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TOWARDS COST-EFFECTIVE DE-MINING:

AN EVALUATION OF EXPERIENCES
AND TECHNIQUES

by

Laurie H. Boulden



THE SOUTH AFRICAN
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Jan Smuts House, Braamfontein, Johannesburg, South Africa
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SAIIA National Office Bearers

Dr Conrad Strauss, Chairman
Gibson Thula • Elisabeth Bradley
Brian Hawksworth • Alex Pienaar
Dr Greg Mills, National Director

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Preface

It is well-known that Africa is the continent most severely affected by landmines and that long after the end of hostilities, when heavy armaments have been decommissioned, contained or destroyed and media attention has moved elsewhere, civilians in the former conflict zones continue to run the gauntlet of a deadly enemy: the landmine.

The countries most contaminated by landmines are located in the developing world, and they lack the resources to respond to the medical, social, economic and environmental consequences caused by landmines. These countries are inhabited by mainly rural agricultural and pastoral populations who depend on the land to survive. The danger created by landmines often makes such forms of subsistence impossible. Because effects of landmines are felt at all levels of society - individual, family, community and nation - it is certainly of utmost importance that this issue should be addressed in the most cost-effective manner, especially in Africa.

Although a great many problems in de-mining have been encountered as part of the *Landmines in Southern Africa* research project, the South African Institute of International Affairs (SAIIA) persisted and were able through exceptional initiatives to identify the fundamental issues which presented themselves as extremely relevant and as areas in need of real improvement. Cost-effectiveness is merely one of many factors that had to be addressed, and by convening this conference SAIIA clearly highlighted the resources located within Southern Africa to address landmine-related issues. Covering topics from co-ordination and control of mine clearance programmes to difficulties encountered regarding technical and operational matters, the commitment of those who convened the conference was evident.

Drawing on the experience of experts covering the whole spectrum of mine action as well as excellent chairmanship, the organisers were able to obtain the goals of the meeting: sharing of information. The wealth of technical as well as managerial experience available in the Southern Africa region was successfully portrayed through the presentations and certainly sparked more ideas on a Southern African approach to mine action. As I see it, 1998 is not only a critical year for Southern Africa and the African Campaigns to Ban Landmines, but also for Southern Africa to demonstrate its ability to address the issue of landmine clearance without awaiting direction by the international community.

Once again, this conference demonstrated the region's ability as well as willingness to achieve this goal through the various presentations and meaningful discussions.

It is most encouraging to note the initiatives regarding the possible emerging partnerships that responses to the problem have generated, especially on the operational and technical levels. Such partnerships, with the sharing of resources, will strengthen the collective capability within the region and ensure the meaningful exchange of related information. Concerted efforts to critically examine the techniques employed during mine clearance are also essential, including an emphasis on the particular difficulties encountered from a technical/operational sense, as well as the management and organisation of de-mining operations. Distinguishing the responsibilities and areas of interest of different agencies and donors on mine clearance will permit the integration of efforts and the refinement of information.

This very successful conference, 'Towards Cost-Effective De-Mining: An Evaluation of Experiences and Techniques', served as an invaluable forum for the exchange of information and ideas for members of the Southern African mine clearance community, experts and no-experts alike. However, what matters most is how we pursue the ideas and/or recommendations that were initiated at this forum. Governments, non-governmental organisations and people of the region must work together to further these initiatives. I strongly believe that Southern Africa does have the ability to address this senseless slaughter of the innocent in an independent and professional manner.

Colonel JP Botha
Deputy Chief
United Nations Mine Action Service
New York, May 1998

South Africa and a Landmine-Free Southern Africa

Deputy Defence Minister Ronnie Kasrils used his keynote address to open the conference and to outline South Africa's experience of landmines. Kasrils stated that there is no doubt that the millions of landmines strewn around the world are a great scourge to humanity. Accordingly, the resolution of this problem is a prime objective of the South African Government.

In 1997, Joe Modise, the Minister of Defence, announced a comprehensive ban on the use, development, production and export of anti-personnel landmines in South Africa. The Cabinet decided, further, that the existing stockpile of anti-personnel mines would be destroyed immediately, with the first controlled detonation occurring on 21 May 1997. After 200 subsequent detonations, South Africa completed the destruction of its anti-personnel mines in 30 October 1997. A total of 243,423 mines were destroyed. This destruction placed South Africa ahead of the terms and obligatory deadlines for mine destruction as encompassed in the 1997 Ottawa Treaty against anti-personnel mines.

What South Africa has to Offer

Kasrils turned next to South Africa's de-mining capacity, which developed through the conflicts of the apartheid period - conflicts engendered by Pretoria itself, he noted. Today, South Africa is grateful to have the opportunity to redress the wrongs of the past and contribute to other countries' development through mine clearance. The government, according to Kasrils, would like to see South Africa's people, arms industry and country playing a more active role in de-mining and victim assistance programmes. However, while South Africa is a world leader in countermine technology, equipment and expertise, and has a vital role to play in mine clearance, Pretoria does not want the defence industry to appear to be making a huge profit from de-mining in the process.

According to Kasrils, the primary elements of the South African approach to de-mining include: the use of mine-proof vehicles to protect lives and mobility in de-mining; the use of proven detection methods in conjunction with one another; the use of safe and effective clearance techniques; the ability to assess a problem correctly and

implement correct, cost-effective measures; the use of experienced countermine personnel at all levels; and the use of dedicated and experienced research and development groups as backup to field operations.

Kasrils also elaborated the six tenets of South Africa's countermine philosophy: mine awareness training before, during and after clearance operations; detection of mines with the best equipment available; marking detected mines; neutralisation of mines; de-mining auditing; and the protection of de-miners.

Assistance to Fellow African Countries

Finally, Kasrils turned to specific assistance available to Angola, Mozambique and other African countries upon request. First, the Department of Defence and its Engineer Formation have the experience, expertise and equipment to operate as a training resource, and in fact, some courses have already been given to train both de-mining teams and managers, he said. This facility will continue to be available with the concurrence of the concerned governments. Secondly, commercial companies in South Africa have been, and are, engaged in contracts to de-mine specific areas in Angola and Mozambique. They are performing well and have an important role, according to the Deputy Minister.

In conclusion, Kasrils re-emphasised the threat to regional security and political stability presented by mines. However, in his opinion, South Africa has the will and resources required progressively to remove the threat of the landmine entirely in an efficient and cost-effective manner, and in the general spirit of humanity. In addition, he reminded the conference that, while the ban on landmines did not come easily and required great political will, South Africa had recognised that humanitarian concerns overrode military objections to the ban. All countries still outside the ban should be encouraged to join also.

Organisation and Implementation

United Nations De-mining in Bosnia

JJ van der Merwe outlined the concept of a United Nations (UN) Mine Action Centre (MAC). He described attempts, through the establishment and operation of an indigenous national de-mining institution, to tackle the mine problem in Bosnia, using a continuous process of education, the location and marking of unsafe areas, and the removal and destruction of mines. As he explained, there are estimated to be 1 million mines and large quantities of very dangerous unexploded ordnance (UXO) in Bosnia and Herzegovina as a result of four years of conflict. The mine-polluted areas are concentrated around areas of the former conflict and are therefore generally known. However less than half of the areas are recorded in usable detail, and tracking down the remainder is a painstaking process.

Basic Fundamentals

Addressing a mine problem and the associated issues is not complex. It is a matter of will, funding and procedures, according to van der Merwe. The ultimate responsibility for clearing and destroying the mines lies with the governments of the countries affected, and the attention the international community focuses on attraction of both funding and the application of specialist expertise and the latest technology. Establishing a national institution is economical and effective, and is based on the following principles:

- The country with the mine problem should address the issue of mines with its own people and resources, through assisted training and phased funding;
- Assistance provided should have the aim of allowing the country to address the problem unaided in the long term;
- The will of the government to de-mine should be clear, and lead to legislation to ban the laying of new mines;
- A clear understanding of the problem and its scope should be supported by a detailed and accurate database;

- A de-mining model should be developed, which is sustainable both in the short and long term;
- The government should progressively take financial responsibility for the organisation;
- The government should be involved from the start;
- The de-mining priorities should initially focus on humanitarian needs and the immediate development support; and
- The institution should be a civilian organisation.

