Appendixes

Appendix 1

Case study of Kosovo

Background on Kosovo

Although Kosovo has a rich mineral and natural resource base and fertile agricultural land, it is generally agreed that the province needs substantial rehabilitation and modernisation As a result of the spring 1999 conflict, industrial output collapsed and agriculture production plummeted, with livestock herds lost or killed and the planting season missed (IOM, 2000:1). In addition to repairing conflict-related damage, the effects of a decade of neglect have to be dealt with, and effective sectoral institutions and policies have to be developed (EU and World Bank, 1999:19).

Transition in Kosovo has to take place against the background of not only the legacy of Yugoslav-style planning and social ownership but also the constitutional peculiarities and political uncertainties of the present (World Bank, 1999a:3). Constitutionally, Kosovo remains within the Federal Republic of Yugoslavia, but following the end of the war between the regime in Belgrade and the North Atlantic Treaty Organization (NATO), the United Nations, through the aegis of the United Nations Mission in Kosovo (UNMIK), has become the *de facto* government of the province.

A study by the International Organization for Migration (IOM) found that half the total post-war population of Kosovo is under 25 years age, with 32 per cent younger than 16 years (IOM, 2000:16). Unemployment in the province is 50 per cent, with 57 per cent of the unemployed living in rural areas. The most common sectors of activity among those employed are agriculture, education, industry and mining, public administration, and trade (IOM, 2000:53). Illiteracy among those 10 years and older is 6 per cent, of whom 83 per cent are women. A total of 71 per cent of persons older than 14 years have completed elementary and high school, only 9 per cent have completed higher education (IOM, 2000:16)

International organisations (World Bank, 2000a; UNMIK, 2000) have identified three main challenges for Kosovo:

- To develop a thriving, open and transparent market economy, which can quickly

provide jobs to a large part of the population of Kosovo; this requires restarting the rural economy, encouraging the development of the private sector, and addressing the issues of public enterprises;

- To restart public administration and establish transparent, effective and sustainable institutions, with particular focus on setting up the central institutions that are key for economic recovery, developing municipal governance, and restoring law and order through an effective police and judiciary; and
- To mitigate the impact of the conflict and to start addressing the legacy of the 1990s, with a focus on restoring adequate living conditions (and in particular housing repair, local infrastructure rehabilitation, and landmine clearance), rehabilitating the infrastructure networks needed for economic development (telecommunications, energy, transport), and upgrading social service delivery (both education and health).

As IOM has noted: "Reliable demographic indicators are scarce in Kosovo. The absence of reliable demographic and health indicators hampers the rehabilitation efforts being undertaken by the international community in Kosovo. All agencies, institutions and organisations involved in humanitarian aid and development programs are experiencing difficulties in setting priorities and planning for the evaluation of their programmes. Furthermore, it is difficult to track population mobility as Kosovo slowly recovers from the very difficult period of the war" (IOM, 2000:1).

History of mine and unexploded ordnance contamination

In most mine-affected countries, the mine and UXO threat has been caused by years of warfare, resulting in an indigenous body of knowledge of the general location of minefields and their impact. In Kosovo, however, the overwhelming majority of the mine and UXO contamination occurred over a period of only a few months with most of the population displaced, either internally within the province or across neighbouring international borders. As a result, the principal source for information on mines and mine impact shifted from local inhabitants to external actors, especially NATO and mine action organisations and bodies.

In Kosovo, the mine and UXO threat comprises blast anti-tank mines, blast, bounding, directional and fragmentation anti-personnel mines, cluster bomb munitions (CBU), and other unexploded ordnance. By 2000, seven varieties of anti-personnel mines and eight types of anti-tank mines had been identified. A number of locally-fabricated explosive items combining mines or ignition systems with conventionally-configured explosive charges were also discovered.

The landmine threat comes largely from minefields laid by the Yugoslav Army, Yugoslav Police, and other paramilitary forces. Minefields were typically laid as border minefields, as large defensive minefields in the interior of Kosovo, and around avenues of approach (roads, trails). The Kosovo Liberation Army (KLA) also laid minefields. Nuisance mines or improvised explosive devices were also laid in and around houses, schools, villages, paths, and the like. There were two incidents where new mines were laid against members of the Serb community in villages outside Pristina. Three people were killed in these incidents.

The bulk of the UXO threat to civilians results from unexploded NATO cluster bomblets. Three different types have been found in the province. CBU strikes were typically targeted against military units and encampments, facilities and strategic infrastructure. There is also a significant number of other conventional UXO ranging from small arms ammunition and grenades to mortar and artillery shells and bombs.

History of mine action in Kosovo

The speed and size of the deployment of a wide range of mine action resources to the province of Kosovo are unprecedented in the history of humanitarian demining. In contrast to many other mine-affected regions, where years of mine laying and UXO contamination demand the commitment of mine action resources for decades, it is believed that only a few years will be needed to clear Kosovo of its mine and UXO threat.

Following the end of NATO bombardments and the United Nations's entry into the province, massive amounts of mine action capacity flowed into the region. Initially, this came in the form of military engineer and EOD units but was soon followed by a wide array of commercial and NGO mine action organisations. The ratio of clearance resources to contamination is probably greater in Kosovo than in any other mine-affected region in the world.

With the United Nations operating as the *de facto* government of the province, the MACC, located within UNMIK, has atypical powers over the operation of mine action in the province. This means that some of the lessons learned from the Kosovo experience may not be easily transposable to other mine action contexts.

