

# Landmine Impact Survey

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**REPUBLIC OF CHAD**



**Certified by the United Nations Certification Committee**

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**Implemented by the Survey Action Center and  
Handicap International**

**Republic of Chad**

## PROJECT ABSTRACT

The *Landmine Impact Survey* in Chad summarizes the results of a nationwide socio-economic survey of the affects of landmines and UXO on communities in Chad. 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 Chad 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:



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## ACRONYMS USED IN THIS REPORT

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AP	anti-personnel
AT	anti-tank
BCR	Bureau Central de Recensement—Central Census Office
CDR	Conseil Démocratique Révolutionnaire—Democratic Revolutionary Council
CMA	community mine awareness
EOC	expert opinion collection
EOD	explosive ordnance disposal
FAN	Forces Armee du Nord—Armed Forces of the North
FE	field editor
FROLINAT	Front de Liberation du Tchad—Chadian Liberation Front
FS	field supervisor
GICHD	Geneva International Center for Humanitarian Demining
GIS	Geographic Information Systems
GLS	Global Landmine Survey
GPS	Global Positioning System
HCND	National High Commission for Demining
HELP	Help D'Allemagne Organisation Humanitaire Internationale
HI	Handicap International
IMSMA	Information Management System for Mine Action
LIS	Landmine Impact Survey
LQAS	lot quality assurance sampling
MDD	Mouvement pour la Démocratie et le Développement— Movement for Democracy and Development
MoAC	Ministry of Agriculture and Cooperatives
MoFA	Ministry of Foreign Affairs
MPC	Ministry of Planning and Cooperation
MPS	Mouvement Patriotique du Salut
NGO	non-governmental organization
QAM	quality assurance monitor
SAC	Survey Action Center
SWG	Survey Working Group
UNMAS	United Nations Mine Action Service
UNDP	United Nations Development Program
UNOPS	United Nations Office of Project Services
UXO	unexploded ordnance
VVAF	Vietnam Veterans of America Foundation

# Introduction

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**G**rowing 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 over 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 Chad. 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 as described in this report and the attached CD-ROM.



# Executive Summary

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## SUMMARY OF CONCLUSIONS

The Landmine Impact Survey conducted in the Republic of Chad from December 1999 until May 2001 conclusively identified 249 mine-impacted communities, containing 417 areas contaminated by landmines and/or unexploded ordnance (UXO). The affected areas cover 1,081 square kilometers of land. This contamination directly interferes with the livelihood and safety of at least 284,435 persons. A thorough verification exercise resulted in a high degree of confidence that the survey discovered at least 95 percent of the impacted communities in Chad.

The survey confirmed that landmines and UXO extensively contaminate northern Chad. The survey also revealed significant levels of contamination in the central and eastern portions of the country, and highlights the extent to which the people of Chad live with the deadly toll of mines and UXO.

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

- In Chad, a greater *proportion of communities are severely impacted than initially projected, and their geographic distribution is unexpectedly wide*. The North region contains 91 impacted communities, 37 of which are highly impacted. The East region has 51 impacted communities, 12 of which are rated as highly impacted.
- A small number of parameters exert a strong influence on the probability that a mine incident will occur. Thus, *it is possible to predict which communities are most likely to have incidents*.
- *The deadly effects of UXO in Chad are much higher than expected*. Data show that many victims sustain upper body injuries caused by tampering, mostly with UXO. This knowledge indicates two needs: a focused mine awareness program to reduce tampering with munitions, and a targeted effort to demolish highly concentrated UXO “caches.”
- *Active military firing ranges constitute a special threat to surrounding communities* and are causing at least 19 casualties per year.
- Based on these findings, users of the Landmine Impact Survey can reduce the current hazard most effectively if they *concentrate mine action efforts on a small number of areas*.

## PROJECT OVERVIEW

The Landmine Impact Survey in Chad began in early 1999 when the United Nations Mine Action Service (UNMAS) made an official request to the Survey Action Center (SAC) to undertake this effort and designated Chad’s Haut Commissariat National au Déminage (HCND National High Commission for

Demining) as the primary beneficiary of the findings. An advance survey mission was conducted in July of 1999 and Handicap International of France (HI) was chosen by SAC to be the executing agent. HI established an office in Chad in January 2000 and completed the fieldwork and data collection by May 2001. HI, under a contract from SAC, 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 governments of the United States and the United Kingdom, as well as the United Nations Foundation, provided funding for the survey. HI and the Vietnam Veterans of America Foundation (VVAFA) also contributed funds to complete the survey. A portion of these funds was made available through a contracting mechanism managed by the United Nations Office for Project Services (UNOPS).

HI executed the survey using four international staff members and more than 60 Chadian nationals recruited from all of Chad's regions and major ethnic groups. A main office was established in the capital of N'Djamena. Four field survey teams worked throughout the country, often for weeks at a time, with their movements coordinated through high frequency radio. Data collected were entered into the Information Management System for Mine Action database (IMSMA). The data in turn are analyzed and used in strategic planning processes.

## **SCOPE OF THE PROBLEM**

In total, the survey teams visited all 28 departments and 98 sub-prefectures in Chad. The only portion of the country not addressed was that of Tibesti in the north where security concerns prevented operations. The survey identified 249 mine-impacted communities in 23 departments, in which 284,835 people reside. Based on the distribution of the mined areas and the latest census information in Chad, nearly half of Chad's citizens live in a sub-prefecture that has some degree of mine or UXO contamination.

Not all regions are equally affected. For instance, in northern Chad the departments of Borkou and Ennedi contain more than one third of all impacted communities and more than one quarter of the nation's affected population. At the other end of the scale, southern Chad has only 20 impacted communities, although the majority of the country's people live there.

The survey identified 417 distinct areas of landmine and/or UXO contamination that affect communities in Chad. A further 135 "dangerous areas" were identified where mines/UXO exist but cannot be associated clearly with a local community. Based on observation and information provided by local informants, the survey estimates that 1,081 square kilometers of Chad are contaminated.

## **IMPACT ON COMMUNITIES**

SAC used the standard impact scoring mechanism that ranks communities in broad categories that reflect the degree of mine impact. Indicators include the number of victims in the past 24 months, blocked access to facilities or livelihood

areas, and the nature of the contaminating ordnance. Based on this system, 49 communities in Chad—nearly 20 percent of the total—are “highly impacted.” Fifty-two communities, or 21 percent are “medium-impacted” while the remaining 148 communities representing 59 percent of the total are considered to be “low-impacted.” Although communities are categorized as highly impacted and medium-impacted mostly based on their levels of blocked access, the highly impacted communities also suffer from numerous mine incidents. In Chad, 63,470 persons live in highly impacted communities, 66,925 live in medium-impacted communities, and 154,040 live in communities where impact is low.

## **IMPACT ON SECTORS**

The survey collected extensive information regarding the types of livelihood and institutions that are denied local populations because of the presence of landmines and UXO. The most commonly reported blockages occur to pasture and agricultural land, roads and trails, and water resources and housing. Pastureland is an important economic resource in Chad, where livestock outnumber people. Many communities there have alternative pastureland, but in some locations, particularly in the north, suitable land is limited and alternatives are few. In the case of roads, Chad’s flat terrain allows for easy alternatives to be established in most regions of the country. Yet, in some very specific locations, such alternatives are not readily available, forcing long and difficult detours around contaminated roadways.

Among the 249 communities surveyed, 180 had a history of mine incidents. These communities reported a total of 1,688 victims, 339 of whom were injured or killed within the previous 24 months. When the incident reports were analyzed on a regional basis, a dramatic finding emerged: The North region has less than one percent of the population of Chad, but includes 57 percent of the mine victims. In this region, 154 persons per every 100,000 inhabitants are injured or killed each year. The East region has the next highest rate with 4.6 incidents per 100,000 persons. More than one third of mine incidents were reported as being caused when victims tampered with munitions. The ratio of upper body to lower body injuries is roughly 1:1, suggesting that as many as one half of all mine incidents in Chad are caused by conscious interaction with these deadly devices. While the vast majority of incident survivors received emergency care, the survey teams could not identify even one survivor who had received any sort of rehabilitative care.

## **CAUSALITY**

Statistical analysis of the survey data confirms that a relationship can be established between a number of factors and increased mine risks. Factors found to influence mine risk include geographic region, proximity to other mined areas, population, intensity of previous conflict, and the strength of overall community institutions. Communities in the north, dependent on a few critical resource areas and with limited institutional assets, find it much harder to adapt to the dangers of mines. Because the parameters affecting risk calculations are few and their

influence is strong, it is possible to predict which communities are most likely to have mine incidents in the future.

## **BUDGET AND EXPENDITURE**

The budget for the Chad Landmine Impact Survey was first developed in late 1999 following completion of the advance mission. The initial amount of \$1,152,221<sup>1</sup> was revised upward during a mid-project review to account for the much broader range of contamination being discovered and the difficult operating conditions found in Chad. The final expenditure for the survey was \$1,639,585, of which approximately 25 percent represents the value of non-expendable equipment provided to HCND to support future mine action and information management activities.

## **CONCLUSION**

The results of the survey clearly indicate that Chad suffers from the adverse impacts of landmine and UXO contamination. The data collected provide a vivid and accurate description of the location and nature of these impacts.

The Landmine Impact Survey in Chad provides national authorities with the information required to put a national mine action plan in place. The findings of the survey suggest that a concentrated effort, using modest resources, could target the most at risk communities and the very specific behavior pattern of UXO tampering. These measures could quickly and effectively reduce the most adverse consequences of landmines and UXO in Chad.

<sup>1</sup> All monetary figures are in U.S. dollars.

# Survey Results & Findings

# Survey Results & Findings

# Scope of the Problem

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## NUMBER OF COMMUNITIES AFFECTED

The Landmine Impact Survey identified 23 mine and UXO contaminated departments out of 28 in Chad.<sup>2</sup> Overall, the survey established that 249 communities in 51 sub-prefectures report problems with landmines and/or UXO. An estimated 284,435 people live in these communities and have their daily lives influenced by the presence of mines and UXO.

