. Instead, socio-economic and other data were obtained via the County Institute for Urban Development, the Bureau of Statistics, and various ministries.

THE PILOT APPLICATION OF MULTI-CRITERIA ANALYSIS

The original plan for the Pilot CMAP made no mention of Multi-Criteria Analysis (MCA). This approach was incorporated about the middle of 2001 when Mr. Nenad Mladineo from the University of Split was engaged as an advisor, using funding provided by CIDA.⁶ Mr. Mladineo and a two-person team of GIS specialists devoted about three months over the remainder of 2001 on the pilot CMAP effort.

The specific MCA methodology used is termed Preference Ranking Organisation METHod for Enrichment Evaluations (PROMETHEE). Like any decision theory methodology, it first requires a thorough understanding of the problem so a model can be formulated for analysis. After a series of discussions with CROMAC, Mr. Mladineo identified the following problem characteristics:

- Mine clearance is extremely expensive, so resource constraints preclude the clearance of all, or a significant proportion, of the contaminated area in the short- to medium-term;
- There are many different groups affected by the contamination, and their interests are in many cases in conflict (i.e., each group would select different areas for priority clearance);
- There is a hierarchy of decisions. For mine action in Croatia, the problem of allocating mine action assets can be separated into decisions concerning how much to provide [i] for each county (termed the 'strategic decision' in the documentation), then [ii] for each municipality within a county (tactical decision), and finally [iii] for clearance of specific hazards within a municipality (operational decision).

Concerning the last point, as the pilot project was to prepare a county MAP, the exercise embraced only the 'tactical' and 'operational' decisions. Thus, we can define:

- Decision 1: how to allocate the available county budget across the cities and municipalities (hereinafter, municipalities).
- Decision 2a: how to allocate the available municipal budget to clear specific hazards.

Structuring the exercise in this manner implies that county officials divide at least some of the mine action budget among municipalities, and then let the municipal officials determine which hazards to clear. Of course, it is conceivable that county officials could bypass the municipal officials and select which hazards to clear on a county-wide basis.⁷ In this case, there would be a single decision at the county level, as follows:

⁶ We understand the contact with Mr. Mladineo initially was made by a member of the CROMAC Scientific Council, and that the proposal for funding was submitted to the Canadian Embassy in Zagreb in the winter of 2001. We understand the original proposal was to use MCA for 'backward engineering' analysis (i.e., to analyse what criteria were used in selecting priorities for clearance in the past), but this was abandoned in favour of using all the funds in support of the pilot CMAP effort.

⁷ While the pilot project envisaged greater input from civil society groups, it recognised that "setting of priorities is a task for the politicians." (*Project Plan: County Mine Action Plan*, version 6 February 2001, Annex 3, Section 3.3)

- Decision 2b: how to allocate the available county budget to clear specific hazards.

The following table summarises the three decisions.

No.	What is being decided	Who decides
1	Resources allocated to each municipality.	County
2a	Resources allocated to each hazard.	Municipality
2b	Resources allocated to each hazard.	County

The problem must then be defined, which requires defining the **alternatives** (e.g., hazards which could be cleared) and formulating the **criteria** and **indicators**⁸ to guide decision-makers in selecting – or giving priority to – some alternatives rather than others.

The alternatives for decision/problem 1 are the 11 municipalities. For decisions/problems 2a and 2b, the CROMAC team used the ‘systematic resurvey’ work done by the Survey Group to define 72 polygons of suspected contamination, which served as the alternatives.

Concerning the criteria, the following are listed in *The County Plan of Demining Priorities for Sisako-Moslavacka County on the Basis of Multicriterial Analysis* (hereinafter, *The MCA CMAP*):

- Humanitarian consequences;
- Reconstruction;
- Economic growth;
- Technical-technological parameters;
- Ecological parameters. (*The MCA CMAP*, p. 4)⁹

Typically, criteria are phrased in fairly broad terms. This is important to ensure people are clear of the true goals (e.g., to reduce the physical danger to the settled and returning populations) thus avoiding an overly narrow focus on, say, clearing the maximum number of square metres. However, it is difficult to determine in an objective or consistent fashion how well the programme is performing relative to a broadly defined criterion. Indicators are ways to measure or assess how much an alternative (i.e., a possible clearance task) satisfies a criterion. For example, ‘agricultural land’ might be used as an indicator of economic growth potential; similarly ‘past landmine accidents’ might be an indicator for the ‘humanitarian consequences’ criterion.

⁸ The documentation on the pilot CMAP does not distinguish clearly between the terms ‘indicator’ and ‘criterion.’ Nevertheless, the distinction is important and the international development community typically puts great store in ‘objectively verifiable indicators’, so we will employ the term clarify for donors some of the potential links between MCA and the analytical approaches used in planning, managing, and evaluating aid projects.