United Nations Involvement

On the 12 January 1996 the governments of Bosnia and Herzegovina formally requested the UN Department of Humanitarian Affairs (DHA) to assist with the task of mine clearance in Bosnia and Herzegovina, as van der Merwe explained. With the agreement of the three Prime Ministers an interim structure was agreed which would enable rehabilitation and reconstruction to proceed with the help of the international community, until such time as the governments are in a position to assume full responsibility. This initial understanding led to the establishment of the UN Mine Action Centre.

The primary tasks were to develop a policy which would lead to the generation of a sustainable national mine clearance capacity, and the development of a strategy to address immediate and long term priorities. The Mine Action Centre was initially established to co-ordinate mine clearance and take on the role of operational arm and focal point for all mine related activities in Bosnia-Herzegovina.

Concept of Implementation

An integrated approach was decided upon to reduce the level of risk and address the problem as quickly as possible. The mine action plan for Bosnia and Herzegovina has four major components which are integrated into four prongs: mine awareness; minefield marking and mine information; mine and unexploded ordnance clearance; and training. These functions are undertaken using commercial companies, which provide flexibility and competitive pricing; non-governmental organisations (NGOs); former warring faction/entity armies, which have

agreed to use their military forces to remove and destroy mines and explosive devices and field fortifications; and a national capacity. The establishment of the national mine clearance capacity is the responsibility of the UN MAC. This capacity addresses priority tasks to clear areas where people are living in mined areas, or have to return to areas that are mined, or where prompt reconstruction is essential. The UN MAC helps to compile the priority lists and then assigns de-mining resources to these tasks. Van der Merwe explained that the MAC also has many other responsibilities.

Transition

The United Nations Headquarters gave MAC the deadline of 31 December 1998, after which the UN would hand over to the authorities in Bosnia and Herzegovina a fully-developed capacity to continue the implementation of the Mine Action Plan, with continued financial and technical support from the international community. Already the de-mining structure has evolved to meet new needs. A structure for the future is being developed to address problems and take into account the political situation in the country, using a Commission on De-mining consisting of MACs operated by the Entity Governments and a Board of Donors to help facilitate this transition.

Conclusion

In total the program has cost approximately US\$10 million, which has been funded through the Voluntary Trust Fund for De-mining from earmarked and unearmarked funds. The UN MAC has achieved its aim to develop and establish a mine clearance institution for Bosnia and Herzegovina by December 1997. This has been done in consultation with the governments through the Commission for De-mining and the members of the Board of Donors. Whether this institution is sustainable will depend on its ability to raise funds and continue to de-mine in a safe and productive manner, as the programme moves from the structural development phase into the phase of consolidation and maturity.

Mechem, Mechanical Clearance and MEDDS

As Theo van Dyk explained next, the bulk of de-mining activities today is conducted by manual teams on foot, using metal detectors and

prodding the ground. Manual de-mining, conducted within the parameters of existing standards and practices, has established itself as an acceptable method able to reach the desired 99.6% clearance rate. In spite of this, manual methods remain time-consuming and dangerous to the personnel on foot. Average clearance rates vary from 10 to 50 square metres per day for an individual de-miner, depending on terrain conditions, for example, soil, conductivity, vegetation and metal contamination. Costs associated with manual de-mining also vary from country to country, but an average operational cost ranging from US\$0.83 to US\$2.50 per square metre is generally accepted today.

As a result, it is quite clear to van Dyk that the global mine problem cannot be solved by using manual de-mining alone, and alternative methods are needed - not to replace manual techniques, but to supplement current operations, making them more efficient without losing quality. Various de-mining techniques and technologies can be integrated to enhance overall clearance efficiency, with increased clearance rates and thus lower costs. A certain technology or technique is chosen according to which will give the best results under certain operational conditions - the 'toolbox' approach.

Determining the technique appropriate to a situation is affected by climatic conditions. For example, in Southern Africa more de-mining can be conducted in the dry winters than in the wet summers. Choice is also affected by the mines encountered, including density, configuration of the minefield and the types of mine present. Terrain conditions including soil type and condition, vegetation and gradient will also affect which mine clearance technique is used, van Dyk explained. In tandem with these concerns, the two key factors of utmost importance for the integration of techniques are safety and clearance efficiency - cost and rate of clearance should be of secondary importance.

Field Experiences

Drawing from a recent Mechem contract in Mozambique, van Dyk described the operational integration of manual mine clearance and Casspir mine-proof vehicles equipped with steel wheels to clear a concentrated mine ring. The Casspirs drove over the soil, detonating the mines underneath. Manual de-miners then followed behind, checking for remaining mines. Although terrain was problematic for the Casspirs in some cases, van Dyk said that external quality assessors found only one mine after Mechem had finished with project, which

represented a high level of efficiency at a lower cost due to the combined techniques. In Mechem's final estimates, this combined approach was five to eight times more efficient than manual clearance alone, and cost less than US\$0,10 per square metre. In addition, the Casspirs covered between one and three hectares per day.

In another example, van Dyk described Mechem's effective use for more than five years of vapour-sniffing dogs to locate mines. According to his calculations, Mechem Explosive and Drug Detection System (MEDDS) dogs can also achieve nearly 100% efficiency when utilised properly, and at a higher level of cost-efficiency. (Highly trained dogs can be used to locate mines by smelling the explosive content. In some cases, dogs operate at the end of leads with a handler, or in the MEDDS System vapour samples are collected from suspected mined areas and taken to the dogs for sniffing.)

In conclusion, van Dyk asserted that more efficient de-mining operations are made possible by integrating various mechanical and other techniques with manual operations using metal detectors and prodding. Integration of techniques would be best served if the various members of the de-mining fraternity can settle differences and share information, experiences and methods, he said.

Norwegian People's Aid in Angola

Håvard Bach outlined the challenges presented by Angolan de-mining. These are:

- the need for efficient de-mining priorities;
- the requirement for fast implementation;
- vegetation, soil and topographic problems;
- logistics; and
- accessibility to areas.

Considering the urgency of mine clearance in the country, the Norwegian People's Aid (NPA) used several different mine clearance techniques in support of each other to address these problems. While NPA has discovered that no method is free from weaknesses, all methods, when implemented wisely, can be valuable tools for the wide range of de-mining tasks that exist in Angola.

At present, NPA utilises four different de-mining methods:

- manual;
- use of free-running vapour-detecting dogs;
- using dogs for remote air-sampling tests; and
- mechanical de-mining.

Mine Detection Dogs

After some initial problems with the dog programme, NPA currently uses free-running dogs for minefield reduction and verification tasks in Angola, as NPA programmes in other countries do. In 1998, NPA Angola aims to have 20-25 free-running dogs that will work in conjunction with the remote-sampling dogs.

NPA Angola is the first outside organisation to utilise Mechem's MEDD System of vapour collection. In this process, the vapours are collected and transported to the dogs, to reduce the work effort of the dogs. In 1998, NPA wants to have eight to ten dogs in service to sniff the collected vapours, specifically hoping to clear and/or verify more than 1000 kilometres of road in two provinces.

Mechanical De-mining

In 1996, NPA purchased two refurbished Aardvark flail machines, explained Bach. The Aardvark was selected because flails have:

- a lightweight construction;
- a favourable price;
- a proven operational record;
- a good ability to resist anti-tank mine explosions;
- a good personal safety record for operators;
- an ease of repair, direction and operation;
- the ability to work in normal vegetation; and
- reduced sensitivity to topographical variations.