Mine survey

The extent of the mine/UXO threat in Kosovo is relatively well known. In fact, the planning and analysis process suffers from an information glut but its use is hampered by the quality of the data and the resulting impact on its analysis. As a consequence, mine action faces two distinct yet interrelated challenges. First, detailed local surveys need to be undertaken to eliminate false, duplicate and overlapping records from the system: the MACC estimates that between 30 and 50 per cent of all the IMSMA database entries fall into one of these three categories. Second, all records must be prioritised in terms of clearance and mine awareness education. It was decided by the MACC that a Landmine Impact Survey was not appropriate in Kosovo owing to the huge concentration of resources within the province and the relatively short time needed to clear mines and UXO. However, the MACC identified the need to base their future plans on more than just mine location data, and as a result approved the concept of the modified Landmine Impact Survey as outlined by the SAC.

For Kosovo, IMSMA imported all records of minefields, UXO and CBU strikes as danger areas.[1] Each record was automatically assigned a number, based on its date of

[1] Under normal procedures of a sequential Landmine Impact Survey, (Level Two) Technical Survey and (Level Three) Clearance Certification, suspected mined areas would be entered as mined areas. Danger areas were intended to denote other dangers such as collapsed bridges, banditry, ambush sites, etc. The standard Landmine Impact Survey ties mined areas to villages and towns surveyed. Without the town/village survey, there was no way of entering the records as mined areas and so all records were entered as danger areas.

entry into the IMSMA. Upwards of seven separate data sets were combined to form the IMSMA danger area data set. The data for these records came from multiple sources and the approximately 4,000 records are of varying reliability

Yugoslav Army records are the most accurate of available data sources, however the physical representation of these records is based on arbitrary safety buffers or polygons generally reflecting a grouping of smaller minefields. These records consist of paper drawings of minefield plans completed by the Yugoslav Army mine laying unit and which were handed over to the United Nations Kosovo Protection Force (KFOR) in accordance with the Military Technical Agreement. KFOR also provided GIS layers of polygons and map points based on the co-ordinates of the centre of mass of the minefield. These two types of documents, though, do not always coincide. In addition, some rather less accurate maps were provided of minefields laid by the Yugoslav Police, paramilitary forces and reservists. Although a large number of these records have been entered into the IMSMA, the process is time consuming.

NATO records imported from KFOR include two main types — cluster bomb strikes and all others:

- Cluster bomb data is based on point target data (i.e., the intended target) and not the actual point of impact. The actual pattern of contamination is dependent on factors such as attitude of the drop, speed of the aircraft and the vector or direction of attack. The pattern of contamination should generally be an ellipse 300m wide by 500m long, and oriented to the direction of travel of the aircraft. NATO has only released the number of CBUs dropped and the targeting co-ordinates [2] Hence data in IMSMA does not necessarily represent the actual contaminated area on the ground. The official estimated failure rate for the bomblets varies from 5 to 10 per cent depending on the source. Clearance of cluster strike areas involves locating and destroying in situ the unexploded sub-munitions. Minefield clearance assets are not used for CBU clearance, which is achieved through "battlefield area clearance" (BAC) for items of surface and sub-surface UXO.
- All other NATO records include minefield, UXO and other reports that were collected by NATO or reported to it in June and July 1999 prior to the MACC taking over management of the IMSMA database. In January 2000, when the case study was originally drafted, KFOR was entering its third troop rotation. The resulting loss of institutional memory between rotations has made it more difficult to find out why certain records were originally entered as well as to determine the status of areas reported cleared. Also problematic is the limited reporting of independent clearance by KFOR contingents. In many cases, KFOR troops have cleared areas independent of a tasking by the MACC, resulting in many danger area records remaining in the system even though the areas are in fact clear.

The HALO Trust, a British mine clearance NGO, undertook a rapid survey of mine and UXO contamination in June and July 1999, using portions of the IMSMA Landmine Impact Survey format. These records were entered into IMSMA without cross verification with other records. The limited socio-economic data collected was of negligible value. This was due to the fact that many refugees were still in the process of returning at that time and so the information was too incomplete to provide a sound basis for planning.

Other reports include information provided by NGOs, returning civilians, and older records from the 1998-1999 Kosovo Verification Mission/Kosovo Disengagement Observer Mission. Few, if any, of these records were verified prior to entry into the IMSMA database. It was completely impractical to do this given the emergency nature

[2] After the original submission of the case study, NATO provided additional information regarding the use of cluster bombs and the location of cluster bomblets

of the programme, and a conscious decision was made to err on the side of caution, rather than withhold information that could potentially save peoples lives.

Most of the above-mentioned records were imported wholesale into IMSMA in July and August 1999. Others were progressively consolidated into IMSMA from August to November 1999. A difficulty faced when entering and/or verifying records has been the imprecision in recording danger areas. Reasons range from a standard Global Positioning System (GPS) error of ±100m to individual map reading errors by the observer/recorder. IMSMA plots each entry as a separate record, yielding a GIS layer of multiple overlapping contaminated zones. It is suspected that many of these records are duplicates or false reports (MACC estimates these to be 30-50 per cent of the total), and they are often referring to the same area but are offset by 10-100 metres dependent on observer position reporting error.[3] Using GIS functions the SAC estimated the total mine/UXO contamination problem in Kosovo as covering some 360 97 square kilometres. On the basis of a 30-50 per cent rate of duplication and false records, particularly cluster strike areas which heavily overlap, the physical area within Kosovo to be cleared will be substantially lower than the estimated composite contaminated area.

Mine marking and fencing

International mine clearance NGOs and companies began minefield and UXO fencing and marking during the second half of 1999, while KFOR concentrated on the fencing and marking of CBU strike areas. KFOR has also been a principal procurer of marking and fencing stores received and managed by the MACC

Most of the larger NGOs have their own marking stores and signs and limited marking and fencing maintenance occurred over the winter of 1999-2000. Since colours and patterns vary quite widely, samples are collected for distribution to mine awareness educators. Initial problems were encountered with mine signs being removed or defaced due to the use of Cyrillic Serb lettering. An attempt was made to correct this during the winter 1999-2000 with the procurement of signs using English, Albanian and romanised Serbian. But as of February 2000 not all the signs had been removed, although some ethnic Albanian mine awareness teams were crossing out the Serb phrases and words.

