Landmine Impact Survey

Kingdom of Thailand

Certified by the United Nations Certification Committee

Implemented by the Survey Action Center and

Norwegian People's Aid

Kingdom of Thailand

PROJECT ABSTRACT

The *Landmine Impact Survey* in Thailand summarizes the results of a nationwide socio-economic survey of the effects of landmines and UXO on communities in Thailand. This survey was conducted over a fourteen-month period, ending in June of 2001. This document is only one in a series of reports, which collectively constitute the *Global Landmine Survey Initiative*. This initiative aims to catalog the socio-economic impacts caused by landmines and UXO and to store this data in a manner that supports strategic national planning and resource allocation decisions. The report on Thailand is designed to be read in conjunction with a document entitled *The Global Landmine Survey Initiative*, which describes the global project as well as the general methodologies used to conduct impact surveys.

The following governments and organizations provided contributions to the survey:

Funding was matched in part by the United Nations Foundation.

Table of Contents

Maps, Tables, and Figures

Maps

Tables

Figures

ACRONYMS USED IN THIS REPORT

ADPC–Asia Disaster Preparedness Center

AP–anti-personnel

AS–area supervisor

AT–anti-tank

BBC–Burmese Border Consortium

CDD–Community Development Department

CMAC–Cambodian Mine Action Center

CPT–Communist Party of Thailand

DC–data collector

DIFID–Department for International Development

EOC–expert opinion collection

EOD–explosive ordnance disposal

FE–field editor

FS–field supervisor

GICHD–Geneva International Center for Humanitarian Demining

GIS–Geographic Information Systems

GLS–Global Landmine Survey

GPS–Global Positioning System

HI–Handicap International

HIT–Handicap International Thailand

HMAU–Humanitarian Mine Action Unit

IMSMA–Information Management System for Mine Action

JAHDS–Japanese Alliance for Humanitarian Demining Support

JRS–Jesuit Refugee Services

LQAS–lot quality assurance sampling

MAG–Mines Advisory Group

MoAC–Ministry of Agriculture and Cooperatives

MoFA–Ministry of Foreign Affairs

MoI–Ministry of Interior

NGO–non-governmental organization

NMAC–National Mine Action Committee

NPA–Norwegian Peoples Aid

QAM–quality assurance monitor

RTG–Royal Thai Government

SAC–Survey Action Center

SWG–Survey Working Group

TA–technical advisor

TCBL–Thailand Campaign to Ban Landmines

THB–Thai Baht

TMAC–Thailand Mine Action Center

UNMAS–United Nations Mine Action Service

UNDP–United Nations Development Program

UNOPS–United Nations Office of Project Services

USHDP–United States Humanitarian Demining Program

UXO–unexploded ordnance

VVAF–Vietnam Veterans of America Foundation

Introduction

Growing out of the wide collaborative efforts of the International Treaty to Ban Landmines, Landmine Impact Surveys are executed to meet the needs of all members of the international humanitarian mine action community including donors, national authorities and mine action implementers.

The overall vision for Landmine Impact Surveys is to *"facilitate the prioritizing of human, material and financial resources supporting humanitarian mine action at the national, regional and global levels."* To fulfill this vision, Landmine Impact Surveys are executed across the globe to the same uniform high standard.

Landmine Impact Surveys provide the three major partners of mine action—national authorities, donors and implementing agencies—with a common dataset. This data, as collected during the impact survey, offers clear improvements of past efforts in that it:

- *Defines* the entire problem in terms of scale, type, location, hazard and social and economic impacts experienced by local communities.
- *Improves* national planning efforts by allowing for clear prioritization of resources
- *Fosters* development of national plans with well-defined immediate, intermediate and end-state objectives
- *Establishes* baseline data for measuring performance

In sum, this implies nothing short of a major revision of how mine action programs are managed and how resources for such programs are allocated. Impact surveys are the first and most vital step in the overall transformation of humanitarian mine action. Impact surveys dramatically improve the quality of information available to support management decision making at all levels.

The findings and information presented in this report are stored in the Information Management System for Mine Action (IMSMA) database and are intended to be descriptive in nature, providing the best and most comprehensive picture of the nature of the mine and UXO threat experienced by communities in Thailand. While essential for national planning, this report is *not* a substitute for a national plan. It does not relieve national authorities or mine action professionals from their collective responsibility to gain a full understanding of the results of the survey and to use these results to set priorities, mobilize funding and allocate resources in the most effective and rational manner. The survey has transformed the unknown into information and knowledge. The challenge now is for others to use this knowledge to bring about positive, constructive action.

As a global initiative with a stated goal of standardizing information across countries, Landmine Impact Surveys make a concentrated effort to ensure conformity of methods, procedures and processes. These are based on best practice in the fields of social science research and mine action. To ensure confidence in

the results, impact surveys are supported by both internal and external quality control mechanisms. All surveys executed with the involvement of the Survey Action Center measure and score impacts in affected communities in a generally uniform manner. This being stated, the true value and nature of the impacts can not be ascertained by a quick tallying of colored dots on a map; instead readers should make a concentrated effort to understand all aspects of the problem.

Executive Summary

SUMMARY OF CONCLUSIONS

The Landmine Impact Survey conducted in the Kingdom of Thailand from May 2000 until June 2001 conclusively identified 530 mine-impacted communities that contain 933 distinct mine and UXO contaminated sites. Of these communities, 297 are located along Thailand's border with Cambodia, 139 along the border with Myanmar, 90 in the areas adjacent to the Thai-Laos border, and four near the border with Malaysia. The estimated 2,557 square kilometers of contaminated land in Thailand directly affects the livelihoods and safety of 503,682 persons. A thorough verification exercise suggests that the survey was successful in reaching at least 95 percent of the contaminated communities in Thailand.

The data collected afford extensive opportunities for research, analysis, and project planning, and lead to several key conclusions:

- Thailand's border area with Cambodia is the most seriously affected region in the country. It contains three quarters of the contaminated land and the majority of highly impacted communities. More than half of the mine incidents in Thailand have occurred on this border.
- Hunting and the collection of forest products such as foodstuffs or wood are the most frequently reported activities at the time of a mine incident.
- Surveyed communities reported that large swaths of forested land are mine- and UXO-contaminated and that the loss of access to this land is the greatest adverse impact. This creates a severe dilemma in that low density or poorly defined contamination in such areas poses severe and costly technical challenges to clearance activities.
- The profile of the average mine incident victim in Thailand is a working-age male engaged in some form of income-generating activity. The data indicate that very few victims are children and that very few victims are engaged in either tampering or informal demining at the time of injury.
- Over one third of the mined areas in Thailand are reported to be easily accessible and have a clearly delineated boundary on all sides.
- Communities that suffer multiple blockages of forests, cropland, and water sources have a higher rate of incidents than other communities do. They also tend to be clustered close together.

BACKGROUND AND PROJECT OVERVIEW

Thailand was the first nation in Southeast Asia to sign and ratify the *Convention on the Prohibition of the Use, Stockpiling, Production, and Transfer of Anti-Personnel Mines and On Their Destruction*. In 1998, the Office of the Prime Minister established the National Mine Action Committee (NMAC) as the mine

action policy body within Thailand. It then established the Thailand Mine Action Center (TMAC) to implement and coordinate mine action activities. The Humanitarian Mine Action plan that TMAC currently uses envisions the creation of multi-skilled Humanitarian Mine Action Units (HMAU) to work in the most affected sections of Thailand's borders.

The Landmine Impact Survey in Thailand began in May 1999 when the United Nations Mine Action Service (UNMAS), at the behest of TMAC, requested that the Survey Action Center (SAC) undertake the survey. Following two preliminary missions to Thailand, Norwegian People's Aid (NPA) was selected to execute the survey. It established a full-time presence in Thailand in May 2000. NPA executed the survey in accordance with the principles and operating protocols established by the Survey Working Group (SWG) as well as the UNMAS Certification Guidelines. The data collection phase was completed in May 2001 and the office closed shortly thereafter.

The governments of Norway, the United Kingdom, the United States, Finland, Australia, and Canada, as well as the United Nations Foundation, provided funding for the survey. A portion of these funds was made available through a contracting mechanism managed by the United Nations Office for Project Services (UNOPS).

NPA executed the survey with four international staff members and more than 80 Thai nationals. The survey staff was organized into four field groups that moved throughout the country, coordinating their movements through one central office in Bangkok. Data collected was entered into the Information Management System for Mine Action (IMSMA). The TMAC provided the NPA team with extensive support including office space, use of heavy-duty vehicles, and indispensable coordination and liaison with Thai military commands.

SCOPE OF THE PROBLEM

The survey conclusively identified 27 mine-affected provinces out of the total of 76 provinces in Thailand. Within these provinces, a total of 530 communities were identified as mine-affected. Thailand's border with Cambodia has 297 impacted communities with 473 mined areas that cover an estimated surface of 1,943 square kilometers. There are 139 mine-affected communities on Thailand's border with Myanmar and a total of 240 reported mined areas covering 400.5 square kilometers. The Laos border region contains 90 affected communities, with 213 distinct mined areas covering 211.6 square kilometers of surface area. Near Thailand's border with Malaysia, the survey found only four mine-affected communities with seven mined areas that cover just 1.15 square kilometers of land.

The communities in all regions were close to the respective borders, averaging just 7.1 kilometers from the border with Cambodia, 12.8 kilometers from the border with Myanmar, 14.1 kilometers from the border with Malaysia, and 24.3 kilometers from the border with Laos. The much higher average distance for communities on the Laos border reflects the fact that a fair degree of contamination exists farther inland in the vicinity of old insurgent bases and battlefields. The 933 reported dangerous areas range in size from one square meter to several square

kilometers. The survey collected information on these dangerous areas, including boundary definitions (none, some, and all), topographic features, vegetation cover, and type of ordnance present, and used this information to assess the associated difficulty of clearance. When viewed only on the basis of area, many of the dangerous areas in Thailand are found in large, undefined, and difficult-to-clear sites. Yet, when contaminated areas are assessed in terms of socio-economic impacts, smaller, more defined and easier-to-clear areas stand out.

IMPACT ON COMMUNITIES

Using the impact survey standard scoring mechanism to rank communities in broad categories reflecting the degree of mine impact, the NPA team determined that Thailand contains 69 "highly impacted" communities, 233 "medium-impacted" communities, and 228 "low-impacted" communities. (See Table 1.) The indicators used to determine this ranking include the number of victims in the past 24 months, blocked access to facilities or livelihood areas, and the nature of the contaminating ordnance. In Thailand, 134,320 people live in highly impacted communities, 207,248 in medium-impacted communities, and 162,114 in communities where impact is low. Of the border regions, the Thai-Cambodia border has 51 highly impacted communities, 161 medium-impacted communities, and 85 low-impacted communities. The Thai-Myanmar border area has 16 highly impacted communities, 38 medium-impacted communities, and 85 low-impacted communities. Thailand's border area with Laos contains two highly impacted communities, 34 medium-impacted communities, and 54 low-impacted communities. The border with Malaysia has four low-impacted communities.

TABLE 1

AFFECTED COMMUNITIES, BY BORDER REGION

	Cambodia	Myanmar	Laos	Malaysia	TOTAL
High	51	16	2	–	69
Medium	161	38	34	–	233
Low	85	85	54	4	228
TOTAL	**297**	**139**	**90**	**4**	**530**

IMPACT ON SECTORS

The survey collected extensive information regarding the types of livelihoods that are denied local populations because landmines and UXO are present. Forest area is the most frequently reported blocked resource type—61 percent of all communities indicate some loss in this regard. Blocked access to cropland is the second most commonly reported loss, followed by pastureland and then water resources. In Thailand, mines and UXO rarely affect roads, housing areas, and other major types of infrastructure.

MINE INCIDENTS

The survey identified 346 persons that had come to harm or death due to a mine incident in the 24 months preceding the survey. A further 3,122 victims were

recorded from incidents in earlier years. Incidents took place in 131 out of the 530 impacted communities in Thailand, and the highest rates of injury were along the Cambodia and Myanmar borders. At least 80 percent of all recent victims are males, mostly clustered into the prime working years of between 15 and 30 years of age (33 percent), and 31 to 44 years of age (51 percent). The most frequent activity at the time of injury was reported to be the collection of forest products (43 percent), followed by military border duties (15 percent), traveling (10 percent), and farming (5 percent). Tampering caused only two recent incidents and informal demining caused just three incidents. These rates of injury due to tampering are extremely low by comparison to rates found in other countries. In the most general terms, the typical profile of an average mine incident victim in Thailand is a working-age male, engaged in an income-generating activity. There is no guarantee that every victim was recorded by the survey team. However, this data reflects the results of their best efforts to do so.

CAUSALITY

Statistical analysis of the survey data, particularly that relating to community attributes, allows one to see relationships between a variety of factors and the risks that mines pose to specific communities. In Thailand, survey teams found that those factors most associated with past conflict, particularly a community's proximity to a border, outweigh other factors that might allow the community to adapt to the risk that it faces. Massive resettlement programs are not feasible and demining resources alone are insufficient to meet the need. For these reasons, mine action efforts will have to focus on other circumscribed clearance projects and marking if they are to make a noticeable difference to the lives of most of the population of concerned communities. The data also suggest that certain economic policies, particularly those that reduce the reliance on forest products, may have the potential to facilitate community adaptability.

BUDGET AND EXPENDITURE

The final expenditure for the impact survey in Thailand was $1,565,000. Of this amount, $239,000 was spent on non-expendable equipment that was provided to TMAC and is now available to support other mine action efforts.

CONCLUSION

The results of the impact survey plainly indicate that Thailand suffers a number of adverse impacts caused by the presence of landmines and UXOs along its border regions. Clearly, the extensive contamination that exists in Thailand's dense forestlands will pose a hazard for many years to come. Yet, the information gained during the impact survey process will allow for the development of an appropriate, well-targeted response that combines marking, area reduction, large-scale clearance, and mine awareness education in a manner that will produce positive and immediate results.

Survey Results & Findings

Survey Results & Findings

Scope of the Problem

NUMBER OF COMMUNITIES AFFECTED

The survey identified 27 (of 76) mine-affected provinces in Thailand. Within these provinces, 84 districts and 530 distinct communities with a reported total population of 503,682 persons were found to experience some impacts due to the presence of landmines and/or UXO.

Table 2 shows the distribution of affected districts, communities, and populations for the 27 affected provinces. There are large differences in the number of mine-affected communities among provinces: Four provinces have only one affected community, while there are 63 in the province of Sa Kaeo.

The 84 mine-affected districts have a combined population of 4,254,611.

TABLE 2

AFFECTED DISTRICTS, COMMUNITIES, AND POPULATIONS, BY PROVINCE

	Province	Districts	Communities	Population
Cambodia	Buriram	3	33	28,858
	Chanthaburi	2	21	15,171
	Sa Kaeo	4	63	31,221
	Si Saket	3	45	36,529
	Surin	4	46	31,690
	Trad	3	51	40,215
	Ubon Ratchathani	5	38	32,350
	TOTAL	24	297	216,034
Myanmar	Chiang Mai	5	19	34,993
	Chiang Rai	7	48	44,465
	Chumphon	1	3	1,070
	Kanchanaburi	3	7	3,730
	Mae Hong Son	6	32	50,514
	Phetchaburi	1	2	36
	Prachuap Khirikhan	4	6	4,533
	Ratchaburi	1	7	15,962
	Tak	4	15	74,478
	TOTAL	32	139	229,781
Laos	Loei	2	7	3,430
	Nan	8	37	
	Nong Bua Lamphu	1	1	1,220
	Nong Khai	1	1	0
	Phayao	3	18	13,193
	Phetchabun	4	7	5,063
	Phitsanulok	2	11	7,378
	Udon Thani	1	1	30
	Uttaradit	3	7	4,495
	TOTAL	25	90	34,809
Malaysia	Nakhon Si Thammarat	1	1	1,200
	Yala	2	3	980
	TOTAL	3	4	2,180
	GRAND TOTAL	84	530	503,682

SETTLEMENT TYPE AND POPULATION SIZE

Mines and UXO in Thailand primarily affect village communities. Table 3 (on next page) shows that 497 out of the 530 affected communities are villages as opposed to urban, suburban, or other types of communities. A total of 382,969 people affected by landmines/

TABLE 3

AFFECTED COMMUNITIES AND POPULATIONS, BY SETTLEMENT TYPE

City type	Affected communities	Population affected	Mean population
Urban	2	3,481	1,741
Suburban	8	4,971	621
Compact village	416	308,291	741
Dispersed village	81	74,678	922
Other	20	112,261	5,613
Unknown	3	–	–
Total	**530**	**503,682**	**9,638**

UXO were reported to be living in village communities, whereas112,261 live in other types of communities.

Three quarters of the village communities have estimated populations of 940 or fewer and half count no more than 590 inhabitants. The smallest affected community, a National Park station, reported a mere six people. The largest was the dispersed village of Ban Peeing Lung, composed of five subvillages with a total population of 10,725. The only urban community reportedly affected, Ban Khlong Yai in Trad province, has an estimated population of 3,000.

FIGURE 1

POPULATION SIZE DISTRIBUTION, COMMUNITY-LEVEL

(Communities > 5,000 excluded)

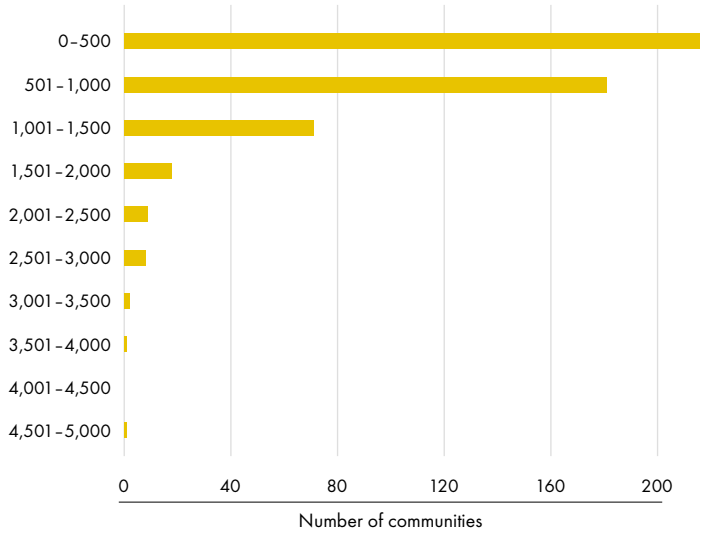
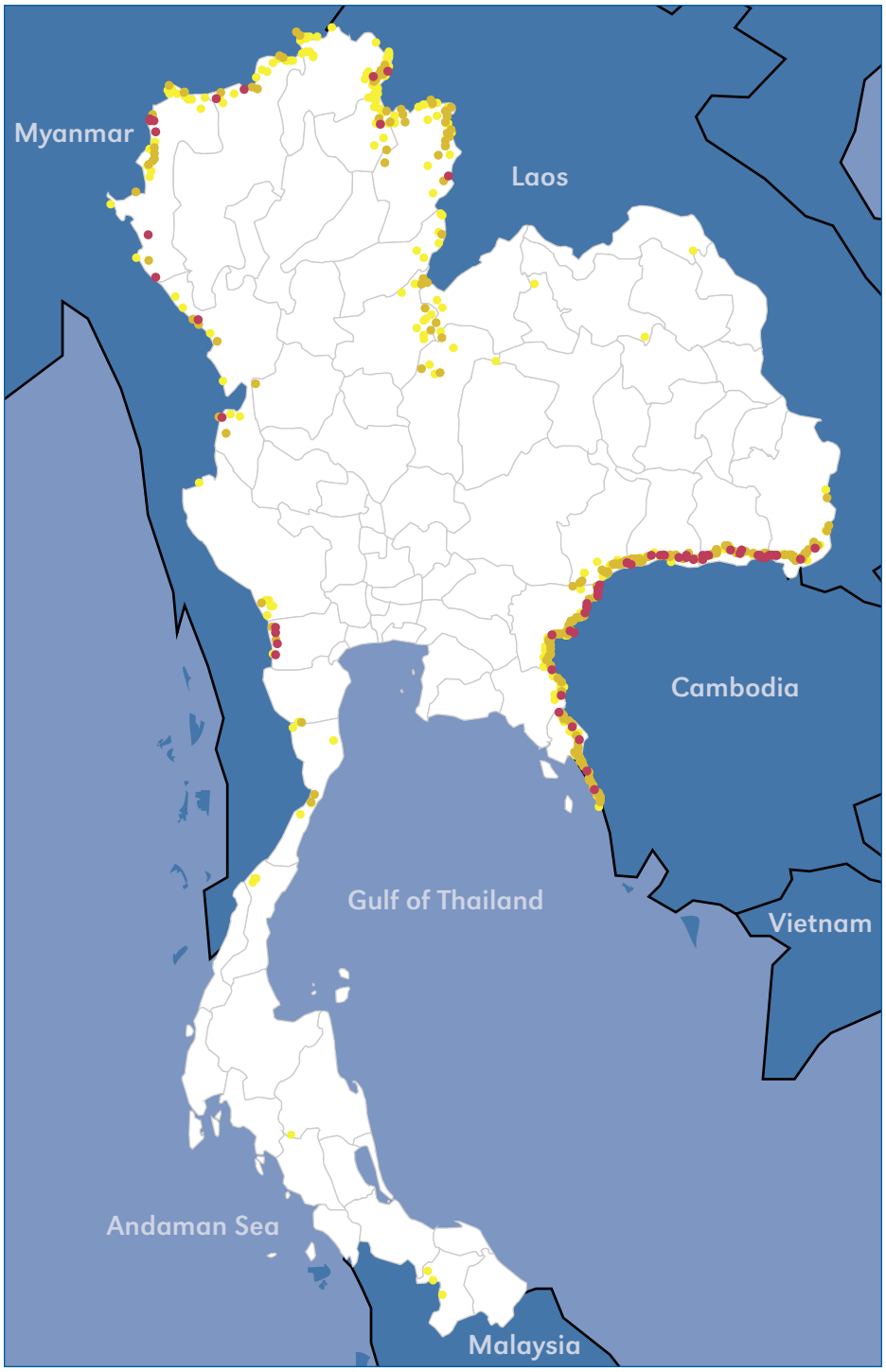


Figure 1 shows the magnitude of the population size distribution for affected communities. In addition, nine of the affected communities are camps for displaced persons.

GEOGRAPHIC DISTRIBUTION OF IMPACTED COMMUNITIES

Nearly all the affected communities are located in a narrow strip along to Thailand's borders. Most affected communities are along the Cambodia border (297), along the Myanmar border (139), and along the Laos border (90). Affected communities are, on average, found within 7.1 kilometers of Thailand's border with Cambodia, within 12.8 km of the border with Myanmar, within 14.1 km of the Thai-Malaysia border, and within 24.3 km of Thailand's border with Laos. Map 1 (on next page) shows the location of the impacted communities.



MAP 1

LOCATION AND IMPACT OF LANDMINES/UXO AT VILLAGE LEVEL

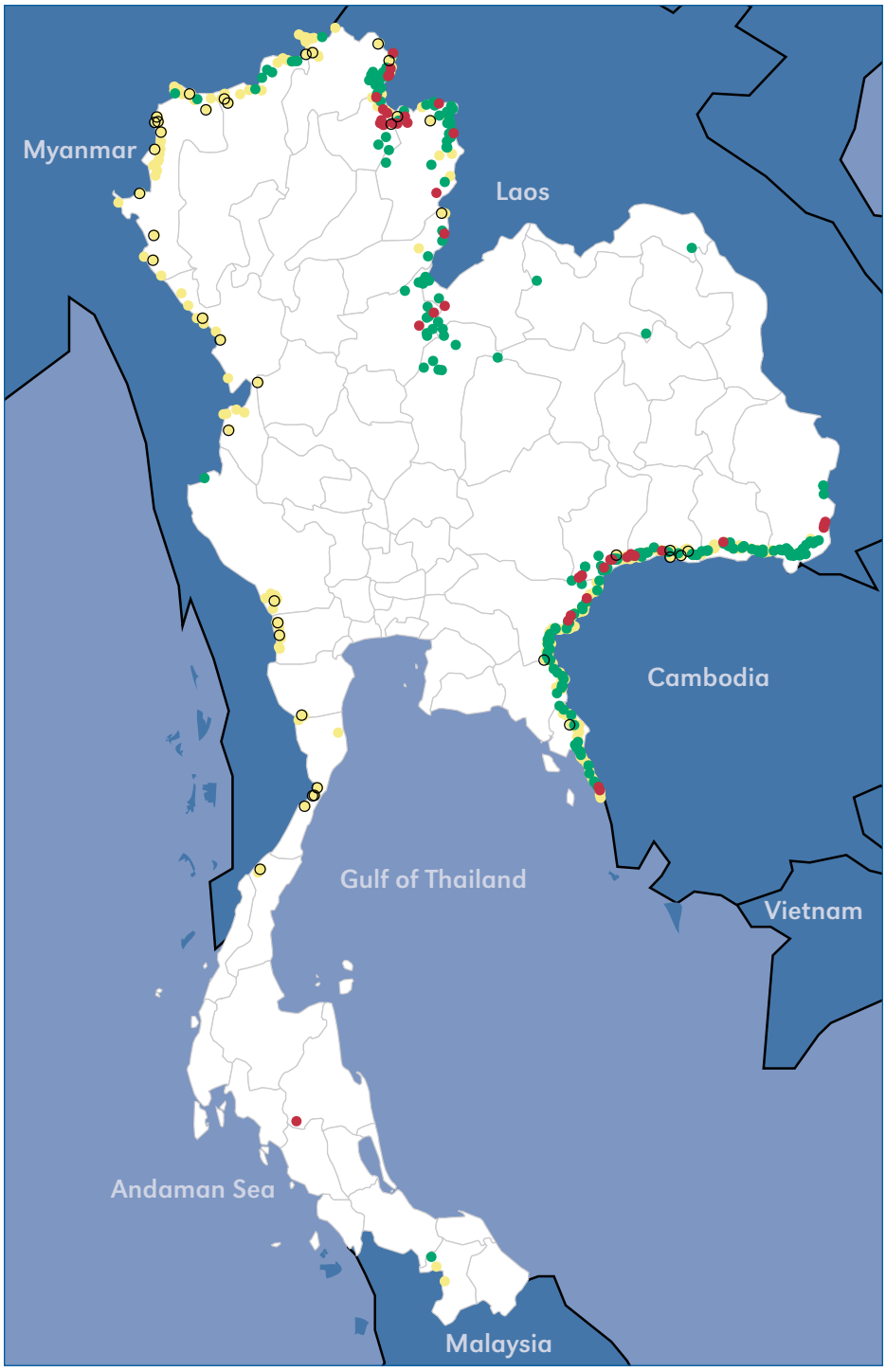
Community impact
- High
- Medium
- Low

The entire Cambodia border is enclosed by a dense band of affected communities. The Cambodia interior conflicts between the Khmer Rouge, the government, and Royalists spilled over into Thailand and left the border areas severely contaminated by landmines and UXO. Contamination is particularly heavy in or near the national reserve forests. This forest region was terrorized by decades of fighting, and landmines were laid as recently as 1996. Along the Laos border,

MAP 2

IMPACTED COMMUNITIES, BY AGE OF CONFLICT

Mines/UXO contamination
- 1968-1980
- 1981-1990
- 1991-2001
- date unknown



most of the affected communities are located in the western portion of the region where the Mekong River does not provide an easy border reference

Although most impacted communities are close to the border, a significant number are located farther inland in mountainous forest areas that hosted communist insurgents. On the Myanmar side, most of the affected communities are located in the north, where contamination is derived from the conflicts between

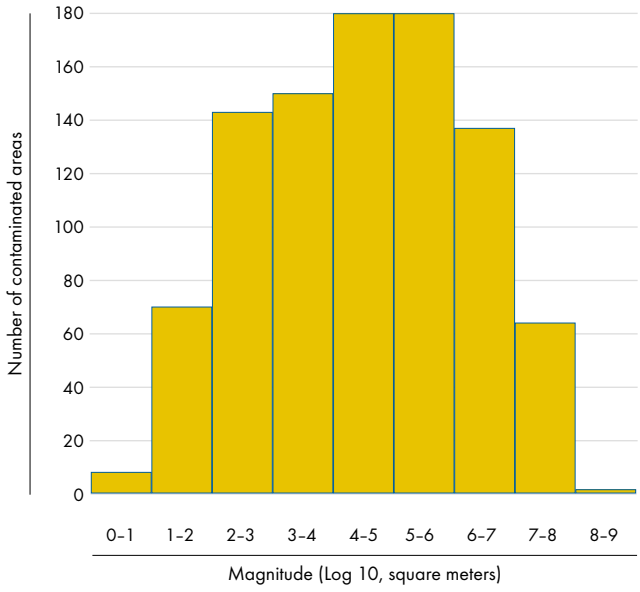
ethnic armed factions and the Myanmar armed forces and/or conflicts related to drug smuggling. Mines have been laid along this border for decades. Conflict in the region continues and many communities face new or unknown threats from both mines and UXO.

Very few affected communities are located in the southern provinces near the Malaysia border. Initial reports concerning contamination caused by past conflicts in the area appear to be overestimated. The extended period since mines were emplaced in this region has allowed communities either to adapt to or eliminate the threats. Map 2 (on previous page) indicates, by community, when mines were emplaced.

The survey identified 933 distinct areas of suspected landmine and/or UXO contamination. These distinct areas were recorded on 1:50:000-scale maps. The total surface area is estimated to be 2,557 square kilometers. During community interviews, 1,174 suspected areas were identified, covering an estimated 5,426 square kilometers. It was determined subsequently that 241 of these areas had been identified, in whole or in part, more than once. The total surface area claimed by the villagers in the interviews was considerably more than estimates recorded on contamination maps. The individual mined areas differ greatly in their relative size. The size of affected areas ranges from one square meter to 129 square kilometers. The arithmetic mean was 2.74 square kilometers. The median size of a contaminated area was 37,155 square meters, which equals a square with sides 193 meters long. (See Figure 2.)

FIGURE 2

MAGNITUDES OF MINED AREA SURFACES



The opportunity to record the boundaries of the mined areas varied considerably. Precise coordinates and thus area estimates could be provided in those cases where all sides could be observed and the boundaries were visually determined, (for instance, by items on the surface, locations where ordnance was stored or dumped, or areas where cultivation or roads clearly delimited the danger areas). On the other extreme, boundary definitions and area size estimates were less precise where the suspected areas could not be visited, where only a very small proportion of the perimeter could be observed, or where the exact location of the contamination was not known by the key informants. In these areas, contamination was

TABLE 4

COMMUNITIES, BY NUMBER OF DISTINCT MINED AREAS

Distinct mined areas in the community	Number of communities	Percent
1	257	48.5%
2	134	25.3%
3	56	10.5%
4	31	5.8%
5	17	3.2%
6	11	2.1%
7	8	1.5%
8	4	0.7%
9	2	0.4%
10	3	0.6%
11	2	0.4%
12	1	0.2%
13	2	0.4%
14	0	–
15	0	–
16	0	–
17	0	–
18	0	–
19	0	–
20	1	0.2%
21	0	–
22	0	–
23	1	0.2%
TOTAL	**530**	**100.0%**

often identified with areas known to be the site of previous conflict (such as former military bases located in forest areas). Most mined areas with a surface estimate above one square kilometer represent an area where the location and/or extent of contamination is less well known.