However, NPA experienced the typical problems that occur in any new project, while some predicted problems never arose. For example break-downs have been more frequent than expected, and the transport of the huge machines on Angola's difficult roads has been problematic. Consequently, NPA has learned several ways to render Aardvark's use more effective. For example, comprehensive remote workshops are being created to travel to the Aardvark when a repair is needed. Also, detailed records of every repair are being compiled to ensure that the correct spares are always on hand.

Bach explained that the Aardvark was working well operationally, again after initial learning experiences. Preliminary tests demonstrated that chains of the flail would be lost in almost every mine detonation, but that clearance rates were high enough to warrant the continued use of the machine. In the first month of operation, the machine cleared more land than 150 manual de-miners had in the first six months of 1997. Today, the machine is used for area reduction and minefield verification tasks, vastly accelerating the pace of manual mine clearance.

Bach concluded by saying that, due to NPA's success with the Aardvark, the organisation is hoping to acquire another Aardvark and three Hydrema flail machines in 1998. NPA is confident that it is now in a position to anticipate and overcome any problems connected with the use of flail machines.

Mechanically Assisted Manual Mine Clearance

Hendrik Ehlers introduced another de-mining NGO, called MGM, which has been working exclusively in Angola for seven years now - and is by far the smallest de-mining NGO active in country. However, the output of MGM's work in relation to size appears quite the opposite.

The reason why MGM works effectively with very few people (15 Angolans and three expatriates in 1997; 33 Angolans and six expatriates in 1998) is the managers' understanding of the Angolan context and the unique and efficient MGM system, explained Ehlers.

According to Ehlers, MGM's different approach stemmed from hands-on experience in Angola. Specifically, simply driving over mines does not give enough safety for the end-user, nor does milling the ground create the rate of confidence which is needed.

However, in his opinion, purely mechanical de-mining is not safe enough for the end-user, and purely manual de-mining is slow and dangerous for the de-miners. The trick is to combine both methods, maintaining advantages and avoiding disadvantages. As a result, MGM prefers manual de-mining as the method with the highest safety warrant for the end-user, but seeks to assist this arduous work with any available safe machinery.

The MAM System

With the above specifications in mind, Ehlers and MGM designed the Mechanically Assisted Manual (MAM) De-mining system. There have been various modifications since the first set-up, and in the process effectiveness and safety have been enhanced.

Ehlers went on to describe this MAM system, The 'Kalahari Ferrari' Wolf III Turbo, an all-terrain 17,5-ton mine-proof monocoque hull with a 360 horsepower engine and transmission, prepares the ground. It is battle-proven as being able to withstand up to four anti-tank mines under one wheel. If there is a blast the crew remains unharmed, and any damaged parts can be replaced on location. Maximum speed on roads is over 100 kilometres per hour. An 80 horsepower Maletti 1500rpm vegetation mulcher is fitted to the end of a 6-metre, extendible 360° rotating hydraulic boom. This mulches down all vegetation up to 15 centimetres in diameter in order to make possible immediate and safe manual clearance on a lawn-like surface. The Wolf and mulcher are not designed to destroy mines, but some may be activated in the process, for example trip wire controlled, bounding and fragmentation mines.

A second mulching unit is based on a mine-protected SAMIL 20 truck, which was also salvaged from a military scrapyard in Namibia. Both also serve as personnel carriers for surveying and safe platforms for scientific sensor testing under field conditions.

Next, manual de-mining operations are performed according to the standard procedures.

However, MGM has other methods that can also be called upon. In a new system, free running explosive-sniffing dogs are integrated into the process. As dogs cannot work in bush and undergrowth, the mulched surface creates perfect conditions for effective analysis and mined area reduction using dogs. (Later, according to Ehlers, another system will

feature explosive-sniffing Giant African Pouch Rats in a trial programme to begin later in 1998.)

The finishing touch is the permanent marking of the cleared areas by a Cat/Wright F12 Grader fitted with an air-conditioned, anti-tankmine-proof cab. It follows the complete manual/animal de-mining process, and enables quality control to verify the clearance achieved at a depth beyond normal prodding limitations into deeper layers, which may contain mines laid many years previously. The windrows created by the grader define clearly the de-mined area. In case of an unexpected detonation (as encountered in reinforced booby-traps), the operator remains unharmed and repairs can be done on location.

In another quest for efficiency, MGM's upcoming RAM-System will consist of a new Dutch off-the-shelf product, called a rotary bucket, mounted on a mine-protected frontloader. As a consequence, the grader's windrows can be sieved for further quality assurance and confidence-building.

One Step Further

Ehlers explained that road clearance does not make sense if it stops at a broken-down bridge. Improvised bridge repair with heavy equipment is part of MGM's integrated approach. MGM also creates drains and culverts when needed, to make the mine clearance results effective.

The modular set-up allows for a variety of RIDE Missions (Rapid International De-mining in Emergencies). All later MGM machines are designed to be airlifted by Hercules C130 cargo planes.

Finally, as Ehlers explained, all MGM vehicle movement is monitored by a high-frequency and Global Positioning System (GPS) tracking system and is about to be linked to an on-line computer geographic system projection for safety, supervision and transparency reasons.

In conclusion, MGM's unique method shreds away vegetation, clears mines manually at an approved 99.6% rate and re-grades the road including its verges. The MGM solutions are no more and no less than useful contemporary devices in the humanitarian de-miner's toolbox, according to Ehlers, but make mine clearance effective for the people of Angola. Additionally, MGM encourages the free dissemination of its ideas for the benefit of de-mining.

Interagency Relations

National Government Oversight: Past and Future in Mozambique

Osório Severiano opened the second session with an assessment of the Mozambican government's oversight of de-mining. He said that the government understands that the process of removing mines should intrinsically guarantee a combination of humanitarian objectives with those of socio-economic development and rehabilitation.

Two Phases

According to Severiano, de-mining in Mozambique has occurred in two phases. In the first, the period under which the 1992 peace agreement was implemented, de-mining assumed a heavily humanitarian and emergency focus. Priorities were to support displaced persons and refugees; to assist emergency aid programmes; and to build conditions for ensuring the free movement of people and goods. During this period, the co-ordination of de-mining usually rests with the peacekeeping missions, he said, whose mandate includes building the basic conditions for the effective and desired transition to government management of mine clearance.

In the following period, although humanitarian issues remain, the issues of rehabilitation and the socio-economic development of the country start to assume overwhelming proportions. Thus, during this phase, priorities centre on: support to the country's rehabilitation and development; population relocation; and the free movement of people and goods. At this time, the process of conducting de-mining, including the mobilisation of needed resources, management and co-ordination, should rest with the national government, said Severiano. Any non-compliance with this principle leads to anarchy in the clearance process, the wasting of resources and a reduction of de-mining efficiency.

Partnerships

In order to be efficient, Severiano asserted that clarity about partnerships and roles is vital. In his opinion, the government is the centre of planning, decision making and co-ordination of all de-mining

activities in the country, including the mobilisation and management of required resources. Any attempt to avoid or withdraw from this role is unacceptable.

Donors, as privileged partners of the government, are needed to support the government in the mobilisation of resources, priority setting and the building of an effective national capacity. This could include institutional, technical, material and personnel upgrading for the government. However, the process must also build in a mechanism to make this process transparent on both sides.

De-mining operators are also government partners and should display professionalism, technical prowess and respect for the country's laws. The government, for its part, must ensure that access to de-mining services is managed through a competitive process to encourage the requisite quality, equity and responsibility. In conclusion, the best partnerships are based on the need for constant engagement with the recipient country, through its government as the manager of all mine actions.