Mine clearance

As mentioned above, the total estimated contaminated area in Kosovo is some 361 square kilometres. This represents 3 32 per cent of the total landmass of the province. Clearance figures (as reported to the MACC) for the seven months to the beginning of the 2000 operating season are summarised in Tables 1 and 2.

The clearance season in Kosovo runs from March to November. Freezing weather, limited daylight, snow and ice all make sustained clearance during the winter impractical. At the end of 1999 the MACC had accredited 17 mine/UXO clearance organisations, including both humanitarian NGOs and commercial companies. These organisations have recruited and trained a total of 600 local deminers. The MACC

[3] For example, some areas were cleared based on a tasking from the MACC of a specific record number. The clearance report submitted to the MACC, which delineates the physical area cleared, does not physically correspond to the co-ordinates of the suspected area record

expected the number of clearance organisations to reach 16 for the 2000 clearance season. Mine clearance in Kosovo is undertaken by manual and mechanical means, and by explosive detection dogs.

Table 1: Explosive items cleared as at 1 February 2000

UXO	Cluster bomblets	Anti-personnel mines	Anti-tank mines
8,475	2,743	2,430	2,319

Source: UNMIK-MACC, 2000a. These figures do not include clearance by KFOR.

Table 2: Land cleared in square kilometres (does not include nuisance mines)

Estimated area	Sq. Km.	Per cent of total area
Total contaminated land[a]	361	100
Area physically cleared[b]	2.3	0.6
Area cleared by reconnaissance[c]	2.2	0.6
Area left to clear	355.5	98.8

[a] Includes estimated safety buffer zones.
[b] Does not include safety buffer zones.
[c] Includes estimated safety buffer zones.
Source: UNMIK-MACC, 2000a. These figures do not include clearance by KFOR

While 1999 clearance progress was slow, the MACC expected to make significant progress in 2000. It is expected that very significant gains will take place through a concentrated survey effort aimed at eliminating false and duplicate records. Indeed, it is conceivable that the estimated composite contaminated area of 361 square kilometres could be reduced to an area of not more than 240 square kilometres once these records have been eliminated. Thus, with a sustained commitment of resources, the MACC believes that Kosovo can be cleared within two to three years.

During the chaotic period following the international community's entry into Kosovo, mine/UXO clearance efforts focused mainly on responding to requests from relief and reconstruction agencies and the civilian population. This approach was not the best application of resources from a strictly mine clearance perspective, but proved to be the only option given the high visibility of large concurrent relief and resettlement activities and the mine action community's lack of a definitive provincial workplan prioritising danger areas for clearance.

The largest of these requests involved surveying and clearing 776 schools for the United Nations Children's Fund (UNICEF) and the ongoing clearance of access routes for the repair of electrical power distribution pylons for donor-funded contract firms. Many additional tasks resulted from requests from civilians to clear suspected mines/UXO from more than 16,000 houses and gardens [4] In fact, these additional tasks, which

[4] A total of 16,111 as at February 2000.

were not linked to a specific danger area, often did not require actual clearance (other than of a few items of UXO) and served more as a confidence-building measure. These requests can, in part at least, be attributed to improved public knowledge by the mine awareness programmes in the refugee camps prior to return.

NATO military resources have also contributed to clearance efforts. Although KFOR is officially mandated only to clear those mines and UXO that obstruct its mission, KFOR EOD personnel also responded to requests for the clearance of other mines and UXO. From June to December 1999 KFOR cleared most primary and secondary roads as part of their mission, additional road clearance was undertaken as required.

Initially, a critical constraint on the clearance effort was the lack of available explosives to destroy the mines and UXO Mine/UXO clearance organisations were prevented from procuring or transporting explosives into Kosovo. Some organisations resorted to dismantling mines for the explosives. After much hesitation and donor government negotiation, some KFOR contingents agreed to store and sell explosives to MACC accredited mine/UXO clearance organisations.

A second major constraint on mine clearance was the lack of sufficient quality assurance capacity. Recognised as a MACC function, the funding and contracting arrangements took some time to arrange and a fully-functioning quality assurance capacity was not due to be deployed until March 2000 This does not include post-clearance verification of land use.

The Yugoslav Army has committed to provide mine clearance assets under the supervision of KFOR to clear those areas they had previously identified. Under the Military Technical Agreement signed with NATO, KLA certified by memorandum that they had cleared their minefields. No records were provided by the KLA regarding the actual locations, hence neither confirmation nor quality assurance was possible.

A number of individuals have also cleared mines and UXO. The more successful of these confirm that they have turned over the removed ordnance and mines to KFOR. The less successful have probably contributed to the large number of casualties in the category of males aged 15 to 24 Mine awareness education programmes have included the message that any discovered mine or UXO be reported to KFOR, mine clearance organisations or to the KFOR Civil Military Cooperation Center.

Mine victim assistance

Between June 1999 and January 2000 there were some 235 mine/UXO incidents in which 92 persons died and others sustained injuries ranging from minor wounds to traumatic loss of limbs. Table 3 below shows the monthly counts of incidents. Victim assistance is tracked through two complementary processes. The IMSMA includes a comprehensive victim and incident recording system that allows such data to be overlaid on maps showing geographic features and contaminated areas. The International Committee of the Red Cross (ICRC) assists the MACC in this process The ICRC has made a conscious effort to track down all surviving victims and families. the World Health Organization (WHO), ICRC and health NGOs also maintain a casualty surveillance system based on reporting from health facilities

There are, however, a number of remaining gaps in the data set with many victim records devoid of any clarifying details.[5] Concerns have also been expressed as to the quality of the data gathering and entry process. The US Centers for Disease Control have provided assistance to WHO and ICRC on improving the data collection and analysis process. About the only conclusion that could be drawn for the available data was that males between the ages of 15 and 24 appeared to have the highest frequency of being involved in a mine/ UXO incident. Analysis performed by the SAC using GIS algorithms and statistical regression drew a positive and significant correlation between the frequency of victims and the overall contamination rate of the district in which the incident occurred. Table 3 shows the absolute number of incidents by month of occurrence and qualified by the time frames for major population movement.