Table 4 indicates that most affected communities reported no more than five mined areas—typically one or two per community.

VICTIMS OF MINE INCIDENTS

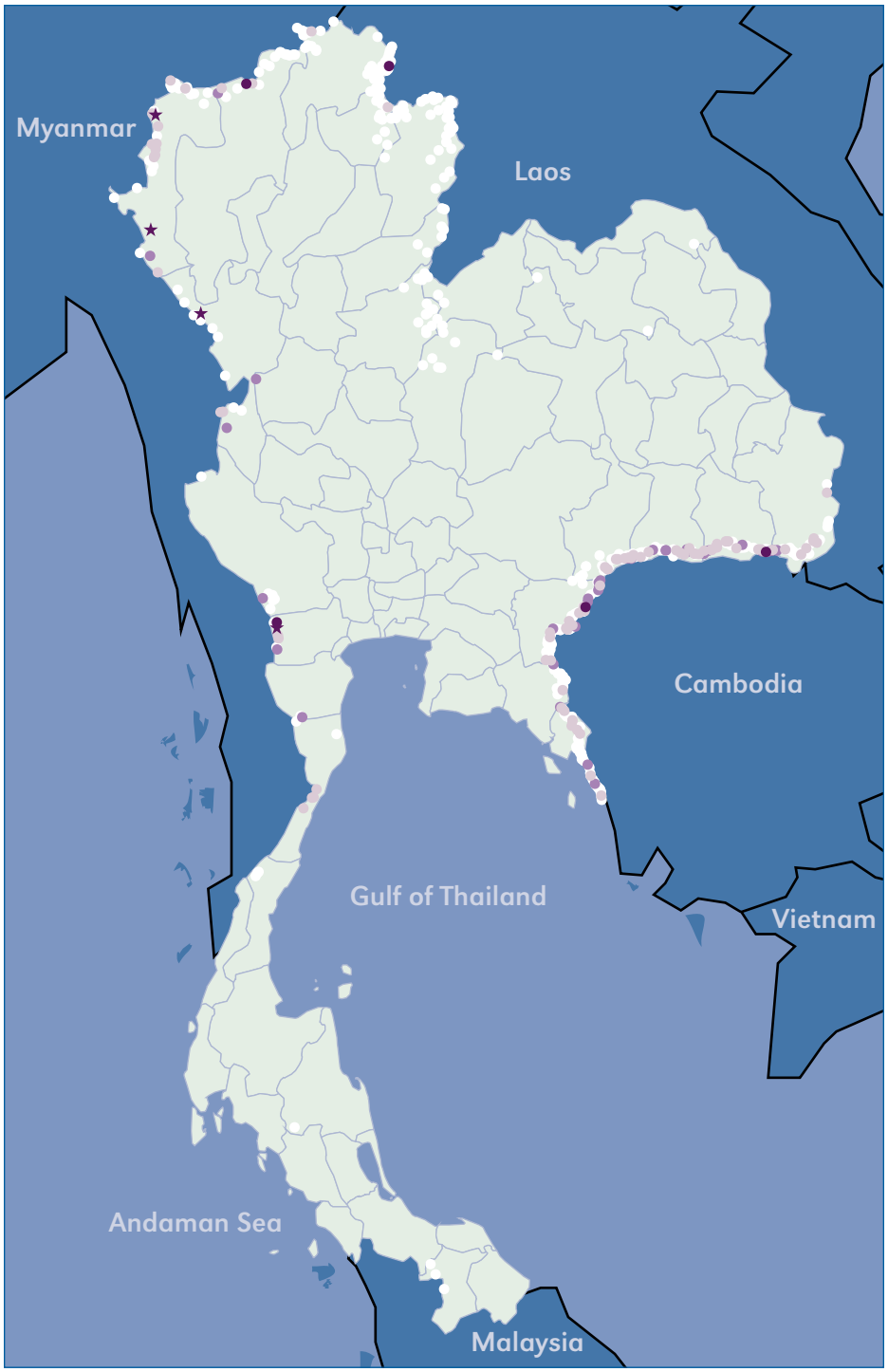
Among the 530 communities surveyed and found affected, 431 had a history of mine incidents that injured one or more persons. Among these communities, 131 recorded recent victims. For the purposes of this survey, 'recent' means that an "incident took place within the past 24 months." Of the total, 399 had victims from periods where incidents occurred more than two years previously. (See Table 5 and Map 3).

More information was elicited about recent victims than about victims from more than 24 months past, in part because interviewees found it easier to recall the relevant details. The figures concerning less recent victims are less reliable than the

TABLE 5

MINE AND UXO VICTIM SURVEY

Period	Communities involved	Victims		
		Killed	Injured	All
Recent victims	131	79	267	346
Victims of less recent date	399	1,418	1,704	3,122
All victims	431	1,497	1,971	3,468
Had no victims	99	–	–	–



MAP 3

COMMUNITIES WITH RECENT VICTIMS

Number of recent victims

- 6-10
- 3-5
- 1-2
- none

Only four communities reported more than 6-10 victims. These are indicated by ★.

information provided for the more recent victims. Based on these figures, the survey proposes the following estimates of mine incident victims per 100,000 people per year. These rates are calculated from the Thai Ministry of Interior population figures for 1998: 34.35 people within the population of affected communities; 0.59 within the population of affected districts; and 0.28 within the entire nation.

Impact on Communities

SEVERITY OF IMPACTS

For each affected community, the survey calculated a point score expressing the severity of the various mine impacts. The score takes three major factors into account:

- Number of recent victims
- Livelihood and institutional areas to which mines block access
- Class of munitions

The score is used to classify communities as low, medium, or high impact. Scores range from one to 48. As reflected in Figure 3, a score of one indicates that a community reported only the presence of some landmine/UXO and no serious blockages or recent victims. The survey found nine communities with this very mild signature. At the other end of the scale, a score of 48 was assigned to Mae La Camp for displaced people due to the presence of 24 recent victims. The permanent Thai community with the highest score was Ban Nhong Ya Kaew, Sa Kaeo province, with a score of 29. However, most communities had a score of eight or less. The modal score, the score most often assigned, was five. The median score was six, meaning that half of the communities scored six or less. The arithmetic mean was 6.96. Score ranges that qualify an affected community as low, medium, or high impact are shown in Table 6.

FIGURE 3

DISTRIBUTION OF IMPACT SCORES

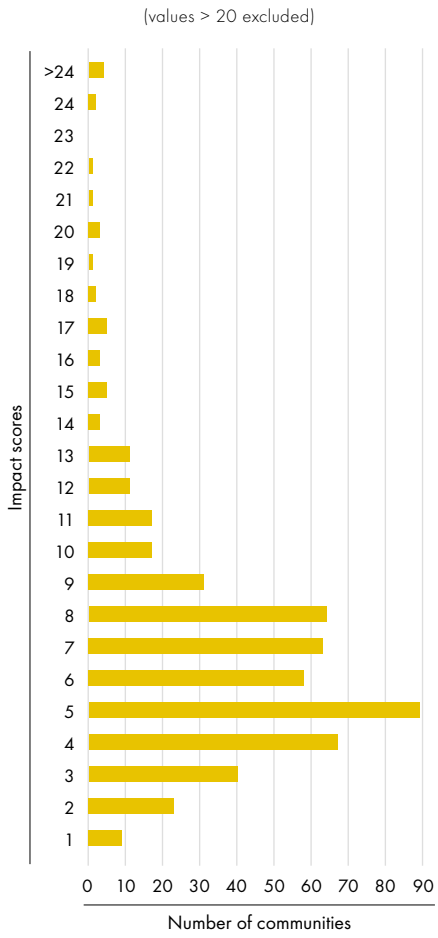


TABLE 6

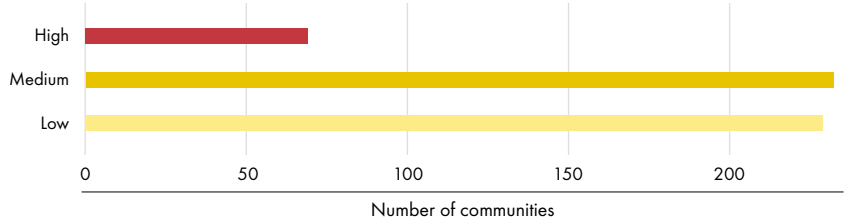
IMPACT SCORE CLASSIFICATION

Score range	Classification
1–5	Low
6–10	Medium
11 and higher	High

With this classification, 228, or 43 percent, of the 530 affected communities are low-impact communities. Medium-impact communities number 233, or 44 percent of the total,

FIGURE 4

IMPACT CLASSIFICATION



while 69 communities, or 13 percent, are classified as high impact. Figure 4 portrays the distribution of low-, medium-, and high-impact communities.

Communities of high and medium impact comprise more than half of the total of the affected communities in Thailand. These communities are often located in close geographic proximity to each other, indicating that within certain confined areas, populations suffer greatly from the harm and economic restrictions caused by mines and UXO.

POPULATIONS BY IMPACT CATEGORY

It is estimated that 504,000 people live in mine-affected communities in Thailand. Of these, approximately 134,000 people live in high-impact communities, and an estimated 207,248 live in medium-impact communities. Thus, the majority of people whose lives are affected by mines and UXO live in communities that the survey rated as high or medium impact. This information is summarized in Table 7. Camps for displaced people contribute significantly to the high population numbers observed for some impact categories.

TABLE 7

COMMUNITIES AND POPULATIONS, BY IMPACT CATEGORY

Impact category	Communities	Affected population
High	69	134,320
Medium	233	207,248
Low	228	162,114
TOTAL	**530**	**503,682**

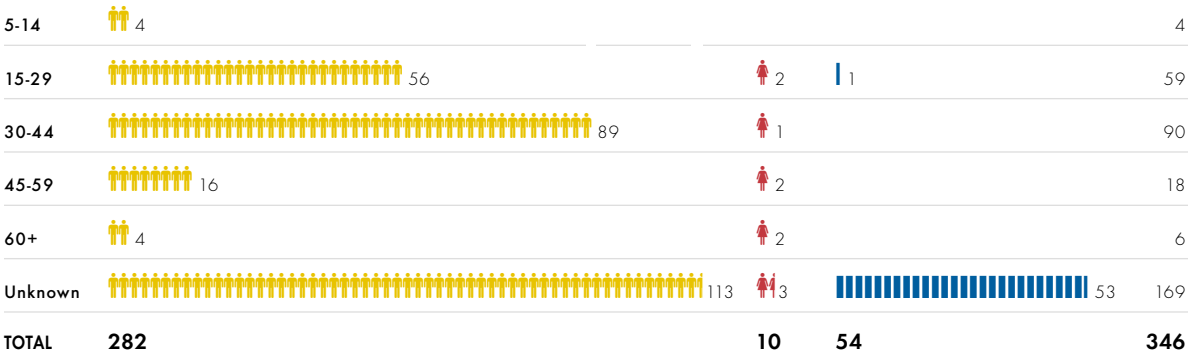
DEMOGRAPHY OF RECENT VICTIMS

The survey identified a total of 346 recent victims in Thailand. These victims were recorded in 131 of the 530 affected communities. Males account for 282, or 81 percent, of the victims, and females for ten, or 3.5 percent, of the victims. No gender information was available for the remaining 54 victims. Among both male and female victims, the age groups most affected are the 15- to 44-year-olds. Figure 5 (next page) indicates recent victims by age and gender.

The survey results show that the incidence of injuries to children in Thailand is less then expected. One possible explanation for this is that children

FIGURE 5

RECENT VICTIMS, BY AGE AND GENDER



are normally restricted from entering into the distant forest areas where many incidents occur.

Table 8 presents a breakdown of recent victims by sex, military/civilian status, and civilian occupation prior to the incident. The primary finding is that 83 percent of the victims were civilians, 40 percent (138) of whom were farmers. An appreciable proportion (58 of 346) of the recent victims were military, and most of these incidents occurred on the Myanmar border.

TABLE 8

RECENT VICTIMS, BY GENDER, MILITARY/CIVILIAN STATUS, AND CIVILIAN OCCUPATION

Activity	Male	Female	Unknown	Total
Military	56	0	2	58
Civilian				
Farming	131	6	1	138
Household	1	0	0	1
Labor	22	0	0	22
Trade	0	1	0	1
Unemployed	3	1	1	5
Other	20	1	0	21
Unknown	49	1	13	63
TOTAL	**282**	**10**	**17**	**309***

*Note: there were an additional 37 incidents for which no occupational information was received.

INCIDENTS AND CONSEQUENCES

Activities at the time of the incident fall into several dominant categories (see Table 9 on next page):

- Collection of forest products is the most frequently reported activity at the time of an incident. Of the 346 recent victims, 148 fall into this category. Most of the affected communities depend on the forest for supplies of food, firewood, building materials, wild game, and they also use it as a transit route to visit neighbors and family members. The number of victims falling into this

TABLE 9

ACTIVITY AT TIME OF INCIDENT

Activity	Male	Female	Unknown	Total
Military	48	0	2	50
Accompanying military	3	0	2	5
Civilian				
Collecting food, water, wood or hunting/fishing	134	8	6	148
Demining	3	0	0	3
Farming	17	0	1	18
Herding	2	0	0	2
Household work	1	0	0	1
Tampering	2	0	0	2
Trading	6	0	0	6
Travel	28	2	0	30
Other	19	0	0	19
Unknown	19	0	43	62
TOTAL	**282**	**10**	**54**	**346**

TABLE 10

MINE INCIDENTS AND FATALITIES, BY GENDER

Incident fatalities	Male	Female	Unknown	Total
No	212	9	9	230
Yes	70	1	8	79
Total	**282**	**10**	**17**	**309***
Fatality Rate	*25%*	*10%*	*47%*	*23%*

*Note: There were an additional 37 incidents for which no fatality information was received.

TABLE 11

TYPE OF CARE RECEIVED BY THOSE VICTIMS NOT KILLED IMMEDIATELY

Type of care	Male	Female	Unknown	Total
Emergency care	126	4	4	134
Rehabilitation care	11	1	1	13
Vocational training	0	0	0	0
Other care	8	0	0	8
No care	14	0	0	14
Unknown	35	2	7	44

Note: There were a total of 279 recent victims not immediately killed by their injuries.

category may actually be higher than reported activity of "traveling" may reflect a mixed activity that also involves the collection of forest products.

- Military activity accounted for 50 recent victims who were largely engaged in border patrol or military police actions at the time of injury. Areas adjacent to the border with Myanmar clearly pose the greatest risk in this regard.
- Tampering with mines and UXO is surprisingly insignificant as an activity leading to accidents. Although there is reason to suspect that this particular cause of incidents may be underreported, it is clear that this is not a major source of danger in Thailand.

Of the 530 affected communities, 37 have made some local effort at mine clearance. Only three of the recent victims, however, were engaged in clearance at the time of the reported incident.

Table 10 shows the distribution, by gender, of mine incidents and fatalities.

Table 11 highlights the fact that 134, or 48 percent of those not immediately killed, received some form of emergency care (of known cases). The table also reflects the virtual lack of

TABLE 12

TYPE OF INJURY, BY GENDER

Injury	Male	Female	Unknown	Total
Amputation	127	8	6	141
Loss of sight	14		1	15
Other	88	3	1	92
Unknown	14	1	4	19
TOTAL	**243**	**12**	**12**	**267***

*Note: Of the 279 accidents that were not immediately fatal, 12 died later, leaving a total of 267 survivors.

physical rehabilitation and vocational therapy for mine incident survivors. As a result of their wounds and the available level of care, 141 of the 267 survivors suffered amputations of extremities, 15 lost their eyesight, 92 sustained other kinds of injuries, and 18 were not recorded (see Table 12). Table 13 shows occupation and gender of the survivors.

TABLE 13

MINE INCIDENT SURVIVORS, BY GENDER AND OCCUPATION

Occupation of survivor	Male	Female	Unknown	Total
Military	10	0	0	10
Civilian				
Farming	83	3	0	86
Herding	1	0	0	1
Household work	1	0	0	1
Labor	18	0	0	18
Office work	2	0	0	2
Refugee	0	1	0	1
Student	2	0	0	2
Unemployed	28	4	1	33
Other	17	0	1	18
Unknown	50	1	7	58
TOTAL	**212**	**9**	**9**	**230***

*Note: There were an additional 37 incidents for which no occupational information on survivors was received.

Impact on Sectors

TYPES OF BLOCKAGES

Key informants in the affected communities report that the presence of landmines and UXO results in blocked access to, or restricted use of, four major resources: forest, cropland, pasture, and water (see Table 14).

Several findings stand out:

- Forest area is the resource most frequently reported to be affected by the presence of mines because most of the armed conflicts took place in the forested border areas. Forests are largely government domains. The Forestry Department administers them, and the Ministry of Defense is responsible for security. Although use of forestry reserves by citizens is strictly regulated, poor people commonly rely on the government forests for subsistence and income. Hunting, firewood collection, the gathering of food and medicinal plants, and charcoal burning are important livelihoods.

TABLE 14

PERCENTAGES OF COMMUNITIES REPORTING BLOCKED ACCESS

Areas of blocked access	Communities affected
Pasture	24%
Cropland	39%
Forest	61%
Water	24%
Houses	6%
Roads	3%
Other infrastructure	8%

Note: Percentages are based upon a total of 530 mine-affected communities. They do not add up to 100 percent because a given community may experience blocked access to more than one resource or institutional area.

- Blocked cropland is a frequent consequence of mine contamination. Interestingly, community informants did not easily make the distinction between irrigated and rain-fed land. Very few communities specifically reported blocked access to irrigated land, perhaps because they lack access to such high-value cropland under any circumstances. Mines and UXO in Thailand rarely affect roads, housing areas, infrastructure, or utilities. In the rare cases in which modern institutions such as rural schools, power grids, and health care clinics are blocked, these functions usually can be shifted to other buildings and places relatively inexpensively. For example, only ten out of 933 mined areas reportedly obstruct access to an educational facility. Unlike in some other landmine-infested countries, the case of blocked roads is somewhat special. Isolation from administrative centers is not a problem in Thailand. Only two communities reported that landmines block roads to their district centers. Mined minor roads and trails do pose an infrequent yet serious hazard, and may hinder access to forest areas, farms, and border passes. Nineteen communities mentioned this kind of problem.

- Blocked access to water resources is the most difficult hardship to interpret. A number of communities reported such problems, 53 communities regarding drinking water, and 133 regarding other uses. However, key informants did not signal that these problems were particularly serious. Alternatives, particularly for drinking water, seemed to be readily available. On the other hand, communities with blocked water points tended to have more recent victims. This may be an indirect effect. Reported blockages of water resources statistically are associated with blocked cropland and forests. Water may make parts of this land more fertile and more attractive. If this is so, incidents may happen more frequently to persons working on land around water. Communities may be more concerned about farms and forests than about water, yet the contiguity of these resources induces a link from water blockages to victims. This finding requires local inspection on a case-by-case basis.
- The size of the population affected by a particular problem and the numbers and surface of the mined areas involved are summarized in Table 15. A given mined area may block several resource types, so the overlap between these categories is considerable. Surface estimates are given for mined areas that interdict resources that come naturally as polygon features; they are not attempted for mined areas blocking line-and-point features such as roads and water points. Estimates are based on maps, not community interviews; thus mined areas affecting several communities are counted only once.

TABLE 15

MAGNITUDE OF BLOCKED ACCESS

Type of Impact	Communities affected	Population of those communities	Contaminated areas involved	Estimated surface (sq km)
Pasture	143	95,927	380	1,264,313
Cropland	242	181,224	702	2,106,006
Forest	414	327,616	964	5,100,159
Drinking water	53	41,601	131	1,003,074
Other water uses	133	87,910	357	2,479,441
Housing	37	27,263	181	490,891
Any roads	20	13,305	72	514,623
Other infrastructure	60	41,785	253	745,152

TYPICAL COMBINATIONS OF IMPACTS

The Landmine Impact Survey seeks to understand the socio-economic impact on communities in which access to various resources is blocked by mines and/or UXO. The survey has revealed four basic groupings that reflect the types of resources that are unavailable to communities because of mine contamination.

These groupings are called "clusters" of impacts and are reflected in Table 16. The categories are:

Type A: Communities that did not report blocked access to the forest. Other than this negative definition, they have little in common. Several communities reported no impact at all. A significant number of communities complained of blocked access to some of their cropland or to infrastructure other than roads and housing. This cluster includes 88 communities.

Type B: Communities that suffer from blocked access to some forests. No other impacts are associated with this type, which contains 152 communities.

Type C: Communities that rely heavily on forest and cropland. Minor affiliations are with pasture, housing, and other infrastructure. This cluster includes 154 communities.

Type D: Communities that experience blocked access to water for non-drinking uses, and also to forest and cropland. Many of the 132 communities in this category also have problems also with pasture and drinking water, and a significant minority complain of blocked access to housing and other infrastructure.

TABLE 16

IMPACT COMBINATIONS

Type	A	B	C	D	Frequency
Pasture					27%
Cropland					45%
Forest					79%
Drinking water					10%
Other water uses					25%
Housing					7%
Other infrastructure					11%
COMMUNITIES CONCERNED	**88**	**152**	**154**	**132**	**526**

Note: Cells in black designate impacts that are always or almost always present in the communities of the particular type. Gray stands for impacts that occur in the particular type at a frequency much higher than its average frequency across all types.

A review of the impacts combinations suffered by communities in Thailand leads to several conclusions. (Note: The statistical method used to obtain this typology is detailed in a "Supporting Analysis" annex, which is provided on the CD/ROM):

- Blocked access to forest, cropland, and water is the dominant impact of contamination by mines and UXO. Communities that reported blockages in two or three of these resource areas tended to experience a range of impairments.
- Mine contamination does not appear to have significant impacts on housing, drinking water, and other infrastructure, perhaps because of considerable resettlement of border communities. These new communities may have pollution that blocks access to some productive land, but the technical and residential infrastructure has been moved from harm's way.

- Communities experience different effects from landmines and UXO depending on whether the blocked resource is forest or non-forest. Type D communities average more than twice as many victims as Type A and B communities. Type C communities fall in between.

Type C and D communities are also in close proximity to each other, as Table 17 shows. Neighboring communities tend to be of similar type when they share a common polluted environment. In other words, communities with a high-hazard profile have a disproportionate number of neighboring communities that have experienced recent incidents.

TABLE 17

PROXIMITY OF HIGH-HAZARD COMMUNITIES

Impact combinations	Median distance to nearest other community with recent victims (km)
A	10.9
B	8.3
C	7.4
D	5.0

Summary of Past Mine Action

ADMINISTRATIVE STRUCTURE

Mines before demolition

On 3 December 1997, Thailand signed the Ottawa Convention and on 27 November 1998 became the 53rd country, and the first in Southeast Asia, to ratify it. In August 1998, the Office of the Prime Minister of Thailand issued an order forming the NMAC, chaired by the Prime Minister and composed of all major government ministries and departments. NMAC was created to develop policies and to monitor the obligations set forth by the Ottawa Convention.

On 18 January 1998, NMAC established the (TMAC) to serve as the implementer for mine action operations including coordination of national and international organizations and donors. On 18 January 2000, TMAC was officially declared a working facility under the authority of the Thai Supreme Command and received Royal Patronage bestowed by Her Royal Highness Princess Galiyani.

TMAC established a mine action program to address the timelines and obligations of the Ottawa Convention including anti-personnel (AP) stockpile destruction. The first bulk demolition of 10,000 landmines occurred on 1 May 1999. Since then, progressive demolitions have taken place on a regular basis.

FUNDING FOR MINE ACTION IN THAILAND

The Master Plan on Humanitarian Mine Action of Thailand drawn up by TMAC outlines the establishment of seven Humanitarian Mine Action Units (HMAUs), four on the Cambodia border and one on each of the remaining borders with Laos, Myanmar, and Malaysia. Currently, three HMAUs are functioning in the most-affected sections of the Cambodia border. The best-equipped HMAU, in Sa Kaeo province, conducts mine awareness, technical surveys, and manual demining, and possesses a mine detection dog and the capability for mechanical assistance capacities.

Manual deminer

Funding for humanitarian mine action comes from both national and international sources. The Royal Thai Government (RTG) passed a supplementary budget in March 2000 of 1.6 million Thai Baht (THB), equivalent to $32,000, to initiate mine action in Sa Kaeo province. An additional 16.2 million THB was added to the TMAC operational capacity for mine action efforts in July 2000. International contributions, excluding the Landmine Impact

Mine awareness

Mine detection dog

Survey, have come largely from the United States. These resources, in excess of $880,000, have provided for:

- Infrastructure development and technical advisory support
- Training support
- Equipment acquisition and operational support
- Regional capacity development
- TMAC capacity training ("train the trainer" and mine detection dog team training)

THE MINE ACTION COMMUNITY

In June 2001, TMAC had three mechanical systems for evaluation: the TEMPEST mini flail for vegetation clearance, the SDTT (Survivable Demining Tractor and Tools), and the PROMAC vegetation cutter and soil grinder funded by Canada. In addition, a dozen trained dogs assist with mine detection.

Since its inception in 1998, TMAC has focused its efforts on establishing a solid technical and organizational foundation to support nationwide mine action efforts. Accomplishments include:

- Establishment of a permanent mine action center
- Formation of three HMAU teams to cover the five most affected provinces on the Cambodian border
- Creation of working mine clearance capacity that uses a toolbox approach to employ manual and mechanical clearance capacities and mine-detection dogs.
- Establishment of a populated Information Management System for Mine Action (IMSMA) database with a national dataset from an impact survey.

These achievements provide TMAC with a solid foundation upon which to expand the program and coordinate the support provided to other national and international organizations, including:

ASIA DISASTER PREPAREDNESS CENTER (ADPC)

ADPC works in partnership with TMAC on mine awareness education for the public sector and in communities affected by landmines in the province of Sa Kaeo.

The program is being expanded to include other provinces along the Cambodian border.

HANDICAP INTERNATIONAL THAILAND (HIT)

HIT has an established orthopedic workshop in a camp for displaced persons on the Thai Myanmar border in Tak province. This workshop provides orthopedic and prosthetic devices and physical and social rehabilitation, particularly for persons injured by landmines. In addition, HIT has community-based mine risk education programs in Tak province and another in the province of Chanthaburi on the Thai-Cambodian border.

THAILAND CAMPAIGN TO BAN LANDMINES (TCBL)

The TCBL, an NGO coalition, supports Thailand's participation in the international campaign of the same name and provides mine awareness education in schools and universities across Thailand and in the heavily mined province of Sa Kaeo.

PROSTHETICS FOUNDATION

A mobile unit under the Royal Patronage of the Princess Mother provides artificial limbs to disabled persons throughout the country.

GENERAL CHATICHAI CHOONHAVAN FOUNDATION

The General Chatichai Choonhavan Foundation has undertaken some limited mine awareness activities in Sa Kaeo province and is currently recruiting civilians to support a TMAC initiative to mobilize funds. This foundation is actively advancing the cause of developing Civilian Mine Action Units (CMAU) to complement the HMAU teams.

MINISTRY OF PUBLIC HEALTH

Several border provincial hospitals have prosthetic and assistance devices available and there is some government provision for vocational or skills training for landmine victims. The Maha Chakri Sirinfhorn Medical Rehabilitation Center in Nonthaburi provides training for persons who will work with disabled individuals, their families, and communities.

THE ROYAL THAI ARMY AND NAVY

The Royal Thai Army and Navy have Explosive Ordnance Disposal units (EOD) and demining capabilities that conduct ongoing clearance and marking activities in several areas of the country. It is reported that since 1997, clearance on the Thai borders has yielded between 2,500 to 3,000 mines per year.

COMMUNITY PERSPECTIVE OF MINE ACTION

During the 530 full community interviews of the Landmine Impact Survey, questions related to mine action received the following responses:

Questions related to mine action	Communities giving positive responses
Has the community had mine awareness training?	182
Have any marking or survey activities been undertaken in the community?	76
Has any landmine or UXO clearance occurred in your community?	96

The community responses indicate that most affected communities have been exposed to mine action activities, whether by HMAU teams, military personnel, NGOs, or government bodies.

Factors Influencing Mine Clearance

Anyone planning mine clearance operations in Thailand should consider many factors. Of these, the physical characteristics that most influence clearance are the size of the suspected areas, the type of existing vegetative cover, the characteristics of the terrain, and the types of ordnance.

SIZE AND DEFINITION OF MINED AREAS

Areas of mine and UXO contamination in Thailand range in size from one square meter to several square kilometers. The size and the definition of the boundaries of suspect areas are fundamental issues when reviewing approaches to clearance. For instance, the survey recorded 241 well-defined mined areas accounting for about 26 percent of the total number of contamination sites recorded in Thailand. These sites may not require extensive area reduction and it may be possible to eliminate them quickly with small, highly mobile EOD teams or specialized units of deminers.

UXO on path

AP mines placed on rock

The survey recorded 153 well-defined areas with an estimated surface of 10,000 square meters or less. A typical example of such an area would be a mined agricultural plot surrounded by land presently under cultivation. Although the terrain and topography of the sites will influence the selection of a final clearance approach, the well-defined boundaries of these suspected areas may reduce the requirements for area reduction and allow for more detailed planning of the task, and provide

opportunities for cost-efficient marking. The differentiation of medium tasks also provides a useful filter for tasks that can, if required, be undertaken in a realistic timeframe using demining teams alone.

Large poorly defined areas and areas normally considerably greater than 10,000 square meters account for 539, or 58 percent, of the reported suspected areas in Thailand.

CONTAMINATED LAND BY VEGETATION AND TERRAIN

The 933 mined areas identified in Thailand have different ground profiles and are covered by different types of vegetation that are critical factors to be considered when planning clearance operations. While the size and definition of a suspected area can suggest particular clearance techniques, the physical characteristics of vegetation and topographic relief, especially at larger sites, have the most influence on the final approach selected. Table 18 presents the mined areas in terms of ground profile and vegetative cover.

TABLE 18

MINED SURFACE AREA, BY VEGETATION AND GROUND PROFILE TYPES

	Ground profile (sq km)					
Vegetation	Flat	Gully	Hillside	Ridge	Total	Percent
Bushes	12	1	12	26	50	2.0%
Grass	5	0	1	5	10	0.4%
Other	3	5	31	1	39	1.5%
Trees	843	25	1,050	539	2,457	96.1%
GRAND TOTAL	**862**	**31**	**1,093**	**571**	**2,556**	**100.0**
Percentage	*54.9*	*38.6*	*3.2*	*3.3*	*100%*	

Terrain with minimal vegetation and topographic features is the simplest and fastest to clear of mine contamination. In Thailand, less than one percent of the suspected contaminated area is flat ground covered with grass. Mined areas tend to be areas of high relief (recorded as hillside, ridge or gully) and with thick vegetative cover (where reported areas are in forests). Mine clearance activities in such areas are particularly challenging, especially in regions where additional restrictions hinder movement of cumbersome clearance apparatus.