During the survey, seven teams were responsible for different regions of Chad. The teams were selected and assigned based in part on the ethnic and linguistic differences between regions. The survey regions were made up of the following departments:

- *North*: Borkou and Ennedi
- *East*: Assongha, Biltine, Ouaddaï, and Sila
- *Center*: Batha East, Batha West, Guéra, and Salamat
- *South*: Barh Kôh, Lake Iro, Kabia, Tandjilé East, Tandjilé West, Mayo Boneye, Mayo Dala, Mandoul, Logone Occidental, Logone Oriental, and Monts de Lam
- *West*: Lake Chad, Kanem, and Barh El Gazal
- *Greater Baguirmi*: Baguirmi, Bokoro, Dababa, Hadjer Lamis, and the commune of N'Djamena (surveyed by a separate team)

Table 1 (see next page) shows the distribution of impacted communities, sub-prefectures, and populations for the 23 departments in the various survey regions. Within regions, the Survey found that the number of villages contaminated by mines and UXO varies widely from one department to the next. Northern Chad is notable for its concentration of impacted communities: the two departments of Borkou and Ennedi contain more than one third of all impacted communities and more than one quarter of the nation's affected population. In contrast, southern Chad has only 20 impacted communities even though the majority of Chadians live there.

<sup>2</sup> Chad is composed of 29 departments of which 28 were covered by the survey. The department of Tibesti in northwestern Chad was not included because of security concerns in the area at the time of the survey. It should be noted, however, that Tibesti is heavily contaminated with both mines and UXO.

TABLE 1

**AFFECTED DEPARTMENTS, PREFECTURES, LOCALITIES, AND POPULATIONS,  
BY SURVEY REGIONS**

	Departments	Prefectures	Localities	Population
North	Borkou	4	42	30,765
	Ennedi	9	49	42,730
	<b>TOTAL</b>	<b>13</b>	<b>91</b>	<b>73,495</b>
East	Assongha	1	2	225
	Billine	4	36	38,662
	Ouaddaï	2	10	22,108
	Sila	2	3	1,600
	<b>TOTAL</b>	<b>9</b>	<b>51</b>	<b>62,595</b>
Center	Batha East	2	12	9,398
	Batha West	2	2	2,250
	Guéra	3	13	24,255
	Salamat	2	3	6,186
	<b>TOTAL</b>	<b>9</b>	<b>30</b>	<b>42,089</b>
South	Barh Kôh	1	6	2,348
	Lac Iro	2	9	7,231
	Logone Oriental	1	1	1,070
	Mandoul	1	1	532
	Mayo Boneye	1	2	840
	Monts de Lam	1	1	240
<b>TOTAL</b>	<b>7</b>	<b>20</b>	<b>12,261</b>	
Greater Baguirmi	Baguirmi	2	7	20,300
	Dabada	2	5	10,400
	Hadjer Lamis	2	5	825
	N'Djamena	1	11	18,970
	<b>TOTAL</b>	<b>7</b>	<b>28</b>	<b>50,495</b>
West	Barh El Gazal	1	5	3,800
	Kanem	1	4	5,000
	Lac	4	20	34,700
	<b>TOTAL</b>	<b>6</b>	<b>29</b>	<b>43,500</b>
<b>GRAND TOTAL</b>		<b>51</b>	<b>249</b>	<b>284,435</b>



## SETTLEMENT TYPE AND POPULATION SIZE

Mines and UXO in Chad mostly affect rural villages. As Table 2 shows, 169 out of 249 impacted communities are either a rural village, with a single locality consisting of permanent housing, or a dispersed rural village with multiple satellite encampments. As compared to urban, suburban, or nomadic communities only 45 percent of the country's affected population live in such villages.

TABLE 2

### AFFECTED COMMUNITIES AND POPULATIONS, BY SETTLEMENT TYPE

City type	Affected communities	Population affected	Mean population
Urban	44	92,020	2,244
Suburban	23	35,128	1,849
Rural village	159	136,530	910
Dispersed rural village	10	2,355	261
Nomadic	4	2,650	883
Other	9	15,752	1,750
<b>TOTAL</b>	<b>249</b>	<b>284,435</b>	<b>7,897</b>

The majority of the impacted communities are small. Nearly half of these communities have estimated populations of 500 or less and more than two thirds have populations of less than 1,500 (see Figure 1). This is in keeping with population size distribution in Chad, which has many more small communities than large ones. Although surveyors do not know the parameters and distribution of every community in Chad, it can be assumed that in terms of size, the impacted communities follow the typical population pattern.

## THE IMPACT OF MINES AND UXO ON NOMADIC PASTORALISTS

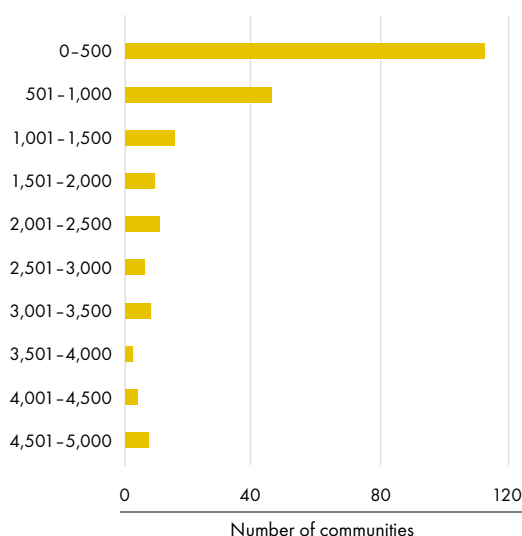
Between five and 15 percent of Chad's people are nomadic pastoralists. Their presence raises a number of significant methodological and operational issues.

Among the 249 impacted communities, only four are characterized as nomadic. Of these four, two communities are in northern Chad and two are in the eastern part of the country. It is certain that these communities suffer from the presence of mines and UXO, at least, on the portion of the territory they use. Access is blocked to areas including

FIGURE 1

### POPULATION SIZE DISTRIBUTION, COMMUNITY-LEVEL

(Communities > 5,000 excluded)



pastureland, wells, and tracks, yet the results of the survey do not allow for the precise quantification of either the scope or the complexity of the impact of mines and UXO among nomadic communities.

It is difficult to analyze this phenomenon for many reasons. Herding is one of the main economic activities in the country, and is a major source of livelihood even under harsh conditions. It is estimated that 11.5 million head of livestock are raised in Chad. In fact, during the last 30 years, the number of communities relying on transhumance activities to survive has increased. Due to climactic changes, particularly the drop in the amount of precipitation in the Sahelian zone, nomadic populations have had to search further afield to find the pasture necessary for the survival of their animals. Likewise, the loss of rain and increases in population have caused herding activities that occur within stationary, agrarian villages to extend across wider areas. As herders enter areas they do not know well, they may face increased risk of an incident from mines and UXO.

The diversity of nomadic pastoral practices further complicates the analysis. If certain herders limit themselves to a certain territory of a hundred or so kilometers, others can travel immense distances, at times crossing national frontiers. This makes it particularly difficult both to differentiate with certainty between sedentary communities and nomadic ones and to analyze the impact of mines and UXO in reference to a certain territory and those resources to which access is blocked.

It is clear though that the presence of mines or UXO does have an impact on herding—51 percent of the impacted communities report blocked pastureland. The fact that 155 out of 339 recent victims are herders reveals the danger faced by this category of the Chadian population. Moreover, in the east, the survey found six wadis and temporary ponds that are occasional or regular stopping points for nomadic pastoralists. The surveyors reported these areas as affected, even though they were unpopulated at the time. This information begins to hint at the increasing scale and complexity of the problem.

The presence of mines and UXO affects nomadic communities in a number of ways:

1. *Nomadic pastoralists are exposed to danger when they cross unmarked mined areas.* Nomadic communities possess extraordinary group memory, which helps to reduce their risk. Their risk increases though when they leave familiar areas, or when weather, or climactic or political conditions force them from their normal crossing patterns (see box).
2. *Nomadic herders may find that UXOs block their access to resources* such as ponds or wadis in certain zones they habitually use for transit. Portions of basic agricultural land specifically used by nomadic communities may be unusable.
3. *Nomadic herders may face increased risk when they approach contaminated areas* to sell animal herds, to seek water, or to take part in seasonal agricultural activities.
4. *Animals are rarely lost to UXO explosion, yet the survey teams learned of animals poisoned by toxins* that leached from UXO into the soil or by licking UXO in an effort to increase salt intake.

5. *Children and young men in nomadic communities in affected regions are at high risk* because they may be tempted to tamper with these objects either out of curiosity or for material gain. (See the analysis concerning recent victims.) The widespread presence of these devices also leads to dangerous and unintended uses, which can contribute to incidents. For instance, UXO are moved and sometimes used to fetter animals. One cause of incidents reported during the survey was the use of UXO components as a source of light and heat.
6. *The presence of mines in the North region forces nomadic communities to abandon certain routes or take involuntary detours.* It is difficult to precisely document this type of impact due to limited access to this population, and their long-term absence from the areas concerned.

Despite this, the survey collected accounts of abandoned wells and pastureland, and of localities situated along former routes or caravan trails. For example, today, to arrive at Faya, capital of the department of Borkou and veritable capital of the North, from Kouba it is necessary to make a detour of about 80 kilometers across a difficult area of large sand dunes. When routes are mined, populations may be forced to move. In this way, many of the people of the community of Koro Toro have moved to Kouba. Similarly, certain critical water sources have been abandoned, as the routes to these sources are no longer safe.