Table 3: Recorded Mine Incidents (1999-2000)

Refugees returned	June	87
	July	69
More settled conditions	August	31
	September	24
	October	12
	November	7
	December	3
	January	2
	TOTAL	**235**

The victim assistance community in Kosovo acknowledges the near complete lack of social and health support service for victims and their families. The lead agency for victim assistance is WHO. Along with the ICRC and a number of NGO partners such as Handicap International and the Mother Theresa Society, WHO is developing the means to provide comprehensive medical and rehabilitation care to mine victims. However this will take some time, as much of the public health system and services had deteriorated over a number of years and will require considerable effort to be upgraded.

In order to address these shortfalls, Handicap International has established a prosthetic production facility. KFOR provides evacuation by ambulance and helicopter to facilities in Kosovo or the Former Yugoslav Republic of Macedonia, as well as body recovery. In addition, the Vietnam Veterans of America Foundation (VVAF) has embarked on victim assistance programmes aiming to provide psycho-social services to help victims and family members identify needs and seek additional help. The programme also assists in the reintegration of victims into educational and economic activities. The MACC has recognised its own need for victim assistance analysis and co-ordination capacity.

Mine awareness education

ICRC, UNICEF and MAG undertook mine awareness education in refugee camps in Albania, Macedonia, and Montenegro. The efforts resulted in people being aware of the danger posed by mines and UXO in areas to which they would be returning. This

[5] A complete survey of mine victims has now been completed for the MACC by VVAF to address concerns surrounding victim data.

was borne out by the heavy demand on house clearance by returning Kosovo Albanians, whether or not there was actually any danger present.

In 2000 mine awareness education in Kosovo was carried out by 17 organisations as well as KFOR. There is some overlap between mine clearance and mine awareness organisations. The MACC co-ordinates and accredits organisations to work in Kosovo and exercises a mandatory review and certification of all MAE materials to be used.

The main mine awareness programmes that are being implemented are community-based activities which include the "Safer Village"[6] concept and the child-to-child programme, which is supported by an EOD team to undertake immediate UXO clearance tasks along with the identification and marking of "child safe areas". The Safer Village concept looks at the specific needs of a village and tries to provide an alternative solution to risk-taking behaviour. The child-to-child programme (at least as it is implemented in Kosovo) focuses on the child as a trainer of other children and parents in the home using traditional games and activities. Already there have been occasions when children have used the information passed to them during the child-to-child training to report cluster bombs and UXO to a responsible adult/community member or KFOR representative.

Summary of future mine action needs in Kosovo

In its 1999 Donor Conference report, the MACC identified the need for specific resources for the calendar year 2000. These include an Impact Survey and Technical Survey capacity; responsive and programmed mine clearance capacity; cluster-strike marking, survey and clearance; and EOD and mine awareness education teams.

In addition to the benefits of area reduction as a precursor to mine clearance activities, a Technical Survey capacity is an essential component of any mine action programme Invariably, a number of mined areas are not deemed to be an immediate priority for clearance, yet still require some action to be taken. Presently there are approximately 2,000 reports of such areas within Kosovo. As an absolute minimum, mine awareness education should be provided to the local community in these areas, a preferred option, though, is to conduct a Technical Survey as well, which may or may not incorporate area reduction. Technical Surveys have been used extensively in 2000 by teams contracted by the MACC and have targeted small mined areas that do not warrant deployment of full mine clearance teams.

The MACC objective to clear unexploded cluster bombs from the province as soon as possible will continue during 2000. In April 2000, the approach to remove the threat by destroying both the surface and sub-surface UXO in the priority areas was changed to focus on instrument-assisted surface clearance in the first instance, with sub-surface undertaken at a later date. The rationale behind this change was to quickly remove the immediate hazards that were easily accessible to the local population. The exception to this approach is when the land is to be used for agricultural purposes and is to be ploughed – a sub-surface search is conducted in the first instance. Teams have been identified to quickly follow on from KFOR survey and marking teams to ensure that strike areas in close proximity to local populations are cleared expeditiously. Clearance

[6] "Safer Village" is an ICRC term However its general principles are replicated in the overall community mine awareness programmes.

teams tasked to clear CBUs are also capable of other types of BAC, which may be necessary in some areas (e.g., around defensive positions where fighting took place)

Individual items of UXO such as bombs and grenades will continue to be discovered throughout Kosovo for some time to come. As these items are reported, a responsive EOD capability is required in order to maintain confidence and minimise risk to the local population. In some cases the EOD teams may form part of the integral capability of mine or cluster clearance teams. It is expected that EOD activities will continue in Kosovo long after most traditional demining and battlefield area clearance has been completed.

Actual areas of contamination as confirmed by reconnaissance or Technical Survey require marking and fencing As surveys further refine the actual areas contaminated, marking and fencing will take on greater importance. To some extent, area reduction and clearance will occur simultaneously.

In terms of victim assistance, it will be important to bolster the existing prosthetic support capability and to introduce a basic psycho-social and advocacy support network to assist with the reintegration of mine/UXO victims in the workforce or school system. This should be co-ordinated through WHO, ICRC and various NGO partners, in conjunction with the MACC.