CONTAMINATED LAND BY ORDNANCE CLASS

The types and distribution of munitions in the contaminated areas also affect the choice of clearance technique. The survey elicited information about generic types of munitions, i.e., anti-personnel (AP) mines, anti-tank mines (AT), or UXO.

Three quarters of the contaminated areas reported AP mines (40 percent) and UXO (35 percent). The incidence of AT mines represented less than one tenth of

Mined areas tend to be of high relief (left) and with thick vegetative cover (right).

the reported contamination and much of this was restricted to the Cambodian border only. The presence or absence of AT mines can influence decisions about deploying some mechanically assisted clearance techniques.

Community Background and Mine Effects

COMMUNITY ADAPTATION

The history of conflicts that created the landmine and UXO hazard in hundreds of local communities is well known to the citizens of Thailand and is not the main subject of this survey. However, much less is known about how the affected communities have responded to the hazard. There is anecdotal evidence that many affected communities resort to some local clearance efforts and that the number of recent victims reported killed or injured during such attempts is very small. Neither is it known what has happened to the affected communities over time. Some communities may have become free of certain types of blockages as selected small-scale contaminated areas were cleared. Other communities whose active contamination ended many years ago still report the same average number of blockage types as communities with more recent contamination.

It is reasonable to assume that communities continually refine their response to the landmine hazard. This includes communication between community members on threat assessment and reduction, the circumspect use of resources in dangerous areas, and the continued search for, and development of, alternative income-generating activities.

Social science assumes that this adaptive community response depends not only on the nature of the hazard, but also on the social factors that affect those exposed to it. Community adaptation, much like individual adaptation, is circumscribed by history as well as by current organization and resources. Unfortunately, in the case of a landmine problem affecting a large number of communities, it is difficult to find indicators that are universally available and that make a valid point about the degree of successful adaptation to the mine hazard.

One potential indicator is the ability to avoid mine incidents. The ability to know the location of landmines, to develop alternatives to the use of resources trapped in polluted areas, and to mobilize outside connections for clearance should be inversely proportional to the risk of new incidents. One may also assume that not all communities can build this ability to similar degrees. Moreover, one chooses this indicator with the assumption that data about recent mine incident victims are reliable.

Data collected during the Thai Landmine Impact Survey were analyzed using a variety of statistical methods to find associations between recent mine incidents and the social characteristics of the communities in which they occurred. The mine action community in Thailand (and elsewhere) can use results of these analyses to determine and respond to indicators of vulnerability. Findings also may help to validate the method used to score and prioritize the affected communities. With regard to long-term adaptation and rehabilitation, it is still important to listen to the con-

cerned communities and to other knowledgeable groups. The case studies appended to this report provide examples of local insight and knowledge.

FACTORS RELEVANT TO THE ADAPTABILITY OF THE COMMUNITIES

A great many factors affect a community's ability to deal with mines and UXO. The survey collected data on a number of the most important variables:

1. Size of the population

The more people, the greater the likelihood that some of them will interact with the hazard and be injured or killed. However, it is possible that mines may affect the land or property of a few people only and not the entire population, in which case the relationship between population size and incidents is not direct.

2. Institutional endowment of the community

Complex local institutions should possess more of the skills required to reduce the hazard and to develop alternatives to using contaminated land. The method for measuring this is described below.

3. Extent to which mines block critical resources

Because reported blockages of water sources are highly correlated with the clustering of impacts it is assumed that communities cut off from some of their water sources tend to have more incidents than communities with unimpeded access.

4. Legacy of the conflict

In Thailand, this legacy is expressed in four dimensions: distance to the border, the estimated surface of the mined areas to which the community belongs, the intensity of regional landmine use as indexed by the distance to the nearest other community with some recent victims, and by the number of years that have passed since mines or UXO were last emplaced in the community.

The first and third factors are readily understood. The second and fourth demand more explanation. The nontechnical part is given here; technicalities are offered in the Appendix on the CD-ROM.

The survey used 12 indicators to measure the institutional complexity of the affected Thai communities:

1. Do at least some of the households have access to piped water?
2. Does the community have telephone service?
3. Is the community connected by a paved road?
4. Is motor fuel available locally?
5. Does the community have a primary school?
6. Does the community have a secondary school?
7. Does the community have a health care facility?
8. Do members of the community produce charcoal?
9. Do at least some of the households use natural gas or electricity?

10. Does the community have a cooperative?
11. Have some of the households formed a savings group?
12. Does a trader have an active business in the community?

Analysis of the survey results revealed highly significant correlations among these indicators. Communities that possess any three of the first four indicators from the above list are better connected to the broader society than are those communities that rank lower on these traits. Piped water supply may indicate good connections when maintenance and sharing of catchment areas call for cooperation with other communities.

Indicators 5, 6, and 7 concern traditional government services in education and health care. Communities with several of these facilities have enjoyed priority attention in decisions for government services.

Indicators 8 and 9 form a common factor that indicates to what extent local energy sources have been replaced with imported energy. This factor may also be a proxy indicator of poverty or wealth. Charcoal burning is one of the very few cash-earning activities in communities with poor employment prospects, and access to subsidized natural gas depends on an initial investment for containers that members of very poor communities may not be able to afford.

The presence of the last three items in the list indicates greater economic vitality and above-average diversity of employment alternatives, factors that reduce dependence on the use of contaminated land.

Table 19 shows the percentage of affected communities that have these characteristics. A more technical exposition is found in the annex included on the CD/ROM.

Another main indicator used to measure mine impact is the number of years that have passed since landmines or UXO were last emplaced in the community. The assumption is that the more time that has elapsed since the last mines were planted, the more time the community has had to find ways around the danger and to develop alternatives to the blocked resources.

TABLE 19

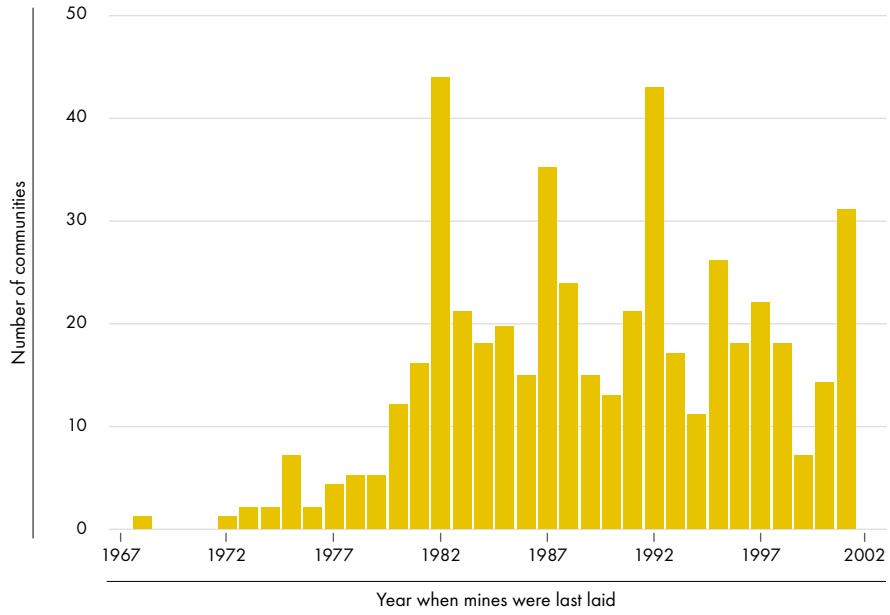
INSTITUTIONAL COMPLEXITY INDICATORS

Community trait	Percent reporting
Piped water	75%
Telephone	75%
Tarmac road	61%
Fuel for cars	53%
Secondary school	20%
Health facility	51%
Primary school	56%
Coal produce	63%
Gas and/or electricity	31%
Co-op group	37%
Savings group	36%
Trading	17%

The timeline of Thailand's conflicts can be seen indirectly in a graph of mine emplacement dates. (See Figure 6, next page.) The graph shows several spikes, such as for 1982, 1992, and 2001. The earlier ones may coincide with the ebbing of hostilities in some of the more intense border conflicts. The spike for 2001 represents the more than 30 communities in the Myanmar border region that reported ongoing mine laying and UXO scattering for that year. Not all of this new mining

FIGURE 6

COMMUNITIES, BY YEAR MINES OR UXO LAST EMPLACED



activity took place within Thailand proper, but it does affect the lives of persons residing in Thailand, primarily the inhabitants of the displaced persons camps.

The intensity of armed conflict is spatially concentrated and so is the density of mining or UXO contamination the more intense the conflict, the greater the density of mines within a region. In addition, incidents in one community may predict incidents in neighboring communities, based on the distance to the nearest community with recent mine victims.

FACTORS INFLUENCING THE PROBABILITY OF MINE INCIDENTS

The number of victims in a particular incident depends upon situational factors and is not likely correlated with the social structure of the community. Over a large number of incidents, however, statistical analysis reveals associations between structural factors and differing numbers of victims per community.

Analysis of the data from the Thailand survey identified several of these structural factors, particularly those that are associated "over-proportionately" with the absence of incidents. A useful way to conceptualize this is to envision certain "thresholds" beyond which communities find ways and means to live without incidents.[1] The best known such factor is contaminated surface. Some communities have one small area where removed—but not disarmed—live, locally collected munitions are stored; people know of these areas, and do not go near them.

[1] Because the survey has cross-sectional data only, it is not known how a given surveyed community has moved across some thresholds over time. The only comparisons possible are between communities and their conditions in the data collection interval, 2000-2001.

The following is a list of factors, in order of significance:

1. NUMBER OF YEARS SINCE MINES AND UXO WERE LAST EMPLACED

This factor influences a community's ability to adapt to the threat and avoid mine incidents. The influence of this variable differs between conflict regions. Figure 7 shows how the incident hazard for communities in the Myanmar border region decays rapidly with time. The situation is entirely different for the Cambodia border region. Here, a good number of communities that did not see active contamination after 1992 still suffer mine incidents. In fact, there is a third spike of communities that overcame, somehow adjusted to, or mitigated contamination as long ago as 1988, yet still experience numerous recent victims. Along the Cambodian border, only those communities where contamination occurred more than 14 years ago show a definitive decline in associated hazards.

2. INCIDENT IN A NEIGHBORING COMMUNITY

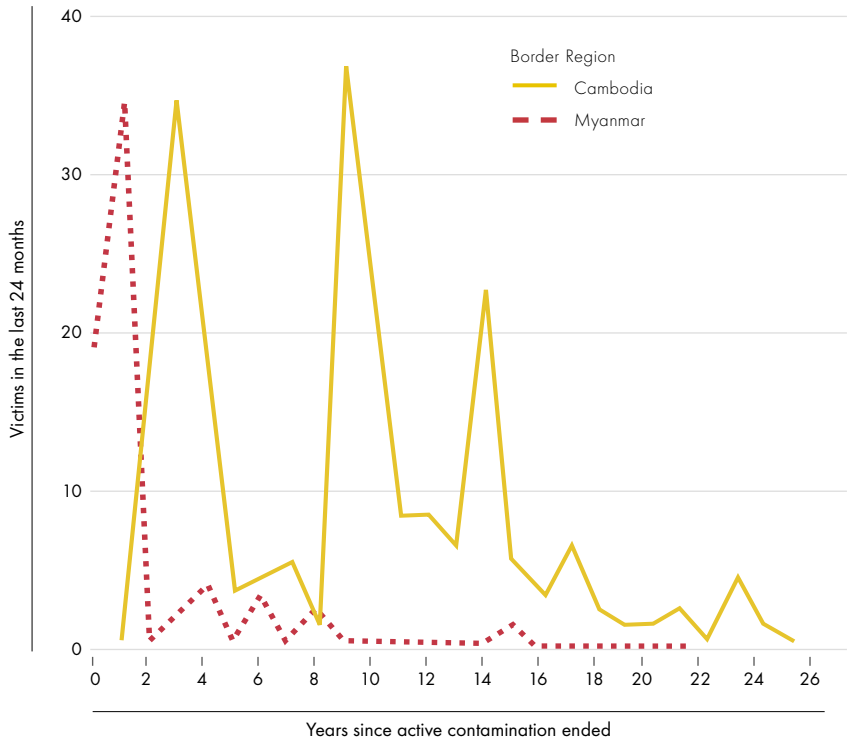
The risk of incidents and the number of victims increase considerably if other communities nearby have also suffered mine incidents.

3. DISTANCE FROM THE AFFECTED COMMUNITY TO THE BORDER, WHERE MOST MINED AREAS IN THAILAND ARE LOCATED

People from communities close to the border go to those areas, particularly forests, because they offer rich opportunities for collecting food, firewood, building materials, and medicinal plants. This factor does not reveal a statistically

FIGURE 7

POST-CONFLICT TIME AND VICTIMS



implicit "threshold" because some communities farther inland have also experienced mine and UXO incidents.

Each of the next three factors is significantly related to incidents, but their influence is clearly weaker than than those described above.

4. POPULATION

This factor has no implicit threshold. Smaller populations simply mean fewer interactions with the hazard. Lower populations in the vicinity of mined areas can reduce, but not eliminate, the risk.

5. SIZE OF CONTAMINATED AREA

At the lower magnitudes, the size of the contaminated area helps communities to stay out of trouble. The best example was given above in regards to a UXO storage heap that represents a very discrete and well-known locality of contamination. Above a certain, size an increase in the amount of contaminated surface area does not produce a significant further increase in the number of victims statistically. This trend may be partially explained by the difficulties of knowing the true scale of a contaminated surface, particularly in large suspected forest areas.

6. BLOCKED ACCESS TO WATER SOURCES

The statistical analysis suggests that blockages of water sources contribute significantly to the number of victims. This factor is not easy to interpret. Roughly 130 communities reported some blocked water sources other than residential drinking water sources. But, among those, surprisingly few indicated that the blockages were posing a serious problem.

One can speculate about reasons for this seeming contradiction. On the one hand, the survey found that the larger a suspected area, the more likely it was also to contain some water source such as a stream, canal, or pond. As a result, interviewers may have checked marked water as an issue even if the community did not face a real problem with this resource. On the other hand, the effect of water blockages on victims persists when surface area is controlled for statistically. The contradiction might be resolved by unknown third factors. These include military considerations such as the emplacement of numerous mines by the side of canals, or the greater fertility of land near water bodies, which makes the area more valuable for farmers and foragers and lead to more frequent human contact with mines and UXO.

HOW COMMUNITIES AVOID HAZARDS

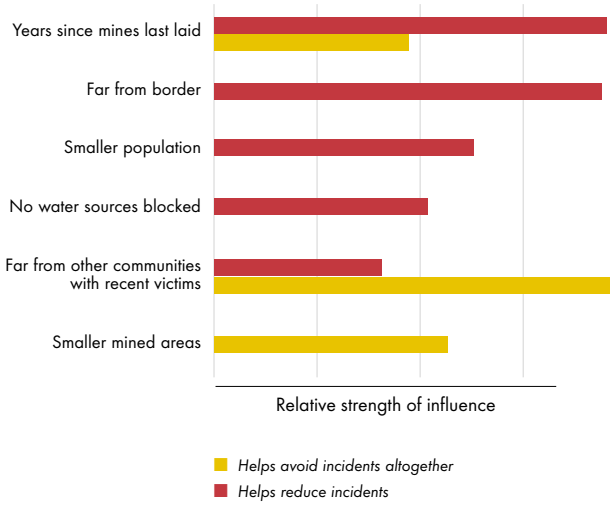
Figure 8 (see next page) summarizes the influence of factors that help communities avoid or reduce the risk of incidents. The concept of "threshold" above or below which a community moves to a stable "no-incident" condition is metaphorical; the data do not permit a clear calculation of these thresholds because each community was surveyed only once, and because none of the factors works in iso-

lation from the others. Readers interested in a more technical explanation may turn to the "Supporting Analysis" annex, which is included on the CD/ROM.

The above analysis draws upon the entire set of affected communities in Thailand for which data were collected. This model does not include community background factors. In fact, for the nationwide set, a relationship between these institutional factors and community adaptation, as measured by the number of recent victims, was not statistically demonstrable.

FIGURE 8

INSTITUTIONAL FACTORS THAT CONTRIBUTE TO AVOIDING MINE INCIDENTS

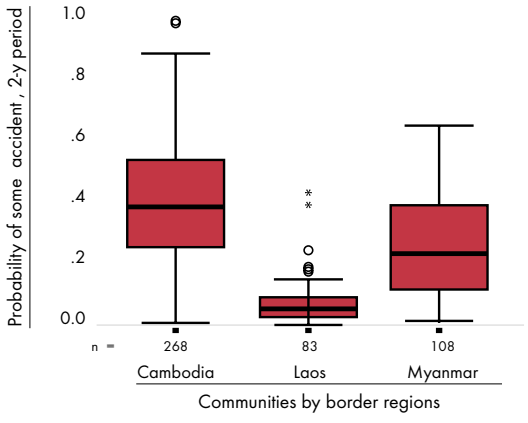


Conditions from one border region to another may be too different for any homogenous causal texture to appear. For example, in some areas, the tourism industry may offer more employment alternatives than the survey reflects. Moreover, along the Myanmar border, recent tensions and drug smuggling activities may cause mine contamination to follow a different, difficult-to-understand pattern.

The full extent of these regional differences is apparent when one studies the probability that each community will suffer at least one mine incident in a two-year period. This measure helps to distinguish the differences between the border regions. Figure 9 shows the median and spread of these probabilities.

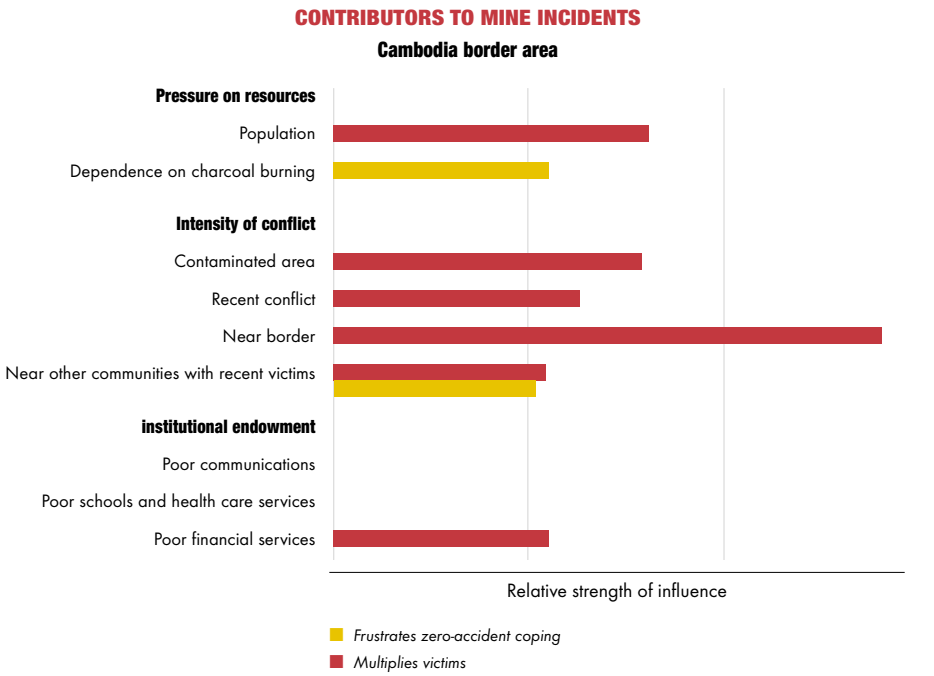
FIGURE 9

LANDMINE AND UXO HAZARD



It is obvious that the landmine hazard is greater, on average, for the communities in the Cambodia border region than in the Myanmar border region, and that the Laos border region is the least dangerous (reportable contamination was not reported for the border between Thailand and Malaysia). For this reason, the survey analysis focused on border regions in which many of the affected communities

FIGURE 10



possess relatively homogenous conditions. In an attempt to create some order among them, Figure 10 assigns them to the three conceptual domains:

- Pressure on resources
- Intensity of the conflict
- Institutional endowment

The factors related to the intensity of the conflict outperform all others in their power to cause victims. Among them, distance to the border is the most influential followed by the size of the contaminated area and by the distance to other communities with recent victims. The amount of time elapsed since the latest active contamination is another significant factor, though less so than the other variables in this group.

Pressure on resources contributes to incidents. The population factor behaves more or less as in the all-Thailand model. The energy factor is significant, but this may in fact be a proxy for poverty. For this reason, the factor was moved from the institutional to the resource pressure part of the graph and was relabeled "Dependence on charcoal burning" to express the lack of employment alternatives.

This leaves the institutional domain with three factors. Remarkably, only one is correlated with recent victims. More diverse financial services go hand in hand with fewer victims. While the correlation is significant, the causation may be more complex. Such services may facilitate the creation of alternative employment that lessens the pressure on contaminated land, or it may be the sequel to pre-existing economic vibrancy that had already moved workers from contaminated farms and forests to more productive and safer venues.

The two other factors, the quality of communications and the level of traditional government services, do not influence the numbers of victims. This has important implications for policy. It suggests that simply creating better access and more social services will not in itself be enough. These conditions may not by themselves enhance new employment opportunities that remove people from contact with dangerous areas.

A comparison between the graph for the all-Thailand model and the graph for the Cambodia border region reveals a different set of yellow and red bars. The region along the Cambodia border has many communities that keep suffering incidents even though active contamination ended many years ago. Moreover, most of the affected communities are near some other community that had recent victims. As a result, these variables no longer produce thresholds across which communities in this set would move to a stable incident-free condition. Yellow bars are shown only for surface (communities with small areas may likely be incident-free) and for dependence on charcoal burning. The latter may be an artifact because the survey could not establish the exact number of people engaged in this activity, but only asked yes/no questions on two energy indicators. The least that can be stated is that communities that did not report coal production as a significant economic activity tended to have fewer victims.

The red bar signifies that among the Cambodia border region communities, not only did contaminated surface have a critical threshold, but there were also additional victims for each magnitude above the threshold. This may be an expression of the water blockage factor. Simply put, there are vast suspected areas, people go there for various reasons, and the water within may fertilize, or otherwise be associated with attractive, yet contaminated, resources. Incident accounts indicate that victims were "collecting something."

The broader findings are relatively easy to summarize, but the data await a much finer sifting of the factors that help communities adapt to polluted environments. The strongest conclusion to date is that the conflict-related factors will continue to be the strongest influence on the ability of these communities to adapt. Short of resettlement and large-scale clearance, this outcome is not easily altered by policy decisions. Thailand, at least along its border with Cambodia, can therefore expect to suffer incidents in its mined areas for many years to come.

The good news is that there seems to be a "threshold mechanism" implied in the effects of contaminated surfaces. This raises the potential for circumscribed clearance projects which could make a noticeable difference for the lives of those in the affected communities. Also, economic policies may have the potential to facilitate community adaptation considerably.

COMMUNITY PROFILES

Six community profiles are presented in Table 20 (see next page). From each of the major affected border areas, the communities most and least likely to have an incident in a two-year period were selected.

Two communities with estimated probabilities greater than 0.5 are those that had some incidents in the two-years prior to the survey. Please note that all three high-probability communities are in forested areas.

TABLE 20

MINE INCIDENTS AND COMMUNITY BACKGROUND VARIABLES—EXAMPLES

	Communities with very low incident probabilities			Communities with very high incident probabilities		
	Cambodia	Laos	Myanmar	Cambodia	Laos	Myanmar
Province	Sa Kaeo	Udon Thani	Chiang Rai	Sa Kaeo	Phayao	Chiang Mai
District	Ta Phraya	Wang Sam Mor	Khun Tarn	Ta Phraya	Chiang Kum	Weang Hang
Subdistrict	Thap Rat	Wang Sam Mor	Yang Hom	Ta Phraya	Rom Yen	Peang Luang
Community	Ban Mai Thai Thavorn	Wang Sam Mor	Ban Yang Hom	Ban Thup Siem–new	Ban Pra Cha Pak Dee	Ban Peang Luang
Probability of some mine incident in two years	9%	0%	2%	97%	42%	64%
Impact score	1	1	4	12	5	6
Total victims in the past two years	0	0	0	2	0	1
Population	100	30	1,068	878	2,320	10,725
Access blocked to some forest area	No	No	No	Yes	Yes	Yes
Year mines last laid	1981	1981	1982	1986	1995	2001
Contaminated area (sq. m.)	62	143	94	2,672,940	15,858,060	6,306,175
Distance to border (km)	20.3	121.2	17.6	3.1	12.1	2.4
Distance to nearest other community with recent victims (km)	19.4	274.7	23.0	0.0	15.6	7.9

Consequences for Mine Action

GENERAL PLANNING CONSIDERATIONS

As mentioned previously, neighboring communities often report the same or similar combinations of impacts. Such groups are usually spread over a fairly small distance, often less than the diameter of their district. In some instances, two to four affected communities relate to the same large mined area. In others, several mined areas are involved, but they all are blocking the same types of resources.

The clustering of communities with common mine-induced problems and the small size of such clusters suggest a need to organize small sets of communities for common action. Typically, these sets of communities may be too small to receive close attention from regional planning entities, let alone a response tailored to their specific problems. They represent a scale of local specificity to which NGOs with community development experience may be more attuned than official bodies are and may present opportunities for novel alliances for mine action.

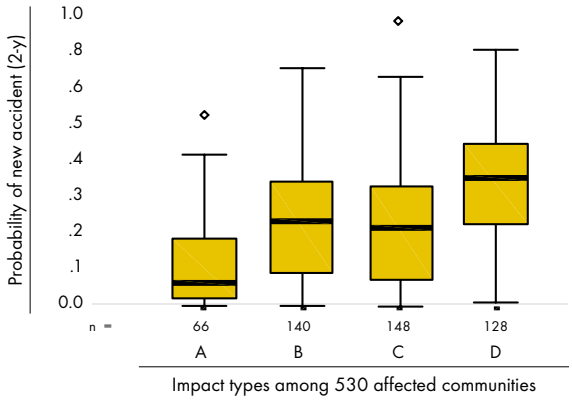
Small clusters of communities that have suffered mine incidents in the same large polluted forest tracts may be particularly conducive to cluster-wide interventions. As we have seen, community members go to contaminated areas for a variety of reasons. Although some of their activities—such as tree cutting and charcoal burning—may be illegal, the background analysis on recent victims suggests that poor people in particular will keep going there, chiefly because they lack economic alternatives. At the same time, many of these forest areas are so large that clearance of large parts will not be practical.

An effective approach could emerge from experimental, collaborative arrangements between authorities, NGOs versed in social forestry, and mine clearance agencies. An appropriate organization would then mobilize the interested communities for consensual and rational uses of forest resources, while helping to create a legal framework, access to loans for poor people, and sustainable plans for clearance, demarcation, and awareness education.

Communities with multiple blockages of forests, cropland, and water resources have a higher incident probability than those with other combinations (Figure 11).

FIGURE 11

IMPACT TYPE AND ACCIDENT HAZARD



Type C and D: Blocked water bodies

For comparison: Type A and B: Only pasture and local roads blocked

This type of community tends to occur in clusters, and may warrant priority attention together with the communities actually scored as highly impacted.

TECHNICAL PLANNING CONSIDERATIONS FOR CLEARANCE

The purpose of the Landmine Impact Survey is not to investigate purely technical mine action issues in detail but to define the nature of the landmine/UXO problem at the national level. It aims to provide an appropriate framework within which national strategic planning, program design, and resource allocation decisions can be made.

DISTRIBUTION CONSIDERATIONS

Twenty-seven provinces have been reported as contaminated by mines and UXO in Thailand, although the degree of contamination and community impact varies considerably. In four provinces, for instance, the level of impact is negligible and one clearance task in each of these provinces would eliminate all mine threat. Three of these provinces Udon Thani, Nong Khai, and Nong Bua Lamphu are in the northeast region and the fourth province Nahkon Si Thammarat is located in the southern region.

Three quarters of the land in Thailand identified as contaminated is on the Cambodian border, about one fifth is on the Myanmar border, less than one tenth is on the border with Laos, and a small fraction of one percent is on the Malaysian border. When the area of contamination within Thailand's borders is linked to community impact, the difference between the border regions is even more pronounced.

The distribution of landmine contamination and community impact identified during the impact survey suggests that the current plan for establishing the 7th HMAU in the southern region should be reviewed. The survey data indicates that the problem on the Malaysian border is so minimal compared to other areas of Thailand, that scarce resources should be focused elsewhere. To address two simple clearance tasks, one in Yala province and one in Nakhon Si Thammarat, resources could be mobilized from the existing military units in the region or teams deployed to the south from other areas for a short time. Similarly, although small-scale clearance tasks should be undertaken on the border with Laos, mine action activities should focus mainly on the Myanmar and Cambodian borders. The on-going security concerns on the Myanmar border, however, support the current strategy of focusing clearance efforts on the Cambodia border provinces. Mine awareness and victim assistance projects remain a viable and much needed option for persons living in highly impacted communities and camps for displaced persons along the Myanmar border.

Class of munitions

Munitions type is an important factor in determining appropriate clearance methods as well as what types of equipment are both safe and effective in a given mined

TABLE 21

SIZE OF CONTAMINATED AREAS IN RELATION TO MUNITIONS TYPE, VEGETATIVE COVER, AND GROUND PROFILE

	Type of munitions								Vegetation				Ground Profile			
Area in square meters	AP	AT	UXO	AP, AT	AP, UXO	AT, UXO	AP, AT UXO	Unknown	Grass	Bushes	Trees	Other	Flat	Hillside	Ridge	Gully
10,000 and smaller	110	9	186	5	35	2	7	19	79	55	168	69	190	120	46	15
10,001–100,000	90	2	31	11	38	0	8	6	17	26	130	7	73	54	47	6
100,001–500,000	43	0	15	13	53	1	9	6	5	12	107	4	46	49	31	2
500,001–1,000,000	23	0	5	1	22	0	6	0	2	3	45	2	9	23	17	3
1,000,001–5,000,000	36	0	10	4	46	1	22	5	3	9	91	3	28	41	35	2
>5,000,000	32	0	10	7	49	1	37	2	0	2	93	1	27	39	29	1
TOTAL	**334**	**11**	**257**	**41**	**243**	**5**	**89**	**38**	**106**	**107**	**634**	**86**	**373**	**326**	**205**	**29**

Note: Though only one type of munition or landmine may have been reported for many of the areas described in this table, a definitive assessment is only possible by technical mine action personnel.

area. Table 21 and Table 22 illustrate munitions type relative to selected physical characteristics of contaminated areas. The vast majority of contamination in Thailand is a result of AP mines and UXO. Only 11 mined areas have been recorded that are exclusively AT mine fields and these represent a minute surface area when compared to the overall figures for the country. AT mine contamination in combination with AP mines and/or UXO does exist in other areas, largely confined to the Cambodian border. For clearance purposes, the presence of AT mines is significant when deploying most clearance machinery.