De-mining Challenges in Mozambique

Lastly, Severiano outlined challenges and courses of action for de-mining in Mozambique. Challenges over the last several years include a lack of reliable information about the mine situation in the country; a need to accelerate mine actions; the need for national capacity building, which entails institutional and financial upgrading and building an operational capability; and the requirement for adequate quality in de-mining operations. As a result of the last factor, Mozambique is instituting mandatory independent quality assessment, including compulsory redress and fines if errors occur.

Other forthcoming actions for Mozambique include more surveying of the mine situation; localised 'vicinity' de-mining in rural communities; socio-economic de-mining; technological promotion to bring the best methods of mine clearance to the country; mine risk education; and increased international and regional co-operation.

In conclusion, Severiano stated that in de-mining only one manager, one co-ordinator and one leader should exist - all responsibilities should rest with the national government.

National Implementation: De-mining in Zimbabwe

Colonel TJ Dube introduced the problems peculiar to landmines in Zimbabwe. According to Dube, during the liberation war, the Zimbabwean guerrilla forces frequently traversed Rhodesia's borders with Zambia and Mozambique. In an effort to stop the guerrilla fighters from entering Rhodesia, the national forces planted a barricade of mines along the borders. Over time the fields were enlarged and modified into huge tracts of no-go areas.

Today these minefields are over 700 kilometres long, and over the years local farmers have abandoned mined areas, though the land is needed. Previous boundary marking for the fields have disappeared, leading to high casualty rates in areas where people must go near the mined land.

In the early 1980s the new Zimbabwean government began to remove these mines. However, only about 10% of the fields were cleared before operations ceased due to a lack of equipment. The magnitude of Zimbabwe's remaining mine problem makes the use of hand-held and manual de-mining impractical, according to Dube. However, if manual methods are used as a complement to mechanical minefield clearing, the rate of clearance of Zimbabwe's minefields can be increased. Casualty risk is also reduced in this way.

Future Possibilities

In Dube's opinion, the future of mine clearance in Zimbabwe entails several actions. First, he believes the national mine committee should be re-activated (having been disbanded in the 1980s with little accomplished) under the leadership of the Defence Force. In addition, the authority for all de-mining operations should be vested with the Ministry of Defence and co-ordinated by Defence Force Headquarters. Through the Defence Force, the de-mining committee can recommend de-mining priorities; monitor de-mining progress and quality; ensure appropriate use of de-mining funding; and liaise with other government agencies for resource mobilisation.

Operationally, Dube explained, all minefield marking and demarcation should be left to Defence Force engineers, as should all mine clearing. The authority for all clearance activities will therefore rest with Defence Force Headquarters. If a private organisation is contracted for clearance, Defence Force engineers will still monitor and oversee the project.

De-mining Financing

In conclusion, Dube explained that the Zimbabwean experience has shown that a project of this size will be difficult to accomplish in the absence of a comprehensive project proposal that aims to achieve total clearance of the minefield. The proposal must specify clearly the financial commitment needed to achieve total clearance. This proposal will not only help the government to locate funds from within its own coffers, but also to solicit support from donors, and will ensure that funds are utilised properly. Such a project proposal should aim to eliminate the mines problem in five years, he said.

National Oversight in Angola

General Helder Cruz commenced his presentation with a historical overview of Angola's mine problem. In his words, the mining carried out by the various factions was widespread but from 1975 until 1992 was along the lines of traditional military doctrine. Government and Cuban troops were in conflict with Unita and South African forces - all sides possessed landmines.

During the first peace process, Cruz said, most mine belts and defensive minefields were identified and were in the process of being cleared. The government with the Joint Commission (overseeing the peace) and South Africa were removing mines.

However, when the war was renewed in 1993, mining departed from traditional military tactics and mines were emplaced all over the country. While new weapons of terror were being laid, the de-mining stopped and eventually previously cleared areas could no longer be guaranteed as such.

This was Angola's situation in 1995 when the National Institute for the Removal of Explosives (INAROOE) was founded, Cruz said. The first tasks of INAROOE were to prepare a national de-mining plan, to establish a school to train de-miners and to create de-mining brigades for each province in Angola. However, due to financial constraints and the political situation in some provinces, only six brigades are functioning today.

INAROOE is also in the process of gathering in comprehensive survey of the mine situation in Angola, through co-operation with Norwegian People's Aid and the other de-mining NGOs. The Institute's regional

delegates also conduct mine awareness programmes. The de-mining school and INAROOE will soon begin a process of certifying the various de-mining training used by operators, by which all de-miners in the country will be approved for work. Uniform paramedic training will also be available through the national de-mining school.

The Operator's Perspective

Chris Pearce opened his presentation with the assertion that mine clearance is an industry, which has expanded from nothing ten years ago to a major growth industry inextricably linked to reconstruction and development. It is an industry which, after a long period of establishment, has matured considerably in the last few years, with established players, both commercial operators and NGOs, and not a few late entrants who are dazzled by the top line figures of mine clearance projects without having a clue as to the bottom line and the real costs and risks involved.

In this industry, as Pearce described, there are certain guiding principles. These have never been clearly defined, but in his opinion they can be referred to as: safety, efficiency, cost and speed. In other words, the crux of this business is to deliver mine clearance to the client(s) with due regard to the key elements of any supplier/customer relationship.

The first area Pearce focused on was productivity, which as the key element is inter-related with all other aspects. Productivity must focus on results. This means companies must achieve what they are paid for. Mined areas must be identified and cleared. If operators fail to identify clearly where the minefields are, and their true extent, time and resources (particularly money) are wasted in unproductive effort. Regrettably, this is all too often the case, in Pearce's opinion.

Productivity is possibly the most important and least understood element of mine clearance. Only recently have people started to grasp this. Resources, specifically money, are limited, according to Pearce. Time is an important factor, irrespective of whether the client is trying to run a refugee-return programme or start an oil project. Money for mine clearance is a finite resource. It has to be used wisely; it has to be used efficiently. This means that everyone involved in the mine clearance process has to understand it fully, and has to understand the implications of his actions, Pearce said. The knock-on effects in this business are huge, with serious cost implications.

Therefore, operators have to ask:

- Is the industry as a whole productivity - oriented?
- Are the donors getting value for money?
- Are programmes properly designed, managed and monitored?
- How can a situation like this happen? and,
- What can be done to improve the situation?

Operators need to be both objective and self-critical. Equally, however, donors and implementing organisations must be the same.

Apart from productivity, Pearce turned to quality and safety criteria, which he said should not be used as an excuse for poor techniques and low productivity. The bottom line, in his estimation, is that the greater the productivity in clearing land of mines, the greater the probability of accidents to the de-miner, unless an operator is working so slowly that the likelihood of accidents is minimal. It is well-known that mine clearance is a difficult and dangerous business; that it has inherent hazards. Unless there are serious breaches of safety procedures - which no professional would tolerate anyway. But in de-mining casualties can, and indeed will occur. Funding agencies, whilst they must surely satisfy themselves that proper health and safety procedures are in place and working, and that the correct insurances are in place, should be more concerned with the productivity issue. Pearce expressed concern that some donors are misled into accepting poor productivity by over-emphasis on the safety issue, which may be a fundamentally dishonest excuse for not delivering the goods to the client.

Contract structure was an issue Pearce addressed, due to many personal experiences with very poorly constructed mine-clearance contracts. He believes that this is partly due to the fact that many consultants who draw up contracts have little or no commercial mine clearance contract experience, and partly due to the fact that some organisations cannot be bothered to construct proper mine clearance contracts, preferring to use standard contract formats, or attaching ill-constructed contracts to standard conditions, neither of which bear much relationship to the realities of mine clearance and are usually only relevant to construction or road construction contracts. Unfortunately, the larger the organisation, the more inflexible and bullying its approach usually is.