Human, social, economic and environmental impact and indicators

Overview of needs assessments

With the return of the international community to Kosovo in June 1999, most United Nations agencies and NGOs began to carry out needs assessments. However, none of these assessments directly addressed the impact of mines and UXO. In the light of the wealth of information available, the SAC and the MACC agreed that there should be a way to integrate these sector assessments with the MACC's abundant mine/UXO data The methodology used to accomplish this task is described later

Analysis of the use of socio-economic indicators

The basis for the prioritisation methodology used by the SAC and the MACC links a public safety/hazard analysis and Landmine Impact Survey based on geographically-defined areas It was reasoned that civilian populations go about their social and economic activities in a geographic space. When parts of these socio-economic spaces are denied, due to contamination by mines/UXO, normal activity exposes the population to greater risk of death or injury. By selecting certain activities and defining the physical boundaries as "essential livelihood space" it is then possible to identify those contaminated areas that pose the greatest threat

After generating a GIS model of the essential livelihood space it is possible to attach values based on social and economic assistance programme priorities. International relief and reconstruction assistance programmes determine project priorities based on sector-specific criteria. Depending upon the focus of the given programme, these sector priorities are usually assigned by town/village, municipality or geographic

region. By compiling the sector priorities for relief and reconstruction resource allocation, it would be possible to identify the relative geographic concentration of such resources across all of Kosovo. It was reasoned that towns and villages in areas with a heavy concentration of relief and reconstruction activities would have a higher demand on mine action services.

Analysis of the views of the local population

Limited sampling of the views of the local population has occurred. Their concerns are most visible in the self-reporting of suspect contaminated areas to KFOR and requests for house clearance. The extensive mine awareness efforts have sensitised a significant portion of the population to the danger presented by mines and UXO. Agricultural assistance NGOs have also reported that many of their beneficiaries are concerned about the potential contamination of their land, especially considering that the policy was not to give resources to farmers with contaminated land. The local population suspects areas to be contaminated if it was known that a Yugoslav military, police or paramilitary force had been in the area.

Existing criteria for the prioritisation of mine action

Concept

The MACC required the ability to prioritise the handling of each danger area record as well as establishing a relative impact measurement based on a social/administrative unit. To accomplish this the MACC has addressed mine/UXO-contaminated areas (IMSMA Danger Areas) in two separate ways. First, each record in IMSMA was given a priority score for further survey and/or clearance. Hence, the prioritisation mechanism would guide the reconnaissance process and the clearance process. Second, in order to develop a relative measure of impact, total suspected contaminated land needed to be estimated in a way that eliminated the double counting of duplicate and overlapping areas. The process did not have to account for false and duplicate records because the MACC was undertaking a deliberate confirmatory reconnaissance process to eliminate these records and define what was actually contaminated. This process would result in a cleaned data set of minefields under the IMSMA Technical Survey format. The new data set would then provide the basis for 2001 work plans.

Drawing on interviews with MACC staff, other mine action organizations, humanitarian NGOs and other United Nations agencies, SAC defined a concept of "essential livelihood space", where most social and economic activities would take place. This same space would also be the location of most point-of-service specific relief and reconstruction projects. As defined, the essential livelihood space comprised the area within a 500-metre radius of a settlement and 200 metres either side of a road. Added to this area analysis were agricultural land and wood foraging areas. Agricultural land was drawn by hand in the GIS using satellite imagery. Wood foraging areas were defined as those areas of dense vegetation that intersected the social space buffer. As a total measure, the essential livelihood space equated to roughly 40 per cent of the total landmass of Kosovo. It was initially envisaged that the sector priorities would be spatially assigned to various nodes in this network. However, such priorities had yet to be established by the responsible international authorities prior to the completion of the analysis.

Considerations

All minefields, cluster bomb strikes and other mine/UXO-contaminated areas were imported into IMSMA using the "danger area" field. The danger area field was not intended for the purpose of managing minefield/UXO clearance. In this regard, IMSMA-managed danger area files only discriminate between cluster bomb strikes and all others. MACC understands that "all others" includes false records, UXO and mined areas. However, pending reconnaissance, no reliable information exists to further break down the "all other" category. Dangerous area size data is generally not reliable prior to confirmatory reconnaissance because polygons and circles were assigned arbitrarily.[7] Many records, notably cluster strikes,[8] are overlapping and a number of seemingly distinct records may actually relate to the same areas.

The first step in the process was to select only those records that fell within the borders of Kosovo. Excluded records from the previous 12 months included those in Albania, the Former Yugoslav Republic of Macedonia, and the Federal Republic of Yugoslavia areas of Serbia and Montenegro. This process yielded 518 CBU strikes and 1,408 minefield and UXO areas.

The second step in the process was to give an area to cluster strikes, which had only been recorded as points. Given the lack of data the contaminated area required an estimate. The IMSMA database had initially been set to give the CBU strike an area based on a 300-metre radius circle. SAC considered this estimate inadequate given the potential physical dimensions of the footprint and increased the area to a circle of 500-metre radius.

Similarly, incident reports and particularly data on incident locations were deemed unreliable because they were incomplete or very imprecise. Population data is available, but had to be patched together from different sources, and does not include the numbers of internally displaced persons. These factors make for high levels of statistical noise. It is expected that the validation of any scoring model will be weak before the confirmatory reconnaissance process has been completed and has been translated into IMSMA.

The priority scale

Based on data analysis, and discussions with MACC staff, mine/UXO clearance organizations and mine/UXO awareness organisations, a scale was established. The resulting scale used for scoring dangerous areas is a proximity scale modified with land use variables. An additive form was chosen because the danger areas can overlap a combination of the various elements – town buffer, road buffer, agricultural land, wood foraging. Table 4 shows the arguments that enter into the score classification, while Table 5 shows the resulting classification brackets.