TABLE 22

AFFECTED COMMUNITIES, CONTAMINATED SITES, AND SURFACE AREA, BY MUNITIONS TYPE

	Number of communities	Contaminated sites	Contaminated surface (sq km)
AP Only	121	334	634
AT Only	4	11	0
UXO Only	65	257	184
AP, AT, UXO	316	89	1,210
Unknown munitions	10	38	36

Note: Though only one type of munition or landmine may have been reported for many of the areas described in this table, a definitive assessment is only possible by technical mine action personnel.

Survey staff recorded the specific make and model of mines expected to be found in a mined area, if such information was readily available through the military or informed civilians. Data of this nature can provide insight into appropriate clearance approaches. For example, mines made of plastic or materials with low metal content can challenge the sensitivity limits of mine detectors, particularly in iron rich soils. In such cases, a greater emphasis on dogs or mechanical support may be appropriate. A number of mine types are found in Thailand; details of their distribution, where recorded during the survey, are stored in the database at TMAC.

There have been a number of reports that improvised devices were used on the borders with Myanmar and with Malaysia. This has a significant impact on

the duration of a mine threat since improvised devices tend to decay and become nonfunctional at a rate that is considerably faster than for manufactured mines. On the Malaysian border, the impact of mines reported by communities is significantly less than expected, perhaps in part because the improvised devices have lost much of their deadly potential.

Vegetation and ground profile

Vegetation and ground profile survey statistics for the country as a whole indicate that trees cover 69 percent of the contaminated sites and that 60 percent of sites are in areas of high relief. In terms of area, the proportion of forests is even more pronounced, accounting for 95 percent of surface contamination (see Table 18 on page 36).

The large suspected areas reported in many forested regions are poorly defined. When viewed from a national or regional perspective, they may distort statistics for surface area, vegetation, and terrain. For purposes of strategic and operational planning, it is important to balance area statistics with actual site numbers. For example, flat surfaces and grassy conditions account for less than one percent of the total area reported for the whole country. If reviewed in terms of the number of sites, then 11 percent are considered flat with light vegetation.

Table 23 shows in detail the distribution of vegetative cover in relation to the terrain and contaminated surface area and the number of mined areas for highly impacted communities.

TABLE 23

RELATIONSHIP OF VEGETATION, TERRAIN, AND CONTAMINATED AREAS IN HIGHLY IMPACTED COMMUNITIES

		Flat	Gully	Hillside	Ridge
Bushes	Contaminated areas	14	1	2	3
	Surface area (sq km)	9.75	0	0.03	14.38
Grass	Contaminated areas	13	1	6	6
	Surface area (sq km)	0.83	0	0.03	0.19
Other	Contaminated areas	9	2	1	1
	Surface area (sq km)	0.02	0	0.07	0
Trees	Contaminated areas	56	2	37	29
	Surface area (sq km)	422.66	24.29	364.40	98.78

Inhabitants of many impacted communities report that the mines in forests have the greatest effect on their livelihoods. At the same time, forested areas pose the greatest challenges in terms of clearance. Manual deminers are expensive and unproductive when operated in large areas of low-density or poorly defined contamination. Dogs with mechanized assistance can be more effective in such

areas, yet thick vegetation make it difficult to verify canine findings, and machines are hindered by rugged terrain and poor access.

One remedy is to deploy machinery to remove vegetation. This step in particular enhances the use of dogs, which benefit from improved access and the reduced threat of trip wires which are triggered or stripped by the machines. Some clearance can occur seasonally because ground-level vegetative cover may vary during the year.

The full clearance or partial verification of vast expanses of forested areas in Thailand is an unrealistic goal. An alternative approach is to target selected forested areas, based on access routes, victim hotspots, or well-defined areas of economic and social importance such as temples and archaeological ruins. A balance of other mine action activities such as awareness education in local communities and appropriate mine marking can help contain the mine threat. Clearing mines from in the remaining 31 percent of better-defined contamination sites outside forested areas can proceed faster and more efficiently.

Table 24 summarizes the reported time since mine-laying activities ended at a particular site and the corresponding estimated surface area of contamination, grouped into three time intervals. Forty-eight percent of the areas reported that their most recent phase of contamination occurred within the last 11 years (1991-2001), 44 percent 10 to 20 years ago (1981-1990), and 8 percent prior to this period (1968-1980).

TABLE 24

AGE AND SIZE OF CONTAMINATED AREAS

Age of conflict	Contaminated areas	Average size of area (sq km)	Contaminated surface (sq km)
1968 - 1980	75	0.48	36
1981 - 1990	399	1.63	650
1991 - 2001	427	4.24	1,810
TOTAL	**901**	**2.77**	**2,496**

Note: For 32 contaminated areas, there is no indication of when or if mine activity ended.

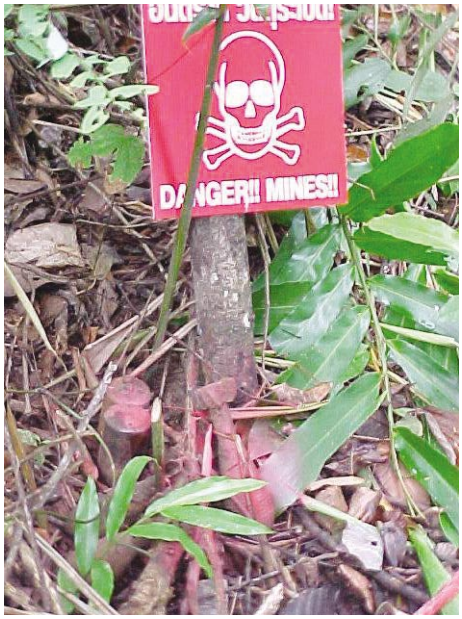
The surface area of the reported contamination decreases considerably with time elapsed since the mines were emplaced. There are several possible reasons for this:

- Minefields remaining from early periods of communist insurgency were more localized and are not represented by large-scale border features.
- The pressure for land over time has forced agriculture and other human activities to encroach on the mined areas, better defining actual boundaries.
- Large minefields that existed many years ago now exist as several small, contaminated areas broken up by uses such as agriculture and new access routes.

Many of the more recently mined areas recorded are in the large suspected areas in forest zones along the Cambodian border. These are poorly defined and considerably above average in size. The older the area of contamination, the greater the chance that some items have been moved. This reduces the size of the contaminated area and often creates new dumpsites of localized contamination.

MARKING

Marking of suitable low-impact contaminated areas with warning signs may prove to be a cost-effective way to reduce the overall risk that mines pose to populations while other higher-priority tasks are accomplished. Only experienced and appropriately trained personnel should undertake this activity. The importance of correct positioning of mine warning signs should not be underestimated. A mine sign placed in the wrong position is counterproductive, excludes safe, productive land from use, and more importantly, could potentially channel people into other areas where real danger exists.



Mine warning sign

The marking of dangerous areas can be addressed at various levels. At one extreme, full technical surveys can be undertaken that involve area reduction techniques and perimeter fencing and are supported by mine warning signs. At the other extreme, individual mine signs can be placed at highly localized contamination sites or run along one edge of a suspected mined area, such as along a road verge. Regardless of the context in which a marking program takes place, the marking system requires regular maintenance.

To assist future marking initiatives, the survey teams collected information about the boundaries of each reported contamination site. This information will be valuable for the planning of technical surveys.

Not all dangerous areas were circumnavigated or safe observation points defined on all sides of the area. However, for the 933 reported areas of contamination in Thailand, 318 were defined by observable terrain features and recorded in field sketches on all sides. Information on definitive edges or boundaries of dangerous areas is beyond the scope of the Level One Impact Survey. However, the data collected by the survey teams does point the way for detailed technical survey.

MINE AWARENESS

Knowing the age and sex of the victims as well as the victim's activity at the time of the incident can help determine appropriate messages and delivery mode for the mine awareness curriculum. A national perspective on the distribution and frequency of incidents and the identification of victim "hotspots" provide a basis for targeting countrywide mine awareness efforts.

Age and sex of victims

Victims are almost exclusively male, with less than 5 percent female victims recorded. Of the 177 recent victims for whom ages are recorded with confidence, 33 percent were 15 to 29 years old and 51 percent were 30 to 44 years old. Very few incidents involved young children.

Activities of recent victims at the time of incident

At the time of incident, 43 percent of recent victims were collecting food, water, or other products in forested areas. Fourteen percent of the victims were military personnel on border duties, percent, 10 percent of the victims were victims traveling, percent, and 5 percent were engaged in farming activities.

Location of victims

When planning mine awareness activities, it is important to prioritize and target locations. Of the 346 recent victims recorded, 56 percent had incidents on the Cambodia border and 43 percent on the Myanmar border. No incidents were recorded on the Malaysian border over the last two years and only one was reported on the border with Laos. More than half of the victims recorded for the Myanmar border reside in Thailand but had had their incidents across the border in Myanmar.

On the border of Cambodia where the highest incidence of recent victims occurs, the provinces of Si Saket and Sa Kaeo have a marked level of incidents corresponding respectively to 31 percent and 27 percent of the border region total of 195 incidents in the last two years.

High-impact communities, where many incidents are recorded, are indicated on maps in the regional section of this report. More detailed evaluations of incidents are presented in provincial reports held at TMAC.

More detailed analysis of victim data at a local level can support further development of specific messages and can suggest appropriate means of delivery. There is enormous potential for developing tailored approaches across the country. All mine awareness actors should be encouraged to access the database at TMAC, obtain relevant information and appropriate maps, and take time to shape a coordinated approach to address the awareness needs of affected communities nationwide.

LANDMINE VICTIM ASSISTANCE

Care

The survey identified 3,468 victims of landmine and UXO incidents; of these victims, 1,973 survived and remain disabled. In the last two years, there have been 346 incidents, almost exclusively on the Cambodian and Myanmar borders. In these recent incidents, 23 percent of victims died as a result of their injuries.

TABLE 25

RECENT VICTIM CARE, BY PROVINCE

	Province	Emergency	Rehab	Vocational Training	Other	None	Unknown
Cambodia	Buriram	3	0	0	0	0	4
	Chanthaburi	6	0	0	0	0	0
	Sa Kaeo	21	5	0	1	7	6
	Si Saket	32	3	0	3	1	5
	Surin	17	4	0	1	0	1
	Trad	14	1	0	0	2	1
	Ubon Ratchathani	4	0	0	3	4	3
	TOTAL	**97**	**13**	**0**	**8**	**14**	**20**
Myanmar	Chiang Mai	1	0	0	0	0	9
	Chiang Rai	1	0	0	0	0	5
	Kanchanaburi	1	0	0	0	0	1
	Mae Hong Son	11	0	0	0	0	4
	Phetchaburi	3	0	0	0	0	0
	Prachuap Khirikhan	2	0	0	0	0	0
	Ratchaburi	16	0	0	0	0	4
	Tak	2	0	0	0	0	1
	TOTAL	**37**	**0**	**0**	**0**	**0**	**24**
Laos	Phayao	0	0	0	0	0	0
	TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
	GRAND TOTAL	**134**	**13**	**0**	**8**	**14**	**44**

Not all the victims were available for interview in many cases, data on victim care came from a third party. Thus, the statistics on the care of recent victims that are illustrated in Table 25 should be considered approximate. Based on the data received, more than 50 percent of recent survivors are confirmed to have received emergency care shortly after their injury. Only 5 percent are reported to have received no care. The medical facilities in Thailand are excellent by most standards with a well-structured health system administered down to a district level. Victims that did not receive adequate emergency care invariably had incidents in remote areas.

Types of injury

Of the 346 recent victims, 79 died as a result of their injuries, 67 of which were recorded as immediately fatal. Of the remaining survivors, 141 underwent amputation and 15 lost their sight. For further details and geographic distribution, see Table 26 on next page.

The toolbox concept for demining

The data that are specific to mine area collected during the Landmine Impact Survey help improve understanding of the physical nature and attributes of the mined areas. In broad terms, planners can use the data to shape the resource requirements and the methods of approach to clearance.

The toolbox concept for demining draws on the resources from a number of approaches such as manual demining, mine detection dogs, and mechanically assisted demining. It considers the strengths and weaknesses of the available tools in determining which methods are best suited to the physical characteristics of a particular clearance task. One can estimate the appropriate balance of resources in the "toolbox" for a national program by reviewing the nature of minefield characteristics from a countrywide or regional perspective.

TABLE 26

RECENT VICTIM INJURIES, BY PROVINCE

	Province	Fatal	Amputation	Loss of Sight	Other Wound	Unknown Wound
Cambodia	Buriram	4	1	0	4	1
	Chanthaburi	0	3	0	3	0
	Sa Kaeo	18	22	3	3	6
	Si Saket	17	21	1	21	2
	Surin	8	11	2	8	1
	Trad	8	10	0	2	1
	Ubon Ratchathani	1	4	1	8	1
	TOTAL	**56**	**72**	**7**	**49**	**12**
Myanmar	Chiang Mai	5	8	0	1	1
	Chiang Rai	5	1	0	1	1
	Kanchanaburi	1	2	0	0	0
	Mae Hong Son	3	16	1	0	0
	Phetchaburi	0	2	1	0	0
	Prachuap Khirikhan	2	1	0	1	0
	Ratchaburi	3	9	2	8	4
	Tak	3	30	4	32	0
	TOTAL	**22**	**69**	**8**	**43**	**6**
Laos	Phayao	1	0	0	0	0
	TOTAL	**1**	**0**	**0**	**0**	**0**
	GRAND TOTAL	**79**	**141**	**15**	**92**	**18**

Background&Methodology

Background&Methodology

Project Timeline

The following timeline provides an overview of the survey process from conception to completion.

- **May 1999**—*The UNMAS issued a formal survey request* to the SAC to conduct an impact survey in Thailand.
- **June 1999**—*SAC and UNMAS dispatched a team to Thailand* to develop a preliminary country plan. This plan was subsequently approved by the NMAC in October 1999.
- **October 1999**—*SAC selected the international mine action NGO*, Norwegian Peoples Aid (NPA), to implement the survey in Thailand. It was determined that NPA offices would work in close collaboration with TMAC.
- **January 2000** —*UNMAS, SAC, and NPA representatives visited Bangkok* to meet project stakeholders and clarify the working relationship with TMAC and other authorities.
- **May 2000**—*The NPA team leader arrived in Thailand* and initiated administrative functions relating to the establishment of an office at TMAC, banking, and recruitment and registration of staff and the organization.
- **June 2000**—*The full expatriate staff complement arrived in Thailand.* The office was established and nationwide recruitment drive for national staff was undertaken, yielding approximately 2,000 applicants. Extensive contacts were undertaken with the donor community representatives, NGO staff, and relevant military authorities. Briefings were also provided to international visitors representing the United States Department of Defense; the Geneva International Center for Humanitarian Demining (GICHD); and the Japanese Alliance for Humanitarian Demining Support (JAHDS).
- **July 2000**—*The training course for supervisors and field editors began.* The database was established and the procurement of field equipment undertaken. NPA and TMAC met with CMAC representatives and hosted visitors from Cranfield University Mine Action and the Virgin Group. NPA presented the survey project to ministries and other government departments, including the Office of the Prime Minister, the Royal Thai Survey, Border Patrol Police

Supervisor group photo

Bureau, National Security Council, and ministries of the interior, education, foreign affairs, public health, agriculture, science and environment, and labor and social welfare.

August 2000—*The field supervisor and field editor course was completed* and the pretest of the survey instrument was conducted in the province of Sa Kaeo. Hemi Morete, UNMAS Program Officer, monitored this phase of the project as part of the Quality Assurance Monitor's (QAM) responsibilities. SAC provided social science expertise to assist in the pretest evaluation and to recommend adaptations to the survey approach.

Pretest: testing of the questionnaire

The database staff took part in a ten-day IMSMA course. The NPA team leader and TMAC Counterpart, Maj. Gen. Ronnachai Srisuworanan, undertook a national trip to Thai army headquarters in order to brief senior army commanders, identify appropriate liaison staff, and to facilitate future survey operations around the country.

September 2000—*Sixty candidates were recruited to participate in the data collector course.* Of these, 34 were selected for employment. Honda (Thailand) supported the survey project with 28 motorcycles through JAHDS and provided a weekend motorcycling course for data collectors. Kenwood Ltd. provided instructors for VHF radio training and the Red Cross provided nurses for first aid training. At the same time, some supervisors and field editors continued with the process of expert opinion collection. This exercise identified 1,491 communities as affected or possibly affected in 35 provinces.

FS & FE mapping exercise

In parallel to NPA staff training, a dedicated course for 15 liaison officers from Royal Thai military

units nationwide took place. The course focused on the field facilitation of the data collection and on the suggested liaison preparations in advance of survey activities.

Representatives of AustAid and the Australian Embassy were briefed on the survey and possible additional support for the project was discussed.

- **October 2000**—*In preparation for the pilot survey,* various questionnaires and IMSMA adaptations were undertaken before teams were deployed to Sa Kaeo. UNMAS and SAC staff participated in the pilot test and operational review. The UNDP country representative also visited the teams in the field. The scope of the mine problem identified increased dramatically as part of the expert opinion collection. This increased scope, along with now-established rate for field work, caused the project timeline to be extended by an additional two months.

Students during pilot test

- **November 2000**—*Data collection extended into four further provinces* on the Cambodian border, with each supervisor and team responsible for a separate province. Additional meetings with governors and military commanders, including a seminar at which 19 provincial governors attended or were represented, took place to facilitate the expanding operational coverage of field teams. The first provincial report and maps were completed for the province of Sa Kaeo.

International visits were received from the GICHD, UNDP, and ETH Zurich.

- **December 2000**—*The Cambodian border was completed* and the focus for all four survey groups shifted to the Laotian border. The SAC Program Manager visited field teams and took part in a coordination meeting where the results of the Sa Kaeo province were presented to the donors.

The NPA team leader attended an operational review of surveys in progress (Chad, Mozambique, and Cambodia) sponsored by SAC with funding support provided by the United States government.

- **January 2001**—*By the end of January, surveys of 18 of the 34 provinces* identified as contaminated during the expert opinion collection were completed and teams now focused efforts on finishing the Laotian and Myanmar borders. Alain Dazy, the UNMAS QAM, visited all field teams with the NPA team leader.

Data collectors with escort on Myanmar border

- **February 2001**—*During this month, all teams were operating* on the Myanmar border.

  The survey team leader attended the Survey Working Group meeting in Oslo, Norway.

- **March 2001**—*Field operations expanded from the Myanmar border* to also include the Malaysian border. SAC personnel visited a field team in the province of Chiang Mai and a consultant from DIFID received a brief on the survey progress. A small delegation from the NPA head office visited Thailand for meetings with the Norwegian Ambassador and Director of TMAC. A demining seminar in Sa Kaeo province included a detailed presentation of the survey. In addition, a visit of facilitation was conducted to the 4th Army Commander in the south to lobby support for the survey teams working in the southern provinces.

- **April 2001**—*The data collection phase of the project ended.* A workshop was held with all HMAU units operating on the Cambodian border to allow the results from the survey to be incorporated into ongoing operations. A representative from the Mines Advisory Group (MAG) visited the survey to prepare for an upcoming survey in Lebanon. Further presentations were held at a meeting of the Burmese Border Consortium (BBC) and at a gathering of mine action organizations at the Canadian Embassy in Bangkok.

- **May 2001**—*Data from the last remaining provinces surveyed* and information from the camps for displaced persons continued to be entered into IMSMA. Map production and quality assurance procedures continued SAC staff arrived in Thailand to assist with the analysis of data and the drafting of the final report. A display of survey results was presented at an open day of the Civilian Demining Initiative attended by the Deputy Defense Minister.

  The final presentation of the survey to stakeholders and the Thailand authorities took place on 31 May 2001.

Database workshop scene

Key Participants

The Landmine Impact Survey in Thailand was implemented in partnership with TMAC. In addition to critical assistance provided by the staff of TMAC, the survey also received a wide range of support from other national bodies, nongovernmental organizations, and the international community.

- **The National Mine Action Committee (NMAC)** is the senior Thai government body responsible for the supervision of activities in accordance with the Ottawa Convention. The NMAC is chaired by the Prime Minister and composed of 26 military and civilian representatives from a broad range of ministries and governmental departments.
- **Thailand Mine Action Center (TMAC)** is the operational body charged with the responsibility to implement decisions of NMAC and to coordinate the humanitarian mine action program in Thailand. TMAC is the intended local customer and future custodian of collected data from the Landmine Impact Survey. TMAC provided the survey staff with a range of invaluable support, including office space within the TMAC premises, assistance in recruiting key national staff, use of heavy-duty vehicles, access to radio frequencies, and daily coordination with the various regional military commands.
- **Thai Government Ministries and Departments** assisted the survey, including the Ministry of Interior, the Ministry of Foreign Affairs, the Ministry of Agriculture and Cooperatives, the Ministry of Science, Technology, and Environment, the Ministry of Education, the Ministry of Public Health, the Ministry of Labor and Social Affairs, and the Royal Thai Survey Department. Particular acknowledgement must be given to the Supreme Command and the commanders of the Royal Thai Army, Royal Thai Navy, and Royal Thai Border Police.
- **Survey Action Center (SAC)** is a Washington, D.C.-based, nonprofit organization affiliated with Vietnam Veterans of America Foundation. SAC provided overall management of the Thailand Landmine Impact Survey, technical expertise to support the work in the field, and coordination between the Thailand survey and other international survey efforts.
- **Norwegian Peoples Aid (NPA)** is an international, nonprofit organization based in Norway that implements development assistance, emergency aid, and mine action projects worldwide. NPA is a member of the Survey Working Group (SWG) which guides the process of Landmine Impact Surveys worldwide. In the case of Thailand, it was responsible for the execution and management of all survey activities.
- **United Nations Mine Action Service (UNMAS)** is a body within the United Nations Department of Peacekeeping Operations (DPKO) that serves as a focal point for mine action within the United Nations system in the areas of policy and overall coordination. UNMAS selects the countries to undergo impact surveys, manages the process of survey certification, and assists in resource mobilization.

- **United Nations Office for Project Support (UNOPS)** is the contracting and project management body within the United Nations that is responsible for administrating a contract with SAC. This contract covers approximately 25 percent of the expenses for the survey in Thailand.
- **Geneva International Center for Humanitarian Demining (GICHD)** is a Geneva-based, international foundation that provides support and services to the international demining community. The GICHD is the proponent agency for the management and development of the IMSMA database.
- **International Campaign to Ban Landmines (ICBL)** is an international organization with an office in Bangkok. It reports on Thailand's compliance with the Ottawa Convention on the prohibition and on the use, stockpiling, production, and transfer of antipersonnel mines The Thai office of the ICBL was a valuable source of basic information and data regarding the overall situation of landmines in the country.
- **Handicap International (HI)** is an international, nonprofit organization based in Lyon, France. It provides assistance to handicapped people worldwide, including victims of landmines. HI is also a member of the Survey Working Group. In Thailand, HI manages a mine awareness program and operates a prosthesis workshop. HI Thailand assisted the survey in the recruitment of local staff and also provided the survey team with information regarding mine victims.
- **Social Science Institute** is a national center of social science education organized as a faculty within Chulalongkorn University, Bangkok. This institute was consulted in order to provide) background information and analysis relating to community endowments, case studies, and local social economic conditions.

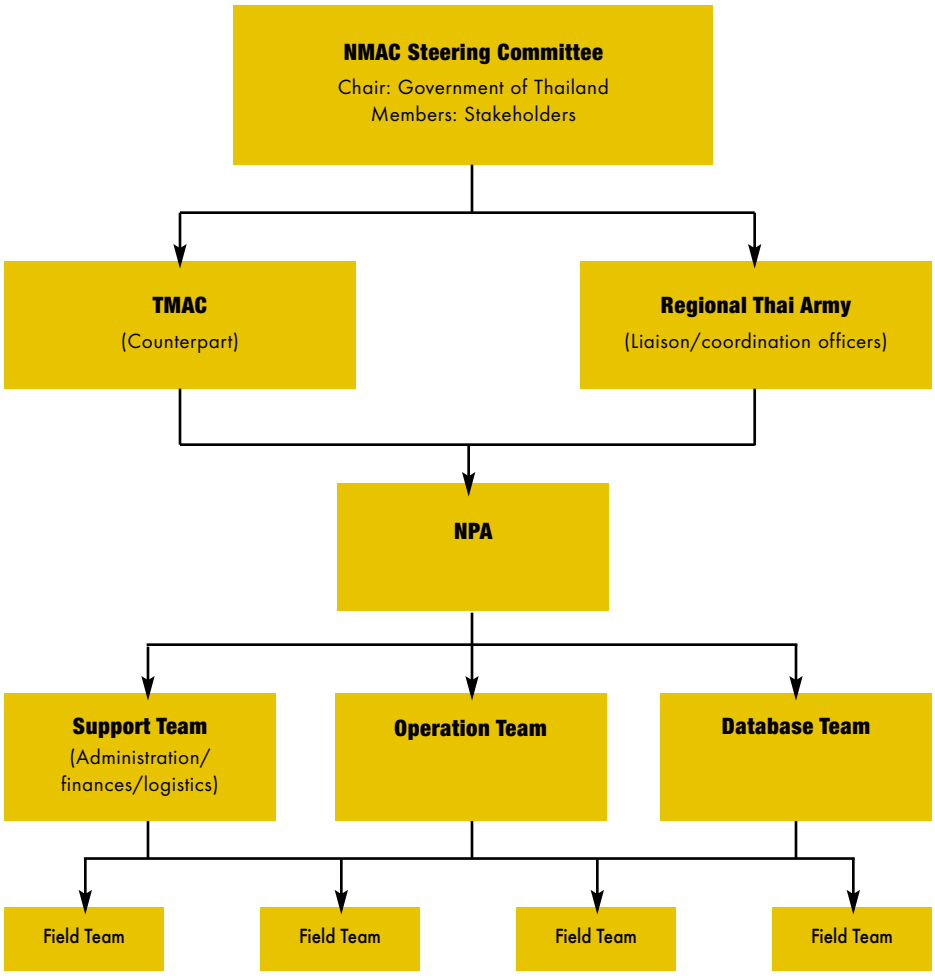
Administrative Structures

- **Local partnerships:** The Landmine Impact Survey was organized under the management of SAC, with NPA serving as the in-country implementing partner. This team worked in full consultation with TMAC and the NMAC. The membership of this committee consists of all major Ministries and Departments of the Royal Thai Government (RTG). NMAC established TMAC as the operational component of NMAC to coordinate all mine action operations in Thailand, including mine survey, mine awareness, mine clearance, training, and victim assistance. In addition, TMAC will guide Thailand in complying with the obligations and timelines of the Ottawa Convention. NPA closely coordinated all survey activities with TMAC and worked with TMAC in expanding contacts to other local partners. The Ministry of Defense, which provided information on suspected areas, was instrumental to the survey's success. This information came from historical and operational records maintained at all army regions and major subordinate military units. Local administration supported the Expert Opinion Collection phase of the survey by sharing records and allowing access to knowledgeable individuals, while the Survey Department provided 1:50,000 and 1:125,000 maps. Finally, the Forestry Department provided survey teams with accommodations and access to experienced forest guides.
- **Survey offices:** Because Thailand possesses strong local infrastructure and no internal security threats, it was felt that all survey operations could be coordinated out of one central office, co-located with TMAC headquarters at the Don Muang military base just outside of Bangkok. NPA established four field survey teams consisting of supervisors, field editors, and enumerators. These teams were well provided with vehicles, radios, and cellular phones, enabling them to operate throughout the entire country and rendering establishment of permanent sub-offices unnecessary.
- **Project staff:** This group included four permanent international staff members of NPA and 80 Thai Nationals. The international staff filled the positions of Project team leader, Deputy team leader, GIS Specialist and Information Management Officer, and Finance/Administration/Logistics Manager. The 80 Thai staff worked in a variety of positions ranging from data management to field data collection. The largest portion of the survey staff consisted of more than 50 fifty persons assigned to work in the field as members of the survey groups.
- **Technical advisory team:** SAC assisted the survey team by providing assistance from specialists in the fields of social science methodology, survey design, geographic information system operations, and statistical analysis as required. Further support was provided by a local Thai social scientist, and the GICHD and the Swiss Federal Technical Institute provided computer systems training and support.

Quality Assurance Monitor: UNMAS staff member Hemi Morete served as the initial QAM for the survey. Mr. Alain Dazy took over in this function starting in January 2001. Both QAMs supported the survey on a part-time basis. In this capacity, the QAMs used the UNMAS impact survey Certification Guidelines to monitor and document the progress of the survey. They also presented instruction during the training phases of the survey and visited field activities to verify survey processes and collection methods.

FIGURE 12

IMPLEMENTATION STRUCTURE FOR THE THAILAND IMPACT SURVEY



Finances

BUDGET AND EXPENDITURES

The budget for the survey was developed following the advance survey mission. Midway through the project, the budget was revised upwards slightly to allow sufficient field collection in the more expansive range of affected communities. The total budget figures are provided below. Of the $1,565,000 total, $239,000 was spent on non-expendable equipment, which at the completion of the survey was given to TMAC to support other mine action projects. The funds expended by the United Nations to cover the costs of the quality assurance monitoring and certification are not reflected.

Survey budget:

Field operations/NPA	$	1,440,120
Technical support/SAC	$	124,880
Total	**$**	**1,565,000**

FUNDING MECHANISMS

Funding for the Thai Landmine Impact Survey was provided by donations received from the governments of the United Kingdom, Norway, the United States, Canada, Australia, Finland, and from the United Nations Foundation. The government of the United States routed funds through the United Nations Fund for International Partnership (UNFIP), which in turn provided a one-third match by the United Nations Foundation.

Funding for the Landmine Impact Survey in Thailand:

Norway	$	450,518
UK-DFID	$	449,700
U.S. DOS (via UNFIP/UNMAS/UNOPS)	$	308,105
UN Foundation (via UNFIP/UNMAS/UNOPS)	$	154,052
Australia-AUSAid	$	100,700
Canada-DFAIT	$	100,000
Finland	$	92,000
Total	**$**	**1,655,075**

In addition to the amounts listed above, JAHDS provided at no cost 28 Honda motorbikes as well as helmets, luggage racks, spare parts, and a driving course. These were provided to NPA for the duration of the project.

Thailand Methodology

SURVEY METHODOLOGY IN THAILAND

The survey in Thailand followed the standard SAC practices of engaging in a two-tiered process of investigation. First, there was the systematic collection and analysis of "expert opinion" to determine the locations of communities likely to be impacted by landmines and UXO. The second avenue of investigation, the "community interview" with its associated component activities of interviewing, mapping, and visual inspection, was then conducted in all contaminated communities. The results of the community interviews were entered into the IMSMA database, which formed the basis for subsequent analysis. A more comprehensive explanation of the standard survey methodology may be found in the Global Landmine Survey report.