### Kyabé herders are the victims of mines

In 1982, armed elements of the Conseil Démocratique Révolutionnaire (CDR) being pursued by the Forces Armées du Nord (FAN) laid anti-tank mines in a sporadic fashion to protect their lines of retreat. Local populations understand the risks in these mined areas and have abandoned the use of certain portions of these routes in the sub-prefectures of Guélandeng in the department of Mayo Boneye, Bousso in Baguirmi, Béhobé in Mandoul, and Kyabé in Lake Iro.

Unfortunately, transient herders do not possess the same knowledge as permanent residents. For example, in November 1999, along a route near to the community of Kofoye in

the sub-prefecture of Kyabé, herders from an Arabic group of nomads coming from the region of Djedaa in the department of Batha West lost two head of cattle in a mine explosion. This group was 450 kilometers from its home territory. They do not frequent this region, and there was no marking or indication that such a danger exists.



**Livestock grazing amid UXO**

# GEOGRAPHIC DISTRIBUTION OF IMPACTED COMMUNITIES

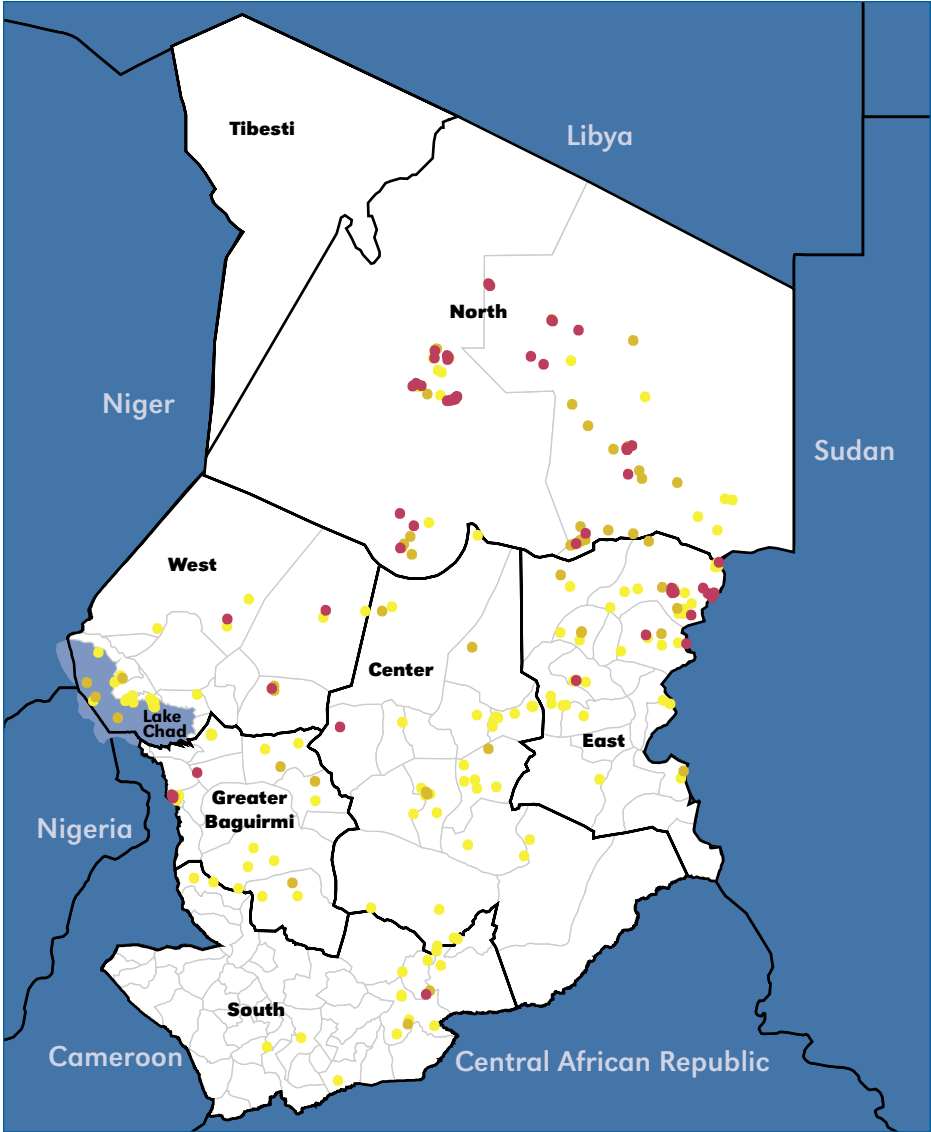
The vast majority of impacted communities are in the northern and eastern regions of Chad. A smaller but not insignificant number of impacted communities are found in the other survey regions. Map 1 shows the distribution of impacted communities nationally.

**MAP 1**

**DISTRIBUTION OF MINE-AFFECTED COMMUNITIES**

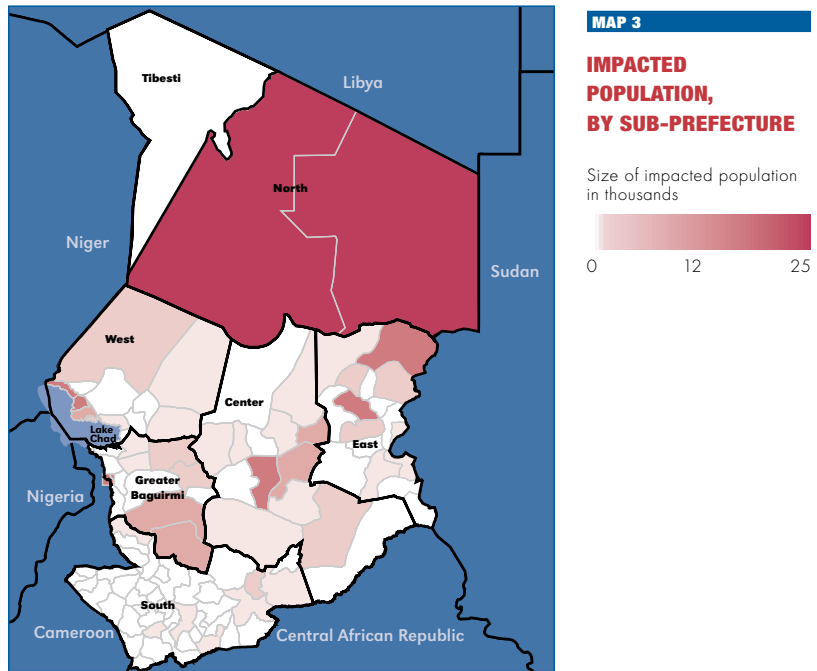
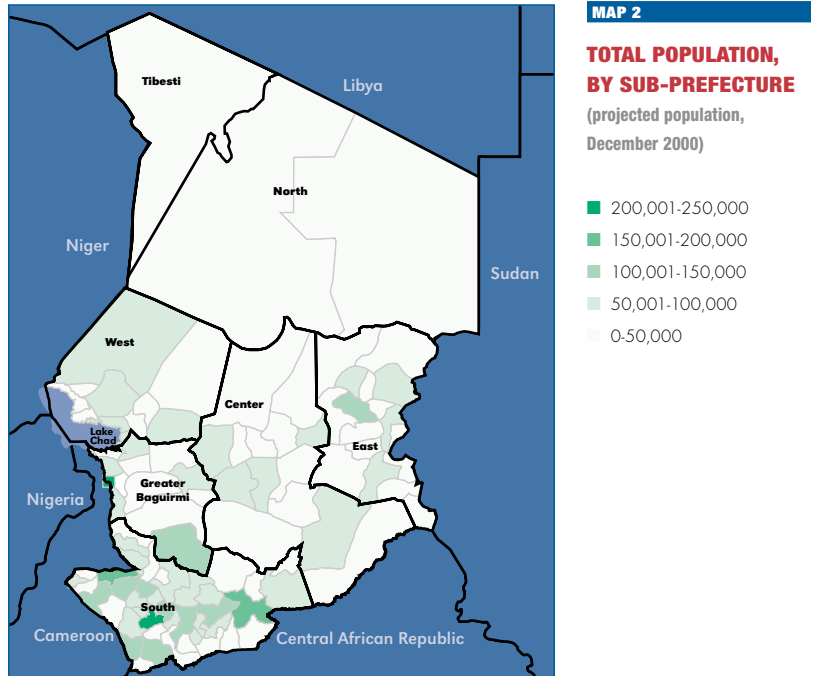
- Village impact
- High
  - Medium
  - Low

*The boundaries and names depicted herein do not imply endorsement or acceptance by Handicap International or the Survey Action Center.*



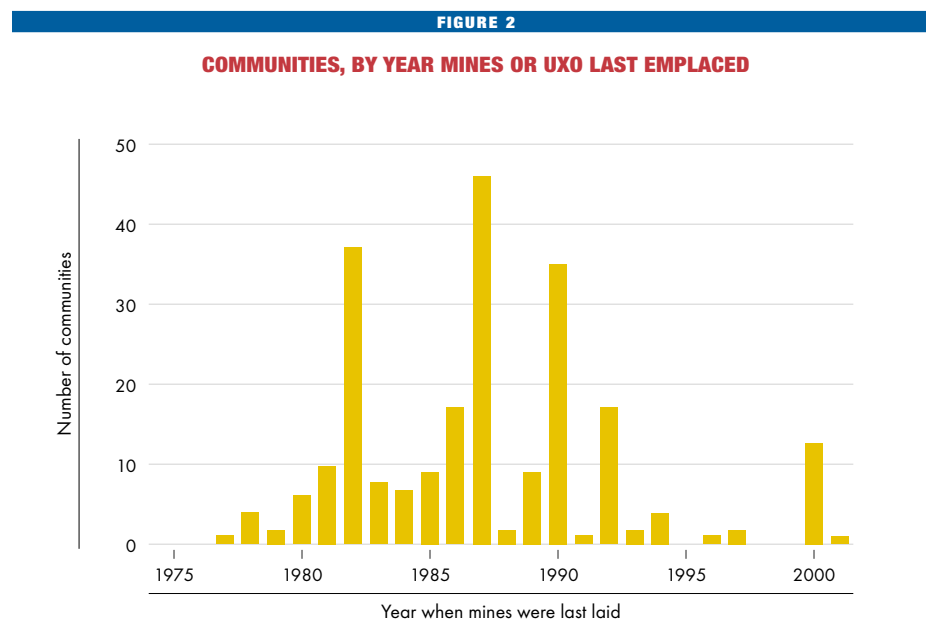
Map 2 shows the distribution of the population by sub-prefecture and survey region, and Map 3 gives an account of the population living in impacted communities for the same two levels of territorial units. A comparison of these maps leads to the following observations:

- The number of affected people in the north is very high as a proportion of the total number of residents. Accordingly, there is a high concentration of the impacts caused by mines and UXOs.
- In the East, Center, West and Greater Baguirmi regions, the proportion of affected population compared to the total population is more evenly distributed, even if the effects between sub-prefectures are not.
- In the South region, except for a small number of sub-prefectures, the affected population is low compared to the total population. The high level of impacted population corresponds to a dense total population in only one affected sub-prefecture.