Not all of the values are used for individual dangerous areas. It should be noted that "zero" does not mean free from contamination. Zero stands for a dangerous area entirely contained in marginal land, notably mountains and forests outside agricultural land.

[7] In some cases the discovery of unexploded mortar rounds prompted the original collector to place a 300-metre radius circle as the danger area

[8] A notable example is the map depiction of a single cluster strike symbol, which when queried through the GIS pulls up 15 separate strike records.

Table 4: Weights for Danger Area Prioritisation

Argument	Points added
Dangerous area intersects with town buffer	10.0
Intersects with road buffer	5.0
Intersects with agricultural land	2.0
Intersects with wood foraging area	1.5
Maximum	18.5

Table 5: Priority Score Brackets

Priority	Score bracket
Low	0 - 3.5
Medium	3.6 - 9 9
High	10 - 18.5

Given the way the bounds were set, a dangerous area cannot become high priority unless it intersects with a town buffer,[9] and it cannot be medium priority unless it intersects with a road buffer. The consequence is that dangerous areas in agricultural land but not touching any buffer are all set to low priority. Given that the agricultural land layer includes both cultivated land and pastureland, those danger areas intersecting solely the agricultural land feature are most likely in remote pasturage. The agricultural and wood foraging scores contribute to making finer graduations within a priority group.

The scale was validated against two external criteria: potential to reduce incidents, and priorities set by others. The latter relies on the siting of community mine/UXO awareness education as decided by other organisations and their local staff. The scale performs well on both.

Estimating district impact

The traditional Landmine Impact Survey uses the community as the unit of analysis. However, community level data in Kosovo existed at less than 50 per cent coverage. The next meaningful level where population data could be compiled for a near 100 per cent coverage was the district. Smaller than the municipality, the district provided a useful administrative and geographic unit for comparative analysis.

SAC estimated the total contaminated area as a means of defining the Kosovo-wide problem and as a tool for estimating relative levels of contamination among municipality and district administrative units. The bases of the SAC summary were the IMSMA tables for CBU strikes and danger areas that were completed on 28 November 1999. These tables are known as cluster and non-cluster respectively.

The ranking maps districts using the simple percentage of total area contaminated This measure was highly predictive for potential incidents. Categories could be formed using different bounds. SAC chose to use a simple scheme based on the median value The median value identifies the middle value in a list of values. In this way the gradations are not influenced by the extremes of high and low values The median value of contamination for 327 districts in Kosovo was 1.3 per cent. The proposed scale is shown in Table 6

[9] According to the SAC, the term town and village are used interchangeably with regard to the prioritisation process.

Table 6: Scale of district contamination impact

Degree of contamination	Definition	Number of districts	District area as per cent of total Kosovo area
No contamination	Zero, for no contamination	99	25.01
Low	Up to the median (0-1.3%)	65	23 14
Medium	Between 1 and 5 medians (1.3%-6.5%)	92	31.28
High	Greater than 5 medians (6.5%-29.8%)	71	20.49

The resulting ranking of districts by mine impact severity, or mine hazard strength, while immediately useful for prioritising mine/UXO awareness activities is of limited practical use as a tool for mine/UXO clearance. If sector rehabilitation plans become firmer and more clearly defined in spatial terms, closer integration can be achieved by means of the district classification.

Assessment of the role of socio-economic indicators in planning

Data collection, reliability, availability, suitability and completeness are major constraints. Many data sets collected by outside institutions, including other United Nations agencies, were available but not easily joined on a common reference. These problems required significant manual manipulation of spreadsheet-formatted data sets. To this end the MACC initiated a number of inter-agency meetings aimed at rectifying data standards. It was foreseen that a survey relying on other organizations' data would increase the vulnerability of the analysis to the failure or tardiness of others to produce basic data. Indeed, securing the basic data was an effort requiring much persuasive diplomacy. Once acquired, the data underwent significant cleaning and rearranging and processed through advanced linking, querying and analysis outside of IMSMA using GIS algorithms. But as a result of the various constraints, the analysis was greatly reduced in scale using fewer variables.

Although the methodology described above provided for the incorporation of socio-economic data, such provision was premised on the reconstruction and development community having well-defined and geographically-prioritised programmes. At the time SAC was developing the methodology, neither the lead sector agencies, nor the European Commission, nor UNMIK's Civil Administration had developed such priorities. Of the main social and economic reconstruction sectors (health, education, agriculture, water, public utilities and resettlement), only agriculture had come close to a priority scheme.

The Food and Agriculture Organization (FAO) set the initial agricultural assistance priorities based on a relative ranking of municipalities using the 1999 harvest as a percentage of the 1997 harvest. However, with one sector available, incorporating only the agricultural priorities would have skewed the overall mine/UXO clearance

prioritisation towards agricultural needs only. As the MACC planning process was drawing to an end, the FAO brought in a consultant to undertake a more in-depth socio-economic impact study of the agricultural sector. The MACC provided FAO copies of the GIS map layers of composite contaminated land, agricultural land use as well as the district administrative units with population estimates. With these tools, it is hoped that FAO's new priorities will be easily joined with mine impact area analysis for establishing priorities.

Although the education and health sectors had maintained master lists of facilities by location, these lists were not prioritised for funding but simply maintained for would-be donors on an *ad hoc* basis. Moreover, the locations of the facilities were rife with spelling errors and freely used either Albanian or Serbian names. Sorting out these lists would have taken a significant amount of time and effort. Public utilities planning was even more haphazard. Projects were initiated with little or no notice and tended to depend on donor government decisions on funding. As an example, MACC support for clearing access to electrical power transmission pylons and sub-stations was conducted without a master plan ever being assembled by the co-ordinating bodies. Consequently, some mine clearance actions were not matched by the appropriate inputs from other sectors and overall rehabilitative efforts were not achieved or were delayed.