The impact survey in Thailand adapted some aspects of the standard methodology to adjust to local conditions and address the requirements of identified end-users. The methodology is described in the following subsections:

1. Staff training and pretest
2. Pilot test and deployment
3. Expert opinion collection
4. Rapid appraisal technique for locating affected communities
5. Community interview
6. Provincial operation and survey planning and execution
7. Recording the locations of suspected contaminated areas
8. Community case studies and field staff statements
9. Camps for displaced people
10. Hospital victim records
11. Field editing and quality assurance

1. Staff training and pre-test

Field staff training took place in stages. First, 15 supervisor and field editor candidates were trained. The 12 successful candidates that completed this training then conducted a pretest of the survey methodology in the province of Sa Kaeo. With help of a social science consultant and TMAC personnel, this activity helped the field staff tailor the approach and standard questionnaire to Thai conditions On completion of the pretest, 60 enumerator candidates were selected and trained. Thirty successful candidates were recruited and organized into four field groups, each composed of a supervisor, two field editors, four teams of two data collectors, and two drivers.

2. Pilot test and deployment

The four groups were deployed to Sa Kaeo province for a pilot test. A controlled data collection effort was conducted where each group was responsible for one of the four affected border districts. At the end of the pilot test, a two-week workshop was held to revise procedures as needed and to retrain staff. Subsequently, each group was allocated a province on the Cambodia border: Group 1 Chanthaburi, Group 2 Trad, Group 3 Buriram and Group 4 Surin, respectively. When these tasks were quality assured, Groups 1 and 2 were deployed to the north of the country while Groups 3 and 4 continued to work progressively along the northern border with Cambodia and then along the Laotian border provinces in the northeast. After the survey of the Laotian border was complete, Group 4 was relocated to the south of the country, working in the southernmost provinces along the border with Myanmar and then along the Malaysian border. The remaining groups consolidated their efforts along the rest of the extent of the border with Myanmar until completion of the project's field collection phase in April 2001.

Visual inspection with QAM on Laos border

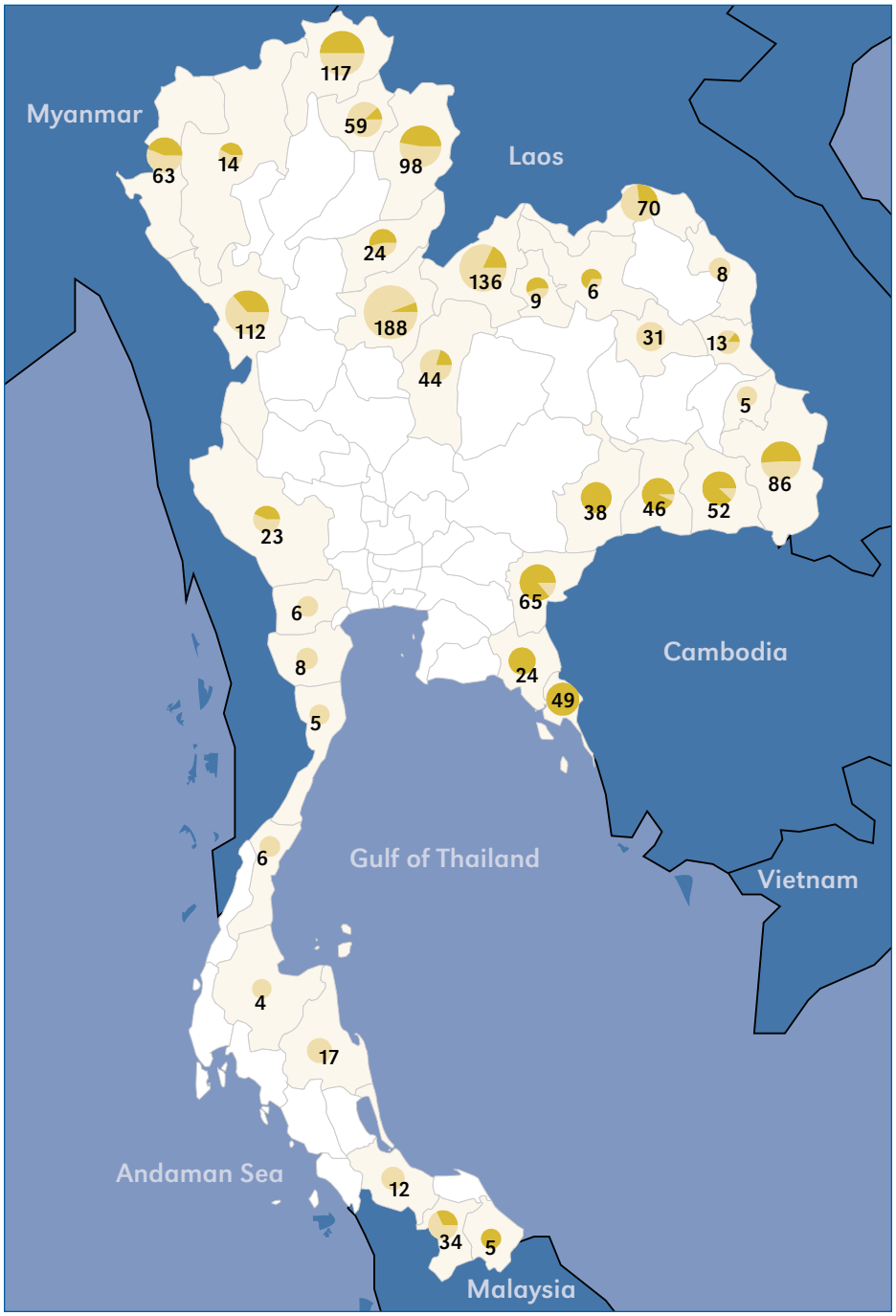
3. Expert opinion collection

Information on the expected distribution of mines in affected provinces was based on extensive discussions with TMAC personnel and the review of baseline data from a Thai army assessment in 1997. At that time, contamination was recorded over an area of 796 square kilometers in 19 border provinces.

Survey personnel with a village gazetteer for 1998 visited civilian authorities in all provinces and districts identified as contaminated in the 1997 army assessment. They also visited 27 other provinces where possible contamination was reported. Village lists were updated, and communities in all assumed affected districts were identified as either not-affected, possibly affected, or affected. EOC teams also identified district boundaries in conjunction with district authorities and updated boundaries on the 1:50,000 baseline maps for the project.

After the completion of EOC listings from civilian authorities, military authorities were visited in all army and marine regions where listings were updated, and maps of contaminated areas in military archives were transferred to the 1:50,000 survey working maps. The collected information, the field requests, and the updated village lists were processed and returned to TMAC.

After the main phase of EOC collection, 17 military liaison officers, identified from all major field and task forces nationwide, joined a combined training and EOC symposium at TMAC, followed by a field test. The nationwide conflict history and consequences to survey operations were discussed and the EOC village lists were further refined. Areas were identified that required further investigation and complementary visits were carried out based on liaison officer recommendations. The EOC activity combined the requirement for determining a list of target communities for the project with the important task of briefing provincial governors and



MAP 4

EXPERT OPINION COLLECTION RESULTS

Number of communities (1,491 total)

100 communities

50 communities

Affected

Possibly affected

MAP 5

IMPACT OPERATIONS SUMMARY

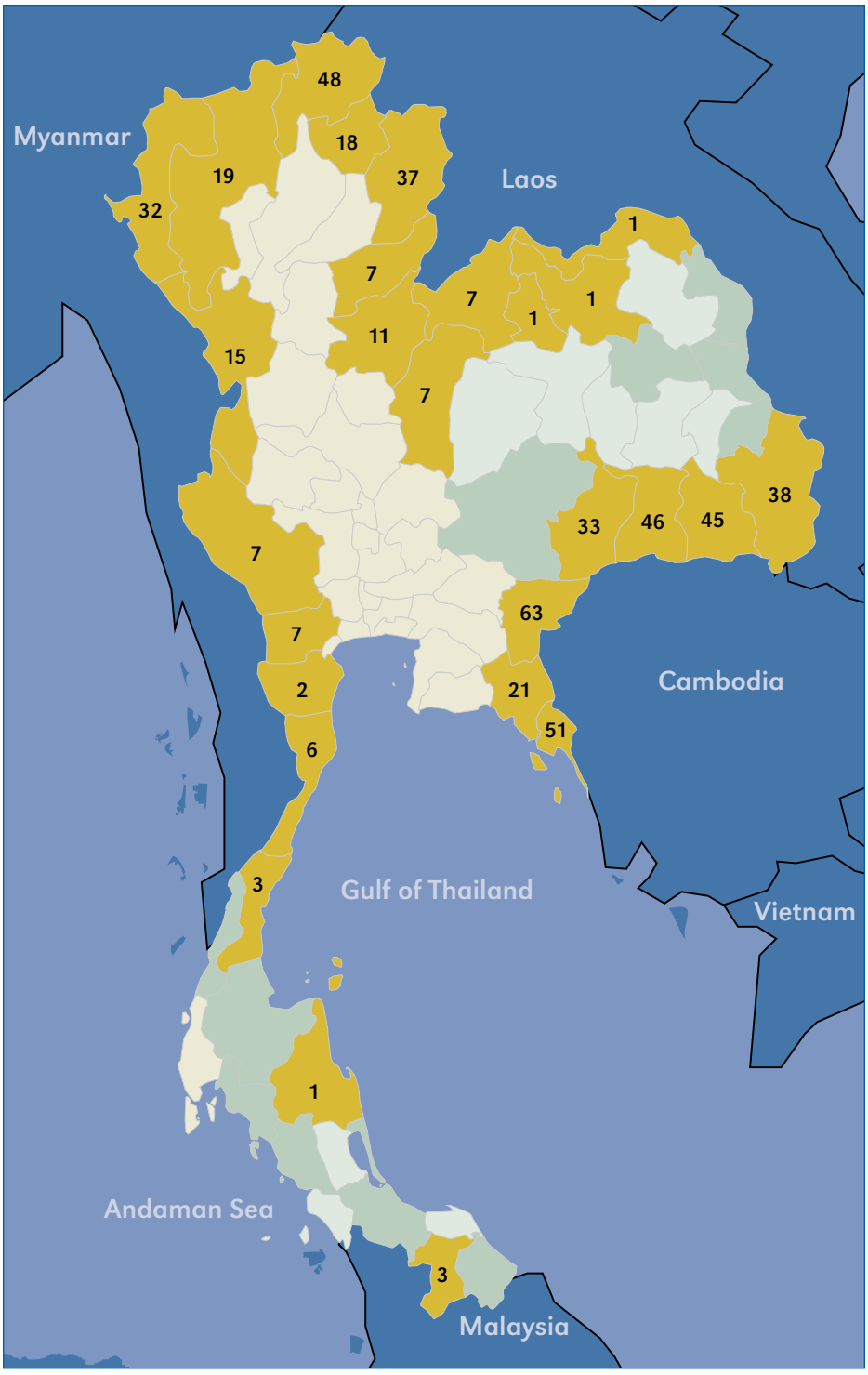
Province reported:

- Affected
- Not affected, according to community survey
- Not affected, according to province and district visits
- No known mine/UXO problem

Preliminary results:
46 survey provinces
27 affected provinces
530 affected communities

7-months field operation completed on April 30, 2001

Numbers show number of affected communities



military commanders on the project. It also provided an opportunity to request assistance during the field operations. The introduction of the project to senior authorities at this stage considerably facilitated the remainder of the survey.

The EOC identified 1,491 communities assumed affected or possibly affected. The proportion of possibly affected to affected communities indicated the preci-

sion in expert opinion. For the provinces along the Myanmar and Laotian borders a very high number of possibly affected communities was claimed, compared to provinces of the Cambodia border region for which EOC data appeared to be more precise. Map 4 on page 73 and Map 5 on page 74 show the EOC planning information and map after the survey.

An operational plan was developed based on the number of communities to visit in a province, the reliability of the information, and the expected difficulty of the survey environment. A nationwide plan was established using as a baseline the time and resources requirements identified during the pilot test. These calculations indicated that the timelines for the field data collection phase of the project had to be extended an additional two months.

4. Rapid appraisal technique for locating affected communities

Because the contamination with landmines and UXO was expected to be confined to the border regions, the standard method of verifying the coverage of the survey efforts was modified. Rather than following the normal protocol for the control for false negatives, which is based on a Lot Quality Assurance Sampling (LQAS) technique across a wide area, a full enumeration of communities was done in a limited area. In most border regions, a 15-kilometer deep band bound the area for full enumeration. Where pockets of contamination existed further inland from the borders, full enumeration was conducted in all surrounding communities.

During a visit to possibly affected communities, a rapid appraisal technique was used to confirm or deny the presence of landmines and UXO. If the visit disclosed that the community claimed some contaminated areas, or if it had some recent victims, or if there was reason to believe that one or the other of those responses could potentially be identified in a longer encounter, then a full community interview was arranged. In the event of a false negative, such interviews were also conducted in the five closest communities in analogy with the normal protocol.

Following EOC and rapid appraisal procedures, survey staff visited 2,730 communities. A summary comparison between the initial expert opinion status and the actual status following site visits is presented in Table 27.

TABLE 27

RESULT OF RAPID APPRAISAL

	Actual Status		
Expert opinion	Affected	Not affected	**Total**
Affected	346	220	566
Possibly affected	116	835	951
Not affected	68	1,145	1,213
TOTAL	**530**	**2,200**	**2,730**

From the spatial distribution of the 68 detected false negatives, it was estimated that the survey covered 96 percent or more of all affected communities in Thailand. The estimate is detailed in the document "Estimation of survey coverage," which is included on the CD/ROM.

5. Community Interview

Before visiting a community assumed affected to conduct a full community interview, preparation was necessary. This involved making an appointment to visit the community, a review of the conflict history in the region, and an analysis of any survey results from neighboring villages. Survey staff would also prepare copies of topographic maps that covered the community and its vicinity. This involved the marking of features such as the international border, roads, rivers and canals, other communities, and identified contaminated sites. On a given day, survey staff were also prepared to visit alternate communities in the event that the initial community proved to be unaffected.

Community meeting in Trad province

Community interview in Chanthaburi

A community interview began with a general discussion covering the conflict history, presence of contaminated areas, and victims in the community. After about 20-30 minutes, the community mapping exercise and victim lists were completed using a large sheet of paper displayed so that all participants could see it from their seats. The participatory mapping was followed by a questionnaire interview. This employed a community module plus a separate module for each of the mined areas that the key informants had placed on the map. On completion of the questionnaire and the attendance list, a photograph of the interview group was taken. A community reference point was fixed with the GPS prior to departure.

Visual verification of contaminated areas was undertaken when it was safe and feasible to do so. Key informants and appropriate guides were identified during the community interview to lead teams to safe viewing points of the contaminated area. At this location, the mined area modules were updated and completed. Particular attention was given to recording the approximate mined area boundaries on the topographic map as explained by the guides.

6. Provincial operations and survey planning and execution

Responsibility for executing the survey in a particular province was assigned to one survey group. As mentioned above, a group consisted of one field supervisor, two field editors, four pairs of enumerators, and two drivers. There were four such groups. Each of them possessed two 4x4 vehicles, six motorcycles, and one truck for transportation. Supervisors and field editors were required to produce a draft report

when each provincial survey was complete. This helped to maintain a result-orientated focus, and communicated a sense of group accountability.

During the initial stages of a provincial survey, field supervisors collaborated with provincial military and civilian authorities. Together they would review working maps, village lists, radio procedures, and security plans. The provincial governor was visited again, and was asked to inform officers at a district, sub-district, and even community level to cooperate with the survey teams. A provincial operations headquarters was established in a room big enough to hang a large operational map of the area. All district authorities were visited at an early stage accompanied by liaison officers from the military. Local guides and armed escorts were arranged where necessary.

Buriram provincial HQ operation map

The supervisor also met additional local experts, such as representatives from hospitals, the forestry department, and national parks. An operational plan for a rapid appraisal survey was then designed and implemented to test and update the EOC information. Then, community appointments and the operational plan were finalized and the community interviews were initiated.

Most groups would hold daily debriefing sessions during which each team would transfer the major results from the day's work to the operational map. All visited communities were clearly marked and color-coded with respect to impact score and depth of investigation. Contaminated area locations were copied onto the group's map. Weekly co-ordination meetings were held with all data collection teams to review results, resolve overlap between suspected areas reported by two or more communities, and revise operational plans and procedures as needed.

At the end of the provincial survey, the field survey group held a final internal evaluation and coordination meeting to ensure that all the work was properly completed and documented. Briefings were provided for local stakeholders, particularly the military, prior to the team's departure from a province. A press release was prepared for the local media. Survey groups were also expected to produce a province report showing the preliminary results, findings, and recommendations from their work.

7. Recording the locations of suspected contaminated areas

In Thailand, enumerators had access to 1:50,000 scale topographic maps. With training in map reading and with extensive visual inspections undertaken, many of the suspected areas were recorded with their outlines detailed to a level that surpassed normal impact survey requirements. For most areas, it was possible to take GPS readings of several edge points. During their daily debriefs, enumerators and field editors reviewed community interview outputs to eliminate duplications in reported areas.

Daily meeting in Chiang Rai province

The use of polygons in recording mined areas required a minor adaptation of the manner in which the impact survey data was stored in the IMSMA database. The core physical data (terrain and viewing point, size, vegetation, land ownership, clearance duration, marking potential, and sketch map) were recorded once for each suspected area. This information is held in the IMSMA dangerous area module. On the other hand, data on impacts (recent victims, socio-economic blockages, and munitions types) were attached to the community module for the affected community. To establish a relationship between these two tables, the primary key for minefield records was copied into the appropriate mined area records. Minefield polygons were digitized in ArcView GIS using scanned and geocoded 1:50,000-scale topographic maps. These were subsequently stored in IMSMA.

8. Community case studies and field staff statements

In light of the heavily analytic nature of the survey process, it was decided that it would be useful if the survey field teams recorded and shared some of their more personal impressions. Field staff were encouraged to write short stories describing some of their impressions and most poignant experiences. Some of these stories were selected for publication in this report. In addition, in-depth case studies were undertaken for a number of communities in Thailand, reflecting various border environments and impact categories. All of this work was written initially in Thai and translated into English.

9. Camps for displaced persons

Along the Myanmar border, ten camps for people displaced from Myanmar have been established over the last decade. The camps contain an official population of about 130,000. They were targeted by the impact survey due to the high number of victims in the camps and the assumption that camp inhabitants might suffer new mine incidents. Standard community interviews were modified to account for the camp environment and an earlier victim survey conducted previously by Handicap International.

Camp community interviews involved two sub-lines of investigation, one with a group of knowledgeable stakeholders and the other with victims. The interview with the stakeholders identified individuals, authorities, or organizations that were affected by mines, were concerned with mine victims or incidents, or were affected in any way by the survey results. The victim interviews targeted all recent victims individually using the recent victim questionnaire for camps.

10. Hospital victim records

Provincial health offices retain lists of mine casualties for up to five years as a legal obligation. In addition, the provincial, district, and military hospitals file records of admission and treatment for landmine/UXO victims. Unfortunately not all of these records are complete or clearly identify victims of mines as opposed to other types of injuries. Nonetheless, survey teams worked closely with medical staff to scrutinize records and to complete the incident/accident module of IMSMA. Special efforts made to differentiate between incidents occurring on Thai soil as opposed to Myanmar territory were clearly defined.

11. Field editing and quality assurance

As indicated, the field teams reconvened regularly to review the outputs from the community interviews (completed questionnaires, maps, and photographs) with the field editors. First, the field editors assured the quality of the questionnaires and maps, and issues such as data incompleteness or inconsistency were corrected. Matters arising because different communities claimed the same contaminated areas were also resolved and the questionnaires were then translated into English. The field editors checked each other's work and the supervisors inspected the material.

The field operations received extensive support from the national and international staff based in Bangkok. A senior head office representative participated in all final coordination meetings in the province to ensure that the questionnaires, maps, gazetteer lists, and the provincial report were completed to the expected standard. All data from the province was transferred to the database team in Bangkok.

The data were entered under the supervision of the Information Management Officer. Extensive internal quality control measures ensured that the data entered accurately reflected the data collected. These measures included:

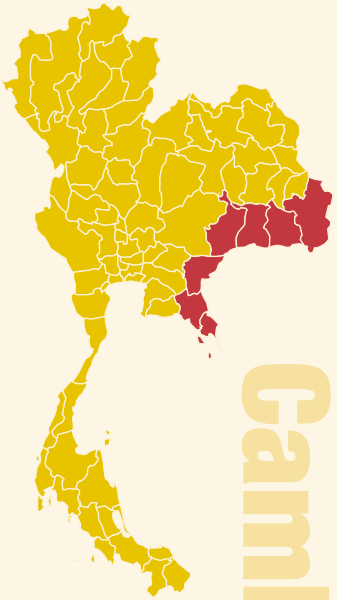
- Checking field staff certifications
- Controlling attachments for completeness
- Checking reference points in the GIS against those marked on hardcopy maps
- Review of the data by another person
- Review of the community summary information by a person from outside the database team

With the verified information, the master tables were created. These tables in turn supported all subsequent analysis and presentations.

Regional Reports

RegionalReports

Cambodia Border Region



SUMMARY

The Cambodia border region is the most seriously affected region in Thailand. It has the highest number of affected communities, the highest number of contaminated areas, and the highest number of recent victims.

TABLE 28

KEY RESULTS FOR THE CAMBODIA BORDER REGION

Key item	Region total
Affected provinces	7
Affected districts	24
Affected subdistricts	72
Affected communities	297
Affected population	216,034
Recent fatalities	56
Recent injured	139
Total recent victims	*195*
Old fatalities	1,084
Old injured	1,322
Total old	*2,406*
ALL VICTIMS	**2,601**
Number of contaminated areas	473
Estimated contaminated surface area (sq km)	1,943.6

BACKGROUND

Thailand shares a border with Cambodia that is 790 kilometers long. All seven provinces along this boundary are affected to some extent by landmines and UXO. Contamination within the affected communities, which are located in a strip close to the border, mainly affects the activities of farming and collection of forest resources, and cross-border movement of people. The contamination in many areas is restricted to zones of varied topography covered by forest. All communities along the border are accessible by vehicle on tarmac or dirt roads. Most contaminated

TABLE 29

KEY RESULTS FOR THE CAMBODIA BORDER REGION, BY PROVINCE

Province	Affected districts	Affected communities	Affected population	Recent victims	Contaminated areas	Contaminated area size (sq km)
Buriram	3	33	28,858	10	27	37.5
Chanthaburi	2	21	15,171	6	55	99.4
Sa Kaeo	4	63	31,221	52	189	181.6
Si Saket	3	45	36,529	61	22	541.8
Surin	4	46	31,690	30	35	260.4
Trad	3	51	40,215	21	107	312.8
Ubon Ratchathani	5	38	32,350	15	38	510.1
TOTAL	**24**	**297**	**216,034**	**195**	**473**	**1,943.6**

MAP 6

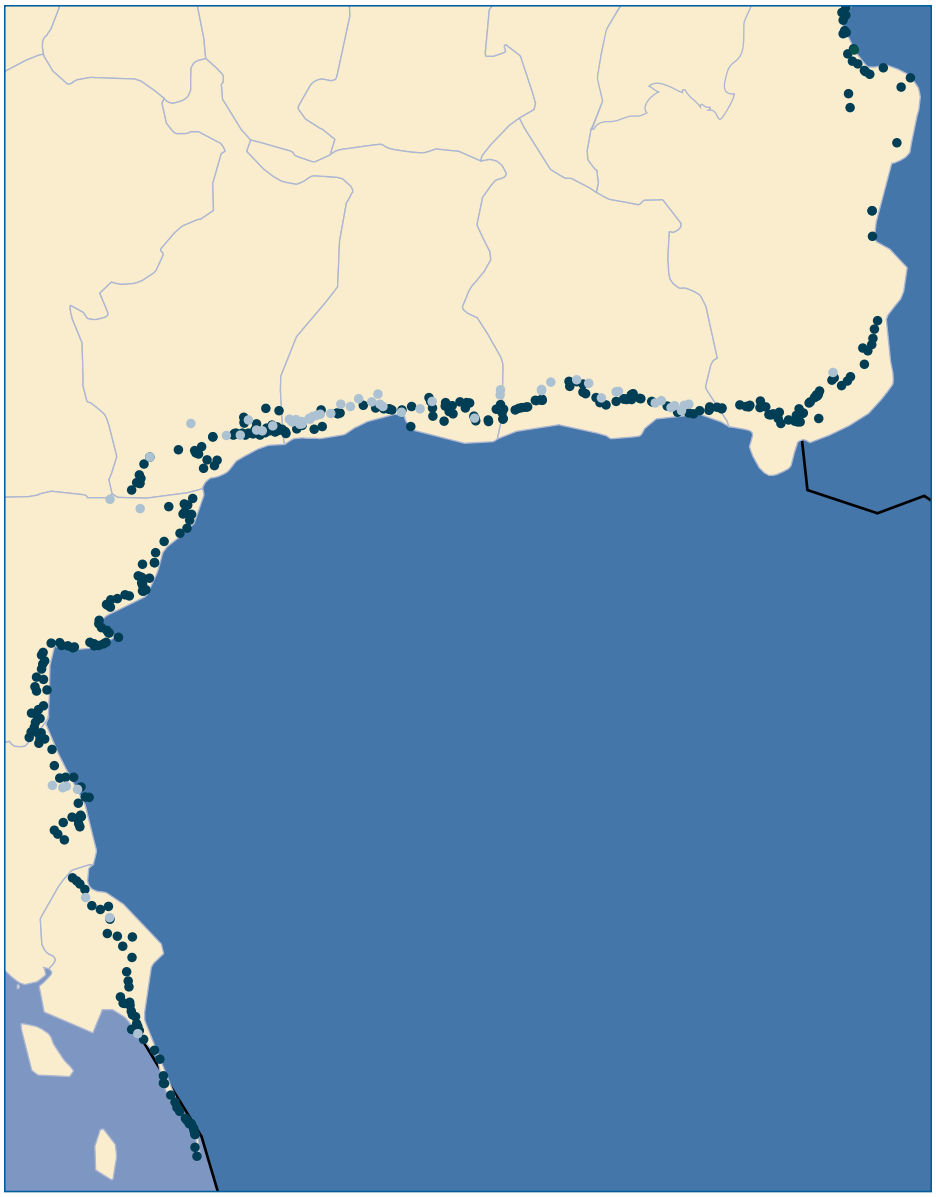
SURVEY COVERAGE FOR THE CAMBODIA BORDER REGION

● Community visited

areas could be approached and information recorded from a safe viewing point, particularly when such roads formed the boundaries of suspected contaminated areas. Mined areas in forested areas were less precisely defined.

Survey teams visited 782 communities along the border, interviewed 3,211 people, and identified 297 affected communities. (See Maps 6, above, and 7, facing page.) Although the level of impact of mines and UXO on some communities was minimal, the total number of affected communities was a significant increase over the 89 affected communities reported during a 1997 military assessment.

The majority of Thailand's mine action efforts are focused on this border and have increased markedly over the last 24 months. In the past, the army and the navy have conducted clearance and marking initiatives and provided some basic mine awareness education in the communities. As of June 2001, mine action



MAP 7

DEPTH OF INSPECTION FOR THE CAMBODIA BORDER REGION

- Community interview
- Community interview after rapid appraisal
- Rapid appraisal

efforts coordinated by TMAC include the first HMAU mine action unit in Sa Kaeo province, the second HMAU in Chanthaburi and Trad provinces, and the third HMAU in Surin and Buriram provinces. The establishment of a fourth HMAU, for the remaining two provinces of Si Saket and Ubon Ratchathani, is being planned. In addition to the HMAU capacities, an initiative to provide civilian clearance units is being explored in the province of Sa Kaeo, and ADPC and HIT are undertaking mine awareness programs.

The survey findings reflect the prevalence of mine action activities: 152 of the 297 affected communities reported some level of mine awareness training, 63 had observed marking activities under way, and 61 communities witnessed clearance operations in some areas.

SCOPE AND HISTORY OF LANDMINE/UXO CONTAMINATION

Survey teams recorded 473 distinct mined areas covering an area of 1,943.6 square kilometers. The poor definition of mined areas in forests along the border had a significant effect on the total surface area reported as potentially dangerous. The landmine and UXO contamination along the border has resulted from both the Cambodian conflicts and the conflict between the Communist Party of Thailand (CPT) and the Thai military. The contamination is mostly restricted to forest reserve areas within ten kilometers of the border. The mines were deployed defensively along the border, around former military positions, and in some cases, along paths or near villages. The survey team documented reports that some tripwire-initiated mines were used for hunting purposes in some border forests. UXO are scattered over battlefield areas, and are found in large quantities in former military bases, or in dumps and at collection points close to cultivated land in contaminated areas.

TABLE 30

DESCRIPTION OF CONTAMINATED AREAS IN THE CAMBODIA BORDER REGION

Typical terrain	Number of contaminated areas
Hillside	116
Ridge	45
Gully	17
Flat	295
Typical vegetation	
Trees	333
Bushes	49
Grass	43
Other	48

TABLE 31

ORDNANCE REPORTED FOR CONTAMINATED AREAS IN THE CAMBODIA BORDER REGION

Ordnance class	Number of contaminated areas
AP	356
AT	129
Mixed AP and AT mines	117
UXO	290
Mines and UXO	89
Unknown munitions	16

Military and local communities report considerable amounts of clearance, particularly where there is high pressure for land. In Sa Kaeo province, for instance, some previously mined areas have been cleared and the boundaries of the remaining sites are relatively well defined by the extent of cultivated land.

Table 30 illustrates that many of the mined sites are described as flat terrain. Many of the large contaminated areas located in other provinces are in areas of rugged topography where the vegetation is predominately forest.

Of the 473 contaminated areas identified, 157 had defined perimeters. Of the remainder, some sides of 208 contaminated sites were easily identifiable. This includes areas that are partially defined by cultivated land or exist close to a road or access route.