⁹ However, it is unclear the degree to which each of these criteria featured in the pilot exercise: in particular, the ‘technical-technological parameters’ seem not to have been integrated into the analysis, it is unclear how ‘reconstruction’ differs from ‘economic growth’, and it is unclear how ‘humanitarian consequences’ was addressed.

It appears that three distinct problems – corresponding to the three decisions listed above (1, 2a, 2b) – were defined as part of the pilot exercise:

Problem 1: How to allocate the available county budget across the cities and municipalities? The alternatives are the 11 municipalities within Sisako-Moslavacka county. The criterion was ‘humanitarian consequences’ as measured by an index of ‘objectively estimated risk’ facing the populations within each of the municipalities. The list of indicators used to calculate the index appears to have included at least the following:

- The area (square metres) of land suspected of contamination;
- The ratio of contaminated land¹⁰ to the total area of the municipality;
- The numbers of people living within or adjacent to the contaminated land;
- The numbers of people living within 100 metres on either side of infrastructure (roads etc.);
- Landmine and UXO accidents;
- Expected returns.

This analysis led to the following priority ranking of the cities and municipalities:¹¹

1. Sunja	2. Petrinja	3. Jasenovac
4. Dvor	5. Glina	6. Sisak
7. Dubica	8. Novska	9. Topusko
10. Kostanjnica	11. Gvozd	

For problems 2a and 2b, Mr. Mladineo worked with CROMAC and County personnel to construct lists of indicators (i) that were relevant to the various criteria and (ii) that could be measured objectively with the data available (much of which was in GIS format) or otherwise ‘valued’ by relevant experts (e.g., CROMAC personnel, county officials, ICRC representatives). Over 20 indicators (*The MCA CMAP* refers to these as ‘categories’) were used in the pilot effort (See Appendix 2).¹²

Various groups (county officials, municipal officials, etc.) then were asked to assign weights to the different indicators to provide a gauge of how important each type of land or infrastructure was deemed to be by the members of that group. This then allowed the calculation of a ‘value’ or ‘score’ for each alternative (hazard polygon) using the PROMETHEE methodology, following which the alternatives could be ranked in terms of their ‘score’.¹³

¹⁰ For ease in exposition, we will use the phrase ‘contaminated land’ in place of the more correct but unwieldy ‘land suspected of contamination.’

¹¹ In fact, different versions of this index were calculated. CROMAC seems to have placed most weight on the percentage of land area within each municipality that is contaminated (see *The MCA CMAP*, Table 1, p. 15). Some other documents focus on the numbers of people within a contaminated area. (*Choosing the optimal policies for risk reduction in mine contaminated areas*, p. 4 and p. 6)

¹² Some of these indicators were dropped as they were relevant for only one municipality.

¹³ PROMETHEE is one of a broader family of ‘outranking’ approaches. Outranking is based on the systematic comparison of each alternative against each of the other alternatives (termed ‘pairwise comparison’) for each criterion. In loose terms, if alternative A is at least as good as alternative B for

In the pilot study, two rankings for the hazard polygons were generated: one using the criteria weights of the county officials and the second using those of the municipal officials. There was significant congruity between the polygons identified as priorities by county- and municipal-level officials, but a few differences were apparent, as depicted in the following table:

Polygon #	Municipality	Municipal Ranking (only polygons in municipality)	County Ranking (all polygons in county)
B67	Sunja	1	1
B66	Sunja	2	5
B68	Sunja	3	9
B28	Sunja	4	10
B20	Petrinja	1	2
B23	Petrinja	2	4
B24	Petrinja	3	8*
B21	Petrinja	4	7*
B10	Glina	1	23*
B14	Glina	2	11*
B26	Sisak	1	3
B06	Dvor	1	6
B37	Jasenovac	1	20*
B48	Jasenovac	3	17*
* County ranking order differs from municipal ranking order.			
Data obtained from <i>The MCA CMAP</i> , Table III, pp. 20-21, and Table IV, p. 22.			

The fact that some of the priority rankings were different for county and municipal officials is not surprising. For example, officials in one municipality might give scant weight to mine clearance in support of flood control measures if these serve to protect a downstream municipality, but county officials would have to consider the wellbeing of citizens in both municipalities. One of the potential strengths of a number of the MCA approaches – including PROMETHEE – is in the clear identification of those alternatives (e.g., hazard polygons) for which the priority ranking does change as a result of the different weightings. The ‘conflicts’ are, therefore, made concrete and can be discussed to see if they can be resolved or at least narrowed. We understand however that this was not done during the pilot project. Instead, CROMAC and/or county officials decided on the following approach:

- Some demining would be done in each of the eleven municipalities in 2003;

the majority of criteria, and is not significantly worse than alternative B on any other criterion, then alternative A is said to ‘outrank’ alternative B. The authors do not have sufficient background in Operations Research to evaluate the PROMETHEE method, but did obtain a number of academic papers and case studies which indicate that the methodology is widely accepted and has been used for the analysis of many complex problems, particularly in the field of environmental management.