After contract structure, another issue is that of price. Operators in the industry have to be competitive. Yet, in mine clearance, there is a definite correlation between price and a successful result. No-one can possibly meet at a bargain-basement price, the stringent criteria and standards for mine clearance demanded by the UN and larger donors. Good pricing is achieved by management efficiency and a balanced use of technologies to achieve efficient and effective mine clearance. It is not achieved by cutting corners.

In a technical context the de-mining industry also needs to examine seriously the use of additional appropriate technologies, since Pearce suspects that some serious financing might be going towards inappropriate technologies, which rarely receive field trials before completion. This is in direct opposition to any sensible commercial approach which demands market research.

Finally, one way to build credibility and co-operation in the industry, Pearce suggested, would be a de-mining confederation which will become a self-regulating body for commercial operators; which would set standards of conduct and ethics; would interact with governments, donors and other clients; would provide a platform for education and interaction between all the players; and would play a key role in the setting and modifying of industry standards, rather than complaining when those standards are imposed by others.

Donor Funding

In the first presentation on donor funding, Ambassador Robert Mayor elaborated the Swiss approach to funding de-mining, which he termed a 'huge task'. He encouraged donors not to discourage each other by estimating how much time and money will be needed to de-mine the whole planet.

However, he said, there can be no doubt that de-mining will require a lot of both human and financial resources in the years to come; the donor community must be prepared. To date the Swiss Government has spent more than US\$16 million on de-mining and victim assistance since 1993, including programmes on de-mining in Angola and mine awareness in Mozambique. According to its budget, Switzerland's investment will continue with another US\$3.3 million for de-mining and victim assistance due to the increased awareness among the Swiss of the huge problems presented by landmines. The primary channels of this aid will be the UN and the International Committee of the Red Cross.

At the same time he said, the Swiss must take into account their limited means and budgetary constraints. Priorities must be established to enable them to decide which projects will be financed in the first place.

Priorities

According to the Ambassador, both political and management criteria are considered. For example, Switzerland strongly supports the 1997 Ottawa Treaty against mines. Consequently, Switzerland will give special consideration to countries which also support the ban, but the overall position is very clear: to de-mine the fields so that the land can be used.

As for management criteria, two points must be stressed, he said. First, the socio-economic impact of mines on the daily lives of the populations and their effect on development are of primary concern. Not every mine needs to be removed in the short- or medium-term. Rarely used areas may require only some fencing to protect the population, while the densely populated and economically important areas must be cleared as soon as possible.

Second, the cost-effectiveness of de-mining operations is another important factor to the Swiss. In their view, de-mining should not be mingled with job creation, trade promotion, technology transfer or any other goals. De-mining is not part of the development process; it is a precondition for development. Positive side-effects may emerge, but they must not determine the means and measures of de-mining, said the ambassador.

However, cost-effectiveness is not easy to assess; it is not simply a dollar-to-mine ratio but depends on the situation in the field. Therefore, in Mayor's view, de-mining projects must be subject to sophisticated monitoring and quality assessment. These are significant obligations for donors, but could be carried out by independent observers. If properly implemented, monitoring and quality assessment will not only reassure taxpayers that their money is being wisely spent, but could also help to improve de-mining projects.

Finally, in order to facilitate information exchange on safe and cost-effective de-mining, Mayor announced that Swiss agencies are preparing the launch of a Mine Information Centre in Geneva, the concept of which has been designed in collaboration with the UN. The

Centre is expected to be operational in 1999, will bring together the representatives of the 14 UN MACs annually, and also provide them with an electronic information network. The Centre will also be active in the training of future de-mining managers and computer specialists. The ambassador noted that the Centre was evidence of Switzerland's desire to contribute to cost-effective and successful de-mining operations. Moreover, he concluded the government would remain involved in the de-mining of Southern Africa, including a new project in southern Mozambique.

American De-mining Assistance

Karl Olson presented information on the US Government's Humanitarian De-mining Program, which began in 1993, by charter of the White House's National Security Council. The programme currently operates in 19 countries, including five added in 1997 alone. In 14 countries, landmines are being destroyed now, he said. Programmes exist in Africa in Angola, Chad, Eritrea, Ethiopia, Mozambique, Rwanda and Zimbabwe. New countries are being recruited as well.

To participate in the programme, countries have to meet two criteria which are essential for consideration: that hostilities must have ceased, with a viable peace agreement in place if applicable; and that the government of the landmine-affected nation must make a formal request to the US Embassy for assistance. A policy assessment is then conducted to explain the details of the programme to the government and to determine the host nation's commitment to providing its own resources, or soliciting resources itself, to support the programme in the longer term after direct US Government involvement declines. A 'Requirements Determination Site Survey' is also conducted, to determine exactly what is needed. Generally speaking, said Olson, if a landmine-affected country maintains a good bilateral relationship with the United States and continues to use US assistance effectively, provided that resources remain available and without unusual complications, assistance will ordinarily be continued until the landmine threat against civilians is removed.

Olson explained that the overall objective of the US programme is to create a sustainable, indigenous de-mining capability in the landmine-affected country that will continue into the future. This includes the establishment of a MAC as a single point of contact for the government of the country, responsible for co-ordinating all mine actions in the country. An effective MAC is considered an essential prerequisite for

success. Other aspects of the programme include public awareness training, historical research, training and equipping of de-miners and the commencement of actual de-mining operations. In all cases, the programme in each country is a programme of that country, he emphasised. The host nation must make policy decisions, set priorities and manage and co-ordinate activities in its country.

Recently, Olson explained, the US made two changes to its programme: first, that unexploded ordnance clearance will also be included in activities if deemed necessary by the MAC; second, that new flexibility will be utilised to accept non-traditional proposals that support the overall policy objective of creating a sustainable, indigenous mine clearance capacity.

Finally, Olson outlined the De-mining 2010 Initiative, which he described as a diplomatic initiative to increase substantially public and private contributions to de-mining in order to remove all mines threatening civilians by the year 2010. The goal is to increase contributions (roughly by a factor of five) to US\$1 billion per year. The initiative will also create a co-ordinating mechanism for donors and landmine-affected countries to improve efficiency.

The Future of De-mining

The Promise and Practicalities of Technology

Dr Vernon Joynt opened the second day of the conference with a discussion of the future of de-mining technologies - namely the long-term search for a 'silver bullet' versus successful current techniques. Joynt expressed concern that while some work, such as mine awareness and medical rehabilitation that deplete de-mining funding is commendable, work on costly, high-tech research and development projects, which are most expensive, is less warranted.

For example, one serious problem in Joynt's view is that proven technologies available today are not being used to remove mines, or are not being used to their fullest capacity. These existing pieces of equipment which can improve the safety and efficiency of de-mining operations are not being used, although the search for 21st Century measures goes on. More research and development is not necessary until the full impact of these techniques, including mine-proof vehicles, dogs, mechanical detonation machines, vegetation clearance devices and vehicle mounted detectors, has been exploited.

Of course, Joynt explained, even if a silver bullet could be found for mines, serious hindrances would still exist to bar its use, as these same hindrances already affect the utilisation of current technologies. For example, when a new piece of equipment is developed, people will refuse to believe in its effectiveness, will ignore its existence and may probably continue to do things their own way regardless. Some legitimate objections do exist to new methods, he explained, including the high capital costs for development and purchase, a lack of trained operators, the supply of current operators for old technologies, and the inability of any machine to work in all situations.

However, each of these concerns can be countered. To reduce capital costs, contracts could be consolidated and equipment shared among operators. Advanced training schools could be established to train people in the new skills required. Most important, to counter arguments against limited applicability, good management can identify areas where the new technique can work efficiently (versus areas where manual de-mining is required), and build operations along these parameters.

The issue of manual de-mining raised several other points for Dr. Joynt, as manual de-mining is often regarded as too slow and costly. A broad principle for the use of manual versus other techniques, in his opinion, is that advanced technologies should only be used where they will clearly be better than manual action. Using criteria such as cost, time, reliability and availability, a good manager can assess whether or not the acquisition of advanced technologies is worthwhile.