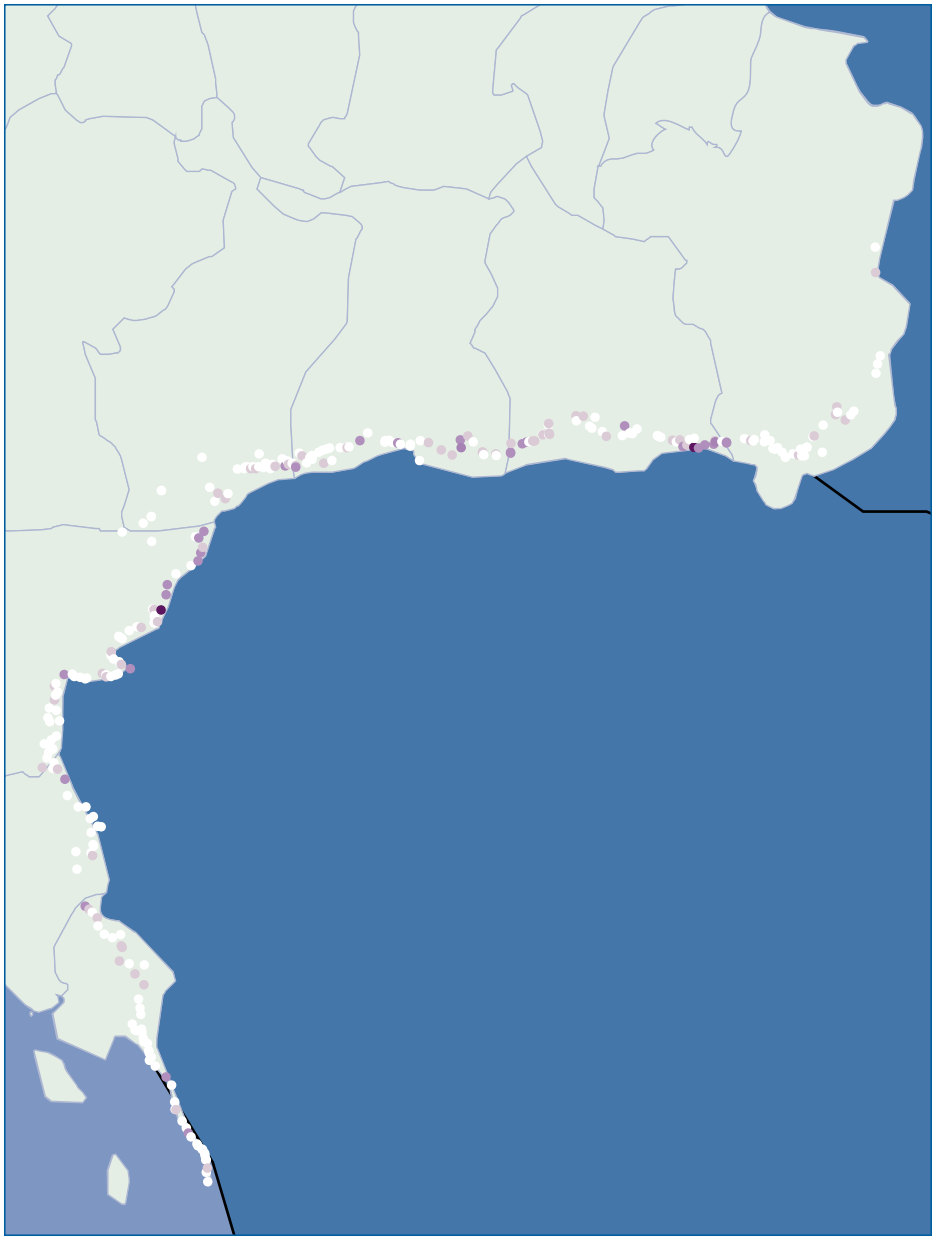
122 mined areas have been identified as small extremely well-defined sites such as a dump of mines or isolated UXO. In addition, 59 mined areas of the order of 10,000 square meters are reasonably well defined. The remaining areas are poorly defined and consist of large expanses where considerable resources may be required for clearance.

While AP and AT mines and UXO are reported, most mined areas are documented as containing AP mines. Two hundred and eighty communities identified AP mines as the main threat (see Table 31).

VICTIMS

A total of 2,601 victims of landmine/UXO were recorded, of which 1,140 were confirmed fatalities. (See Map 8.)

Within the last two years, 195 victims of landmine/UXO accidents were recorded. Fifty-six of these were confirmed fatalities. The provinces of Si Saket and Sa Kaeo have the highest rate of incidents along the Cambodian border and for the country as a whole. Most victims are men and young adults. Only six female victims were reported and only 21 victims out of the total were younger than 14 or older than 45. Most victims described their profession as farmer (114) or laborer (14) before the incident and nearly all survivors reportedly continued with



MAP 8

COMMUNITIES WITH RECENT VICTIMS IN THE CAMBODIA BORDER REGION

Number of recent victims
- 6-10
- 3-5
- 1-2
- none

their profession after the incident. Sixty-four percent of the victims, including all the females, had incidents while collecting food or wood in forested areas.

Based upon the population in the affected communities and the number of recent victims, an estimate for the incident rate is 45.13 mine incident victims per 100,000 people per year.

IMPACT ON COMMUNITIES AND SECTORS

Contamination by landmines and UXO affects 216,034 people in 197 communities. Communities impacted by mines and UXO were found in all seven border provinces and in a total of 72 subdistricts in 24 districts. (See Map 9, next page.) An additional 577 communities were visited and confirmed not affected. The average impact score for the region was 7.76. (See Table 32.)

The impacted communities typically had populations of up to 1000 people. All are found close to Cambodia, at an average distance of 7.1 kilometers from the border.

TABLE 32

AFFECTED COMMUNITIES AND POPULATIONS IN THE CAMBODIA BORDER REGION, BY IMPACT CLASS

Impact class	Number of communities	Affected population
High	51	43,384
Medium	161	116,472
Low	85	56,178
TOTAL	**297**	**216,034**

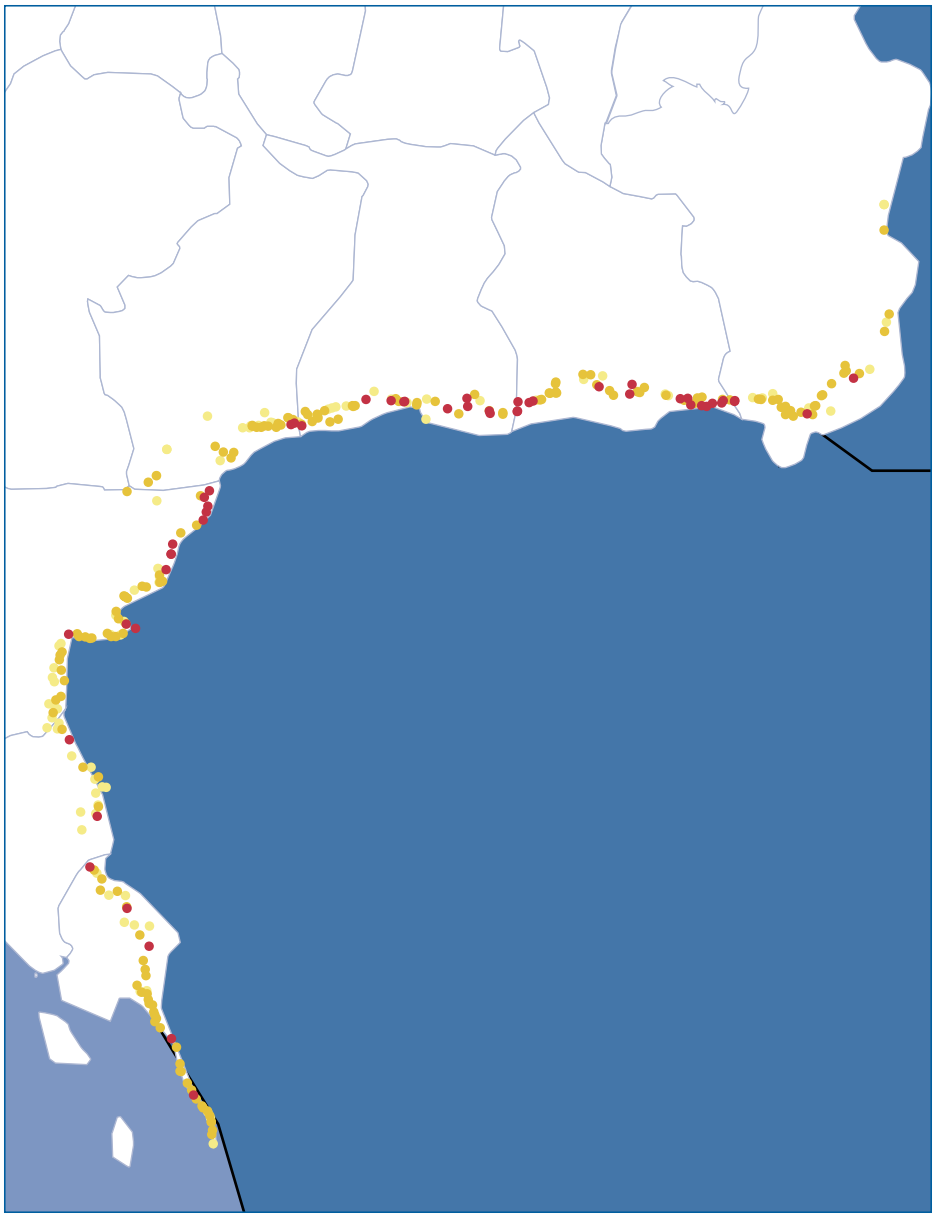
TABLE 33

AFFECTED COMMUNITIES IN THE CAMBODIA BORDER REGION, BY AFFECTED RESOURCE

Affected resource	Number of communities	Percent of communities
Pasture	91	30.6%
Cropland	167	56.2%
Forest	240	80.8%
Water	110	37.0%
Roads	15	5.1%
Houses	24	8.1%
Other infrastructure	31	10.4%

The main resources with impaired or blocked access due to landmines or UXO were forest resources, cropland, and pasture. Water sources were frequently reported as affected. However, the impact of water as a blocked resource is probably misrepresented since water courses, particularly canals and rivers, are abundant in the vicinity of many mined areas and the presence of water is simply captured as a resource in associated mined area reports. Investigation of the impact statements from communities indicates that very few communities report impaired access to water as a major problem.

As shown in Table 33, impaired or blocked access to resources in the forest was the most frequently reported problem and was experienced by 80 percent of the affected communities. A large proportion of the contaminated areas is located in forestland, restricting access to many important forest resources. Mined areas blocked access to mushrooms, fruits, vegetables, herbs, hunting, and fishing (212 mined areas), wood for charcoal burning and foraging (157 mined areas), building materials (106 mined areas), and



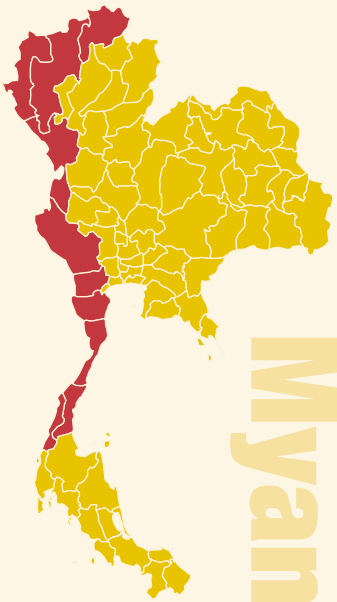
MAP 9

COMMUNITY IMPACT FOR THE CAMBODIA BORDER REGION

Community impact
- High
- Medium
- Low

medicinal ingredients (85 mined areas). Few communities reported problems associated with utilities or other infrastructure (10 percent)
and even fewer reported restricted access to housing areas (8 percent) and roads (5 percent).

Most of the villagers said that the major impact on their communities stems from their concern about the risk of having incidents. They were also concerned about restrictions imposed on cultivation and the lack of safe access to the forest areas.



Myanmar Border Region

SUMMARY

Following the Cambodian border, the Myanmar border with Thailand is the most affected by mines and UXO. The security on this border is poor. This is by far the most sensitive area in Thailand, and presents the greatest challenge for the survey. Much of the access to remote communities was difficult and some of the areas recorded were contaminated quite recently. It is expected that the level of contamination will increase in a few sensitive sections along this border and that the vast majority of this increase will take place within the territory of Myanmar. (See Tables 34 and 35.)

TABLE 34

KEY RESULTS FOR THE MYANMAR BORDER REGION

Key item	Region total
Affected provinces	9
Affected districts	32
Affected subdistricts	64
Affected communities	139
Affected population	229,781
Recent fatalities	22
Recent injured	128
Total recent victims	*150*
Old fatalities	196
Old injured	195
Total old	*391*
ALL VICTIMS	**541**
Number of contaminated areas	240
Estimated contaminated surface area (sq km)	400.4

TABLE 35

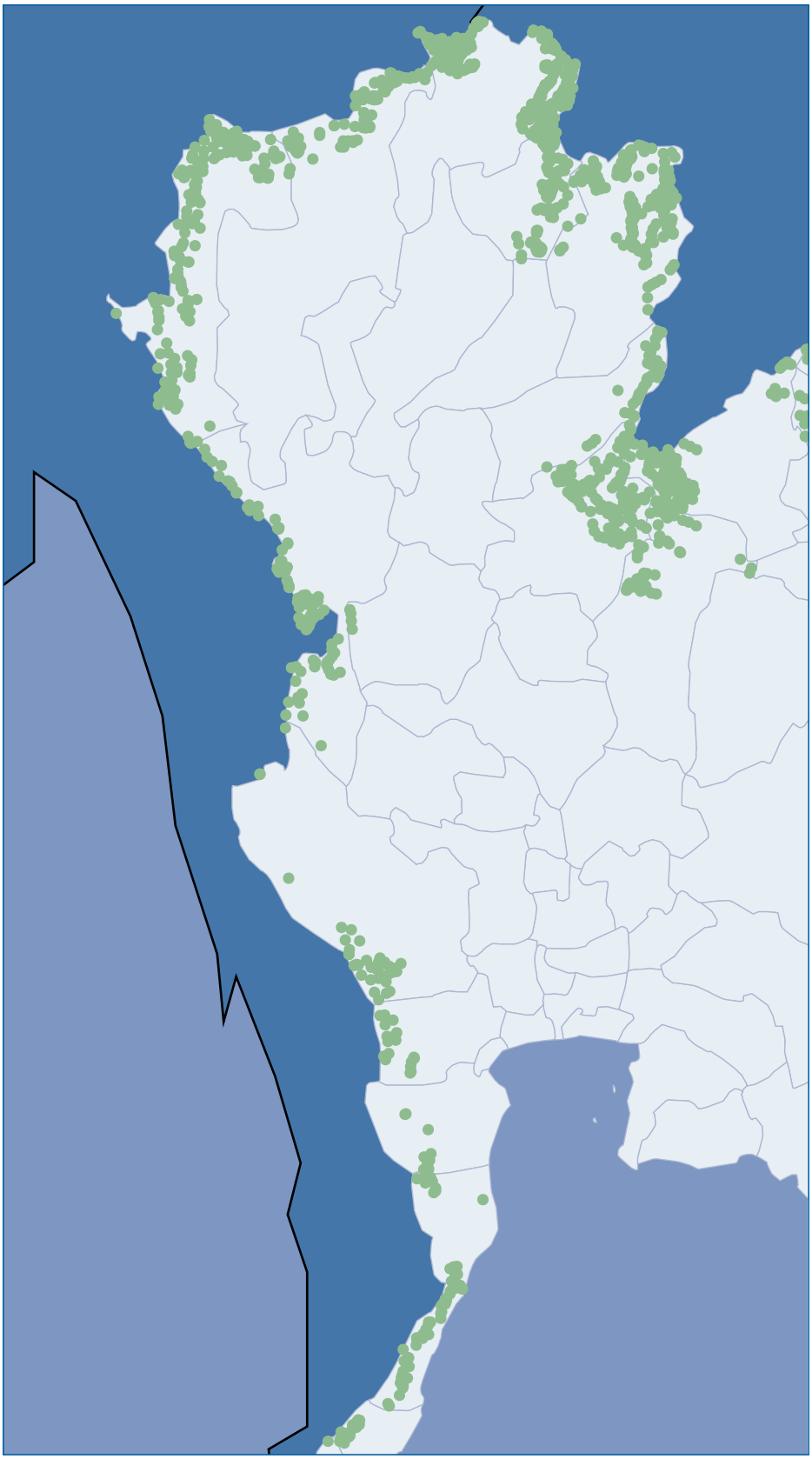
KEY RESULTS FOR THE MYANMAR BORDER REGION, BY PROVINCE

Province	Affected districts	Affected communities	Affected population	Recent victims	Contaminated areas	Contaminated area size (sq km)
Chiang Mai	5	19	34,993	15	32	132.0
Chiang Rai	7	48	44,465	8	135	38.5
Chumphon	1	3	1,070	0	3	6.9
Kanchanaburi	3	7	3,730	3	9	17.9
Mae Hong Son	6	32	50,514	51	28	103.0
Phetchaburi	1	2	36	3	2	31.4
Prachuap Khirikhan	4	6	4,533	4	5	18.5
Ratchaburi	1	7	15,962	28	8	31.8
Tak	4	15	74,478	38	18	20.4
TOTAL	**32**	**139**	**229,781**	**150**	**240**	**400.4**

MAP 10

SURVEY COVERAGE FOR THE MYANMAR BORDER REGION

● Community visited



BACKGROUND

Thailand shares a border with Myanmar that is 2,401 kilometers long. Ten provinces are located adjacent to the border: Chiang Rai, Chiang Mai, Mae Hong Son, Tak, Kanchanaburi, Ratchaburi, Phetchaburi, Prachuap Khirikhan, Chumphon, and Ranong. The majority of the affected communities are concentrated in the northern region of the border where the minority groups of the Karen and Karenni in particular are exposed to a mine and UXO threat. The main activities impeded are farming, collection of forest resources, and cross-border trade.

The visual inspection of contaminated sites in some remote areas required a considerable amount of time, often with security being provided by military escorts. On several occasions access was possible only through the use of mules, boats, and aircraft. Translation was required in some areas to facilitate communication during community interviews.

The survey visited 874 communities along the border, interviewed 1,602 people, and identified 139 communities affected by mines and UXO, as shown in Maps 10 and 11. The EOC process proved to be poor and a large number of the communities assumed affected were actually unaffected. Teams completed full surveys of all communities in sections of the border where there were indications of past or present conflict on the Thai or Myanmar side. Minority groups inhabit many communities along the Myanmar border and rely on traditional small-scale agriculture and collection of forest products. Villagers were typically scattered widely among subcommunities that were often separated by five to 15 kilometers. The exposure to the landmine and UXO problems varied between subcommunities. Although the level of impact in many communities was minimal, the total number of affected communities (139) was a significant increase over the 17 affected communities reported during a 1997 military assessment.

Current mine action initiatives are mainly focused on emergency medical treatment of victims in the provincial and district hospitals. Handicap International also provides prosthesis workshops in camps for displaced people in Tak and Mae Hong Son provinces and has initiated a mine risk education program for some camp populations. Additional emergency aid is provided by MSF and AMI.

No HMAU units have been established on the Myanmar border to date, but where resources allow, military units responsible for border regions clear UXO and mines reported by villagers. In several cases, clearance tasks identified during the survey were also addressed in this manner.

Of the 139 affected communities identified, 25 reported having received some mine awareness training, 11 had seen marking activities undertaken, and 23 reported clearance operations in their vicinity.

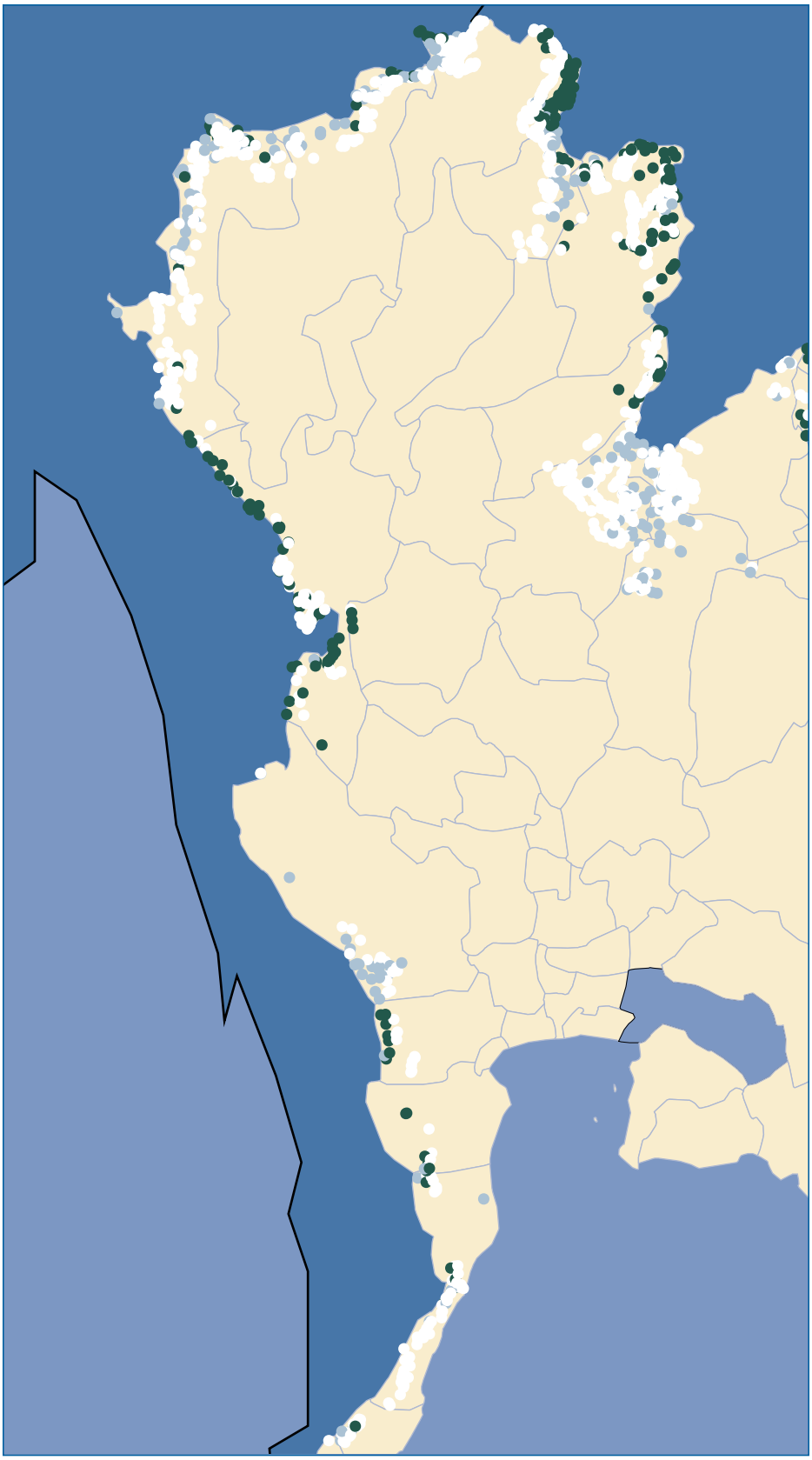
SCOPE AND HISTORY OF LANDMINE/UXO CONTAMINATION

The contamination affecting the population in the region is a result of both past and present confrontation. Tak and Chiang Rai provinces were polluted during the communist insurgency and the struggle between the CPT and the Thai government.

MAP 11

DEPTH OF INSPECTION FOR THE MYANMAR BORDER REGION

- Community interview
- Community interview after rapid appraisal
- Rapid appraisal



Currently, conflicts between minority groups and the government forces of Myanmar contribute to poor stability in the region, and result in new contamination by landmines and UXO. In addition, both the activities of drug producing and trafficking factions and ongoing border disputes between Myanmar and Thailand heighten tension in some areas.

The fighting in Myanmar has driven many people from communities, resulting in a considerable flow of vulnerable populations from Myanmar into Thailand where camps for displaced persons accommodate more than 100,000 people. This displaced population contains a large number of mine victims. Thai hospitals report that between 50 and 100 mine victims are treated each year.

Although the main threat of mines and UXO exists in Myanmar, 240 distinct areas were identified on Thai soil and cover a reported area of 400 square kilometers. A large portion of this amount represents areas of past conflict, or battle area.

Survey data indicate that 78 mined areas have a high potential for marking, 100 sites were identified as being defined on some sides and suitable for some marking, and that the remaining areas were large and poorly defined. Fifty-seven small, well-defined areas were identified, as well as 43 areas considered medium-well-defined sites and 140 large, poorly defined sites (Table 36).

TABLE 36

DESCRIPTION OF CONTAMINATED AREAS IN THE MYANMAR BORDER REGION

Typical terrain	Number of contaminated areas
Hillside	105
Ridge	101
Gully	5
Flat	29
Typical vegetation	
Trees	167
Bushes	21
Grass	37
Other	15

TABLE 37

ORDNANCE REPORTED FOR CONTAMINATED AREAS IN THE MYANMAR BORDER REGION

Ordnance class	Number of contaminated areas
AP	152
AT	7
Mixed AP and AT mines	3
UXO	124
Mines and UXO	3
Unknown munitions	16

VICTIMS

A total of 541 reported landmine/UXO victims were recorded, of which 218 were confirmed fatalities. (See Map 12 on next page.)

One hundred and fifty reports of victims of landmine/UXO incidents were recorded during the last two years, of which 22 were confirmed as fatalities. Eighty-three recent victims were identified in camps for displaced people. If the

MAP 12

COMMUNITIES WITH RECENT VICTIMS IN THE MYANMAR BORDER REGION

Number of recent victims

- 6-10
- 3-5
- 1-2
- none

Only four communities reported more than 6-10 victims. These are indicated by ★.

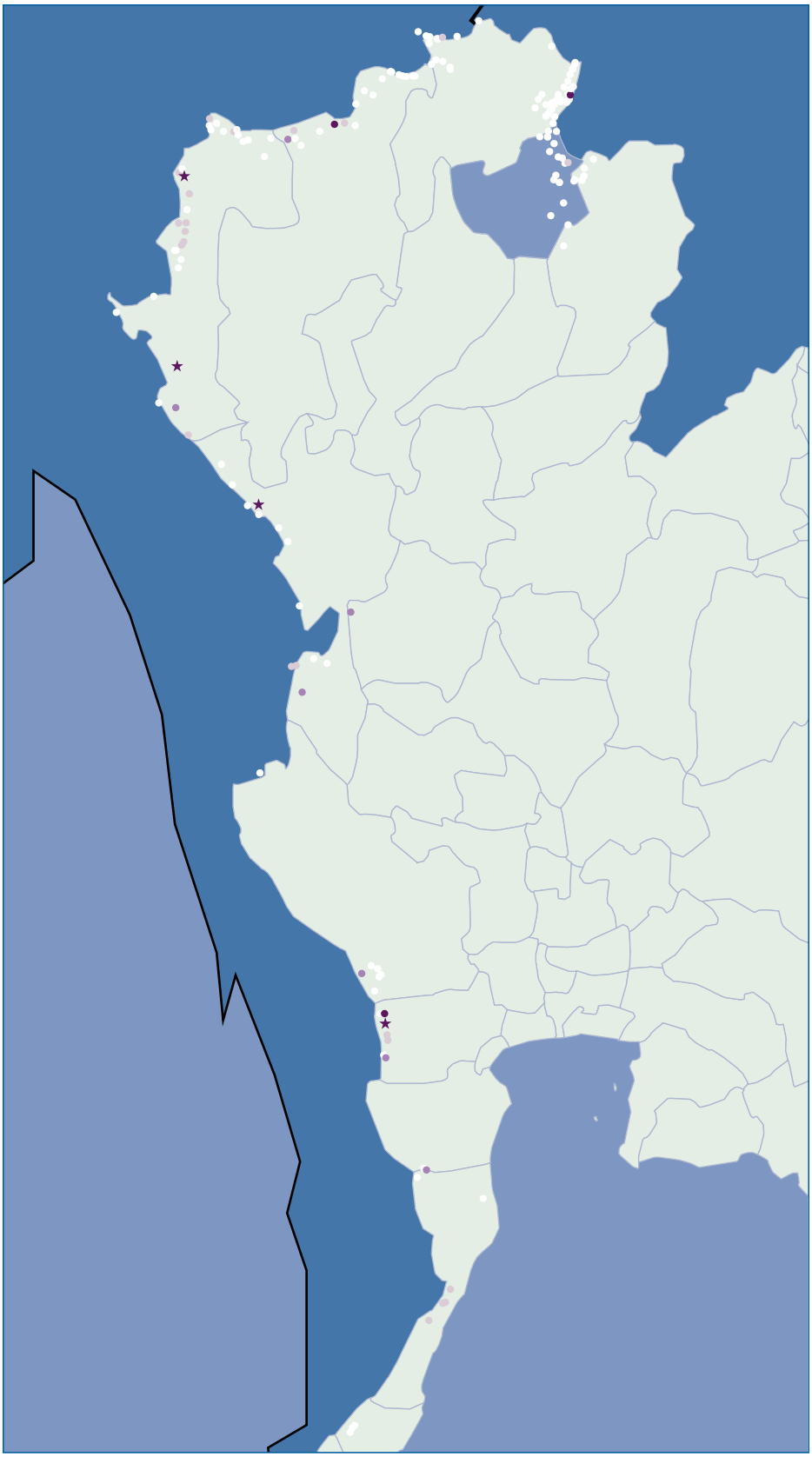


TABLE 38

AFFECTED COMMUNITIES AND POPULATION IN THE MYANMAR BORDER REGION

(including contribution from displaced person camps)

Province	Affected communities	Affected population	Affected camps	Affected camp population	Total recent victims	Recent victims in camps	Recent victims outside camps
Chiang Mai	19	34,993	–	–	15	–	15
Chiang Rai	48	44,465	–	–	8	–	8
Chumphon	3	1,070	–	–	0	–	0
Kanchanaburi	7	3,730	–	–	3	–	3
Mae Hong Son	32	50,514	5	41,740	51	40	11
Phetchaburi	2	36	–	–	3	–	3
Prachuap Khirikhan	6	4,533	–	–	4	–	4
Ratchaburi	7	15,962	1	8,207	28	10	18
Tak	15	74,478	3	62,020	38	30	–
TOTAL	**139**	**229,781**	**9**	**111,967**	**150**	**80**	**62**

camps for displaced persons are excluded, there were 63 recent victims, with the highest numbers recorded in Ratchaburi, Chiang Rai, and Mae Hong Son provinces (Table 38).

Most victims were male (only four females were reported) and adult (only one child under 14 and six people over 45 were reported). The professions of victims prior to their incident ranked as follows: military or people involved in fighting (52), farmer (24), or laborer (8). Nearly all survivors stayed with their profession after the incident or were residing in one of the camps. Forty-six victims, all men, had incidents during military deployment, 23 while collecting food or wood in the forested areas, 15 while traveling, nine while farming, and three during demining activities. In addition to the 83 survivors that had incidents in Myanmar and are now living in the camps, the non-camp communities reported 13 survivors that had incidents in Myanmar.

Based on the population in the affected communities and the number of recent victims, the estimated incident rate is 32.64 mine incident victims per 100,000 people per year. If the camps are excluded, the incident rate decreases slightly to 28.43 mine incident victims per 100,000 people per year.

IMPACT ON COMMUNITIES AND SECTORS

A total of 229,781 people in 139 communities were affected in nine of the ten border provinces and in a total of 64 subdistricts in 32 districts. (See Table 39 on next page.) An additional 735 communities (and subcommunities) were visited and confirmed not affected. The average impact score for the affected communities in the region was 6.55.

Nearly all of the impacted communities were found close to Myanmar at an average distance of 12.8 kilometers from the border. An exception is a small num-

ber of affected communities near former CPT bases and conflict areas in the interior mountain ranges on the Laotian side of Chiang Rai province. (See Map 13.)

The affected communities are villages with a typical population below 1,000 people or large camps for displaced persons. The inclusion of the camp populations (111,967 people) nearly doubles the number of affected people in the Myanmar border region.