- Within each municipality, some part of the municipality's highest priority polygon would be cleared;¹⁴
- The remaining demining resources would be allocated according to county-level priorities.

CROMAC officials used the above rules, plus the findings from the MCA analysis, to generate their proposed Mine Action Plan for 2003 for Sisak-Moslavacka County.¹⁵

Conclusions

GENERAL CONCLUSIONS

First, it must be emphasised that Multi-Criteria Analysis (MCA) is properly viewed as a decision-support system rather than decision-making system. Elected politicians have the legal responsibility and authority to make decisions concerning mine action priorities in Croatia. Such decisions benefit from the recommendations proffered by mine action officials, and such recommendations should be based on thorough analysis. MCA promises to enhance such analysis to support – but not replace – the recommendations and final decisions.

Second, while CROMAC is not the first to employ MCA for mine action (the Survey Action Center uses an MCA approach in generating priorities from its Landmine Impact Surveys), the pilot CMAP project entails a number of important innovations. A more sophisticated MCA methodology is employed (PROMETHEE) to take advantage of the far greater amount of socio-economic, demographic, ecological, and other data available in Croatia. An MCA specialist was engaged as a consultant to assist CROMAC personnel in the pilot effort. A sophisticated software programme (Decision Lab 2000) was used to facilitate the analysis. The priority-setting process was properly diagnosed as a hierarchical system of decisions.

Third, as is to be expected in a pilot effort featuring a number of innovations, both CROMAC personnel and Mr. Mladineo were on steep 'learning curves'. Together, they have found solutions to some – but not all – of the problems in harnessing MCA for mine action planning, and have reaped some – but not all – of the benefits from this approach. In particular:

- The results obtained depend on significant amounts of parallel or preparatory work being done (systematic re-surveys; collection of data). Much of this work is valuable in its own right, but it represents a substantial effort;
- Some technical problems were not fully resolved in the pilot (definition of polygons);
- The pilot did not embrace the strategic decision-level (how resources should be allocated among Croatia's counties) and did not apply MCA to

¹⁴ Many of the 72 polygons were extremely large – some over 35 million m². Clearance of the entire polygon would be infeasible in such cases as the annual clearance capacity in Croatia is only 30 million m² or less.

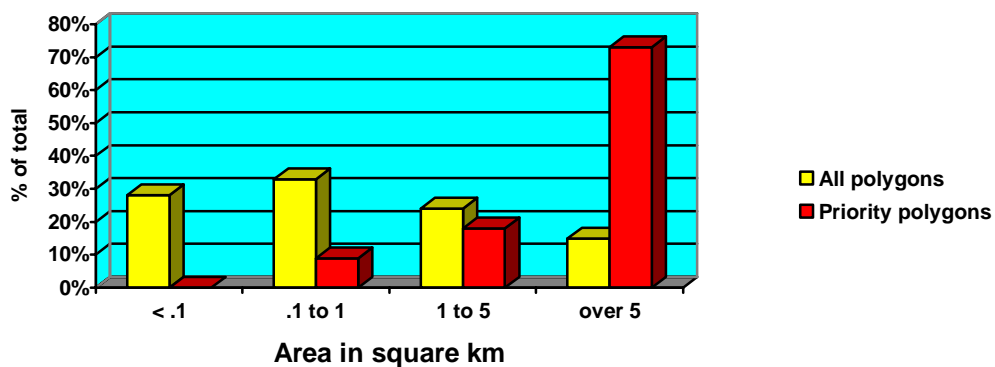
¹⁵ CROMAC officials had also decided to tender larger clearance tasks for 2003 in recognition of the high mobilisation costs faced by demining contractors.

the lowest-level decision (i.e., determining how much and which parts of the high priority polygons will be demined in 2003);

- Time did not allow for the involvement of a full range of civil society organisations and interest groups (farmers, tourism businesses, etc.) in the pilot process;
- The set of criteria and indicators are not yet fully developed, and overlaps among indicators may mean that certain types of benefits are being counted/weighted more than once;¹⁶
- As pilot project, the on-going effort required to benefit from the use of MCA for planning and priority-setting is not reflected in organisational structure of CROMAC.

The major problem at this point appears to be the definition of the polygons. For the PROMETHEE system to work properly, these should be 'homogeneous', but the 72 defined polygons are not: for example, polygons vary in size between 38,445,502 m² and 2,812 m². The way the PROMETHEE methodology was applied also made it far more likely that the largest polygons would be identified as priorities, as depicted on the graph below.¹⁷

Distribution of Polygons by Size



This appears to the validation team to be a flaw in the methodology as it was applied in the pilot. The ranking seems to reflect the total score of all the 'valued things' (i.e., items covered by the indicators used) within each polygon – regardless of size – rather than the score per square metre. It should surprise no one that a polygon of 20 million m² scores higher in absolute terms than one of 200,000 m². But the first polygon would also cost perhaps 100 times as much to demine. Put another way, priorities should be set based on the ratio of benefits to costs, but the pilot study seems to have identified the polygons promising the largest benefits without giving any consideration to the costs. We believe this apparent flaw can be corrected.