## HISTORY OF POLLUTION BY MINES AND UXO

The analysis of data concerning the year mines and UXO were last laid or left behind makes it possible to develop a chronology of the events that resulted in such contamination. Figure 2 gives a graphic representation of this information.

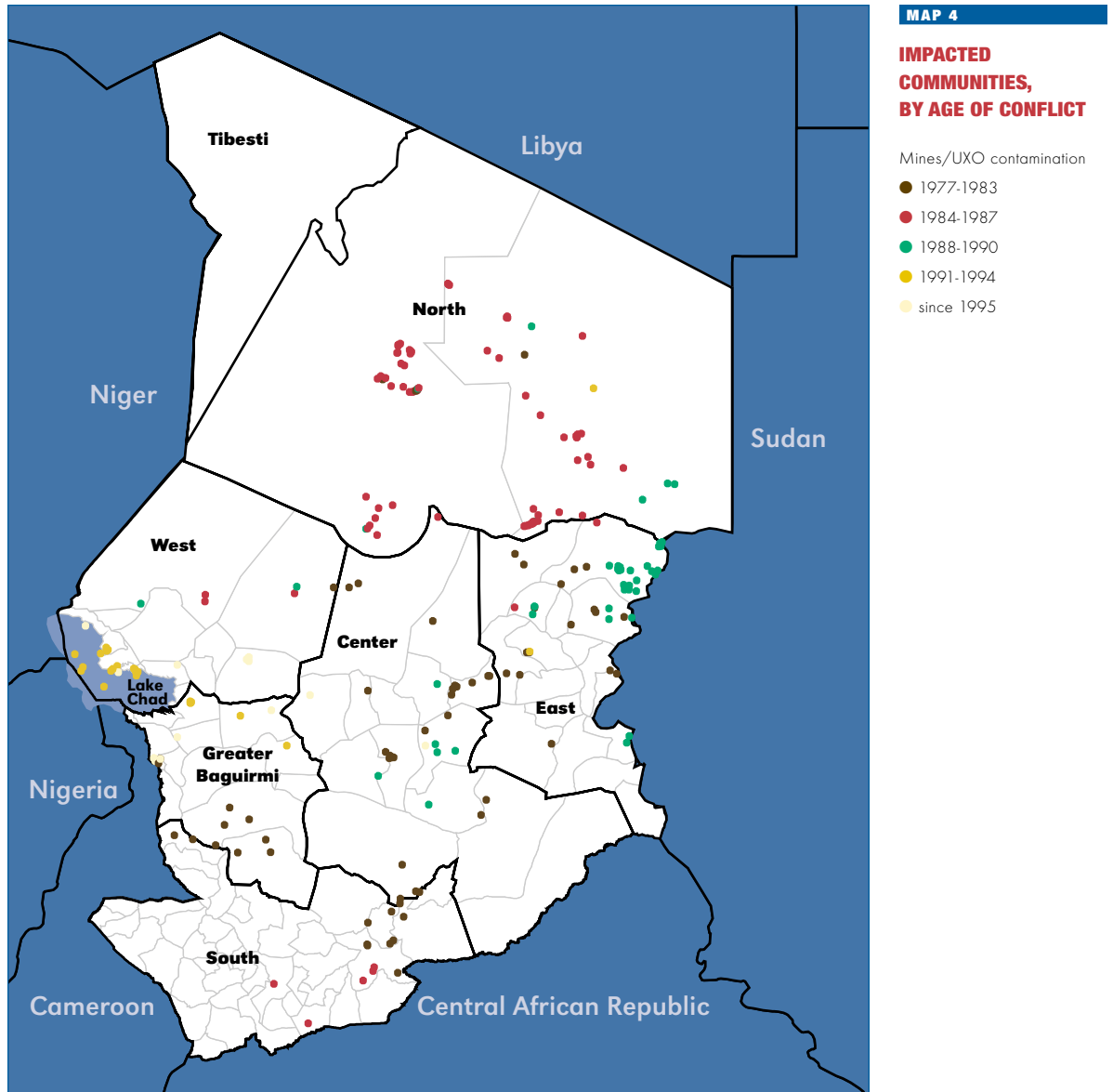


Five periods are apparent, each characterized by a peak in contamination of a more or less large scale. The histogram starts in 1977, but this does not signify that armed conflict or resulting contamination did not occur before that date. The data collected in the impacted communities indicate that the pollution by mines and UXO first appeared in 1960. Only marginal contamination occurred from 1960 to 1977. Contamination caused by mines and UXO began to expand in the mid-1970s with the modernization of armaments and the increased use of heavy arms by the opposing sides. The data do not represent contamination that might be occurring as part of ongoing military operations in the department of Tibesti.

Map 4 (see next page) indicates the last year mines or UXO were reported as laid or left behind.

### Period 1: 1977-1983

This period corresponds to the war between the various factions that were spread out across the whole of Chad. Anti-personnel (AP) and anti-tank (AT) mines began to appear in the north as they were used to defend military installations. In the other regions, mines, essentially AT mines, were used sporadically in ambushes or to defend a military retreat. This is the case in particular in the three regions of Greater Baguirmi, in the south, and the central region along the routes in Guélandeng, Bousso, Massénya up to Sarh, and Kyabé. Conflicts were numerous during this period, particularly in 1982, and the territory was widely contaminated by UXO.



### Period 2: 1984-1987

This period was characterized by the second Libyan occupation of northern Chad, which prevented Chadian forces from recovering complete control of the territory until the offensive of 1986-87. Most of the pollution in the north comes from this period when mines were used as instruments of terror against the local populations to force them to leave certain areas and to take refuge in the large towns. Significant amounts of UXO were left on the battlefields of Ounianga, Ouddai Doum, and Aouzou. In the other regions of Chad, the war of the factions continued. In the south, the rebellion of the Codos resulted in sporadic combat, mostly ambushes and reprisals that left grenades and cartridges in the fields. A border conflict between Chad and Nigeria in 1983-84 along Lake Chad also resulted in notable UXO contamination.

### Period 3: 1988-1990

The conflict between the Chadian armed forces and the Mouvement Patriotique de Salut (MPS) in the north and east dominated this period. The aftermath of the conflict includes UXO left behind on the battlefield or abandoned along with some of the armaments as the Chadian troops retreated. The areas most affected are in the East region, in the sub-prefectures of Iriba and Guéréda and in the North region, in the sub-prefecture of Bahai.

### Period 4: 1991-1994

During this period, the Chadian armed forces fought against the Mouvement pour la Démocratie et le Développement (MDD), with combat focused in western Chad and to a lesser degree in the region of Greater Baguirmi. The ensuing contamination is limited to UXO, and affects primarily the area around Lake Chad.

### Period 5: Since 1995

This period is not distinguished by any particular conflict, at least in the 28 departments covered by the survey. The contamination appears to peak in the year 2000, the year of the survey, and corresponds essentially to the UXO contamination from the various military ranges used by the armed forces of France and Chad. Contamination is especially notable in the military firing ranges at Farcha in the capital city, in Massaguet in the department of Hadjer Lamis, and in Moussoro, in the department of Barh El Gazal.

## The story of Abéché, who deposited mines during ten years of war

Mostly in the Center region, but also in eastern and southern Chad, Abéché, “the man with the white hair,” is a bit of a legend. For more than ten years, from 1979 to 1990, this man laid mines on behalf of the various armed movements in these regions. Villagers in different impacted communities mentioned his name during data collection interviews. Team members finally found this man in retirement and were able to collect his personal account.

Abéché was born around 1950, in the village of Délep in the department of Guéra. Recruited into the army, he went for ten years military training in Ethiopia, where he learned how to use explosives. He returned to a country torn apart by conflict. He was engaged successively first by FROLINAT, then the CDR, and finally the MPS.

Abéché said, “My mission was to lay the mines along the routes to block enemy convoys. I was generally informed by an officer responsible for liaison with me, who himself received his instructions by radio. I would arrive in the place indicated, with my donkey loaded with anti-tank mines, separated and tied, three on each side of the animal. I also sometimes used



anti-personnel mines. I usually laid these beneath the anti-tank mines to stop people from removing them. In order to accomplish some of my missions, I had to infiltrate the areas controlled by the enemy. I would disguise myself as an old man carrying firewood, sometimes even as a woman carrying merchandise to the market. This strategy of harassment was effective and I believe that the majority of the mines I laid have already exploded.”

