

Cambodia: A Country Profile

Through the efforts of CMAC, Mines Advisory Group and HALO Trust, Cambodia is working to eliminate the hundreds of contaminated areas within its borders. Rohan Maxwell proposes changes in these operations to sustain removal efforts.

By Rohan Maxwell, Officer, Canadian Army

Background

In the late 1960s, communist insurgents known as the Khmer Rouge began operations against the central government of Cambodia, launching three decades of nearly continuous warfare. Vietnamese communists supported the insurgents, while the government came to be supported by the United States and South Vietnam. The fighting was exacerbated by the expansion of the Vietnam War into eastern Cambodia, including a massive American bombing campaign against communist supply lines. Battlefield UXO was widely dispersed, while aerial-delivered UXO was concentrated in the eastern and central provinces (ref 1). According to the International Committee of the Red Cross (ICRC) (ref 2), about 10 percent of the mines in Cambodia were laid during this period—most in the central and southern provinces.

The first civil war ended with the defeat of the central government in April 1975. It was followed by 44 horrific months of Khmer Rouge rule, during which more than 1

million Cambodians died of starvation, disease and murder. Approximately 5 percent of the mines were laid under the Khmer Rouge regime, mainly in the Thai and Vietnamese border regions.

The second civil war began at the end of 1978 when Vietnam, goaded by border provocations, drove its erstwhile ally back into guerilla warfare and installed a more cooperative government led by Khmer Rouge defectors. After a decade of fighting between the central government (and its Vietnamese backers) and the Khmer Rouge (and various non-communist Cambodian groups formerly opposed to them), Vietnam withdrew its forces and peace negotiations began. With the concurrence of all parties, the U.N. Transitional Authority in Cambodia (UNTAC) was mandated to run Cambodia for 18 months (1992-1993) in order to supervise demobilization and conduct elections. The Khmer Rouge chose to resume fighting, so demobilization failed, but elections did take place and the central government gained greater international legitimacy. The war continued for the remainder of the 1990s, with the central government slowly gaining the upper hand and internal and external support for the guerillas ebbed. Most of the fighting took place in the northern and northwestern provinces, but there was also significant fighting in the central and southern provinces. By the late 1990s, the guerillas were a spent force and the last groups gave up in 1999.

The majority of the mines, 85 percent, were laid during the second civil war. All combatants used mines extensively, and, ironically, the highly mine-affected Cambodian civilians began using them for their own purposes—self-defense, protection of property, or brutally direct dispute resolution. Few records were kept, but in 1994 the United Nations estimated that there were as many as 10 million mines in Cambodia (ref 2). In 1997, this was reduced to 4 million to 6 million (ref 2), an estimate supported by the number of mines that were actually being

■ A bridge along National Route 10, the main highway connecting Cambodia's second-largest city, Battambang, to Thailand. c/o Rohan Maxwell



located (ref 3). In 1999, the HALO Trust took this empirical approach one step further, applying the known clearance results to the amount of land thought to still be contaminated: this estimate suggested that there had been no more than 1 million mines to begin with (ref 2).

UNTAC identified more than 1,900 potentially contaminated areas (ref 3) totaling approximately 3,600 square kilometers (refs 2 and 3). By 1999, subsequent survey efforts had reduced this to 2,800 sq. km (ref 3). Of this total, 656 sq. km were known to be contaminated (ref 4), leaving 2,144 sq. km in doubt. Since on average only 35 percent of suspected terrain is actually mined (ref 2), it is probable that a further 750 sq. km of contaminated land will be identified, for a total of approximately 1,400 sq. km. This total will require a significant amount of clearance, since on average each square kilometer of contaminated land contains more than 1,000 mines.

In 1993, the UNTAC force commander estimated that it would take 30 to 40 years to demine Cambodia (ref 5). In fact, given the current clearance rate of approximately 15 sq. km per year (ref 2), it would take 93 years to clear 1,400 sq. km. If only high priority land is considered—land needed for resettlement, agriculture and critical development—the task becomes more manageable. For example, the HALO Trust estimates that all high-priority land in Cambodia could be cleared in five to 10 years at the current rate of progress (ref 2). This estimate depends on the definition of high-priority land, but the key point is that with continued international assistance it should be possible for most Cambodians to live a mine-free existence within a reasonable period of time. Once that has been accomplished, a smaller-scale, long-term effort can deal with the remaining areas.