¹⁶ For example, there are separate indicators for 'forests', 'national parks', 'nature reserves', and 'hunting areas'. If national parks and nature reserves are largely forested, then the value of forests is essentially being counted three times. Similarly, if hunting areas are largely forested, we may have a similar problem of multiple counting.

¹⁷ We are unsure whether this is due to (1) the likelihood that larger polygons would contain more 'valued things' (i.e., items covered by the indicators used), (2) the likelihood that larger polygons would contain larger amounts of any particular 'valued thing' (e.g., agricultural land), or both.

TRANSPARENCY

MCA increases transparency in some important ways. It requires that criteria and indicators are made explicit, along with the weightings attached to these by various groups. All these could be reported upon and independently verified. It imposes a far more structured and systematic process, the adherence to which also could be verified. It also highlights conflicts between priority rankings of different groups, setting the stage for discussions to illuminate the underlying reasons for these conflicts (i.e., different interests in one form or another). As well, the MCA process generates a reasonably clear priority ranking of the polygons. If politicians decided that one or more polygons not on the MCA priority list should be demined, then audits or evaluations could focus on those specific polygons and the reasons they were selected. More fundamentally perhaps, once there is more community involvement in the MCA process (see the discussion on community involvement, below), civil society organisations and interest groups are likely to be better informed and in a position to exercise more effective oversight of local politicians than is presently the case.

However, the MCA methodology was not employed for the entire priority-setting process (i.e. all the decisions in the hierarchy). In particular, it was not used for determining which specific areas within the priority polygons would be demined. This is an extremely important point, in part because (as noted above) the MCA methodology was applied in a manner which led to the identification of the largest polygons as priorities. The 11 priority polygons on the 'county list' comprise over 148 square km, or 68 per cent of the entire contaminated area in the county. Croatia's total clearance capacity is less than 30 square km/year. Assuming 5 square km might be cleared in Sisacko-Moslavacka in 2003, only about three per cent of the so-called priority area will in fact be cleared in the coming year. Even if area reduction via further surveys is included, only a small percentage of the 'priority' area will be released for safe use in the coming year. This leaves ample opportunity for selecting certain land for clearance based on non-transparent criteria. We understand the MCA methodology could be used to restructure the priority-setting 'problem' so that more tightly targeted areas would be selected for priority attention, and this should be attempted in the next iteration.

The use of a methodology such as MCA also has the potential to diminish transparency for two reasons, both of which can be addressed. First, the results obtained depend on experts and the techniques are not easily grasped by politicians and members of the public. There is a requirement for a clear overview written for the layman if people are to have faith in the results. Second, the results are generated in a more-or-less mechanical fashion from the data and from the weightings assigned to the indicators. There is a possibility that the data or (less likely) the weightings could be altered or manipulated by someone reasonably familiar with the process to skew the results for private or political gain. Thus there is a need for a periodic audit to insure the integrity of the system.

THE OPPORTUNITY FOR COMMUNITY INVOLVEMENT

While the pilot plan envisaged significant involvement from community organisations and interest groups, this did not materialise for the most part. This omission seems to be the result of time pressures and resource constraints, as the MCA approach is well suited for community involvement. This would be most readily achieved by having community organisations and interest groups provide their weightings for the indicators and, perhaps, suggest additional indicators. Different weightings are likely to generate different priority rankings, and the natural next step would be follow-up meetings to analyse the specific conflicts and attempt to arrive at a compromise that would garner consensus support. This process would then provide the foundation for greater community oversight of the entire mine action planning and priority setting process.

THE UTILISATION OF SOCIO-ECONOMIC DATA

MCA has the capacity to incorporate significant amounts of socio-economic data, thus generating priorities based on socio-economic impacts. The pilot effort did draw upon some socio-economic data (demographic, agricultural land, infrastructure) but further work required to capture these potential benefits more completely. The most important step is to extend the analysis on basis of cost-benefit logic, which requires the introduction of the cost side of the equation.¹⁸ Additional improvements would then come from drawing upon more data. For an obvious example, agricultural land could be broken down by quality and supplemented by crop data.

It must be stressed at this point that not all CROMAC officials appeared convinced of the importance of incorporating socio-economic analysis into the priority setting process. In part this may stem from the recognition that priorities ultimately will be established by elected politicians. However, we understand the political directorate has, for the most part, endorsed the recommendations put forward by CROMAC, so it is important that these recommendations are geared to achieving the maximum socio-economic benefit with the available resources.