As Joynt explained, these assessments are vital, because much of the technological research backed today as the imminent silver bullet has actually been under development for decades to no avail. Joynt offered ground-penetrating radar and thermal imaging as examples. Similarly, around the world the quest for a better metal detector continues, but in the wrong direction. While scientists look for increasingly sensitive detectors, Joynt says they should be searching for more selective equipment instead. It is useless to have a detector strong enough to find every shard of metal in the ground; instead, one that can differentiate between harmless items and mines is more important.

Finally, drawing from experience with Mechem operations in the field, Joynt commented on the combination of technologies available today with manual de-mining, in the search for cost-effective landmine clearance. While the use of manual de-mining is a waste of time in some circumstances, he asserted, when combined with dogs, Casspirs with steel wheels and vehicle-mounted detectors, manual de-mining is an appropriate and cost-effective method.

Landmines, Peace Building and Disarmament

Martin Edmonds explained that according to the evidence extant, landmines have been extensively used by all sides in modern conflicts as a preferred weapon. This was graphically demonstrated in the break-up of the former Yugoslavia. The role of anti-tank and anti-personnel mines figured prominently in the conflict, not only in the break-up of the former Yugoslavia but also in the conduct of the peace enforcement operations. All the parties used anti-personnel landmines extensively in their attempts to terrorise the local population. For these reasons, the liberal use of anti-personnel and anti-tank mines by the combatants in Bosnia Herzegovina presented a particularly challenging task to the UN and peacekeeping forces.

Multi-functional Peace Support Operations

The Bosnian example is replicated elsewhere in the world where landmines have been used in recent years and international forces have intervened during or after a conflict. Somalia, Cambodia, Angola and Mozambique immediately present themselves, in Edmonds' view. High among the objectives of peacekeepers is to rid these countries of the negative residual effects of war (in which landmines figure at the top of the list), whilst at the same time to take positive action to rebuild the basic infrastructures of agriculture, transport, industry, and public utilities. Invariably, the latter is impossible until the former task has been completed. In this role, co-operation between the UN forces, non-governmental agencies, commercial mine clearing companies, and the civilian population is essential.

Mine clearing spans the boundary between peace support and peace building and raises a host of legal, operational and functional problems. Peace building is potentially a limitless commitment, and one which national forces are not necessarily best equipped to conduct, with, of course, the one exception of mine clearance once the more easily defined international UN task of peace support operations has terminated. It is for this reason, perhaps, that the task of mine-clearing in post conflict situations devolves on to non-government organisations, charities and commercial companies.

Despite these actors, mine clearance by peacekeepers is not the most easy or straightforward task, for a whole host of reasons. First, there is the whole question of the mandate under which the UN forces are operating. This need not necessarily encompass post-conflict reconstruction responsibilities. Second, UN operations invariably carry with them a time limit, not to mention the limits that participating countries impose on the commitment of their national forces. Peace-making and peace enforcement are lengthy operations and difficult enough tasks; wider peace support operations and peace building initiatives introduce an added burden. Funding these commitments, whether from UN resources or from national contributions, is a major problem. Mine clearance is only one small element in peace building, and so far the UN Secretary General's Voluntary Trust Fund for mine clearance has not attracted significant sums towards resolving the problem.

Disarmament and Land Mines

A primary problem in international agreements between states to limit or ban certain categories of weapons, according to Edmonds, is that not every state will either sign or ratify treaties. A subsidiary problem is that even when states sign the agreement, they do not necessarily abide by their undertaking.

The 3 May 1996 amendment to the Convention on Conventional Weapons carried the process of debate on the banning and elimination of anti-personnel mines further, as did the completion of the December 1997 Ottawa Treaty against anti-personnel mines. As yet, however, only a few states have taken the step of ratifying it. Other recent international resolutions and declarations have all helped to maintain international pressure to ban the production and use of anti-personnel mines, and done so in a regional context.

The wording of some of these protocols, however, will need improving, especially when some actually endorse the existence and use of anti-personnel weapons, so long as they are 'responsible' and self destructing. Then, after ratification, provisions are needed for effective verification and monitoring of signatory states, something which some states may well resist. Furthermore, as anti-personnel technologies become more sophisticated, the definition of the anti-personnel land mine becomes less precise.

What are the Longer Term Prospects?

These initiatives, declarations and resolutions are extremely useful steps in the right direction, but the longer term prospect is not as promising as many would like or expect. The major problem is to translate exhortation into practical reality. Whether the stigma of being known to be a country that uses landmines, or even non-statutory, guerrilla-type forces, will be sufficient to act as a deterrent against their use is debatable.

As if these problems were not difficult enough, there are still too many land mines available around the world in the hands of non-statutory forces and irregular groups for there to be much confidence in the possibility of a total removal and destruction of the anti-personnel landmine as a tool of war. Furthermore, mines are too cost-effective, both as a political and military weapon not to remain in demand. The landmine remains simple to produce, easy to use and effective.

Evaluating De-mining in Southern Africa: Other Issues to Consider

For Alex Vines, the issue of the legacy of Landmines in the Southern African Development Community (SADC) warranted comment before addressing the ethical and other implications of de-mining. Vines asserted that a determination of the responsibility and accountability for the existing problem of mines is needed. Additionally, Vines commented that NGOs would like to see a full accounting of the activities of landmine clearers, prior to their current careers. For example, he noted a desire to see Mechem give a full submission to South Africa's Truth and Reconciliation Commission on the actions of the company and its members during the apartheid regime. Equally, he named certain Zimbabwean de-miners whose past he would like to see opened to public scrutiny.

Turning to de-mining, Vines raised a concern that contract tendering and the process of awarding de-mining contracts should be open to public scrutiny. Not only is the playing field far from level in Southern African de-mining, he has found that competition among actors is so fierce it leads to the spreading of rumours and false stories to damage reputations. At one time a death threat was even made to a tendered in a contract competition.

In addition to companies battling it out in the press, governments often intervene on a company's behalf, making the award of a contract a political issue. However, this is not Vines' only concern. He asserts that in the SADC region, recipient governments often push for contracts that contain kickbacks or personal benefits for members of the government.

Finally, contracts must have tight terms of reference, including strict quality regulations to ensure proper standards of mine clearance, said Vines.

Quality control within contracts is not the only source of difficulty. According to Vines' research, NGOs and commercial operators often spread disparaging tales about the quality and safety standards of their competitors. Unfortunately no independent and impartial quality assessment body exists, so it is impossible to verify the quality of an operator's work, except on their own word, or the word of a quality assessing company subcontracted by the operator itself. A related concern exists when operators sub-contract actual operations, as little supervision may take place regardless of the primary contractor's reputation.

Related to the question of reputation, Vines highlighted the absence of any method by which to verify the credentials of an operator before a contract is awarded. This is exacerbated by the rivalries and slanderous remarks among operators mentioned above. Vines suggested that a central database of operators and results could be created for SADC.

Finally, Vines raised the issue of co-ordination among mine clearance operators. Because of their competitive nature, firms share little information about mines or locations, despite the obvious advantages of combining information. Donors have encouraged this isolated and maverick action by funding only one de-mining operation at a time and funding it in total, rather than encouraging multiple operations. According to Vines, some de-mining firms exist solely because of this patronage, not because of any particular expertise - such weaknesses will not be exposed when no one knows what an operator is doing.

Co-ordination among operators should also extend to pay structures for de-miners, concluded Vines. In one example, low pay rates by one organisation sparked donor pressure on all operators to cut costs. However, this search for cost-effectiveness should not be allowed to occur at the expense of quality or safety, as has happened in a quest to make contracts more competitive. NGOs and other watchdog organisations can help with this monitoring of both donors and operators, said Vines.