The Mines

Of all mines in Cambodia, 99 percent are AP: 68 percent blast, 26 percent fragmentation, and 5 percent bounding fragmentation. The Russian PMN-2, whose 115-gram charges inflict great damage, accounts for approximately 80 percent of the blast mines. Smaller blast mines include the Vietnamese MD 82B and MN 79, the Russian PMD-6 and the very low metal content Chinese Type 72A and B (the B model incorporates an anti-disturbance device). Most fragmentation mines are Russian POMZ-2 or POMZ-2Ms, while the Chinese Type 69 is the bounding fragmentation mine of choice. AT mines are almost all Russian; many of them are buried in stacks of two or three more than a meter down with a bamboo pole to conduct pressure from the surface to an AP mine placed atop the first AT mine (refs 3 and 4).

Casualties

In 1994, Handicap International determined from the number of mine-related amputations per month that there were approximately 500 casualties per month from 1985-1994, or a total of 60,000 casualties (ref 5). In contrast, a 1998 estimate by the U.S. government gives a smaller figure of 37,428 casualties for the longer period of 1979-1996, including 13,328 fatalities (ref 1). The most comprehensive and recent information is that gathered by the Cambodian Mine Incident Database. This source provides a figure of 48,842 mine and UXO casualties from 1979 to the present (ref 8). Adding 15 percent for pre-1979 casualties (based on the proportion of mines laid before 1979) increases this to perhaps 56,168 casualties since the fighting began, as many as 28 percent of which may have been fatal (15,727 deaths—refs 1 and 8). This is by no means a worst-case

analysis—at present a majority of the estimated 49,846 Cambodian amputees (ref 1) are casualties of mines and UXO. As amputations represent 27 to 40 percent of all injuries (refs 5 and 8), there could have been as many as 124,615 to 183,281 casualties. Discrepancies on such a large scale are



■ A mine detecting team ready for the mine field. c/o Rohan Maxwell

difficult to fathom until one recalls that a much larger figure—the number who died under the Khmer Rouge—has not yet been narrowed down to the nearest million.

The Mine Incident Database provides excellent detail on the current situation. At present, 91 percent of casualties are civilians, 38 percent of whom are injured in the course of subsistence activities such as farming, gathering wood, fishing, collecting food, fetching water and herding cattle. An additional 15 percent are injured while travelling. Adult males

account for 63 percent of all victims, but 30 percent are children under the age of 18. Tampering causes 42 percent of casualties, including one-quarter of the men, three-quarters of the children and one-quarter of the women. Most of them fall victim to mines, but UXO accounts for 41 percent of all casualties, including 69 percent of children. There are, on average, 85 new victims each month, and 1 in 5 do not survive their injuries.

Demining Organizations

There are many humanitarian organizations that have conducted, supported or are presently contributing to demining operations in Cambodia (e.g. Norwegian People's Aid (NPA), Handicap International (HI), World Vision, CARE) but this article will discuss only those that are currently conducting operations: HALO Trust, Mines Advisory Group (MAG) and the Cambodian Mine Action Center (CMAC). HALO Trust has been working in the northwestern provinces of Banteay Meanchey and Siem Reap since October 1991. Its

500 Cambodian staff are organized into 16 clearance teams working predominantly in the immediate vicinity of villages—houses, schools, water supplies, health facilities and paddy fields. HALO's Cambodia operations are funded by the governments of the United Kingdom, the United States, Finland, Ireland and Japan, as well as the United Nations, the European Union (EU) and private donors in England and Japan. MAG Cambodia started work in 1992. Its mine action teams are presently concentrated in the northern and northwestern provinces of Preah Vihar and Battambang. Like the HALO teams, they normally work in proximity to villages. The 389 Cambodian staff (including 48 amputees and 46 woman deminers) and nine expatriates are supported by donors including the governments of the United Kingdom, the United States and Austria, as well as the Lutheran World Service and Church World Services.