The apparent lack of concern may also stem from Croatia's commitment to eliminate the impact of mine contamination by the end of 2010 – all the important hazards will be cleared within the next eight years, so why spend time and money refining the priority-setting process? To our knowledge, no cost-benefit analysis of mine clearance has been done in Croatia, so it is difficult to quantify the benefits of proper priority-setting. But studies done in other mine contaminated countries, including Bosnia and Herzegovina, suggest these benefits are very large. Given that mine action expenditures will need to be in the neighbourhood of US \$1 billion by 2010 according to *The National Mine Action Programme in the Republic of Croatia*, the difference in economic benefits between optimal and mediocre targeting of mine clearance is likely to be some tens of millions of dollars – Appendix 3 contains a simple analysis designed to get a rough feel for the sums at stake.

¹⁸ This does not imply that all indicators must be valued or measured in financial terms, which would reduce the problem to a single criterion. Rather, the analysis needs to incorporate both benefits (however measured) and costs. Even on the cost side, while most will readily be measured in financial terms, at least some indicators could be valued in some other fashion. For example, the danger of demining accidents causing deaths or injuries to deminers is one of the costs of mine clearance.

With a potential economic payoff in the tens of millions of dollars, it is important to invest in approaches that might improve the priority-setting process.

THE POSSIBILITY FOR DECENTRALISED IMPLEMENTATION

MCA is, in principle, quite suitable for decentralised application. However, the regional MACs and county authorities should be supported by dedicated staff in CROMAC headquarters. For the next round of CMACs at least, additional support from an MCA expert such as Mr. Mladineo would also be required.

OTHER ISSUES

MCA very well suited for hierarchical resource allocation problems. It would be possible to apply MCA to the national-level 'strategic' decision (i.e., how to allocate Croatia's total mine action budget among counties, central ministries, and state-owned enterprises) before all the county MAPs are completed.¹⁹

MCA also appears to have significant potential for application in other mine affected countries – initially those possessing significant amounts of data (e.g., Bosnia and Herzegovina) but potentially, more generally.

Recommendations

First, CROMAC personnel and others involved in the pilot project should prepare an explicit proposal for continuing the effort to harness MCA for mine action planning and priority-setting and submit this to CROMAC management. This proposal should address organisational issues (e.g., staffing requirements for a central unit responsible for supporting the preparation on CMAPs by the regional MACs and county authorities); requirements for outside expertise; a plan and schedule for phased introduction into the other counties;²⁰ budget requirements (including the costs of data acquisition); etc. As well, the proposal should incorporate the following objectives for building on the partial success of the pilot project:

- Devising a better way of defining the alternatives than the polygons of suspected contamination;
- Incorporating indicators of mine action costs so priority rankings reflect the expected costs as well as the potential benefits;
- Obtaining input from civil society organisations and interest groups;
- Incorporating additional indicators and obtaining the socio-economic data needed to quantify or value these;

¹⁹ Indeed, it might be easier to apply the approach at this level as counties form a homogeneous set, whereas polygons as defined in the pilot study do not.

²⁰ CROMAC does not appear to have the capacity to introduce the MCA approach in all the other mine-contaminated counties in the next phase as the prerequisites – a systematic resurvey plus the collection on significant amounts of socio-economic data – represent a good deal of work for each of the counties. As well, the pilot project achieved only partial success, so a proven model does not yet exist that can simply be replicated in the other counties.

- Preparation of a document that clearly describes the process of developing a CMAP and, in layman's terms, the general features of the MCA methodology.

Consideration should also be given to modelling the national-level priority-setting problem: how to allocate the national budget among counties and the work programmes of central ministries and state owned enterprises?

Second, assuming they approve the proposal, CROMAC management should decide whether they wish international involvement. We recommend they should seek some support from international donors, but this should be structured as a partnership rather than a traditional donor-recipient relationship: CROMAC will make a significant contribution to the international mine action effort if it can devise a method to harness the potential of the MCA approach for mine action planning and priority setting.

Third, assuming CROMAC decides to seek international involvement, UNDP and donor agencies should give strong consideration to providing support. Ideally, the Croatian-international partnership would involve GICHD and/or the Survey Action Center to ensure dissemination of findings and subsequent replication in other landmine affected countries.

Fourth, to ensure the mine action planning and priority-setting process is transparent, CROMAC should request Croatia's supreme audit institution to devise an audit programme and undertake periodic audits of CMAPs.

Fifth, any system for setting mine action priorities is based on assumptions concerning what the cleared land will be used for, by whom, and when it will be put to use. We have no way of determining whether these assumptions are valid unless post-clearance 'level 4' surveys are conducted in a systematic manner. CROMAC has not conducted level 4 surveys to date. We recommend that it does so.