Impaired or blocked access to resources in the forest, reported in 78 percent of the affected communities, was the most frequently cited problem. This reflects the extent to which poor communities depend on forest products such mushrooms, fruits, vegetables, herbs, hunting, and fishing (142 mined areas), wood for charcoal burning (99 mined areas), and to some degree, building materials (39 mined areas) and medicinal ingredients (21 mined areas). Restrictions on access routes and footpaths in the forest were also reported to be a problem. (See Table 40.)

TABLE 39

AFFECTED COMMUNITIES AND POPULATIONS IN THE MYANMAR BORDER REGION, BY IMPACT CLASS

Impact class	Number of communities	Affected population
High	16	89,331
Medium	38	71,443
Low	85	69,007
TOTAL	**139**	**229,781**

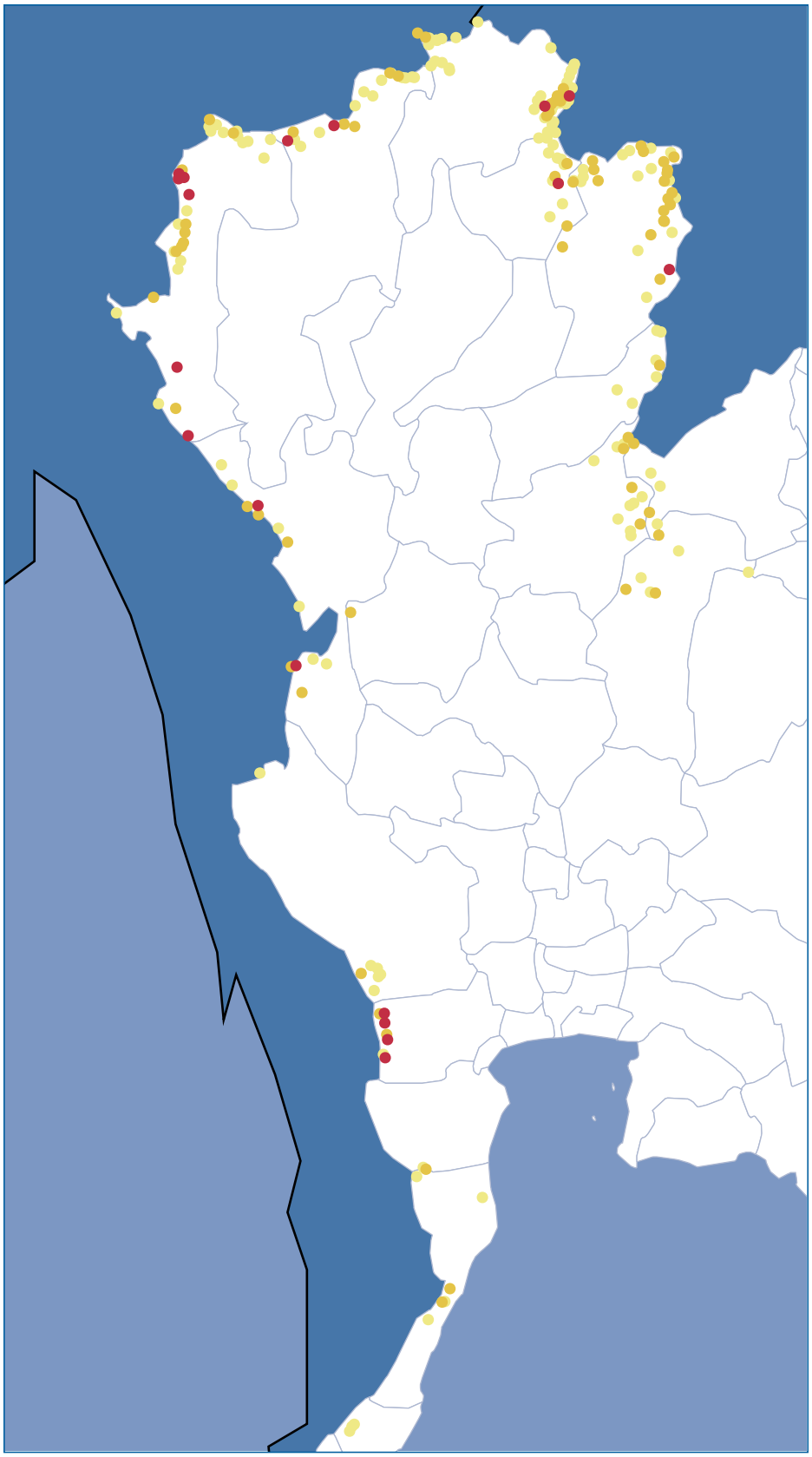
TABLE 40

AFFECTED COMMUNITIES IN THE MYANMAR BORDER REGION, BY AFFECTED RESOURCE

Affected resource	Number of communities	Percent of communities
Pasture	20	14.4%
Cropland	34	24.5%
Forest	109	78.4%
Water	14	10.1%
Roads	2	1.4%
Houses	4	2.9%
Other infrastructure	19	13.7%

Only 13 percent of the affected communities reported problems associated with utilities or other infrastructure. Restrictions on housing areas (3 percent) and roads (1 percent) were even less problematic.

Most of the villagers said the main impact of landmine contamination on their communities was concern about the risk of incidents. Other concerns include restrictions imposed on cultivation and the lack of safe access to the forest areas.

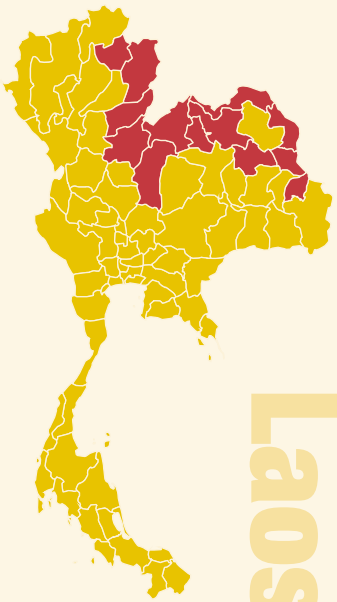


MAP 13

COMMUNITY IMPACT FOR THE MYANMAR BORDER REGION

Community impact
- High
- Medium
- Low

Laos Border Region



SUMMARY

The Laos border region is less affected by landmines and UXO than either the Cambodian or Myanmar borders are but more so than the Malaysia border. Although several provinces and 90 communities have been identified as affected, there has been only one incident in the last two years and only two communities along this border are categorized as highly affected. (See Tables 41 and 42.)

TABLE 41

KEY RESULTS FOR THE LAOS BORDER REGION

Key item	Region total
Affected provinces	9
Affected districts	25
Affected subdistricts	46
Affected communities	90
Affected population	55,687
Recent fatalities	1
Recent injured	0
Total recent victims	*1*
Old fatalities	135
Old injured	180
Total old	*315*
ALL VICTIMS	**316**
Number of contaminated areas	213
Estimated contaminated surface area (sq km)	211.6

BACKGROUND

Thailand shares a long border with Laos, about half of which is defined by the Mekong River. Nine provinces located along the border were surveyed:

TABLE 42

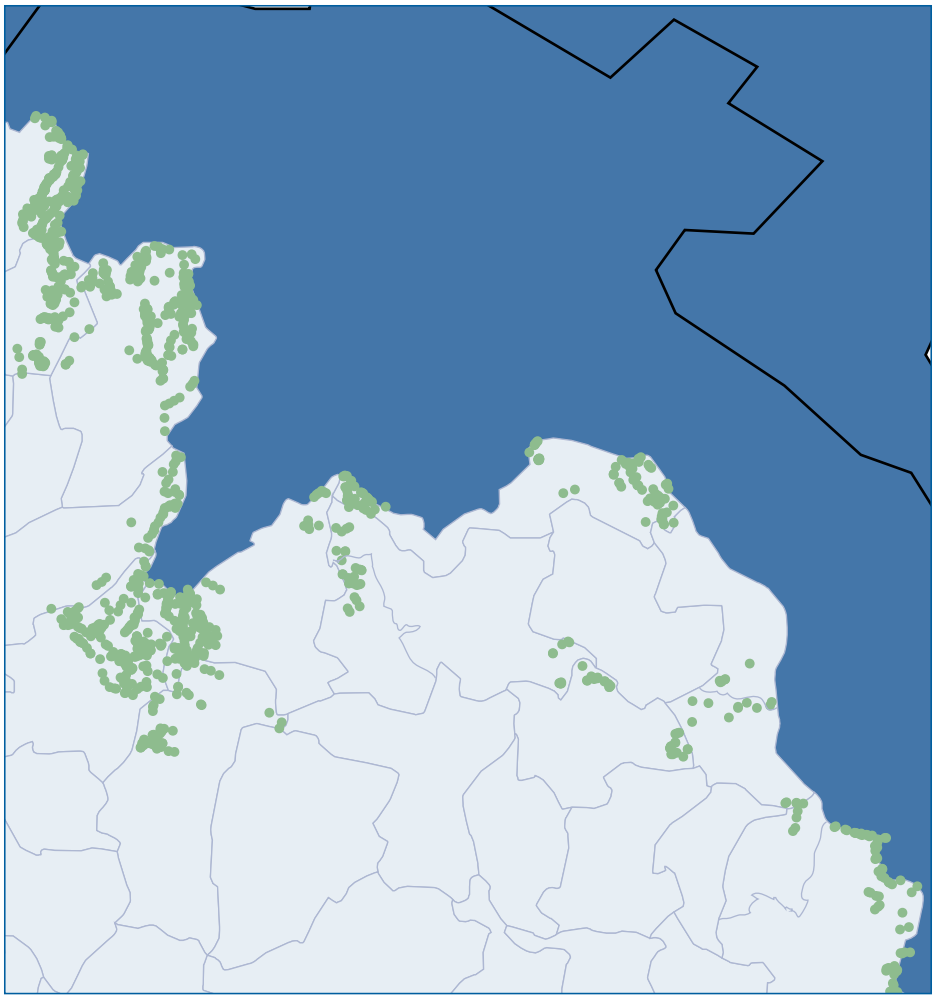
KEY RESULTS FOR THE LAOS BORDER REGION, BY PROVINCE

Province	Affected districts	Affected communities	Affected population	Recent victims	Contaminated areas	Contaminated area size (sq km)
Loei	2	7	3,430	0	6	15.4
Nan	8	37	20,878	0	92	22.7
Nong Bua Lamphu	1	1	1,220	0	1	0.0
Nong Khai	1	1	0	0	1	0.0
Phayao	3	18	13,193	1	42	76.3
Phetchabun	4	7	5,063	0	36	49.5
Phitsanulok	2	11	7,378	0	26	40.3
Udon Thani	1	1	30	0	1	0.0
Uttaradit	3	7	4,495	0	8	7.3
TOTAL	**25**	**90**	**55,687**	**1**	**213**	**211.5**

MAP 14

SURVEY COVERAGE FOR THE LAOS BORDER REGION

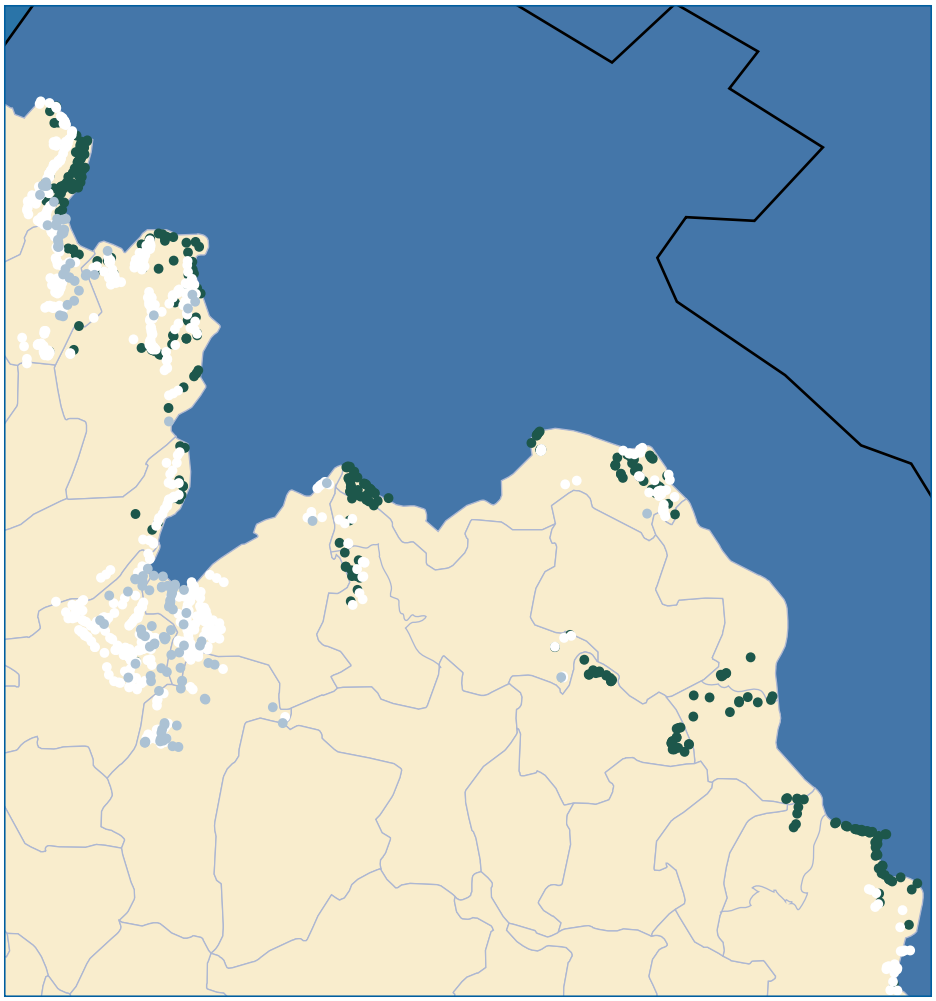
● Community visited



Phayao, Nan, Uttaradit, Phitsanulok, Loei, Nong Khai, Nakon Phanom, Mukdahan, and Amnat Charon. In addition, four interior provinces were surveyed: Phetchabun, Nong Bua Lamphu, Udon Thani, and Kalasin. A total of nine provinces were identified as affected by mines and UXO, and three of these have minimal levels of contamination.

The affected communities are located either close to border areas, particularly in the vicinity of passes, or in mountainous areas where contamination may extend away from the border regions. The main activities in the affected communities are farming, collection of forest resources, and cross-border trade. Although some communities and suspected areas of contamination were difficult to access, the majority of sites were accessible and contaminated areas could, in most cases, be recorded from a safe viewing point.

The survey visited 961 communities in the region, and identified 90 that were considered affected. While the level of impact was minimal, this figure is much greater than the previously reported level of 27 affected communities. (See Maps 14 and 15.)



MAP 15

DEPTH OF INSPECTION FOR THE LAOS BORDER REGION

- Community interview
- Community interview after rapid appraisal
- Rapid appraisal

The region has had limited recent exposure to mine action activities although some military and civilian clearance efforts took place after the CPT–Thai government conflict. Of the 90 affected communities, five were reported as having received mine awareness training, one had seen marking activities, and 11 had had demining activities, seven of which were informal community-based efforts.

SCOPE AND HISTORY OF LANDMINE AND UXO CONTAMINATION

The current landmine and UXO contamination resulted from the communist insurgency in the 1970s and 1980s and then from border conflicts between Thailand and Laos and between Laos and anti-Laos guerrillas. Contamination resulting from the period of communist insurgency was considerably less than expected and impacted communities are mostly restricted to the north Laotian border section. A total of 213 areas of contamination were identified during the course of the survey, covering a maximum surface area of 211 square kilometers.

The contamination is typically found along border passes, near roads, on strategic topographic features, and around former military bases. The survey teams identified 80 mined areas that were defined on all sides.

TABLE 43

DESCRIPTION OF CONTAMINATED AREAS IN THE LAOS BORDER REGION

Typical terrain	Number of contaminated areas
Hillside	103
Ridge	57
Gully	7
Flat	46
Typical vegetation	
Trees	127
Bushes	37
Grass	26
Other	23

TABLE 44

ORDNANCE REPORTED FOR CONTAMINATED AREAS IN THE LAOS BORDER REGION

Ordnance class	Number of contaminated areas
AP	117
AT	4
Mixed AP and AT mines	4
UXO	146
Mines and UXO	0
Unknown munitions	5

As shown in Table 43, of the 213 sites of contamination, 60 were considered to be small and defined. A further 50 sites were recorded as well-defined medium sites. The remainder of tasks were poorly defined with areas greater than 10,000 square meters.

Sixty communities reported contamination by AP mines, 64 by UXO, and only four by AT mines. Many items where dumped at collection points during extensive local clearance at the end of the communist insurgency period (see Table 44).

VICTIMS

A total of 316 landmine and UXO victims were recorded, of which 136 were confirmed fatalities. Only one recent victim report was submitted during the last two years (see Map 16). Based upon the population in the affected communities and the number of recent victims, an estimate for the incident rate is 0.90 mine incident victims per 100,000 people per year.

IMPACT ON COMMUNITIES AND SECTORS

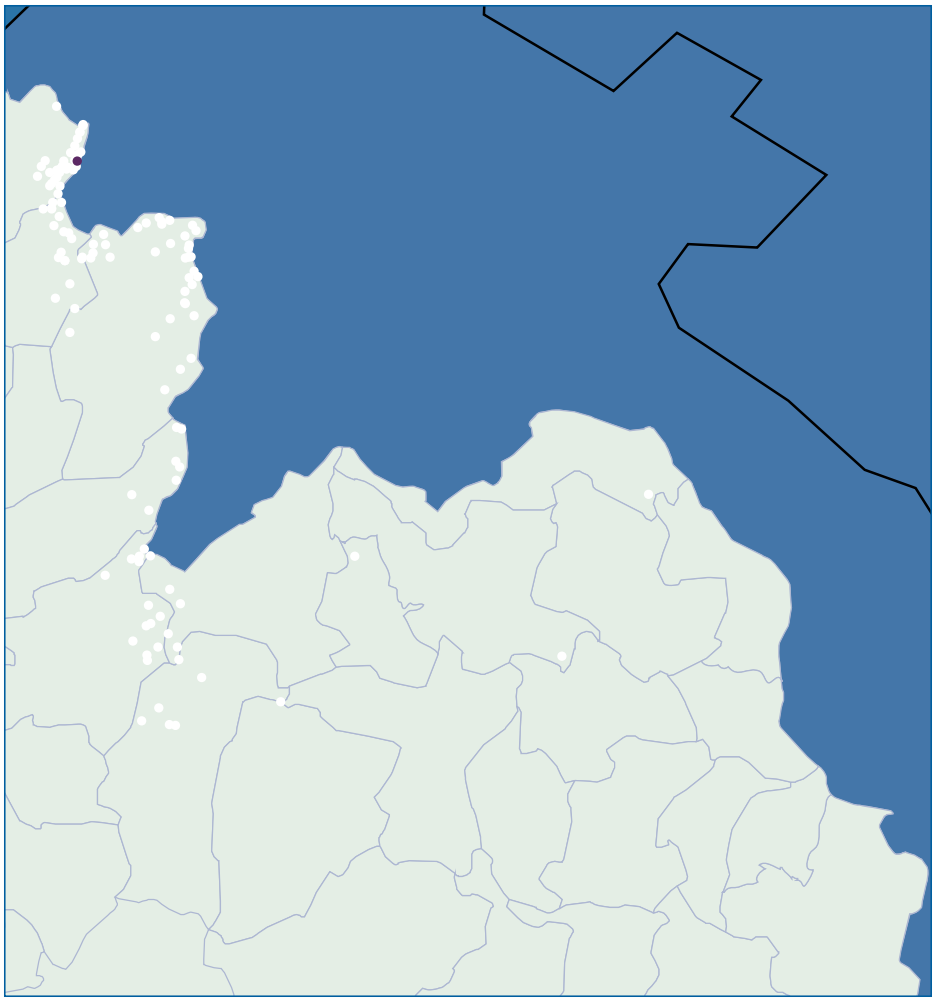
Along Thailand's border with Laos, 55,687 people live in the 90 communities affected by mines and UXO. A further 871 "control" communities were visited and confirmed not affected.

The impacted communities have a typical population of 500-800 people and are located at an average distance of 24.3 kilometers from the border. (See Map 17 on page 106 and Table 45.) Twenty-eight of the 90 affected communities

TABLE 45

AFFECTED COMMUNITIES AND POPULATIONS IN THE LAOS BORDER REGION, BY IMPACT CLASS

Impact class	Number of communities	Affected population
High	2	1,605
Medium	34	19,333
Low	54	34,749
TOTAL	**90**	**55,687**



MAP 16

COMMUNITIES WITH RECENT VICTIMS IN THE LAOS BORDER REGION

Number of recent victims
- 6-10
- 3-5
- 1-2
- none

were hill tribe communities composed of the following ethnic groups: 17 Mong, seven Lhua, and four Mon.

Sixty-nine percent of communities reported blocked access to forests. Accordingly, inhabitants of these villages could not hunt and fish or collect food such as mushrooms, fruits, vegetables, and herbs (106 mined areas). In addition, mined forest areas blocked access to charcoal production (91 areas), building materials (46 areas), and medicinal plants (39 areas). A further 72 mined areas were reported as contaminating cropland and 56

TABLE 46

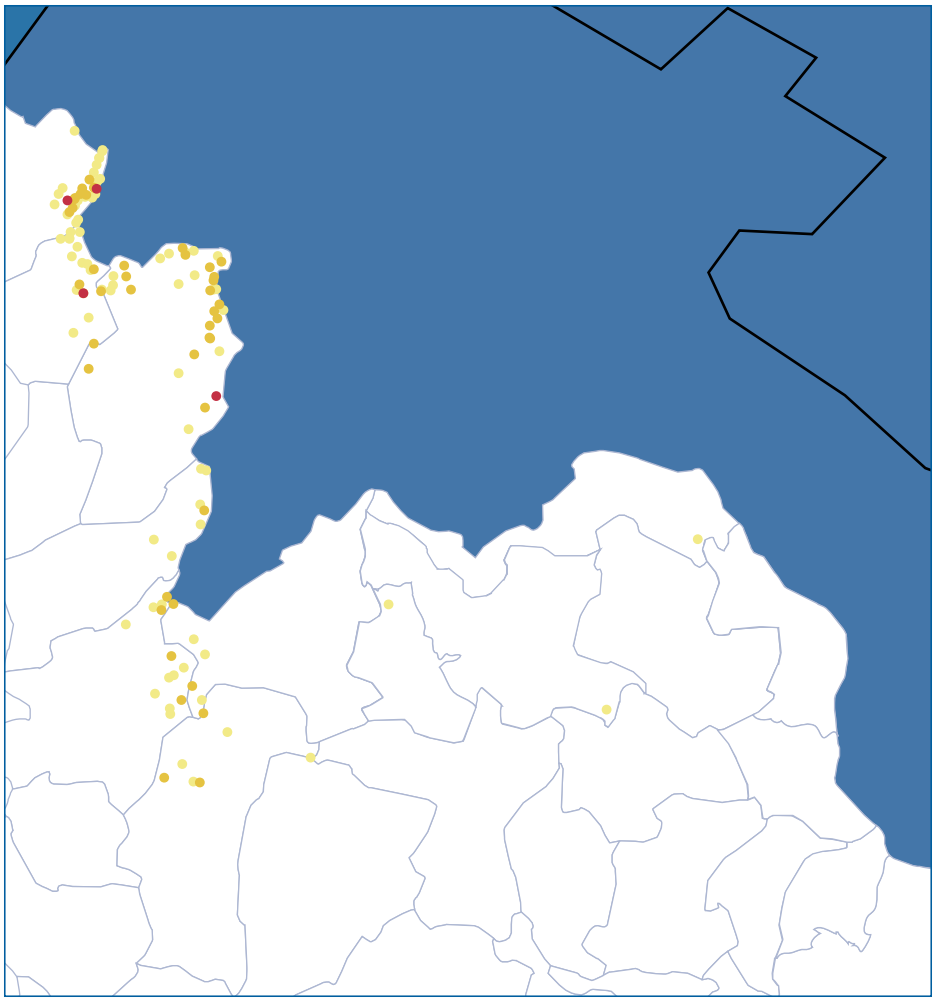
AFFECTED COMMUNITIES IN THE LAOS BORDER REGION, BY AFFECTED RESOURCE

Affected resource	Number of communities	Percent of communities
Cropland	36	40.0%
Pasture	32	35.6%
Forest	62	68.9%
Water	16	17.8%
Roads	3	3.3%
Houses	9	10.0%
Other infrastructure	9	10.0%

MAP 17

COMMUNITY IMPACT FOR THE LAOS BORDER REGION

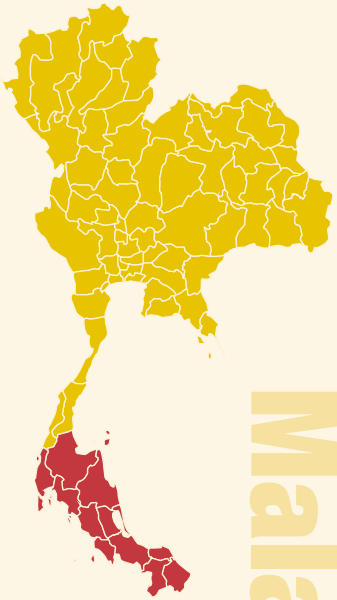
Community impact
- High
- Medium
- Low



mined areas were said to contaminate pasture. Ten percent of the affected communities reported problems associated with utilities or other infrastructure. Similar numbers were reported for restrictions on housing areas (10 percent) and only a few roads were reported blocked (3 percent). (See Table 46 on previous page.)

While many villagers expressed concerns regarding the risks of possible incidents, particularly for children and tourists, the very low number of recent victims suggests that an appreciable number of UXO and mines may be non-functional due to their age or limited to areas that are not currently frequented.

Malaysia Border Region



SUMMARY

While it was expected that the Malaysia border region would be the least contaminated area of the country, the survey found even less contamination than originally anticipated. (See Tables 47 and 48.)

BACKGROUND

Seven provinces on or near Thailand's southern border with Malaysia were surveyed: Satun, Songkhla, Yala, Narathiwat, Surat Thani, Krabi, and Nakhon Si Thammarat. In the whole region, only four affected communities were identified and these were restricted to two provinces, Yala and Nakhon Si Thammarat. The survey visited 113 communities in the region, and identified only four affected communities, a number considerably less than initially suggested by the EOC and the 20 recorded communities reported by a military assessment in 1997. (See Maps 18 and 19 on following pages.)

There are no dedicated mine action programs currently active in the southern region and the degree of contamination identified does not warrant their establishment in the future. Clearance has been undertaken in

TABLE 47

KEY RESULTS FOR THE MALAYSIA BORDER REGION

Key item	Region total
Affected provinces	2
Affected districts	3
Affected subdistricts	3
Affected communities	4
Affected population	2,180
Recent fatalities	0
Recent injured	0
Total recent victims	*0*
Old fatalities	3
Old injured	*7*
Total old	*10*
ALL VICTIMS	**10**
Number of contaminated areas	*7*
Estimated contaminated surface area (sq km)	1.15

TABLE 48

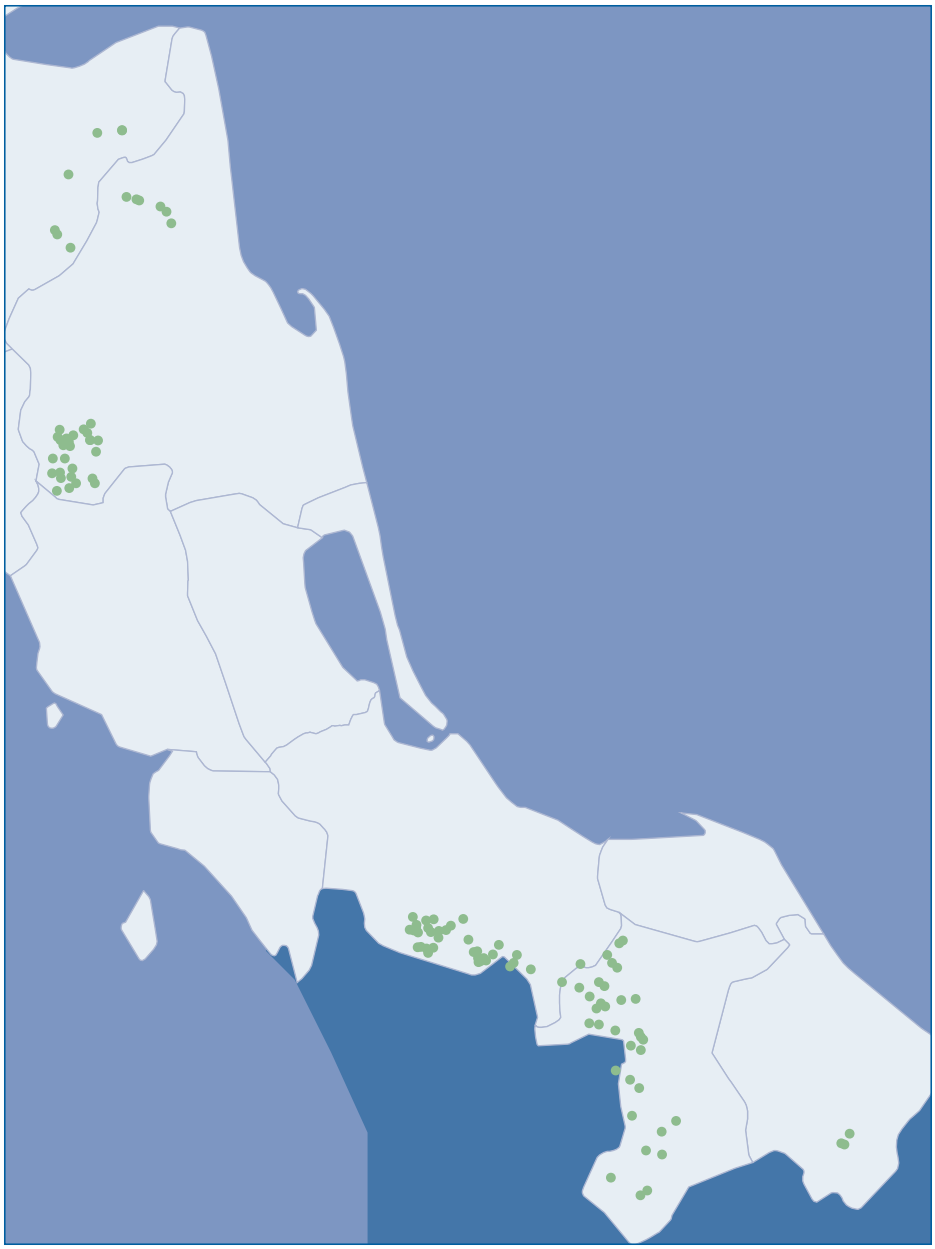
KEY RESULTS FOR THE MALAYSIA BORDER REGION, BY PROVINCE

Province	Affected districts	Affected communities	Affected population	Recent victims	Contaminated areas	Contaminated area size (sq km)
Nakhon Si Thammarat	1	1	1,200	0	1	0.00
Yala	2	3	980	0	6	1.15
TOTAL	**3**	**4**	**2,180**	**0**	**7**	**1.15**

MAP 18

SURVEY COVERAGE FOR THE MALAYSIA BORDER REGION

● Community visited



the past by military units and some reports exist of limited clearance being undertaken by local villagers and ex-communist activists. One of the four affected communities had received some form of mine awareness education and another reported that marking activities had been undertaken.