Strategies for Success in Southern Africa

Laurie Boulden opened her presentation with the assertion that four key ingredients were necessary for the improvement and acceleration of mine clearance in Southern Africa: common sense, communication, clarity and commitment. These four were intertwined in each of her comments and suggestions.

First, Boulden addressed the level of commitment of host governments to de-mining. While their concerns for sovereign decision-making in mine clearance operations are commendable, governments must be committed to the process. Establishing a sovereign office for mine clearance co-ordination is useless if it has no staff, budget or expertise. Similarly, this commitment must be evident to operators and donors if governments are to merit the sovereign rights and respect they seek.

On the other hand, donors and operators must respect the background from which many of the host governments have recently emerged.

Their history of war and civil conflict leads them to have very strong concerns about authority and sovereignty, while they might perhaps lack an appreciation of the need for transparency and accountability experienced in older democracies. These issues, as well as very real personnel, expertise and fiscal constraints in countries that have just experienced periods of turmoil, must be recognised rather than just criticised as inaction and lack of dedication to the cause of de-mining.

More broadly, Boulden said, all expatriates working in these countries should also appreciate cultural and traditional factors that may make members of the host country appear difficult to work with. In fact, concerns about respect and language are not unique to these nations; nor is resentment when they are neglected. As clearly happened in Angola, a foreigner's refusal to learn any Portuguese simply made relations with the national government unworkable and bitter, and this man's entire tenure in Angola worked to the programme's detriment.

Turning to donors, Boulden claimed that it is their duty to understand de-mining better if they are accurately to assess programmes and their effectiveness. For example, if de-mining is not thoroughly understood, with its nuances and differences, a tendency to judge operations simply on a perceived financial 'bottom line' is not adequate. Donors must beware fly-by-night operators and those who cut corners, but appear to have effective operations. Likewise, donors must recognise the external factors that make worthwhile operations look inefficient, such as illness, weather, political difficulties and supply problems. Equally, factors such as medical care for locals or the rebuilding of local infrastructure to facilitate de-mining may look like needless expenses for the operation, but are in fact integral parts of the work. This need for information extends to an understanding of safety and training needs, as well as de-mining methods and operator credibility.

Politically, donors should spend more time and effort helping the recipient governments, according to Boulden, rather than complaining and acting as unilateral decision makers in a foreign country. Instead of berating governments for not formulating national plans and priorities for de-mining, donors could use their position and influence to encourage and work with the government. By continuing to act unilaterally, donors are actually rewarding government inaction, she said, because all pressure on national governments to empower their own de-mining offices is removed. The donors are doing the work for them.

Lastly, Boulden said that donors should beware of their role as advocates for particular operators and as meddlers in operators' affairs. In using political power to push one operator for a contract, the donor is not impartial, nor is it ceding any authority for decisions to the national government. Equally, by worrying over an operator's daily affairs, especially if they fall within the ambit of the national government, the donor again is not acting impartially, and can actually exacerbate small operational difficulties by needlessly turning them into high-level political ones.

Turning to operators, Boulden concurred with Pearce that de-mining is an industry and must be prepared to act like one. Transparency and accountability in actions and budgets must be accepted and encouraged. Educated donors will begin to ask tougher questions, and as funding becomes tighter, donors can impose more stringent requirements.

Additionally, Boulden agreed with Pearce's idea that a federation of de-mining operators should be created to enforce standards, quality and ethics in tendering, and to reduce the needless rivalries and rumour-mongering that exist at present. A confederation could also help disseminate ideas and methods among operators and create a standard of credibility by which donors can judge operators.

Finally, the issue of UN involvement in de-mining was addressed. Boulden queried first, why the UN consistently tried to impose a blueprint of how a mine action centre should be created in every country. She pondered that perhaps the correct question to ask the UN should be whether a mine action centre is needed at all.

Boulden considered that flexibility of thought should be encouraged, particularly with regard to the UN policy of seconding people to train national governments in de-mining. For example, UN personnel arrive in country and attempt to force the national government to learn 'good' management and financial accounting skills that are transparent. However, the UN system is unnecessarily complex and too bureaucratic for most businesses, not to mention recovering governments. Instead, Boulden suggested that managers with broad skills be sent to create a system desirable to the host government, and then begin to implement it - rather than, for example, forcing Angola to learn the UN way and then hoping it can later be adapted to the Angolan situation. A short-cut, in her opinion, would have been to simply ask the Angolans what they wanted.

Boulden concluded that the UN should assess its role in de-mining more broadly. Perhaps the proposed UN mine action centre could simply be an advice and co-ordination centre that helps arrange aid without enforcing it. On the other hand, the UN should consider whether it intends to be some sort of international arbiter of de-mining, using standards to some purpose; or whether the long process of creating de-mining standards has been in vain.

To address all of these problems, Boulden suggested recognising that a more mature stage of de-mining has been reached, and it should be treated as such. The old rules of isolationism and maverick action have passed. A new set of parameters and definition of roles is needed. But overall, the injection of common sense, clarity, communication and commitment can greatly improve the current situation.

Summary and Conclusions

Concluding the conference, Dr Greg Mills highlighted the three overall questions posed by the conference. First, Mills suggested that the conference had examined why an analysis of the issues is important. As such, Kasrils and Edmonds had highlighted the very real security and political threats posed by the presence of landmines during and after conflicts. Consequently, mine clearance remains an international responsibility, not only for development purposes but also as part of peace building and disarmament activities around the world. However, Mills noted Pearce's assertion that de-mining has become a major growth industry and that the larger issue of establishing operator confidence is also an important factor.

Second, Mills believed the conference focused on a critical examination of the techniques currently employed in mine clearance and the difficulties experienced in each case, operationally, managerially and politically. Through the presentations in session one, the de-miners themselves were able to enumerate the successes and failures they have experienced, in order to share advice and lessons learned with others. In the second session, the less tangible problems of de-mining - the political trials - were highlighted. Consequently, the need for better interagency communication and co-operation; better operational and financial management; increased transparency; the eradication of corruption and nepotism; and a need for consistent quality control were each noted. Additionally, the establishment of an improved professional ethos among mine clearance operators was suggested.

Finally, Mills concluded, the conference addressed potential solutions to these problems, specifically how the cost-effectiveness of operations could be improved. In terms of technology, Joynt and others endorsed a combination of manual and mechanical techniques as the most efficient method, if managed properly. Severiano and the government representatives, on the other hand, remarked that better information, improved management, national capacity building and sovereign quality control were each steps toward more efficient and effective de-mining. Co-ordination of the various agencies around the world involved in mine clearance also requires encouragement, and clarity on roles and responsibilities could further this process. Suggestions also included standardised procedures and criteria for de-mining operations, improved contract structures, the use of build-on technology in the field, and the creation of an industry federation as a platform for all of these measures.

In Mills' opinion, the one issue that permeated the conference was the need for better communication, perhaps facilitated through independent monitoring, to reduce the current levels of mistrust in the community. And, in fact, despite the lack of communication extant today, all of the participants were communicating the same broad message: that more efficient and cost-effective methods of de-mining are required to rid Africa of the curse of landmines.