Appendix 1: TERMS OF REFERENCE FOR THE VALIDATION OF THE METHODOLOGY USED IN THE FORMULATION OF COUNTY MINE ACTION PLANS IN CROATIA

Background

1. The nature of the 1991-95 war in Croatia and the resulting mine and unexploded ordnance (UXO) contamination are well known and documented although there are no reliable records as to the number of mines laid. At one time it was thought that 13,000 Km² were contaminated but this has now been reduced to about 1,700 Km².
2. Fourteen of the twenty-one counties in Croatia are mine contaminated. The towns of Sisak, Benkovac, Karlovac, Knin, Osijek and Vukovar, all of which are situated on former battle front lines, are also affected.
3. Very few of the minefields were marked when laid. Their subsequent location and protection from the public has been, and still is, a demanding requirement. The presence of mines and UXOs in the country is seen as a significant impediment to public safety, reconstruction and development. Very little reconstruction is possible without some form of mine action and many development projects include a mine action component. The World Bank has allocated specific funds to the necessary mine action support to reconstruction projects for which it has provided loans.

National Authority

4. To address the socio-economic impact caused by the widespread contamination by landmines and unexploded ordnance and to ensure optimal use of demining resources, the Government of Croatia (GoC) decreed in February 1998, the creation of a Croatian Mine Action Centre (CROMAC) to provide a national co-ordination and management mechanism for all mine action efforts in Croatia and to develop and implement national mine action plans.
5. In March 1998, a Decree was passed to establish an inter-ministerial "Council of the Croatian Mine Action Centre", consisting of representatives from eight ministries and a President from the Office of the Prime Minister. The Council was tasked with approving and monitoring the implementation of plans and proposals submitted by the CROMAC.
6. In September 1999 the GoC requested the UN to provide continued support in terms of advice and technical assistance to the CROMAC to further develop Croatian capacity to conduct all aspects of mines and UXO clearance. It was agreed in the Memorandum of Understanding that during the course of 2000 the responsibility of the UN mine action assistance programme would transfer from UNMAS to UNDP.
7. CROMAC has formulated the current GoC strategy document (*'The National Mine Action Programme in the Republic of Croatia'*) that was ratified by the Croatian Parliament in October 2000.

Ottawa Convention

8. The GoC has signed and ratified the international treaty to ban anti-personnel landmines (the Ottawa Convention) and in 1999, hosted the Second Regional Conference on Anti-Personnel Landmines. CROMAC has responsibility for implementing the majority of the treaty obligations (mine awareness & risk reduction education, minefield marking, clearance and victim assistance), and the Ministry of Defence for stockpile destruction. The Ministry of Foreign Affairs has the overall responsibility for ensuring compliance with the treaty and reporting.

Strategic Operational Target

9. In accordance with its obligations under the Ottawa Convention, the GoC plans to clear all the mined areas in Croatia by 2010. The current strategy document indicates that a total of 4,500 Km² of land is mine contaminated. Since the document was published, extensive general survey operations undertaken as a component of a "pilot" County Mine Action Plan for the Sisacko-Moslavacka County have resulted in a substantial reduction in the total area believed to be mine contaminated. By extrapolation of those results to the other thirteen mine affected counties, it is now estimated that the total mine contaminated land area is 1,700 Km². As actual general survey operations are conducted in all mine contaminated counties, a further reduction in the total area might well be expected.

10. The ten-year target is nonetheless ambitious and demonstrates the GoC's commitment to clear its territory of mines and UXOs. It has committed substantial state funds and has successfully mobilised funds from other sources.

CROMAC Capacity

11. In September 2001, an independent evaluation of the UNDP support project to CROMAC was undertaken. Among its conclusions, the evaluation reported:

- CROMAC's systems, processes and procedures are well advanced, appear better than many other governmental institutions in the country and generally better than most other mine action programmes globally.
- The magnitude of the mine problem within Croatia (i.e. its impact on the country) is assessed to have diminished in recent years through appropriate, cost-effective, and generally well-targeted interventions. Despite this, the landmine/UXO problem is subjectively assessed as still having a moderate-high impact on the country and remains a moderate-high priority issue (relative to other aid/development concerns in Croatia) in the eyes of most of those interviewed.

12. The Evaluation also reported:

- There is insufficient data readily available to determine whether the effectiveness of mine action activities coordinated/managed by CROMAC (i.e. the targeting and socio-economic impact of these) has improved or otherwise. Nonetheless, indicators such as the marked drop in civilian mine/UXO

accidents from some 227 in 1991 to around some 22 in 2000 strongly suggests that CROMAC (together with all other mine action operators) has been adequately targeting priority areas. Despite the lack of comprehensive socio-economic data, the saving of human lives alone (indicated by the drop in civilian accidents and number of in-ground mines/UXO found and destroyed) is, in itself, a significant socio-economic achievement.

County Mine Action Plans

13. CROMAC has four Regional Centres (Sisak / Karlovac / Knin / Osijek) and as part of its decentralisation plans, responsibility for developing County Mine Action Plans (CMAPs) has been devolved to the Regional Centres.