SCOPE AND HISTORY OF LANDMINE/UXO CONTAMINATION

In the southern region, the survey identified just seven distinct areas contaminated by mines or UXO. These areas include a combined surface area of about 1.14 square kilometers.

MAP 19

DEPTH OF INSPECTION FOR THE MALAYSIA BORDER REGION

- Community interview
- Community interview after rapid appraisal
- Rapid appraisal

The landmine and UXO contamination on the Malaysian border results from both the past conflict between the Communist Party of Malaysia and the British/Malaysian government forces between the 1950s and 1989, and between Thai government and armed separatist groups. Visits to communities assumed affected and interviews with ex-activists revealed that many expected contaminated areas were now cleared and cultivated. Many of the mines used in this conflict were improvised devices and have since decayed and become non-functional.

TABLE 49

DESCRIPTION OF CONTAMINATED AREAS IN THE MALAYSIA BORDER REGION

Typical terrain	Number of contaminated areas
Hillside	2
Ridge	2
Gully	0
Flat	3
Typical vegetation	
Trees	7
Bushes	0
Grass	0
Other	0

TABLE 50

ORDNANCE REPORTED FOR CONTAMINATED AREAS IN THE MALAYSIA BORDER REGION

Ordnance class	Number of contaminated areas
AP	4
AT	0
Mixed AP and AT mines	0
UXO	1
Mines and UXO	0
Unknown munitions	2

The reported areas of contamination are located in forested areas where four of the identified sites are on hilly terrain and three are in areas described as flat. (See Table 49.) The survey identified two small, defined sites, two medium-defined sites, and four poorly defined, large sites. One site exists close to cultivated land in Nakhon Si Thammarat province. Clearance of this task would eliminate all contamination recorded in the province.

Two communities reported AP mines and one reported UXO as types of ordnance contributing to the contaminated sites. No UXO dumps were identified. (See Table 50.)

VICTIMS

Ten reported landmine/UXO victims were recorded in total, of which three were confirmed fatalities. These figures are based on interviews in the four affected communities only. It can be assumed that many more people have come to harm along this border, but that these incidents occurred in the more distant past or in communities now free from the threat of mines. There were no reports of victims of landmine/UXO incidents that occurred in the past two years. (See Map 20.)

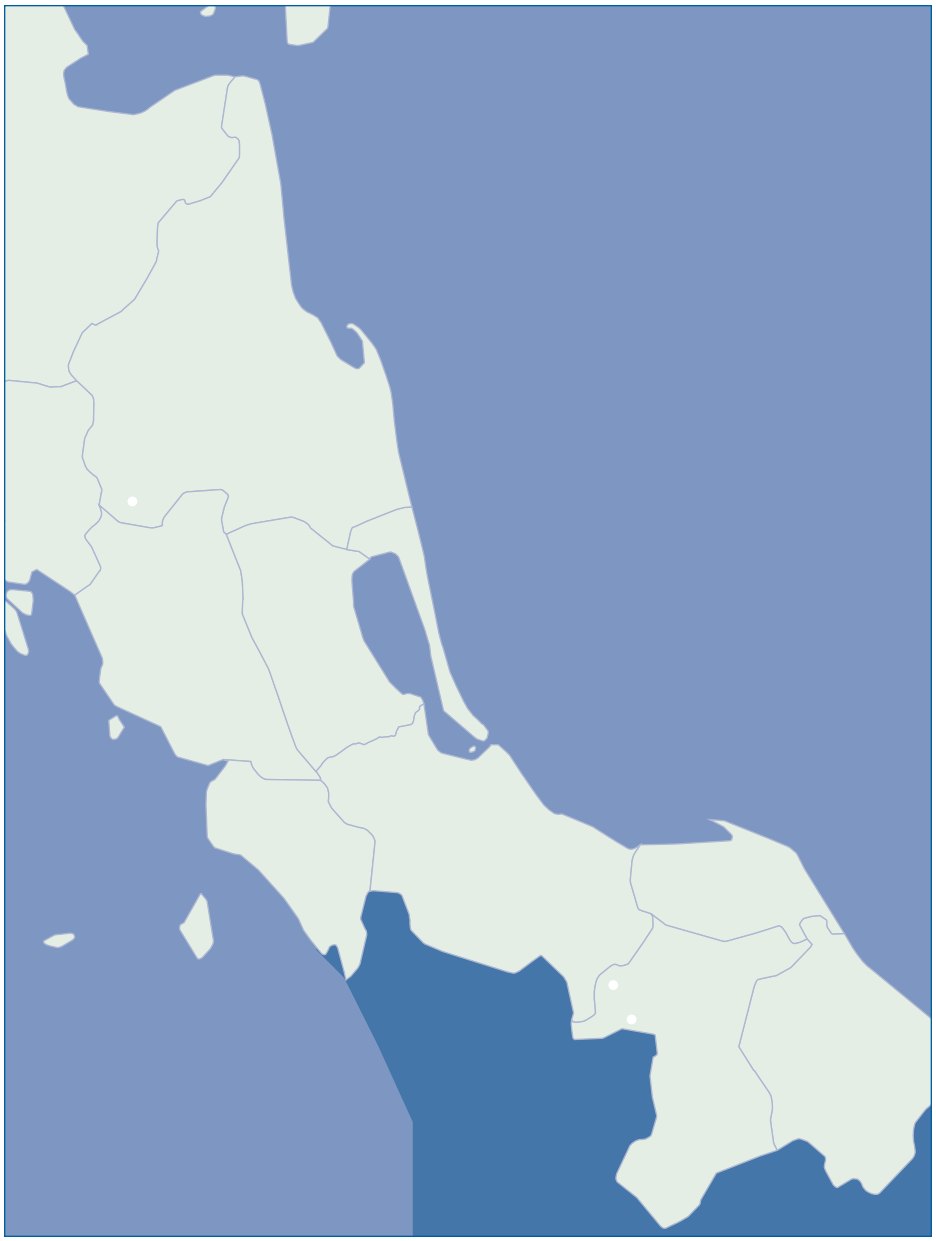
IMPACT ON COMMUNITIES AND SECTORS

In this region, the survey discovered 2,180 people living in four communities affected by the presence of landmines, as shown in Table 51 and on Map 21 (page 112). The mine impact score for each of these communities is low. Three impacted communities are very close to the Malaysia border and one is far from the

TABLE 51

AFFECTED COMMUNITIES AND POPULATIONS IN THE MALAYSIA BORDER REGION, BY IMPACT CLASS

Impact class	Number of communities	Affected population
High	0	0
Medium	0	0
Low	4	2,180
TOTAL	**4**	**2,180**



MAP 20

COMMUNITIES WITH RECENT VICTIMS IN THE MALAYSIA BORDER REGION

Number of recent victims
- 6-10
- 3-5
- 1-2
- none

border. The affected communities are villages with typical populations of about 500 people. The survey visited an additional 109 "control" communities and confirmed that they are not affected.

The main resources with impaired or blocked access due to landmines or UXO were forest resources, cropland, and infrastructure (see Table 52).

TABLE 52

AFFECTED COMMUNITIES IN THE MALAYSIA BORDER REGION, BY AFFECTED RESOURCE

Affected resource	Number of communities
Cropland	1
Pasture	0
Forest	3
Water	0
Roads	0
Houses	0
Other infrastructure	1

MAP 21

COMMUNITY IMPACT FOR THE MALAYSIA BORDER REGION

Community impact
- High
- Medium
- Low

SurveyTeamLeaderReport

SurveyTeamLeaderReport

Survey Team Leader Report

The team leader report provides an opportunity for the impact survey team leader to outline selected personal observations made during the project and to suggest recommendations for future mine action activities in Thailand.

THE SURVEY ENVIRONMENT IN THAILAND

Thailand stands apart from many mine-affected countries due to the country's well-structured administration, proficient military, and relatively high level of stability and development. The capital, Bangkok, is a center and hub of many business activities in Southeast Asia and the country exists as a major tourist destination for about ten million visitors each year.

Elephant injured by landmine

The landmine problem in Thailand is not widely recognized nationally or internationally, although occasional mine-related incidents involving elephants have been publicized. The current survey project in Thailand has now provided a comprehensive understanding of the impact of landmines and UXO on communities, and the geographic extent of contamination on a national scale.

Several positive factors supported the survey project in Thailand:

- Locally employed staff had a high level of education and a considerable work capacity.
- English speakers were available for survey positions where language skills were required.
- Survey vehicles and equipment were obtained locally at a competitive price, eliminating the requirement to import goods and simplifying the procurement process appreciably.
- The Thai authorities and the partnership with TMAC provided strong support and effectively facilitated the project.
- A good infrastructure allowed rapid transportation of survey personnel to border provinces and afforded efficient support of field teams.
- The timing of the survey and establishment of a mine action database was extremely favorable because it legitimized supported the planning and coordination of the relatively recently established humanitarian mine action activities in Thailand. The survey project has a recognized role in assisting Thailand in meeting its obligations under the Ottawa Convention.

The impact survey in Thailand did not take place without challenge. A number of issues had to be addressed in order for the survey to be successfully completed.

Visual inspection of reported contamination sites in remote areas

- The survey focused on border regions where free access is typically limited both by border authorities and the physical remoteness of many contaminated sites.
- Security concerns, particularly related to amphetamine smuggling, exist. Skirmishes took place during the survey and contributed to moderate levels of ordnance contamination.
- Maps are important for survey planning and operations. In Thailand, however, maps of the border regions are not freely available.
- In most border regions, ethnic groups span international boundaries and survey personnel are challenged by the mixture of cultures and languages.

COORDINATION

TMAC counterparts and military facilitation of the project

The impact survey in Thailand was undertaken in close partnership with TMAC including training, coordination of operations, and the establishment of the survey database.

The close affiliation between TMAC and the military was of extraordinary benefit to the survey project. The initial concerns relating to access restrictions in border regions, release of sensitive map scales, and security considerations were appropriately addressed through the TMAC/military partnership.

Military liaison staff assisting in operational planning

The border regions of Thailand are under the

direct control of the Royal Thai Navy, the Royal Thai Army, and the border police. Without authorization and full support from military task forces, the survey project would not have been possible. Therefore, a prerequisite to a survey in Thailand is that appropriate approval for the project be obtained at a regional and local level. Collaboration with border authorities was conducted to gain access to border communities and to receive advice, guidance, and support for survey activities, particularly in areas of poor security. The collaboration with military authorities during the survey was exemplary and NPA cannot emphasize enough the assistance that TMAC provided to facilitate this relationship.

Coordination with civilian national and provincial authorities

At the beginning of the project, a meeting was arranged to provide a detailed brief to senior national authorities on the survey project and to request assistance where necessary. Representatives from the following ministries and departments attended: The Under Office of the Prime Minister, National Security Council, Royal Thai Survey, Border Patrol Police Bureau, Economic and Social Development Department and ministries of Education, Interior, Foreign Affairs, Public Health, Labor and Social Welfare, Science and Environment, and Agriculture and Cooperatives. During the course of the survey, translated summary sheets of the main findings from the most affected provinces were provided and the majority of the authorities that had been initially targeted attended the final presentation of the survey project.

Meeting of provincial governors

On a provincial scale, 43 governors and their officers were briefed in advance of the survey fieldwork and they contributed to the facilitation of the project in their areas of responsibility.

Coordination of national and international NGOs, donors, and other stakeholders

Throughout the project, various survey stakeholders such as NGOs and the donor community were briefed on survey progress and results. After the first provincial report—the report of Sa Kaeo, for instance—was completed, the results were presented to the donors, the provincial authorities, and to the 1st HMAU for comment. Press releases of provinces and border regions were also circulated through TMAC to all stakeholders as fieldwork progressed.

Initial presentations at the outset of the survey provided input and established valuable links for the duration of the project. NPA developed a particularly close relationship with HIT with regard to victim data and other information gathered through their work in the provinces of Chanthaburi and Tak.

CMAC meeting hosted by TMAC in Bangkok

Provincial and district reports produced for the 2nd HMAU

At the end of the project, a final presentation was made in Bangkok. This attracted a range of stakeholders from government, the military, NGOs, and the donor community. The TMAC Director and the Norwegian Ambassador made introductions, and the survey team leader presented the survey findings. An extensive exhibit of survey results and handouts of key summary information and maps supported the presentation.

United Nations Quality Assurance Monitor

The UNMAS certification guidelines were used as the principal document for quality assurance purposes. The Quality Assurance Monitor was not assigned full time to the Thailand impact survey, but also worked on the impact survey running concurrently in Cambodia. This arrangement provided available time for the QAM to follow up key activities and was considered appropriate in the context of the Thailand survey.

ORGANIZATIONAL SUPPORT ELEMENTS

Some relevant organizational arrangements and related observations are outlined below. Other important operational considerations and the manner of approach to fieldwork activities are documented further in the methodology section of this report.

Personnel and administration

The survey management shared offices with TMAC, an arrangement that considerably enhanced administrative and operational aspects of the survey. TMAC also

provided counterparts at the team leader and field officer level and provided drivers for survey trucks to facilitate transportation in areas of military control. In addition, 32 liaison officers from specific military units were allocated to survey teams in particular regions. The survey team leader and TMAC counterpart assisted in authorizing team movement from one army region to another.

A considerable recruitment drive at the start of the project had provided nearly 2,000 applicants for 80 positions and had allowed a selection of staff of various background, experience, and language skill to assist the survey in different regions. The gender balance was slightly in favor of female staff and of the four supervisors, two were women and two were men.

The transport fleet included eight trucks (top), ten Toyota Hilux pickups (center), and 28 Honda motorcycles.

Logistic support

All procurement took place locally including vehicles, GPS units, and digital cameras. Means of communication included cellular phones for supervisors where network coverage existed and VHF radios with booster units at truck communication centers. In remote areas, particularly on the Myanmar border, teams used existing frequencies and the communication systems of the army escorts.

The transport fleet consisted of trucks, pickups, and motorcycles. In general, trucks were used to carry motorcycles to a district level and then motorcycles were deployed. This arrangement improved the mobility and flexibility of data collectors to access communities. In several areas, especially on the western and northern borders, poor access due to terrain and weak infrastructure restricted ground transportation by these means and data collectors walked considerable distances to reach communities and to conduct visual inspection.

REPORT AND MAP PRODUCTION

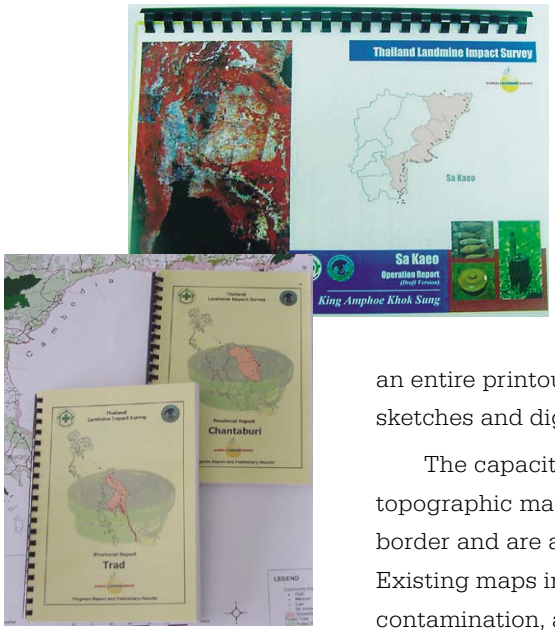
This final report presents a summary of the survey results. Along with the information contained in the IMSMA database at TMAC, it provides the details needed to conduct strategic planning, priority setting, and project development. To meet the current needs of mine action planners more effectively, the survey

team produced a variety of maps to illustrate survey results. These maps and summary sheets are on file and available through TMAC. They include:

- **National summary sheet:** Contains statistics and a summary map of affected communities and contamination distribution on a national scale.
- **Border summary sheet:** Contains statistics and a summary map of affected communities and contamination distribution on a border scale.
- **Province summary sheet:** Contains statistics and a summary map of affected communities and contamination distribution on a provincial scale for the most affected provinces.

All summary sheets in English and Thai were distributed through TMAC to 80 identified stakeholders including press, donors, NGOs, and military and civilian authorities.

- **Final report:** The national level report summarizes the survey findings. It provides information on timelines, stakeholders, methodology and the analysis of impact, blockages, and consequences for mine action.



Examples of district report and provincial summary report

- **Provincial reports:** Provincial reports summarize mine contamination and community impact on the provincial level, and include victim statistics and recent victim maps, demining tasks, marking potential, and other suggested mine action guidelines.
- **District reports:** Contains impact and recent victim maps, and an entire printout of all IMSMA data, including scanned sketches and digital photographs of suspected areas.

The capacity exists to reflect collected data on 1:50,000 topographic maps that have been scanned for the entire border and are available as a layer in the GIS at TMAC. Existing maps include victim "hotspots," reported areas of contamination, and distributions of community impact.

Various workshops have been held with military authorities, HMAU units, NGOs, donors, and local authorities to go over the findings of the survey. Further outreach efforts are required to expand the availability of this information to all key decision-makers and interested bodies.

RECOMMENDATIONS

Execution of impact surveys

1. Training should be included when equipment is procured. In the Thai survey, Honda agreed to provide motorcycle instructors for a two-day training period. During an initial period of the pilot test, Kenwood sent a technician into the field to provide training in the use of radio communication.
2. A number of vehicles were rented in addition to those purchased, an arrangement that was particularly suited to Thailand. Future surveys should consider options for rental as opposed to purchasing all or most survey vehicles.
3. The GIS representation of mined areas from the survey data, the Mined Area Module of IMSMA, does not describe suspected mine sites adequately. It is recommended that mapping skills should be improved in future surveys, where possible, to increase data about the locations of contaminated areas and to allow the GIS to include better representations of the spatial relationship between affected communities and suspected areas. The use of polygons for describing areas addresses many of these concerns and was, in the opinion of the Thai survey staff, an improvement over the use of circular projections.

Data collector map training

4. The database should contain the local language alongside the English translation. The costs for such translation should be included in the overall survey project budget. In Thailand, most of the decision-makers at TMAC have an excellent command of English. However, when information is printed from IMSMA for distribution to field operators, a language barrier normally exists.
5. For future surveys, consideration should be given to modifying the questionnaire template to allow for the English translation to appear alongside the language of discourse. In Thailand, this step reduced the amount of paper required and allowed easy comparison of the two languages for quality assurance purposes, especially during data entry into IMSMA. The combined form also eliminated any chance that the English translation would be separated from the original Thai version. This alteration was a significant improvement.
6. Fifteen military liaison staff, identified before field operations occurred, took part in a three-day seminar and observed the pilot test. The main objective of this exercise was to enhance understanding of the project and to allow liaison

staff to prepare for the survey by collecting data and informing relevant authorities. This initial training of liaison staff was considered valuable in the context of the Thailand survey and may be appropriate in future projects.

7. The IMSMA database is potentially confusing as to when a minefield is shared by more than one community. The survey in Thailand, therefore, introduced a shared minefield section into the survey questionnaire. This allowed only one physical area to be entered into the database although separate impact data could be entered for each of the communities affected. (For additional information, refer to the methodology section of this report.)
8. During the initial training of supervisors and data collectors at TMAC, it was difficult to provide realistic role-playing exercises to familiarize students with the questionnaire and enable them to practice interviewing techniques. Rather than spending time producing theoretical scenarios, villagers from three affected communities were transported to TMAC to participate in mock community interview exercises. These exercises were of great value to students, exposing them during training to real situations as encountered in real villages. In the next phase, during which students were taken to border areas for further training, interviews could be repeated in the actual communities. Other country surveys should consider providing "real informants" as an integrated part of some training sessions for field staff.
9. Database staff should be exposed to field conditions to help them better understand the data collection environment.
10. Approximate task duration filters, such as those for spot tasks, medium tasks with good definition, and long tasks of poor definition, should be considered for inclusion on future survey questionnaires. Such filters improve the recording of areas of contamination by placing a greater emphasis on this important aspect of data collection, and assists in planning future clearance efforts.
11. The release during the course of the survey of preliminary information through summary sheets or reports on a provincial basis should be considered in order to:
    - Provide convenient progress reports to stakeholders
    - Focus survey staff and generate a sense of ownership for supervisors responsible for a particular province within the framework of the national project
    - Provide assistance for current mine action activities and minimize the delay of information that may be important for evaluating present strategies and plans
12. Allow an opportunity for stakeholders of the project to comment on and potentially influence ongoing data collection activities.

National Mine Action Committee and Mine Action Program

To help maximize the benefits of the impact survey project, the following recommendations for mine action in Thailand are listed for consideration and review. Additional information particularly relevant to clearance, mine awareness, and victim assistance activities is discussed in two other sections of this report: "Factors Influencing Mine Clearance" (page 35) and "Consequences for Mine Action" (page 49).

Database and IMSMA

The importance of IMSMA should not be underestimated as an asset central to TMAC's success. The database is a considerable resource that needs to be integrated and updated with ongoing mine action activities and utilized in the planning of activities to address the mine and UXO problem.

1. TMAC currently has a five-year strategic plan, which can now be refined and adapted to incorporate the survey findings. Tasks should be prioritized using the data in IMSMA. This task should be supervised by TMAC in collaboration with civilian and military authorities at a provincial level where additional knowledge of further development plans and other broader issues can be addressed.
2. Mechanisms for the reporting of mine action activities need to be put in place so that mine action tasks can be linked to the IMSMA coding of communities and mine sites. This step facilitates efforts to record the progress of field operations.
3. The current IMSMA version should be upgraded to the most current release.
4. Experienced database personnel are essential to maximize the benefits of the survey and should be employed in the database unit. Database staff should also possess suitable translation skills in order to address the needs of a variety of end-users.
5. The district reports provided to HMAU teams should be re-formatted to address team needs. Hard copies of all reports on affected districts should be printed and distributed to the relevant provincial authorities. It is suggested that district reports be organized with communities arranged in descending order of impact. All information for each community could be presented in each section, including maps and digital photographs.
6. TMAC should explore opportunities to incorporate additional information from existing ministerial and institutional databases into IMSMA where appropriate. It should be emphasized that IMSMA is community-based and uses the standard gazetteer codes of the Ministry of Interior. This enables other data sets to be incorporated into IMSMA or vice versa.
7. After the Thai authorities approve release of data, survey results should continue to be presented to a wide audience of organizations and authorities, particularly at a provincial level. Organization of workshops for the different

components of mine action (i.e., mine awareness, victim assistance, clearance, advocacy, and further survey work) is suggested.

8. Potential end-users outside TMAC (such as NGOs, ministries, institutions, and other authorities) must be encouraged to access the survey data and establish two-way channels of information. They should be assisted in these tasks when necessary.
9. To fund additional mine action projects, proposals to donors and the Thai government should be written based on the detailed information from the survey.
10. Mechanisms to capture new information and channel this into IMSMA should be established. This may, for instance, include additional survey work in selected areas on the Myanmar border where future contamination by mines and UXO may occur.

Mine awareness and victim assistance

Some aspects of mine awareness and victim assistance are discussed in the section "Consequences for Mine Action" (page 49). Additional considerations include:

1. A mine awareness workshop at TMAC for all relevant NGOs and organizations should be conducted to encourage the use of impact survey data in designing mine awareness activities. In particular, location data of victims and identified target groups that remain vulnerable to incidents can be used to improve significantly the existing focus on and approach to mine awareness training.
2. Consideration should be given to using impact survey information to produce documents and maps tailored to the specific needs of the mine awareness community.
3. Although only the details of people who became victims in the last two years are included in the database, previous incidents reported by communities are listed stating whether the victim survived. Further studies or projects focused at victim assistance may consider revisiting those communities to gather further details about survivors.
4. The upgrade of IMSMA to Version 2.2 would provide a greater capacity for storing victim data. Additional fields in the database need to be reviewed.
5. Currently, mine victim data is filed at a variety of places including TMAC, hospitals, the Ministry of Health, and with various NGOs. During the survey, every effort was made to centralize the information on the recent victims in the TMAC database. It is recommended that the current position of TMAC be maintained and that mechanisms to capture future incidents through NGOs and hospitals be established and/or strengthened.

Clearance and marking

To assist in planning, the survey data provided TMAC with the ability to filter mined areas based on size and delineation. The objective was to provide manageable dangerous-area information, with the potential for follow-on technical survey tasks.

MEDIUM AND LONG-TERM CLEARANCE TASKS

The "Consequences for Mine Action" section of this report (page 49) explains the challenges of large clearance tasks in areas of thick vegetation and high or varied topography. Such tasks account for a large proportion of contaminated areas reported in the country.

1. Large tasks should be carefully reviewed for clearance because operational considerations and associated cost-benefit analysis will clearly exclude many of them from short- or medium-term clearance efforts.
2. Area estimates of contamination at forested sites entered into IMSMA are considered to be much greater than the actual area due to the poor definition of contamination. Technical survey teams or closer investigations could probably reduce the size of some recorded mined areas. Further reconnaissance should be considered at some large sites with particular impact or significance. This may be appropriate in areas with a cluster of highly impacted communities or where further development plans are considered.
3. Medium-term tasks can be well planned and managed. Good access allows better calculation of the area for clearance and more confident assessments of the vegetation coverage and topography. Such data enables better estimates of the funds required to pay for demining. Clear observations of the surrounding land use can provide good estimates of agricultural yield expected and allow a better review of the cost-benefit analysis of clearance tasks.
4. Mine action activities should focus on the 69 highly impacted communities identified during the survey. However, communities of medium- and low-impact should also be considered where clearance tasks are well defined and can be executed easily. The rationale here is that clearing ten sites in communities with medium impacts may improve safety for more people than clearing one large site in a highly impacted community, even though completing the tasks requires the same resources and amount of time.

General information

1. The provincial reports include a list of suggested mine action tasks. These were generated by field teams through weekly meetings during the survey and are not determined through database evaluation. The input of field personnel should not be underestimated, since their recommendations may reflect important aspects not adequately captured by the survey instrument.
2. There are many fewer manual deminers currently employed in Thailand than required to address the clearance tasks ahead. The plans to expand operational capacities by expanding the current number of HMAU teams, and by

drawing on the potential resources of civilian demining units, international NGOs, and commercial companies are entirely appropriate.

3. Vegetation cutters, used to augment manual and mine dog detection capacities, are vital tools for increasing clearance efficiency in Thailand.
4. TMAC should consider prioritizing the clearance of medium-duration tasks and should develop clearance guidelines based on the tasks associated with highly impacted communities.
5. Military capacities outside TMAC and HMAU areas were identified during the survey as playing an appreciable role in mine action through clearance and marking activities. TMAC should record such activities and should maintain a complete record of national efforts to address the mine and UXO threat.

Although considerable support came from many key participants in Thailand and from the international community, the Thailand Mine Action Center deserves special acknowledgement for its enormous contribution as a partner to NPA on the impact survey project.

GUY RHODES, PH.D.
NPA Team Leader
Thailand

CD-ROM Appendices

Items Included on the CD-ROM

Included in this report is a CD-ROM containing additional information and data produced during the Landmine Impact Survey in the Kingdom of Thailand.

- Electronic version of the contents of this report
  Thailand landmine impact survey report.pdf
- Thai translation of the text contained in this report
  Thailand landmine impact survey report Thai.pdf
- "Estimation of survey coverage in Thailand" by Dr. Larry Moulton provides the mathematical justification for the claims made regarding the coverage and completeness of the survey
  Estimation of survey coverage in Thailand.pdf
- Supporting statistical analysis of the underlying structure and relationships in the types of blockages reported and in the behavioral outcomes of the landmine/UXO contamination by Dr. Aldo Benini and Dr. Larry Moulton
  Supporting analysis.pdf
- Case studies and stories illustrating the human dimensions and consequences of living in mine contaminated areas
  Case study Ban Huai Ton Nun.pdf
  Case study Ban Nhong Ya Kaew.pdf
  Case study Ban, Phoomsarol.pdf
  Case study Elephant Hospital.pdf
  Short story 1.pdf
  Short story 2.pdf
  Short story 3.pdf

The successful completion of the Landmine Impact Survey in Thailand and the publication of this report would not have been possible without the input and effort of a large number of people and institutions. With respect to this, we would also like to acknowledge the invaluable contributions of the following:

Drafting and Editing:

All the staff of NPA Thailand

Dr. Aldo Benini

Dr. Larry Moulton

Cheryl Simon Silver

Graphics and Report Design:

Betsy Rubinstein, InForm

Rashne Green

All the staff of the Survey Action Center

Project Support and Facilitation:

Gen. Sampao Chuesri, Supreme Command

Lt. Gen. Permsak Puangsaroj, Secretary General, NMAC

Lt. Gen. Dr. Vasu Chanarat, Director General, TMAC

Lt. Gen. Ronnachai Srisuworanan, Deputy Director General, TMAC

Maj. Gen. Gitti Suksomstarn, Assistant Director, TMAC

Maj. Gen. Thamasak Senivongse, Assistant Director, TMAC

Sr. Col. Talerngpan Chiewvej, Assistant Director, TMAC

Dave McCracken, UN Technical Advisor, TMAC

Col. Niran Pipithkul, Deputy Commander, 1st HMAU

Alain Dazy, UN QAM Thailand

Dr. Amara Pongsapich, Director, Social Research Institute,
Chulalongkorn University, Bangkok, Thailand

Geneva International Centre for Humanitarian Demining

Swiss Institute for Technology

Handicap International Thailand

Hiroshi Tomita, Secretary General, JAHDS

Honda Japan

A special thanks to all the Thai nationals who made up the field teams and office staff, without whom none of this would be possible

THAILAND MINE ACTION CENTER

183 Songprapa Road, Sigun Donmuang
Bangkok 10210, Thailand
Phone: 66 2 565-5200
Fax: 66 2 565-5202
Website: www.tmac.go.th

VIETNAM VETERANS OF AMERICA FOUNDATION

1725 I Street, NW, 4th Floor
Washington, DC 20006, USA
Phone: (202) 483-9222
Fax: (202) 483-9312
E-mail: survey@vi.org
Website: www.vvaf.org

NORWEGIAN PEOPLE'S AID

P.O. Box 8844 Youngstorget
0028 Oslo, Norway
Phone: +47 22 03 77 00
Fax: +47 22 20 08 70
E-mail: npaid@npaid.org
Website: www.npaid.org

UNITED NATIONS MINE ACTION SERVICE

304 East 45th Street
Room FF-360, United Nations
New York, NY 10017, USA
Phone: (212) 963-1875
Fax: (212) 963-2498
E-mail: mineaction@un.org
Website: www.un.org/depts/dpko/mine