## AREAS CONTAMINATED BY MINES AND/OR UXO

The survey identified 417 distinct areas of landmine and/or UXO contamination. Local informants estimated that these contaminated areas cover a total land surface of up to 1,081 square kilometers. Pollution by UXO in Chad can be as equally important and dangerous for local communities as landmine pollution. The reported size of the individual contaminated areas varies greatly and does not follow a “normal” distribution pattern, as can be seen in Figure 3. Indeed there are many more large areas of contamination reported than small ones. In Figure 4, the data for the North region are excluded and the shape of the resulting graph approximates a normal distribution more closely. The North region, on the other hand, contains nearly half of the contaminated communities and many estimated contaminated areas of large size. Perhaps this is so because these areas are in open desert, and the communities give very large estimates of their surface. Here, the concept of a contaminated area includes vast zones of previous fighting in open plains often far from settlements.

Outside the North region, 43 percent of the contaminated area estimates were less than 10,000 square meters and another 45 percent were estimated to be between 10,000 square meters and five square kilometers in size.

FIGURE 3

MAGNITUDES OF MINED AREA SURFACES

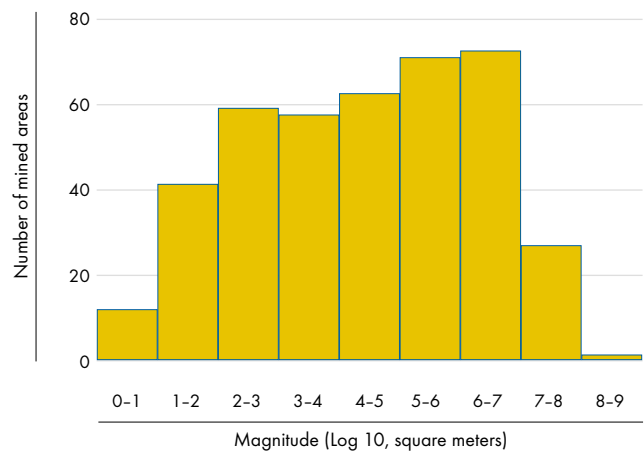
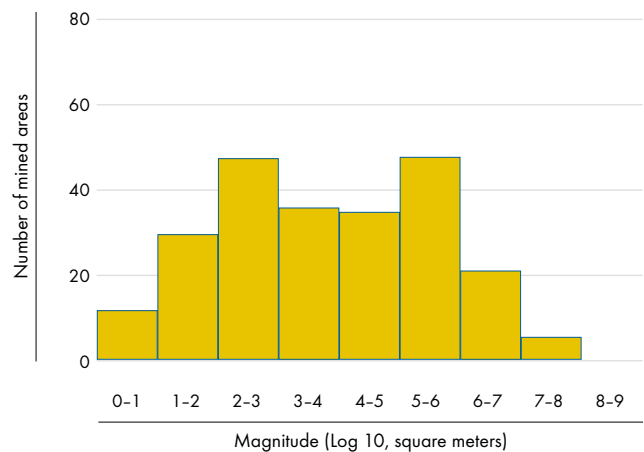


FIGURE 4

MAGNITUDES OF MINED AREA SURFACES, EXCLUDING NORTH REGION



Only 12 percent were estimated to be more than five square kilometers (five million square meters).

The median size of a contaminated area is 30,000 square meters or, more graphically, a rectangle with sides 60 meters wide and 500 meters long. The average size of a contaminated area was two square kilometers.

Based on the experience of its field teams, HI believes that many of the surface estimates could be exaggerated. However, only a technical survey will be able to determine and delineate the exact size of these contaminated areas. Nevertheless, a population's estimate is a good indicator of how the community perceives the problem.

Estimates of surface area could also be linked to contamination from the large battlefields, which cover many square kilometers. Such an estimate would reflect the total area that was fought over, and not necessarily pockets of contamination within this area. Such battle areas are common in certain regions of Chad, notably in the North and the East.

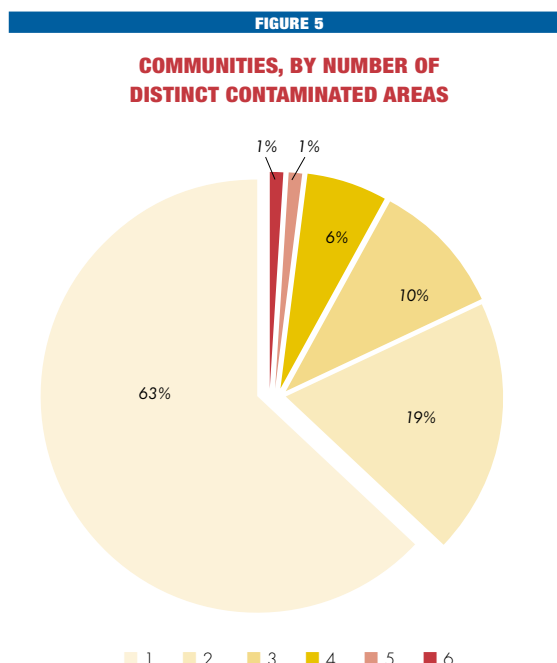
As shown in Table 3 and Figure 5, the number of distinct contaminated areas reported for each community also varies significantly. Ninety percent of the communities reported between one and three contaminated areas. Low numbers of contaminated areas could reflect that communities tend to amalgamate distinct contaminated areas into one large area. This may partly explain the data regarding the large size of contaminated areas. As mentioned above, only a technical survey will solve this kind of problem by better delineating the contaminated areas.

**TABLE 3**

**COMMUNITIES, BY DISTINCT CONTAMINATED AREA**

Distinct contaminated areas in the community	Number of communities	Percent
1	155	62.2%
2	48	19.3%
3	26	10.4%
4	15	6.0%
5	2	0.8%
6	3	1.2%
<b>TOTAL</b>	<b>249</b>	<b>100.0%</b>

Total number of distinct contaminated areas in country = 417



## The particular danger posed by military firing ranges

**D**uring the survey it was discovered that the presence of military firing ranges poses very significant dangers to populations living in the surrounding area. These populations suffer a considerable number of casualties when they interact with abandoned munitions or UXO left on the ranges either in the course of their normal herding and farming activities, or through tampering with devices collected from the ranges. From the perspective of impacts at the community level, these ranges can be viewed as active battlefield areas, in which the level of contamination is continually replenished.

The survey discovered six active military firing ranges that constitute a direct threat to 12 communities with a total population of 11,045 inhabitants. Four ranges in particular have contributed to the recent casualties figures noted in the survey. These ranges are located in Abéché in the department of Ouaddaï, Massaguet in the department of Hadjer Lamis, Moussoro in the department of Barh El Gazal, and Farcha in the capital, N'Djamena. All are in active use and situated in direct proximity to communities.

An analysis of the victim data indicates that 39 people in the last 24 months, and at least 83 prior to that, came to harm because of the presence of these ranges. Over the 24 months preceding the survey, the single range of Farcha in N'Djamena claimed 20 victims, including 13 fatalities. The analysis shows that children and youth are the most at risk due to the presence of these ranges with 82 percent of all victims being between the age of 5 and 29 years. The most frequent casualties occur during the manipulation of devices (33 percent) or through tending cattle brought to pasture (23 percent).

TABLE 4

### VICTIMS CAUSED BY MILITARY FIRING RANGES

	Abéché	Farcha	Massaguet	Moussoro	Total	Deceased
Recent victims	4	20	4	11	39	17
Earlier victims	4	24	10	45	83	45
<b>Total victims</b>	<b>8</b>	<b>44</b>	<b>14</b>	<b>56</b>	<b>122</b>	<b>62</b>

A number of factors contribute to the danger that these ranges pose. The firing ranges are often located in close proximity to inhabited areas. The perimeters are not usually protected or delineated, and physical fences to prevent entrance do not exist. There is no organized effort to inform local communities of the dangers the ranges pose and little effort is made to crack down on the collection and trade in scrap metal. In N'Djamena a path regularly used by children to get to school crosses the firing range of Farcha. In many cases, local communities use the range space as an extension of grazing land, and farming activities are encroaching onto range areas. The seasonal changes in population, along with the overall increase in urban populations, create pressure to use all available land, including that on the ranges. Finally, it is not clear if any professional range clean-up or EOD activities have taken place, and if so, to what standard.

## DANGEROUS AREAS FOUND

In light of the lessons learned in other countries undergoing Landmine Impact Surveys, and from those arising from the experience and needs of the field teams, a form for “Dangerous Areas” was created. These forms were produced to record polluted or mined areas that did not have any impact on villages and/or were located in uninhabited areas. These forms were used during systematic reconnaissance by the supervisor or sometimes by enumerators during village sampling and community visits. This simple form defined dangerous areas according to the following typology—isolated UXO; informal UXO or mine collection areas; munitions depots; isolated minefields; location of an old mine incident; abandoned wells; and villages which are polluted but which were abandoned by the population at the time of the survey. Other information gathered using this form includes basic information about the type of pollution, the size of the contaminated area, and the nearest village.

This dangerous-areas information was entered into a shared file in the database along with the form for verification of a community as non-impacted. The teams found 125 dangerous areas during the period of the survey, in a total of 23 departments and 44 sub-prefectures visited. The teams found six dangerous areas that were actually localities used as waypoints by different communities but which had no population at the time of the survey. These localities are a potential danger for the communities that use them during their nomadic transhumance tours, since they are, in fact, contaminated by mines or UXO. Unfortunately, due to the absence of population, the survey teams were unable to collect comprehensive data. They were able to note the type of pollution and take GPS coordinates of the site. Although these areas have no direct impact on the population, this data supports the idea that contamination by landmines and UXO is very widespread across the territory of Chad. Table 5 summarizes the typologies of dangerous areas in Chad.

**TABLE 5**

### DIFFERENT TYPOLOGIES OF DANGEROUS AREAS IN CHAD

Type of dangerous area	Number	Percent
Isolated UXO	35	25.9%
Confrontation area	25	18.5%
Informal UXO/Mine collection area	18	13.3%
Isolated minefield	17	12.6%
Old mine incident location	14	10.4%
Abandoned UXO in a former well	13	9.6%
Munitions depot	12	8.9%
Former military base	1	0.7%
<b>TOTAL</b>	<b>135</b>	<b>100.0%</b>

## The particular danger posed by abandoned munitions depots

The survey collected information on 25 abandoned ammunition depots that are no longer in use or under the control of the authorities. These abandoned depots present a constant danger to the surrounding communities. While the possibility of a major conflagration cannot be discounted, the primary concern is that the local inhabitants often collect devices stored in these depots as a source of income, for use as building materials, or out of sheer curiosity.