14. Last year, in conjunction with the University of Split, and with the assistance of a UNDP project Technical Advisor, CROMAC developed a methodology for the preparation of a “pilot” Sisacko-Moslavacka CMAP which utilized social and economic indicators as well as other criteria and the assignment of specific weights.

15. The pilot plan was intended to serve as a model for the staff of all four Regional Centres, to create decentralised CMAPs. The model was to be transparent, and incorporate community involvement and define priorities that took into account social and economic opportunity costs.

16. The methodology for identifying and using socio-economic factors is at the core of planning and decision making. This has a direct link with utility of factors considered, targeting of clearance and priorities, which in turn has a direct influence on related projects, benefits, overall utilization of funds and return on such costly investments. Therefore the methodology needs to be validated.

Ongoing UNDP Support

17. A new project undertaken by UNDP includes objectives, outputs and activities relating to CMAPs. An extract from the relevant section of the Project Document is shown at Annex A.

18. The Senior Technical Advisor for the project has commenced his appointment in July.

Objectives of the Validation

19. The objectives of the validation are to:

- assess the relevance and effectiveness of the methodology employed
- identify any shortcomings in the methodology
- based on the findings, to make recommendations for changes to the methodology and improvements that should be included within

the advice and guidance to be provided by UNDP outlined at Annex A.

20. The main stakeholders are:

The County level government authorities

CROMAC

CROMAC Regional Offices

Population of fourteen mine affected Counties

Mine Action operators in Croatia (international / national NGOs and commercial companies)

International community and the GoC in their desire to meet Ottawa Treaty goals and to promote socio-economic development in mine affected areas of Croatia.

Issues to be addressed

21. In order to achieve the objectives of the validation, the team members should address the following issues:

- Guidelines that may have been prepared by the University of Split or other material on which criteria for the methodology is based, including the assessment of the impact of mine contamination on affected communities, socio-economic analysis of mine action and priority setting.
- The status of the pilot Sisacko-Moslavacka CMAP and the other CMAPs that have since been developed including provision for monitoring and evaluation

Methodology of the Validation Team

22. In order to effectively carry out the validation, the following action will be necessary:

- a. The UNDP Country Office and the project will brief the validation team immediately on arrival. The project staff and CROMAC will provide logistical support including coordination of local transportation, and arrange meetings with appropriate stakeholders: Where necessary, an interpreter should be provided.
- b. The validation team will:
 - through CROMAC, compile relevant documentation for review including County Mine Action Plans, and any guidelines developed in conjunction with the University of Split.
 - conduct interviews which should include the staffs of CROMAC and the Karlovac Regional Centre,

County authority which cooperated in the development of the “pilot” Sisacko-Moslavacka County Mine Action Plan

Academic staff of the University of Split who participated in the development of the methodology.

Validation Team

23. The validation team will be composed of two specialists, one of whom participated as a member of the Core Group in the UNDP sponsored Study of Socio-Economic Approaches to Mine Action undertaken by the Geneva International Centre for Humanitarian Demining in 2000 / 01. The other should be a person with extensive experience of management of mine action programmes, and implementing similar methodology.

Time Frame and Conclusions of the Validation Mission

24. The validation Mission is scheduled to begin on []. The total duration of the mission is one week (10 days?). A meeting with CROMAC, UNDP, UNOPS and the project should be held at the conclusion of the mission. Preliminary findings, recommendations and conclusions in the form of an executive summary should be presented at the meeting. Comments made, and conclusions resulting from the meeting will be included in the final draft of the report to be submitted to the UNDP Country Office no later than one week after the conclusion of the mission.

EXTRACT FROM PROJECT DOCUMENTIMMEDIATE OBJECTIVE 2: COUNTY MINE ACTION PLANS

Enhance the ability of CROMAC and regional staff to prepare CMAPs for all mine affected Counties covering the principal dimensions of humanitarian mine action based on an explicit set of transparent and measurable criteria in which social and economic considerations dominate

Success Criteria

A demonstrated and internationally recognised capacity of CROMAC and Regional offices to prepare CMAPs incorporating an efficient and effective mine action planning and priority setting process providing CROMAC with a methodology for completing the remaining CMAP and the means for devolving responsibility to Regional offices. This will result in:

- a. Full understanding of all aspects of mine action and its role in the process of reconstruction, return and development.
- b. Improved management of prioritisation and planning at all levels within CROMAC, and jointly with the relevant ministries and county administrations.
- c. Appropriate decentralisation giving practical responsibility for planning and supervising mine action operations to the Regional offices.
- d. A more efficient planning and management capability within CROMAC that operates in accordance with the socio-economic factors when setting priorities for mine action.
- e. The ability to complete, without further technical assistance, the remaining CMAP.
- f. CROMAC staff, working in co-operation with the international mine action community, to share lessons learned in the development of regional priorities.