CMAC evolved from the UNTAC Mine Clearance Training Unit in 1993. After initial funding

difficulties, it expanded to a strength of 2,800 Cambodian staff and 50 expatriates. CMAC is a Cambodian agency, but it relies almost entirely on international donations and it is administered as a project of the U.N. Development Programme. Its annual budget has peaked at approximately \$12 million (U.S.), plus numerous donations in kind from donors including Australia, Belgium, Canada, Denmark, Germany, Japan, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the EU, the United Kingdom and the United States.

CMAC's approximate 60 demining platoons are organized and deployed in groups of four to six platoons plus supporting elements (ambulance, radio, guards, etc.), with three such groups making up a Demining Unit (DU). This type of organization means that CMAC cannot deal readily with smaller tasks. Some flexibility is provided by community mine teams whose mandate is to take on urgent tasks in order to reduce casualties as quickly as possible. Ideally, these teams clear the most critical areas in a village and mark the remaining mined areas until CMAC can mount a larger operation. There is also a small development demining unit that has carried out a number of high priority tasks with funding directly from UNHCR. CMAC also deploys EOD, mine awareness and mine marking teams.

From 1993 to 2000, CMAC's platoons cleared an average of 10 sq. km per year. In mid-2000, three of the four DUs were working in the northwestern provinces of Battambang and Banteay Meanchey and the fourth was preparing to move into northern Cambodia. Unfortunately, CMAC had failed to adequately address a multitude of concerns about mismanagement and corruption, despite increasing donor pressure beginning in 1999. As a

result, funding became steadily scarcer and after scraping by for several months, CMAC ceased operations and laid off the majority of its staff in late 2000. This effectively removed three-quarters of the demining resources in Cambodia. Currently, it appears that CMAC will resume operations at some point in 2001, once donor concerns have been fully addressed and funding reinstated. Meanwhile, several commercial demining companies are currently seeking to benefit, in part, from CMAC's failings and receive the authority to begin demining operations.

The Planning Process

In theory, demining efforts should be preceded by a systematic Level 1 Survey. Unfortunately, the security situation in Cambodia precluded such a survey until the late 1990s, and as a result the most comprehensive data was that collected by UNTAC and refined by CMAC. Planning was further complicated by the fact that many of the most afflicted areas were not accessible to demining organizations for security reasons. This meant that demining efforts were frequently directed at areas that were accessible, but not necessarily high priority. Now that security levels have improved, the planning process is slowly being refined. In concept, the provincial governments should set demining requirements and priorities. Where appropriate, NGOs and international organizations working in the province must also be involved in the planning process, as they normally provide the resources needed to put the demined land to best use. Demining agencies should provide technical advice—what can be done, and when it can be done—but they should not set priorities. This concept places responsibility for land use where it belongs. Cambodian political

structure at the provincial level includes the provincial governor and government, the subordinate district chiefs, the commune chiefs of each district and the village chiefs of each commune. The Provincial Rural Development committee recommending demining priorities to the governor, but the detailed work is carried out by the Land Use Planning Unit (LUPU). Each district has a District Working Group (DWG) which submits its demining requirements and priorities to the LUPU (and then to the PRDC) based on input from the commune chiefs (who have in turn consulted their village chiefs). The PRDC then coordinates with the demining agencies to match resources to tasks, and the result should be a fully coordinated demining and development plan.

This process is still being developed. The key is to ensure that planners and staff at all levels develop the required level of technical expertise—for example, the use of Geographical Information Systems (GIS)—as well as management, organizational and planning skills. In Cambodia, where the Khmer Rouge did its best to eliminate those who possessed such skills, planning and organizational structures are being rebuilt very nearly from scratch, and it will be some time before the concept outlined above can be completely implemented. Land titling must also become more reliable if demined land is to be put to its intended use. Finally, accurate survey data is still required, and to this end a national Level 1 Survey has finally been initiated, with funding from the Canadian government.