These depots are often located in the capital city of the departments or of the sub-prefecture, sometimes in a compound of sorts, but more often in an abandoned building or an outdoor yard. The depots generally fall into one of two categories.

- Depots created during a conflict. For example, the depot in the center of Berdoba, in the north, is situated where mines and ammunition have been stocked since 1974. The depot provokes feelings of fear among the population. The depot located in the city of Guéréda has decayed to the point where the munitions lie in large piles, partially covered by dirt. This open access depot has caused 15 casualties, three of them in the past two years.
- Depots established after the end of a conflict. Authorities use the depots to collect munitions and UXO. These collection efforts may reduce the risks on a broad area,



Former arms cache

DEPOTS, BY REGION	
Region	Number of inventoried depots
North	7
East	5
Center	4
South	4
West	3
Greater Baguirmi	2
<b>TOTAL</b>	<b>25</b>

but have created a point source of contamination often located in the center of a community. This is the case of two depots in Oum Hadjer, capital of Batha East department in the Center region. One depot is a walled up brick and mud structure situated on the perimeter of the town square. The other depot is part of a building formerly used by the community to store agricultural products.

*continued on next page*

Local people in many districts reported the hardships caused by different military groups throwing UXO and mines down their wells in order to block the access to water by opposing forces. These wells have been abandoned by the population and significantly increase the hardship on local people, especially women, who have to walk many more kilometers to collect and carry water to meet their households' daily needs. Only one former military base was seen as a potentially dangerous area by local people, and thus cannot be considered an important category.

# Impact on Communities

## THE SEVERITY OF IMPACTS

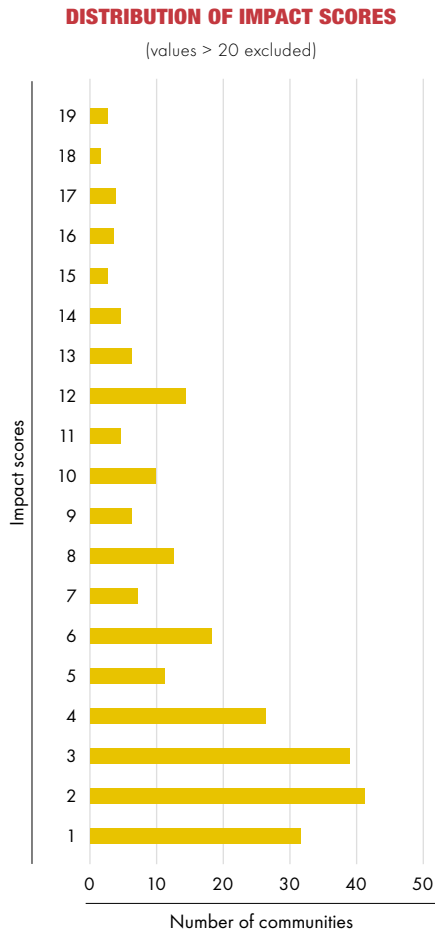
For each impacted community, the survey calculated a point score expressing the severity of the various mine impacts. The score takes three major impact factors into account:

- The number of recent victims
- The livelihood and institutional areas to which mines block access
- The class of munitions

The score is then used to classify communities as low, medium, or high impact. Scores range from one to 34.

As seen in Figure 6, a score of one indicates that a community reported only the presence of some UXO and no serious blockages or recent victims. The survey found 31 communities with this very mild signature. At the other end of the scale, a score of 34 was assigned to the village of Ouddaï Doum II in the department of Ennedi in the North region and 33 to Madjorio (also known locally as the “Jardin d’Essai”) in the first arrondissement of the national capital, N’Djamena. These communities reported numerous blocked livelihood areas and a large number of recent victims.

**FIGURE 6**



**TABLE 6**

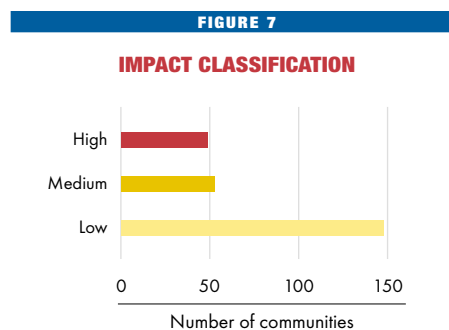
**IMPACT SCORE CLASSIFICATION**

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

The median impact score was four, meaning that half of the communities scored four or less. The modal score—the score given most often—was two. The arithmetic mean was 6.31.

The score ranges that are used to classify an impacted community as low, medium, or high impact are shown in Table 6. Using

this classification, 148 communities or 59 percent of the total are considered to be in the low-impact category; 52 communities or 21 percent are medium-impact; and 49 or nearly 20 percent are high-impact communities. Figure 7 portrays the distribution of low-, medium- and high-impact communities.



## POPULATIONS, BY IMPACT CATEGORY

It is estimated that 284,435 people live in mine and/or UXO contaminated communities in Chad. An estimated 63,470 people, or more than one fifth of those affected, are believed to be living in high-impact communities, and an estimated 66,925 people live in medium-impact communities. More than half of the people live in communities that the survey rated as low impact. Table 7 lays out this information by category of impact and region.

**TABLE 7**

**COMMUNITIES AND POPULATIONS, BY IMPACT CATEGORIES**

Impact category	North	East	Center	South	Greater Baguirmi	West	Total communities	Total affected population
High	32	10	1	1	3	2	49	63,470
Medium	29	8	2	2	5	6	52	66,925
Low	30	33	27	17	20	21	148	154,040
<b>TOTAL</b>	<b>91</b>	<b>51</b>	<b>30</b>	<b>20</b>	<b>28</b>	<b>29</b>	<b>249</b>	<b>284,435</b>

## VICTIMS OF MINE INCIDENTS

Among the 249 impacted communities surveyed, 180 had a history of incidents in which mines or UXO injured or killed one or more people. Of these, 102 said they had victims in the recent past. The term “recent” as used in the interviews in reference to incidents means “in the past 24 months.” One hundred and fifty-four communities reported incidents that occurred before the last 24 months.

The information gathered on recent victims appears to be reliable, since for most of the incidents villagers were able to name the victims and designate their age, occupation, and so on. Specific information may be missing for some victims who were either just passing through the village at the time of the incident or were only remembered as, say, the son of an adult community member.

Based on the figures collected during the Impact Survey, an estimate of mine incident victims per 100,000 people per year is defensible. The following annual



rates (for recent victims only) are calculated from the official population estimation for 2000, which was based on data from the 1993 census and done by the Chadian Central Census Office in N'Djamena:

■ Based on the total population in the impacted communities	59.59
■ Based on the total population of the affected sub-prefectures	5.04
■ Based on the national population	2.24

A regional breakdown of the incident rate per 100,000 people also presents some interesting results. More than half (57 percent) of the victims are from the North region, which has less than one percent of the population of Chad. In contrast, the South has more than half the national population living within its boundaries, but less than one tenth of one percent of recent victims. Based on the total population in each of the survey regions, the following rates have been calculated using the population estimations for 2000:

■ North	154.43 people for every 100,000
■ East	4.59 people for every 100,000
■ West	2.06 people for every 100,000
■ Greater Baguirmi	0.93 people for every 100,000
■ Center	0.84 people for every 100,000
■ South	0.04 people for every 100,000

Clearly, the North region is highly contaminated and UXO/mine contamination presents an ongoing danger to the population. The population in the North, for its small size, suffers greatly from living in a region contaminated by landmines and UXO.

## DEMOGRAPHY OF RECENT VICTIMS

There are a total of 339 recent victims in Chad, of whom 87 percent are men. Among both men and women, the age group most affected is 5–29-year olds. Figure 8 shows recent victims by age, and Table 9 shows the gender of these victims. Obviously, it is young boys and young adult men who predominate in the incident statistics.

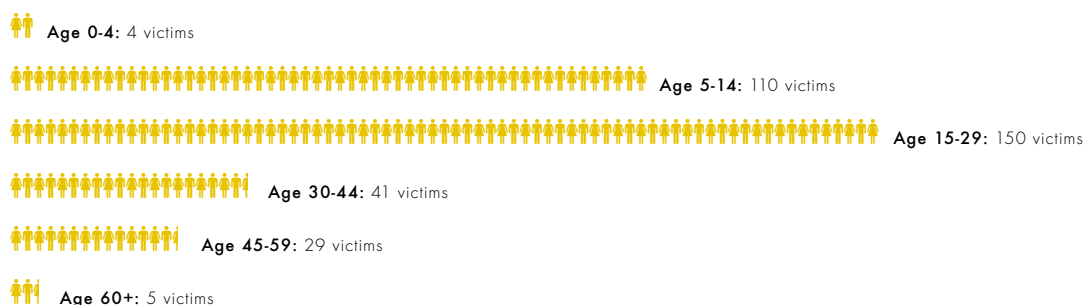
One explanation for the high number of young boys and men involved may be that in many communities, young boys are primarily responsible for tending the

Period	Communities involved	Victims		
		Killed	Injured	All
Recent victims	102	122	217	339
Victims of less recent date	154	703	646	1,349
All victims*	180	825	863	1,688
Had no victims	69	–	–	–

\*The set of communities with some victims, regardless of the date of incidents, is the union of the two-year period, not a simple addition. Some communities had victims in both periods. The victims, however, are mutually exclusive; their numbers add up.

FIGURE 8

RECENT VICTIMS, BY AGE



animal herds and may roam across a large territory every day. While watching the herds they also have a lot of “spare” time in which to investigate any strange or interesting devices.