Conference Programme

Towards Cost-Effective De-mining: An Evaluation of Experiences and Techniques

Hosted by
Landmines in Southern Africa Project
South African Institute of International Affairs, Johannesburg

22-23 April 1998

Day One: Wednesday 22 April

Open and Welcome - Dr. Greg Mills, National Director, SAIIA

Opening Address: South Africa and a Landmine-Free Southern Africa - Mr. Ronnie Kasrils, South African Deputy Defence Minister

Session 1: Organisation and Implementation

Chair: Laurie Boulden, Landmines In Southern Africa Project, SAIIA

United Nations De-mining - JJ van der Merwe, Program Manager, UN MAC, Bosnia-Herzegovina

Mechem, Mechanical Clearance and MEDDS - Theo van Dyk, Manager, De-mining Operations, Mechem

Norwegian People's Aid in Angola - Håvard Bach, Programme Manager, Angola

Mechanically Assisted Manual Mine Clearance - Hendrik Ehlers, MGM, Angola

Session 2: Interagency Relations

Chair: Roger Ballard-Tremeer, Department of Foreign Affairs

National Government Oversight: Past and Future in Mozambique - O.M. Severiano, Executive Director, National De-mining Commission

National Implementation: De-mining Zimbabwe - T.J. Dube, General Manager, Zimbabwe Defence Industries

National Oversight in Angola - Helder Cruz, Executive Director, INAROOE, Angola

The Operator's Perspective - Chris Pearce, Director, Mine-Tech

Donor Funding - Ambassador Robert Mayor, Embassy of Switzerland, Pretoria

Donor Funding - Karl Olson, US Department of State, Washington

Day Two: Thursday April 23

Session 3: Future of De-mining

Chair: MG Mike Willcocks, Assistant Chief of the General Staff, British Army

The Promise and Practicalities of Technology - Dr. Vernon Joynt, Mechem

Landmines, Peace Building and Disarmament - Dr. Martin Edmonds, Centre for Defence and International Security Studies, University of Lancaster

Evaluating De-mining in Southern Africa: Other Issues to Consider - Alex Vines, Human Rights Watch

Strategies for Success in Southern Africa - Laurie Boulden, SAIIA

Summary and Conclusions - Dr. Greg Mills, SAIIA

Participants

Håvard Bach is the Angolan Programme Manager for Norwegian People's Aid (NPA).

Roger Ballard-Tremeer is Department of Foreign Affairs' Director in Pretoria responsible for South Africa's bilateral relations with 15 countries in the North of Africa.

Laurie Boulden is currently researcher for SALLA's *Landmines in Southern Africa Project*.

General Helder Cruz is Executive Director of the Angolan Instituto Nacional de Remoção de Obstáculos e Engenhos Explosivos (INAROOE).

Colonel TJ Dube has been Chief Executive of Zimbabwe Defence Industries since 1994.

Professor Martin Edmonds is Director of the Centre for Defence and International Security Studies at Lancaster University in the United Kingdom.

Hendrik Ehlers is one of the two Managing Directors of Stiftung Menschen Gegen Minen, better known as MGM De-mining in Angola.

Robert Mayor has been Ambassador of Switzerland to South Africa since November 1995.

Dr Greg Mills is the National Director of the South African Institute of International Affairs.

Dr Vernon Joynt is General Manager of Mechem.

Ronnie Kasrils is currently South Africa's Deputy Minister of Defence.

Chris Pearce is a director of the Zimbabwe-based mine clearance company, MINE-TECH.

Colonel Osório Severiano is Executive Director of Mozambique's Comissão Nacional de Desminagem (CND).

JJ van der Merwe served as Programme Manager of the UN Mine Action Centre in Bosnia and Herzegovina until April 1998.

Theo van Dyk is Manager of De-mining Operations at Mechem

Alex Vines is currently Research Associate for Human Rights Watch/Africa.

Major General Mike Willcocks CB became Assistant Chief of the General Staff in July 1996. He was awarded the CB in January 1997.

About the SAIIA

The origins of the South African Institute of International Affairs (SAIIA) date back to the Paris Peace Conference of 1919. In this fragile post-war atmosphere, many delegates expressed a strongly-felt need for the establishment of independent, non-governmental institutions to address relations between states on an ongoing basis.

Founded in Cape Town in 1934, in 1960 the Institute's National Office was established at Jan Smuts House on the campus of the University of the Witwatersrand. SAIIA's six branches countrywide are run by locally-elected committees. The current National Chairman is Dr. Conrad Strauss and the National Director is Dr. Greg Mills. The SAIIA produces a wide range of publications including *The South African Yearbook of International Affairs*, *The South African Journal of International Affairs*, *International Policy Update*, the *Occasional Paper* and *Bibliographical* series, as well as a number of specialised book projects.

The Institute has established a proud record of independence, which has enabled it to forge important links with leaders of all shades of opinion, both within South Africa and outside. It is widely respected for its integrity. The information, analysis and opinions emanating from its programmes often exercise an important influence on strategic decision-making in the corporate and political spheres.

SAIIA's independence is enshrined in its constitution, which does not permit the Institute itself to take a public position on any issue within its field of work. However, it actively encourages the expression of a diversity of views at its conferences, meetings and in its publications. Its independence is also assured by the fact that it is privately sponsored by its members - corporate and individual.

Recent SALLA Publications

Books:

- Mills G (ed), *From Pariah to Participant* (1994)
- Mills G et al (eds), *South Africa in the Global Economy* (1995)
- Mills G, *Maritime Policy for Developing Nations* (1995)
- Mills G & J Cilliers (eds), *Peacekeeping in Africa* (1995)
- SALLA Research Group, *South Africa and the Two Chinas Dilemma* (1995)
- Edmonds M & G Mills (eds), *Uncharted Waters: A Review of South Africa's Naval Options* (1996)
- Venancio M & S Chan, *Portuguese Diplomacy in Southern Africa* (1996)
- Barber J, *South Africa in the Post-Cold War World* (Bradlow Series No.8) (March 1996)
- Handley A & G Mills (eds), *From Isolation to Integration?* (1996)
- Oosthuysen G, *Small Arms Proliferation and Control in Southern Africa* (1996)
- Mills G (ed), *SALLA Yearbook of International Affairs, 1997* (1997)
- Handley A & G Mills (eds.), *South Africa & Southern Africa: Regional Integration and Emerging Markets* (1998)

Bibliographies

- Strachan B, *Angola: The Struggle for Power - The Political, Social & Economic Context 1980-1993* (Bib. Series No. 28) (1995)
- Schoeman E, Kalley JA & N Musiker, *Mandela's Five Years of Freedom: SA Politics, Economics & Social Issues 1990-1995* (Bib. Series No. 29) (1996)
- Strachan B, *Mozambique: The Quest for Peace* (Bib. Series No. 31) (1996)

Reports

- Mills G, *India and South Africa: The Search for Partnership*, 1, 1997.
- Mills G et al, *US-South Africa Relations and the 'Pariah' States*, 2, 1997.
- Oosthuysen G, *The Illegal Drug Trade in Southern Africa*, 3, 1997.
- Mutschler C, *South & Southern Africa: Lessons from Emerging Markets*, 4, 1997.
- Bertelsmann T & C Mutschler, *Revisiting South-South Co-operation: An Agenda for the 1990s*, 5, 1997.

About the Author

Laurie Boulden is currently researcher for SALLA's *Landmines in Southern Africa Project*, for which she has travelled extensively in Mozambique, Zimbabwe and Angola. She has published and spoken widely about landmines and defence issues during her tenure in South Africa, including regular contributions to the *Star/Independent Foreign Service*, *The Sowetan*, and *The Washington Post* as well as Radio 702, Classic FM, Radio Lotus and SAFM. She has also lectured on US defence policy and economic issues at Milpark Business School and the SANDF Staff College.

Prior to joining the Institute, Laurie was Research Associate for the Chemical and Biological Weapons Nonproliferation Project at the Henry L. Stimson Centre (a think-tank) in Washington, DC. In this capacity, she briefed members of the US Congress, the business community, and the public about chemical and biological weapons issues in addition to her publications on these issues.

Laurie holds a Bachelor's Degree in History from the University of Michigan and a Master's Degree in Foreign Policy, with a specialisation in International Security and Arms Control, from the School of International Service at the American University in Washington.



THE SOUTH AFRICAN INSTITUTE
OF INTERNATIONAL AFFAIRS

PO Box 31596

Braamfontein 2017

Tel: (011) 339-2021

Fax: (011) 339-2154

Email: saiiagen@global.co.za