National coordination between the demining agencies was until recently a CMAC responsibility. However, the agencies did not normally work in proximity to each other, and CMAC and the demining NGOs normally concentrated on

different types of tasks. There was little call for coordination in the field and, for planning purposes, MAG and HALO worked closely with selected communities and agencies, while the task of working with the provincial governments fell largely to CMAC. In 2000, as part of the response to the CMAC crisis, a national demining authority was created. The Cambodian Mine Action Authority is developing policies to regulate the operation of commercial demining companies and to conduct quality assurance checks on all demining agencies. Its secretary general envisions the commercial companies undertaking mine clearance tasks unsuitable

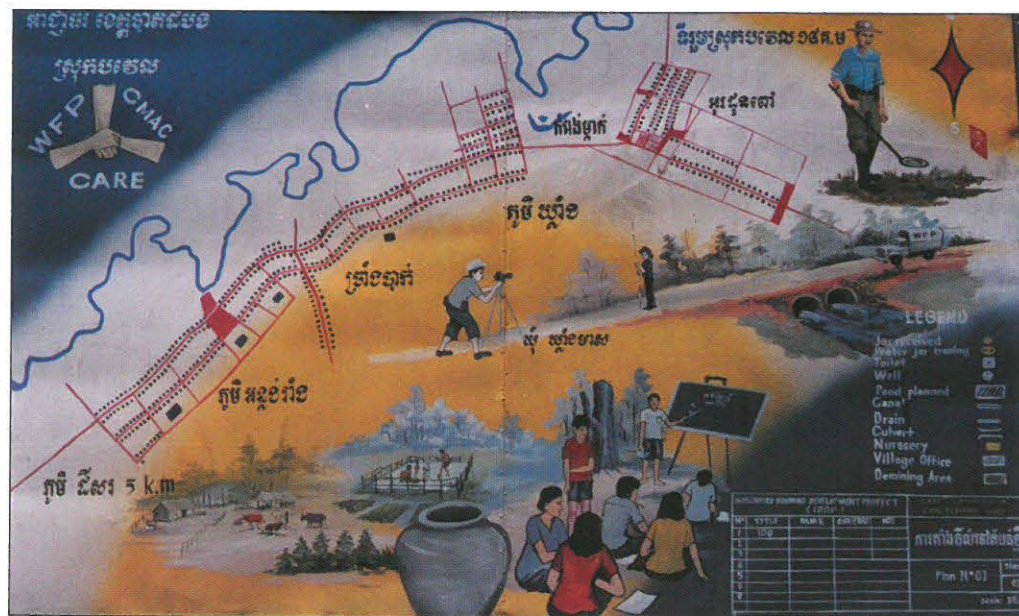


A cluster of three PMN-2s, Cambodia's most ubiquitous mine. c/o Rohan Maxwell

for humanitarian organizations. It is anticipated that the first such operation will be officially licensed in March.

Demining Operations

Manual demining is the primary method in use in Cambodia. The equipment is typical for the job (tripwire feelers, vegetation cutters, mine detectors, prodders and excavating tools, varying suites of protective equipment), as are the physically and mentally arduous conditions deminers face daily. Rates of pay are high by Cambodian standards: \$160 a month for a beginner CMAC deminer, in a country where the per capita monthly income is about \$23. These wages and



Billboard depicting a cooperative project of CARE, the World Food Programme and CMAC. c/o Rohan Maxwell



■ Mine field clearance operation showing typical vegetation cover.
c/o Rohan Maxwell

the status associated with being a deminer are more than sufficient to overcome any concern about death or injury, and there is no shortage of volunteers. There has been a steady trickle of casualties among the demining and EOD teams, averaging eight or nine a year since 1993, about 7 percent of which are fatal. The variety of soil conditions across the country—in particular, the large areas in which the soil contains a high natural metal content—presents a significant challenge, which in CMAC's case has been partially addressed by deploying two different mine detectors. Another challenge is the high level of metal contamination in many areas—not just on old battlefields, which can be expected to contain a great many metal fragments, but also on the sites of abandoned villages that are now being resettled. Ten miniscule fragments per square meter is not uncommon, and even the most experienced deminer cannot differentiate between the signal produced by such a fragment and that produced by a low metal content mine.