This breakdown by age and sex holds true for the majority of the data across Chad. However, there is one interesting regional difference in the data for the West region, where there was a more even distribution between male and female victims. In the area around Lake Chad and Kanem, there were 11 females and 15 males who had incidents with mines or UXO. The sample, while small, suggests that differing agricultural or animal herding practices found in the very specific geographic and climatic conditions that exist in and around Lake Chad may broaden the distribution of mine incidents across a wider segment of the affected populations.

Table 10 illustrates the breakdown for recent victims by sex, military/civilian status, and civilian occupation

TABLE 9

RECENT VICTIMS, BY AGE AND GENDER

Age ranges	Male	Female	Total
0-4	2	2	4
5-14	92	18	110
15-29	134	16	150
30-44	37	4	41
45-59	25	4	29
60 and above	5	0	5
<b>TOTAL</b>	<b>295</b>	<b>44</b>	<b>339</b>

TABLE 10

OCCUPATION BEFORE THE INCIDENT

	Male	Female	Total
Military	9	0	9
Civilian	286	44	330
Herding	139	16	155
Farming	46	4	50
Not earning	22	4	26
Household work	2	11	13
Trading	11	1	12
Artisan	1	0	1
Office work	1	0	1
Other	55	5	60
Unknown	9	3	12
<b>TOTAL</b>	<b>295</b>	<b>44</b>	<b>339</b>

before the incident occurred. The main finding was that 330 out of 339 victims were civilians and not on active military duty. The village communities did not report many military victims during the Impact Survey's data collection. This could be due to the lack of recent heavy military operations in the survey regions. Another explanation is that the villagers were unable to remember details of distant turbulent events of which they were not necessarily a part and from which, in all likelihood, they had fled. Figures on deaths and injuries due to mines during combat were not readily available and would need to be the subject of a special enquiry.

Among the civilians, 155 (45 percent) of the victims were herders before their incident, and another 50 victims (14 percent) were farmers. The assumption that victims classified as "other" were most likely schoolchildren is supported by the data on the age of the victims, a significant proportion of whom fall in the range of 5 to 14 years.

## INCIDENTS AND CONSEQUENCES

More than one third of the reported incidents in Chad stemmed from tampering with or manipulation of dangerous devices. This was the most common cause of mine incidents.

Again, tampering and manipulation are predominantly risk behaviors practiced by men, who make up 90 percent of the victims in this category. There are also a high number of victims who were engaged in herding at the time of the incident, making up just over one fifth of incidents reported. These and other activities are presented in Table 11.

As shown in Table 12, of the 339 recent victims, 122 died. So, for all victims, more than one in three died as a result of their injuries. However, the fatality rate for men (38.6 percent) is more than twice that for women (18.2 percent).

**TABLE 11**

### ACTIVITY AT TIME OF INCIDENT

	Male	Female	Total
Military	9	0	9
Civilian	286	44	330
Tampering	110	11	121
Herding	64	9	73
Travel	42	6	48
Farming	25	3	28
Playing	13	2	15
Collecting food/water	4	1	5
Household work	2	6	8
Other	24	4	28
Unknown	2	2	4
<b>TOTAL</b>	<b>295</b>	<b>44</b>	<b>339</b>

**TABLE 12**

### MINE INCIDENTS AND FATALITIES, BY GENDER

Fatal	Male	Female	Total
No	181	36	217
Yes	114	8	122
<b>TOTAL</b>	<b>295</b>	<b>44</b>	<b>339</b>
<i>Fatality rate</i>	38.6%	18.2%	36.0%

Table 13 highlights the fact that, of those not immediately killed, nearly four fifths (79.4 percent) received some kind of emergency care. However, incident survivors in Chad receive no physical rehabilitation or vocational therapy. This fact has important implications for ongoing and future victim assistance programs.

As a result of their wounds and the type and level of care they received, 45 of the survivors had amputations of the upper limbs and 17 of the lower limbs. In addition to the victims with upper limb amputations, another 20 victims reported losing all or some of their fingers. Sixteen completely lost use of their eyes and another ten had partial loss of sight. Another 119 sustained other types of injuries, mostly burns, fractures, and other injuries to the legs, head, eyes, hands, stomach, abdomen, and arms. Paralysis was also reported in a few cases.

One can assume that the types of wounds sustained by the victim generally reflect the activities taking place at the time of the incident. For instance, injuries to the upper body suggest that the detonation was set off by manipulative activity such as demining or tampering.

The occupation of the survivors is given in Table 14. Only six victims were permanently disabled due to the incident. While the majority of survivors continue to participate actively in the daily work of their communities, a significant number are unable to earn an income due to their injuries.

**TABLE 13**

**TYPE OF CARE RECEIVED BY THOSE VICTIMS NOT KILLED IMMEDIATELY**

Type of care	Male	Female	Total
Emergency care	153	28	181
Rehabilitative care	0	0	0
Vocational training	0	0	0
Other care	22	5	27
No care	14	4	18
Unknown care	1	1	2
<b>TOTAL</b>	<b>190</b>	<b>38</b>	<b>228</b>

**TABLE 14**

**MINE INCIDENT SURVIVORS, BY GENDER AND OCCUPATION/STATUS OF SURVIVORS**

Occupations of survivors	Male	Female	Total
Military	4	0	4
Civilian	167	46	213
Herding	50	6	56
Not earning	39	9	48
Farming	20	3	23
Student	21	1	22
Household work	0	9	9
Trading	5	1	6
Office work	1	0	1
Muezzin	1	0	1
Laborer	1	0	1
Handicapped	5	1	6
Still sick	1	0	1
Unknown	23	16	39
<b>TOTAL</b>	<b>171</b>	<b>46</b>	<b>217</b>

## Mine incident at Korodi to the north of Tigui

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One day in August 2000, Mahamat Issa's life suddenly fell apart. He had left the community of Korodi only three days earlier, accompanied by his mother and sister. He was herding five camels loaded with some of their date harvest towards Faya. He made this ten-day journey many times each year so the family could stock up on millet and on condiments bought in the market of the larger town. That morning, Mahamat was leading their small caravan on foot. The two women were following on the camels. Suddenly, a violent explosion threw him to the ground. One of the camels had just stepped on a mine. When he regained consciousness, Mahamat realized that his mother and his sister had been killed along with the five camels. He was himself seriously injured in the foot, no doubt by a mine fragment.

Other travelers who heard the explosion rescued him, but it would take more than five days to reach Faya, the only place where he could receive the necessary treatment. They began to travel the 60 kilometers, with Mahamat on the back of a camel. However, as his condition deteriorated, his rescuers had to leave him behind and go looking for help. Twenty kilometers from the community of Tigui, they found the HI survey team. The team took the injured man to Tigui, where he was left with the Chadian army which then evacuated him to Faya.

Fifteen days after the incident, the HI team went to visit Mahamat Issa in the hospital in Faya. For him, the future looks grim. In addition to the emotional shock of the death of his mother and sister, all of the family's camels and a good part of their harvest were lost. His right leg gives him a lot of pain, he is suffering from a detachment of his ankle ligaments, and several of his toes were crushed. He is scared he will never walk or work normally again. He does not know when he can return to the other members of his family.



# Analysis of Blockage Impacts

## TYPES OF BLOCKAGE

Key informants in the impacted communities point to four major areas in which landmines and UXO block access:

- Pasture and agricultural land
- Roads and trails
- Water resources used for irrigation, drinking water, and other uses
- Housing

Table 15 ranks resource types by the percentage of communities that reported blocked access to them. Several findings are apparent:

- *Pastureland* is the most frequently reported type of resource to which access is blocked because of mines. More than half the communities report a problem (51 percent) in this regard. The importance of pastureland for Chadian agricultural communities is demonstrated in the fact that animal herds are estimated to equal 11.5 million head, compared to a human population of only 7.5 million.<sup>3</sup> It also indicates the importance of pastureland and herding practices for the many nomadic groups in Chad.

- *Roads* are another important blocked area, with 39 percent of impacted communities reporting some lost access. However, this category also includes trails and so does not reveal much about main roads in Chad. Field experience suggests that real blockages of main roads are rare because the vast majority of the terrain in Chad is flat and detours are relatively easy to develop when one access route is blocked. The North and the East regions face the largest difficulties with blocked roads because some of the detours caused by mines can add many kilometers and many hours, even days to a journey. Data indicate that nearly half of all reported blocked roads are in the North and a further one third are in the East. Thus, these two regions alone contain 74 percent of the 65 communities reporting blocked road access.

TABLE 15

### PERCENTAGES OF COMMUNITIES REPORTING BLOCKED ACCESS

Areas of blocked access	Communities affected
Pasture	51%
Rain-fed cropland	29%
Irrigated cropland	17%
Non-agricultural land	7%
Drinking water	18%
Other water uses	19%
Roads and trails	39%
Housing	14%
Other infrastructure	5%

Note: Percentages are based upon a total of 249 affected communities. They do not add up to 100 percent because a given community may have access blocked to more than one resource or institutional area.

<sup>3</sup> Annuaire Statistique, Ministère du Plan et de L'Amenagement du Territoire, Tchad.

- *Water* is an important resource that is blocked by mines and UXO. When all types of water resources are considered (irrigated land, drinking water, and other uses), more than half (54 percent) of communities reported this problem. It is especially important to note that nearly one fifth of impacted communities have blocked access to irrigated agricultural land. In Chad, this is particularly significant because irrigated cropland is a rare and precious commodity. Blockage of any irrigated cropland has a profound socio-economic consequence for communities suffering from this impact.
- *Housing* blockages, although less prevalent than other blockages have a significant effect in that (see Table 16) contamination by mines and UXO close to inhabited areas places the population at a particularly high risk of incidents.
- *Modern institutions* such as markets, airfields, and medical facilities are rarely reported as being blocked. This is probably because the typical impacted community is a rural village and would have very few such institutions. Only three communities in Chad reported blocked access to airfields or markets. Two others reported a problem with an educational facility and one community each reported blocked access to a medical facility, a cultural site, and a bridge.