The Office of the United Nations High Commissioner for Refugees (UNHCR) had promoted a logical system of positional codes for populated places in Kosovo. KFOR, the World Food Programme (WFP), FAO, UNMIK civilian police, and the MACC adopted the system. The Organisation for Security and Cooperation in Europe had also adopted the system and were looking to expand the detail coverage to be sufficient for civil registration and elections planning. Of particular note, there was little to no inter-agency sharing of critical population information. Indeed, a local population estimate at a level below the municipality only existed as a result of the SAC manually compiling population estimates from WFP, UNHCR, and the European Commission International Monitoring Group. SAC distributed the products of its analysis, including the only GIS map of agricultural land, to all organisations. By distributing this data the SAC sought to encourage other sectors to use the smaller and more useful geographic unit as the basis for planning and prioritisation.

Without the relevant sector rehabilitation priorities the prioritisation analysis is essentially an accident hazard analysis, not a socio-economic impact analysis. If sector rehabilitation plans become firmer and spatially more clearly defined, district classification can be used to bring about greater integration with those efforts. If this occurs, the concept of the essential livelihood space, and the ranking of districts by degree of buffer contamination, will also become more relevant. Since SAC made the district GIS files and population tables available to other lead sector agencies, such an outcome may not be too far off

Existing criteria for measuring the benefits of mine action

The immediate objectives of mine action are to save lives and restore livelihoods. In this regard, the dramatic drop in mine incidents from June1999 to January 2000 can in part be attributed to effective mine awareness education in refugee camps and through a learning function taking place in communities of refugees repatriated to Kosovo. It may also be attributable in part to the onset of winter. If, as seems to happen, incidents

rise along with warmer weather, then these incidents should be analysed separately from the 1999 caseload for risky behaviour patterns. The priority clearance plan incorporates the public safety/hazard reduction concept.

By prioritising clearance areas close to essential livelihood space, it is hoped that measuring the areas cleared will have a direct relationship to removing barriers to economic and social development. Also, such work can be used to establish links to other rehabilitative activities to ensure that all required inputs are available to support land once it has been cleared. Integration allows for prioritisation and synchronisation of inputs, leading to overall cost savings and optimum outputs.

Other than these factors, the major objective of mine action programmes for 2000 is to reduce suspected areas of contamination into a discreet set of known contaminated areas, then mark and fence them

The funding picture

It appears that donors committed more than US$28 million in 1999, with another US$32 million or more in 2000. These figures do not reflect the very significant contributions made to mine clearance and mine awareness activities by various contingents within KFOR (e.g., clearance of major and secondary roads). KFOR will continue to assist, including surveying and marking of cluster bomb sites and monitoring the clearance, by the Yugoslav army, of the minefields they laid.

The funds provided and committed appear to meet, or perhaps exceed, MACC's estimate of US$30 million required from January 2000 to December 2001[10] (plus US$4.5 million for "operating expenditures", apparently to cover local expenses for the Kosovo Protection Corps, the local organisation that will assume responsibility for mine action).[11]

Existing integration within development initiatives

The Kosovo Provincial Works Plan allows for integration with development work. However, at the time of plan formulation no development or reconstruction sectors had a well-defined prioritisation plan. When such plans become available, the MACC will be able to integrate these priorities into the mine/UXO clearance priority scheme. The structure established for mine action prioritisation is based on a strong spatial analysis. Given that relief, reconstruction and development programmes physically locate their project activities in a known location, the system can accommodate these priorities and perhaps anticipate them.

Except for the agricultural sector, no sector had a spatially-defined mechanism for establishing programme priorities. Although the United Nations' Humanitarian Community Information Center had been funded and provided with GIS software and computer equipment, this resource was not used to its full potential. Many agencies acknowledge that spatial planning units exist, such as health facility catchment areas and school districts. But most sector planning does not seem to have used any spatial

[10] EU and World Bank, 1999.94.

[11] UNMIK, 1999 9 The total budget for the Corps in 2000 is DEM 20 7, with about 52 per cent going to wages and the rest to "goods and services"

Table 7. Funding for Demining in Kosovo 1999-2000[a] (in US dollars)

Mine Action Function/ Organisation	1999 Amount	1999 Funding agency	2000 Amount	2000 Funding agency
CLEARANCE[b] (FIRMS)				
• BacTec	1,129,034	UK	1,936,000	UK
• Defense Systems Limited	2,206,601	UK	4,307,782	UK
• EMERCOM Demining	?	Switzerland	?	Switzerland
• European Landmine Solutions	?	?	3,520,000	UK
• Gerbera	?	?	?	?
• Greenfields	1,601,227	UK	?	?
• International Demining				
• Alliance Canada	$868,170	Canada	1,884,400	Canada
• MECHEM	?	?	?	?
• Mine Clear	?	?	?	EU
• MineTech	201,900	Canada	?	?
	?	UNHCR, EU, Belgium	?	?
• RONCO	?	US	?	US
Wolf's Flat/CIDC	355,344	Canada	?	?
CLEARANCE[b] (NGOs)				
• HALO Trust	2,986,080	UK	889,020	Denmark
	350,000	Switzerland	800,000	UK
	185,000	Germany	350,000	Switzerland
	460,000	Ireland	?	Ireland
	460,000	Netherlands, AAR	?	AAR (Japan), Czech
	?	(Japan), Pro Victimis, Czech Republic, US		Republic, US
• Handicap International	500,000	Switzerland	133,300	Switzerland
	160,000	France	50,000	Luxembourg
	240,000	EU (ECHO)	460,000	EU (ECHO)
• HELP UDT	240,000	Germany	300,000	Germany
	?	US	?	US
• InterSOS	?	Italy	360,000	EU (ECHO)
• Mines Advisory Group	554,852	UK	413,585	UK
	?	World Vision	$350,000	EU (ECHO), World Vision
• Norwegian People's Aid	3,125,000	Norway	2,272,727	Norway
	1,800,000	Finland	1,200,000	Finland
• Potsdam Kommunikation	360,000	Germany	300,000	Germany
• Swiss Fed for Mine Clearance	?	?	387,000	Switzerland
CLEARANCE – OTHER				
• UNHCR	1,500,000	Japan	?	?
• To various recipients			7,102,250	US
• UNMAS/KMACC/ITFs[c]	5,270,431	Belgium, Canada, Denmark, France, Germany, Luxembourg, Netherlands, Norway, Sweden, Switzerland, UK, EU	4,630,229	Australia, Canada, Germany, New Zealand, San Marino, Spain, UK
MINE AWARENESS				
• Adventist Development and Relief Agency	?	?	?	?
• Aid Without Borders	?	?	?	?
• Balkan Sunflowers	?	?	?	?
• CARITAS	?	?	?	?
• Danish Church Aid	1,511,346	Denmark	697,085	Denmark
• International Committee of the Red Cross	?	?	?	?
• Islamic Relief World Wide	?	EU	?	EU