In addition to the manual deminers, there are a number of mechanical systems that are either in

service or under evaluation. These systems fall into two categories: those designed to accelerate the manual demining process by removing vegetation (and tripwires); and those intended to demine on their own, with the support of a small number of manual deminers. Vegetation cutters are well suited to the Cambodian situation, where the removal of vegetation and checking for tripwires consumes up to 70 percent of the deminers' time (ref 3). HALO Trust has successfully deployed seven tractor-mounted vegetation cutters in support of its 16 clearance teams. MAG is currently conducting trials on the Pearson Tractor, a multi-functional system that can be adapted to clear vegetation, cut small trees, and conduct area reduction and quality assurance tasks. The Tempest is a remote-controlled mini-flail, which is also being evaluated by MAG for vegetation clearance. This machine is unusual in that it was built in Cambodia by a British charity that employs disabled Cambodians. Finally, CMAC is testing Japanese vegetation cutting systems that are essentially tracked excavators with brushcutters in place of the excavator buckets.

The mechanical vegetation cutters described above are either operational or show promise; in contrast, the two mechanical demining systems that have been evaluated (both by CMAC) have enjoyed less success. The first is the Sisu RA-140 flail, originally designed to clear scatterable mines from hard surfaces or standard mines from open terrain. After extensive trials, it has been concluded that this system cannot clear terrain to meet required standards. Only about 80 percent of the mines (at depths of 5 to 20 cm) are detonated or rendered inoperable, and there is a significant risk that some mines could be thrown out of the mine field into previously safe areas. In addition, the system lacks mobility. The Finnish government, though, remains willing to underwrite the costs of deploying and operating two systems, so CMAC uses them as vegetation cutters. They enjoy reasonable success in this role, particularly against thick bamboo, but they continue to encounter mobility problems.

The second system is RHINO, a tracked vehicle equipped with two heavy counter-rotating drums mounted laterally, one above the other, on the front of the chassis. This adapted agricultural system is designed to till the soil to a depth of 20 cm, crushing all mines and UXO between the drums. At a weight of 48 tons (without the 14 ton tiller unit attached), it was very difficult to deploy RHINO to task sites during its trials. Cranes and flatbed trailers of the required capacity are not easily procured in rural Cambodia, and it was sometimes necessary to make route improvements in order to move the system. Once on site, the machine worked reasonably well when difficulties with depth maintenance had been resolved. A small number of manual deminers dealt with awkward

spots and provided a measure of quality assurance.

After its initial evaluation, RHINO did valuable work in support of a multi-village rehabilitation project under the aegis of CARE Cambodia. The drums survived mine and UXO detonations, but on a number of occasions AT mine detonations rendered the system inoperable for significant periods of time. Spare parts were an ongoing concern, because most of them had to be shipped from Germany. Most critically, RHINO was expensive to operate. This can be more than made up by the savings in manual demining costs, but only if the system can be deployed in a series of very large, open mine fields in close proximity to each other. This was not the case in Cambodia, and once the funding provided by the German government ran out, RHINO returned to Germany.

Finally, CMAC is developing a mine detecting dog (MDD) capability, funded by the Swedish government. The intent is to use MDDs for area reduction and possibly for quality assurance, but the training and deployment process has been a lengthy one. The project began in 1996, but there was a significant initial setback when Cambodian dogs taken to Sweden for training proved unsuitable for the task, necessitating a fresh start using Swedish dogs trained in Cambodia. These dogs and their Cambodian handlers moved from their training facility to Battambang province in early 2000. The intent was to familiarize the teams with the terrain before starting area reduction tasks in the spring of 2000, but this took longer than anticipated and as of mid-2000 there were no operational teams.

Conclusion

Cambodia remains a heavily mine and UXO-contaminated country with an extremely high rate of related casualties. Humanitarian demining will remain a high priority for at least another decade, and while the demining NGOs can probably be relied upon to stay the course and successfully nationalize their operations, the capability lost by the CMAC suspension must be replaced. There are various options—retain CMAC, create several smaller organizations, divert funding to NGOs—but they all require continued international support. Unfortunately, the recent difficulties with CMAC have made many donors justifiably wary. The solution is not to reduce or withdraw funding, but rather to continue to insist on fundamental changes to the way in which demining funds are managed and demining operations are planned and conducted. ■

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