Output 2.1

Develop the capacity of CROMAC staff, and at all four Regional Offices, to create a model for the decentralised preparation of CMAPs. The model will be transparent and incorporate community involvement and will define priorities that take into account social and economic opportunity costs.

Activities for Output 2.1

Provide advice and guidance to the CROMAC staff for them to:

- a. Prepare a Work Plan for the duration of the project specifying target dates, quantitative and qualitative achievement benchmarks for Immediate Objective 2.
- b. In conjunction with the Geneva International Centre for Humanitarian Demining (GICHD), undertake a validation and the refinement, or amendment as necessary, of the methodology adopted in the pilot Country Mine Action Priority Plan partially completed under project CRO/00/001-Q01. The validation should occur not later than July 2002 and express a view on the methodology applied in the use of social and economic indicators as well as other criteria and the assignment of specific weights.

- c. Prepare a manual or handbook in which the various steps of the process are documented, with indications of responsibilities, as well as the methodological and procedural steps required to update, monitor or adjust the CMAP.
- d. Identify individuals to be trained in the use of the model at all Regional Offices and confirm that the institutional and managerial responsibilities for the preparation, updating and operational use of the CMAP are well established.
- e. Conduct workshops for the staff of all Regional Offices in preparation for utilising the model in all mine affected counties within Croatia and involve identified individuals at relevant ministries and county administrations to ensure that all parties understand the connections between mine action, reconstruction, return and development and the use of socio-economic factors in prioritisation.
- f. Collect data on development and re-integration projects in all mine affected counties and information from Level 2 (Technical) and Level 3 (Completion) surveys and improve the quality and use of socio-economic information within the Mine Action Information System in the formulation of CMAPs.
- g. Conduct monthly progress review meetings with UNDP.

Appendix 2: List of Indicators

Indicators	Measure
House yards	Square metres
Roads	Linear metres
Agricultural land	Square meters
Rivers	Linear metres
Low voltage network	Linear metres
Waterworks system	Linear metres
Telecommunication system	Linear metres
Power lines	Linear metres
Gas pipelines	Linear metres
Oil pipelines	Linear metres
Railway lines	Linear metres
National parks	Square metres
Nature reserves	Square metres
Tourist areas	Square metres
Hunting areas	Square metres
Flood prevention systems	Linear metres
Border belts	Linear metres
Forests	Square metres
Fire fighting access routes	Linear metres
Return & safety of the population	Numbers returning
Economic facilities	Square metres
The following indicators were dropped as they only occurred in one municipality.	
Graveyards	Square metres
Border crossings	Linear metres
Collector	?
Army barracks	Square metres

Appendix 3: Benefits of Improved Priority-Setting

[will fill-in the explanation if it's deemed worthwhile, but I have my doubts that anything so conjectural is worthwhile.]

	2003	2004	2005	2006	2007	2008	2009	2010	Totals
Baseline (1/3 each type)									
Cost	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	
Benefit	<u>120,000</u>	<u>120,000</u>	<u>120,000</u>	<u>120,000</u>	<u>120,000</u>	<u>120,000</u>	<u>120,000</u>	<u>120,000</u>	
Benefit-Cost	-	-	-	-	-	-	-	-	-
Net Present Value	-	-	-	-	-	-	-	-	-
Optimal									
Cost	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	
Benefit	<u>205,714</u>	<u>205,714</u>	<u>171,429</u>	<u>102,857</u>	<u>102,857</u>	<u>68,571</u>	<u>51,429</u>	<u>51,429</u>	
Benefit-Cost	85,714	85,714	51,429	- 17,143	- 17,143	- 51,429	- 68,571	- 68,571	-
Net Present Value	85,714	77,922	42,503	- 12,880	- 11,709	- 31,933	- 38,707	- 35,188	75,723
Delayed optimal									
Cost	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	
Benefit	<u>120,000</u>	<u>120,000</u>	<u>205,714</u>	<u>205,714</u>	<u>102,857</u>	<u>102,857</u>	<u>51,429</u>	<u>51,429</u>	
Benefit-Cost	-	-	85,714	85,714	- 17,143	- 17,143	- 68,571	- 68,571	-
Net Present Value	-	-	70,838	64,398	- 11,709	- 10,644	- 38,707	- 35,188	38,989
Poor									
Cost	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	
Benefit	<u>77,143</u>	<u>77,143</u>	<u>77,143</u>	<u>77,143</u>	<u>77,143</u>	<u>162,857</u>	<u>205,714</u>	<u>205,714</u>	
Benefit-Cost	42,857	- 42,857	- 42,857	- 42,857	- 42,857	42,857	85,714	85,714	-
Net Present Value	42,857	- 38,961	- 35,419	- 32,199	- 29,272	26,611	48,383	43,985	- 59,729