Mine Action Function/ Organisation	1999 Amount	1999 Funding agency	2000 Amount	2000 Funding agency
• Mines Awareness Trust	?	?	?	?
• Save the Children	?	UNICEF	?	UNICEF
• UNICEF	?	?	?	?
• Vietnam Veterans of America Foundation (VVAF)	?	EU	?	EU
VICTIM ASSISTANCE				
• Association to Aid Refugees (AAR-Japan)	383,333	Japan	?	?
• Queen's University	$336,500	Canada	?	?
• WHO	?	?	?	?
• To various recipients	1,000,000	US		
GRANT TOTAL[a] (of which)	More than 28 million		More than 32.3 million	
UNMAS-MACC-ITF	5.27 million		4.63 million	
CLEARANCE[b]	More than $19.3 million		More than $27 million	
MINE AWARENESS	More than $2.65 million		$700,000	
VICTIM ASSISTANCE	More than $720,000		?	

[a] Funds shown are commitments and do not necessarily reflect final expenditures incurred in the year
[b] Clearance includes "integrated mine action" and therefore may include some mine awareness and victim assistance.
[c] There may be some double counting of funds going first through trust funds and then to a mine action operator.
[d] Not including significant clearance and mine awareness activities undertaken by various contingents of KFOR.
Sources: Mine Action Investments Database (<http://webapps.dfait-maeci.gc.ca/mai/frameset.asp>); ICBL, 2000.

or service area analysis. Estimating relative access to services and projecting future needs would seem to be the most logical approach to allocating limited resources. Requests by the MACC to have access to such information for incorporation into the mine action planning process did not generate a useful level of data.

Recommendations

1. Relief, development and reconstruction programmes need to make a greater effort at deliberate planning. Where possible these should include spatial measurements for allocation of resources.

Mine/UXO clearance is a slow process at best. Concentrated reconstruction requirements create competing political demands on priority of service. In Kosovo little to no deliberate planning has occurred among development and reconstruction organisations regarding defining sector problems and sequencing planned interventions. More thorough inter-agency planning, which accounts for constraints and sequencing requirements, can improve integration of mine action with programmes addressing socio-economic factors.

2. Common survey requirements should be consolidated in an inter-agency process to reduce duplication of effort and promote a common data standard.
Socio-economic mine action analysis shares with other relief and development activities a common requirement for good data. Current practice is for each organisation to undertake its own surveys and analyses, frequently duplicating what other organisations may have already collected. In a shift from this cycle, the MACC and SAC showed that an information-sharing regime could work and deliver reliable analysis.

3. Efforts should be made during emergency operations to look beyond narrow organisational mandates and give attention to establishing and sharing data and GIS resources useable to all.
Programmes in the relief and reconstruction environment do not operate in a vacuum. All programmes, regardless of degree of specialisation are inter-dependent. Understanding, acting on and integrating the explicit and implicit requirements resulting from this interdependence can lead to greater programme coherence, inter-agency co-operation and economies of scale.

4. Using information technology as a planning and management tool reaches well beyond the mine action community.
The Kosovo Provincial Mine Action Works Plan demonstrated that IMSMA-based analysis is a highly relevant tool for planning and co-ordinating mine action and that an investment in information and analysis could make a major contribution to coherence and credibility of operational programmes. A precedent has also been set in using information technology to outline and predict how resources can be better applied in mine action programmes.

5. Mine clearance tasks should be co-ordinated with other sector activities to ensure that cleared land is put back to use.
It does no good to clear land that also requires other inputs such as seeds and tools, building materials or power poles if such items are not available. Limited clearance resources could be better employed until such time as all inputs are on hand. To do this requires close co-ordination between agencies, an open sharing of data, and a change of culture regarding the value of information.

6. Establishment of a "clearing house" for map and imagery products, as well as a standard set of formats for sharing data, would be a resource valuable across sectors and could lead to major improvements in synchronisation and co-ordination of relief/ rehabilitative activities.
The optimum allocation of mine action resources and greatest socio-economic benefits from mine action will only occur when such activities are integrated with and maximise the inputs provided by other rehabilitative activities. Such co-ordination is only possible when there is some standard "medium" for communication of needs, objectives and analysis. GIS technology, if applied correctly and appropriately supported by a major institution such as the European Union, the United Nations, or the World Bank, could form this medium. Ensuring that all agencies in any country are working from the same map sets, data transfer standards, and imagery is a vital first step