The scope and type of blocked access is presented in Table 16. It should be kept in mind that a given contaminated area might be blocking several resource types. Thus, the overlap between these categories is considerable.

TABLE 16

**MAGNITUDE OF BLOCKED ACCESS**

Impact type	Communities affected	Population of those communities	Mined areas involved	Estimated area (sq km)
Pasture	127	128,779	183	732.9
Rain-fed cropland	71	108,463	87	148.4
Irrigated cropland	42	43,246	54	300.0
Non-agricultural land	17	15,602	20	261.7
Drinking water	46	43,640	55	303.9
Other water uses	48	40,680	57	185.6
Roads	97	106,845	146	423.2
Bridge	1	7,500	1	0.0
Airstrip	3	1,025	3	7.5
Housing	36	57,929	41	67.5
Market	3	17,500	3	0.8
Educational facility	2	14,070	2	0.9
Medical facility	1	13,000	1	0.8
Other infrastructure	12	31,240	14	10.6
Cultural site	1	0	1	6.0
Other vital point	5	5,747	7	8.2
<i>All impacts combined</i>	249	286,901	417	1,080.9

Note: Certain localities are counted twice because they have reported more than one blockage.



## Mined roads—the case of Yarda in the department of Borkou, North region

The population concentration zone of Yarda is found about 120 kilometers northwest of Faya. The road between Faya and Yarda passing by Kirdimi was mined repeatedly between 1980 and 1985. Today, only the rare private vehicle coming from Kirdimi dares to travel along this route. An occasional pile of rocks marks the side of the track, indicating the presence of mines. Merchants no longer risk using vehicles in this area.

No longer are products, such as the salt extracted from the deposit at Bedo, transported from this region to Faya. This isolation of the zone around Yarda due to restricted road activity has resulted in the progressive depopulation of the region. The salt deposits at Bedo are practically abandoned. Other natural resources, such as the water source in Tigui, have not been utilized to their full value.



Abandoned road towards Kirdimi



Abandoned well contaminated with UXO

## TYPICAL COMBINATIONS OF IMPACTS

A Landmine Impact Survey tries to understand the socio-economic impact on communities in which mines or UXO block access to various resources. The survey revealed seven basic groupings that reflect the types of resources made unavailable to communities. These groupings are called “clusters” of impacts (Table 17, see next page). The categories are as follows:

- Type A: Communities that did not report any institutional or livelihood areas blocked (39 communities).
- Type B: Contamination on roads and trails only (39 impacted communities).
- Type C: Contamination of rain-fed agricultural land only (46 communities).
- Type D: Blocked pastureland (42 communities). Some in this group also indicated additional non-agricultural land blockages.

TABLE 17

## IMPACT COMBINATIONS

Type	A	B	C	D	E	F	G	Frequency
Pasture				■	■	■		51%
Rain-fed cropland			■			■		29%
Irrigated cropland					■	■		17%
Non-agricultural land				■				7%
Drinking water						■		19%
Other water uses						■		19%
Roads and trails		■				■		39%
Housing							■	15%
Other infrastructure						■		5%
<b>COMMUNITIES CONCERNED</b>	<b>39</b>	<b>39</b>	<b>46</b>	<b>42</b>	<b>21</b>	<b>43</b>	<b>19</b>	<b>249</b>
<i>Mean recent victims</i>	0.44	0.77	1.26	1.45	1.95	2.02	2.37	1.36

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.

- Type E: Combined blockages in pastureland and irrigated cropland (21 communities). Some of them also lost access to some of their rain-fed cropland.
- Type F: Blockages of water (43 communities). These communities also reported a mixture of blocked pastureland, roads and trails, and irrigated cropland.
- Type G: Blockages of residential areas (19 communities).

Strong correlations exist between the mean number of recent victims and certain impact combinations. In fact, the table of impact combinations was designed and ordered to reflect an increasing mean number of recent victims. Note in particular that Type G, those communities with housing areas blocked, represents a mean number of 2.37 recent victims.

There are also significant differences in the mean number of impact types for the communities in the different clusters. Differences exist, obviously, between Type A, those communities reporting no blockages, and the rest. However, note that those communities falling within Types E and F, which are associated with blockages of various water sources and irrigated farmland, also tend to suffer significant additional impacts.

The understanding gained through this analysis provides an idea of those communities that are most likely to experience mine incidents in the near future and can be used as a guide for developing appropriate preventive responses and allocation priorities.

# Summary of Past Mine Action

The survey also gathered information about the nature of past mine action activities, including mine awareness education, marking, surveying, victim assistance, and mine clearance. Such activities—whether introduced from outside agencies or locally initiated—could be the foundation upon which future mine action programs can be built. The extent to which these activities do or do not exist in a community also reveals potential needs.

Table 18 shows the total number and percentage of confirmed exposure to some type of mine action activity during the past two years for the 249 impacted communities. This information offers an initial insight into how rare such contacts are between communities and mine action programs.

Different aspects of importance to mine action emerge:

- Initiatives taken by local people to clear mines and UXO themselves constitute the most important “mine action” activity in the last two years. These initiatives included the removal or caching, at risk of injury or death, of dangerous devices found in areas communities want to use or in locations such as schoolyards or farmland that present a potential danger to community members. To prevent incidents or access by others, local communities sometimes place these devices in a “safe” place such as a river or stream, hollow tree, or specially dug hole.
- During the last 24 months, more than one in ten communities have resorted to an informal activity aimed at eliminating some of the threat posed by mines and UXO.
- Reconnaissance, mine clearance, and marking actions are the second most important group of activities reported by community members. This probably is, in part, the result of mine action efforts on the part of HCND and its implementing partner, the German de-



Local initiative to bury and mark munitions

TABLE 18

## INTENSITY OF MINE ACTION PENETRATION, BY SOURCE AND ACTIVITY

Exposed to mine action in the past two years	Communities	Percent
From outside		
Reconnaissance	14	5.6%
Mine clearance	12	4.8%
Marking	5	2.0%
Mine awareness education	3	1.2%
Victim assistance	0	0.0%
From inside		
Mine awareness	2	0.8%
Local mine clearance	28	11.2%
<b>TOTAL</b>	<b>64</b>	<b>25.7%</b>

mining NGO, HELP. It is also largely due to the activities of the French military in cooperation with the Chad Military Engineers Corps; these groups have been working together to perform reconnaissance, marking, and demining at various sites in Chad. Both these groups have also worked in the north around the town of Faya Largeau.

- Only five communities reported any kind of mine awareness activity; three reported activity from agencies outside the community and two reported actions resulting from local initiatives.
- Not one community reported any kind of assistance to incident survivors.

The findings above, taken in combination with the high injury rates caused by tampering and manipulation, highlight an acutely felt unmet need for organized mine action interventions through the whole of Chad.

After Libyan forces withdrew from northern Chad in 1987, French military demining commenced in Faya and on the main routes from Faya to other population centers. As many as 150 French troops worked for approximately 18 months but this action was halted abruptly due to injuries among the French forces.

After this, the French changed their strategy and started sending instructors under the auspices of French-Chadian military cooperation. Between 1988 and 1998, more than 120 Chadian military deminers and EOD technicians were trained. They undertook missions in Bardaï as well as in several other contaminated sites. Their main focus is to demolish explosive ordnance and unsecured munitions depots. Based on the information provided by the HI survey team, successful explosive ordnance clearance missions were recently carried out in Bokoro, Bol, and Mongo. Today, only two French instructors are working with the engineering unit of the Chadian army.

HELP has been working in cooperation with HCND since August 2000. Their first mission was in Faya Largeau where the demining team cleared one minefield located close to inhabited areas, opening up 88,000 square meters of land for use by the local community. The deminers also cleared and opened a new road towards N'Djamena, thus cutting 20 kilometers off the previous detoured route. In Faya, EOD work was undertaken within a 20-kilometer radius of the town. The mobile team destroyed more than 56 tons of UXO, AP and AT mines, and released more than 363,000 square meters of land. HELP has established a small, mobile Quick Response Team to deal primarily with UXO contamination and sporadic contamination by mines. This team has conducted missions, some of which used information based on Landmine Impact Survey data, in Massénaya, Moïto and N'Djamena.

The government of the United States provided Chad with centralized demining training and significant amounts of administrative and operational equipment. Both HCND and HELP currently use trained staff and equipment provided through this program.

# Factors Influencing Mine Clearance

## SIZE OF CONTAMINATED AREAS

Areas contaminated by mines and/or UXO in Chad vary in size from one square meter to more than 100 square kilometers. The reported size of a mined area is one of many factors considered by mine clearance professionals when determining the right approach and procedures for addressing a task. Size influences the structure of technical survey teams and suggests locations where mechanical clearance may be most cost effective. Table 19 summarizes the size of contaminated areas as reported during the Landmine Impact Survey in Chad.

## CONTAMINATED LAND, BY VEGETATION AND GROUND PROFILE TYPES

The 417 contaminated areas have different ground and soil profiles and are covered by different types of vegetation. These factors also inform calculations regarding the difficulty of clearance and the appropriate techniques for doing so. In some cases, certain ground profiles and vegetation combinations may suggest the need for specialized brush clearance equipment. Table 19 breaks the contaminated areas down by ground profile and vegetation.

TABLE 19

CONTAMINATED SURFACE AREA, BY VEGETATION AND GROUND PROFILE TYPES

Vegetation	Ground Profile (sq km)				Total	Percent
	Flat land only	Wadis, hillsides or ridges	Sand dunes	Other		
None	246.6	18.0	0.0	8.1	272.7	25.2
Short grass only	8.9	2.9	0.0	0.0	11.8	1.1
Tall grass, at least some	70.2	90.9	1.2	0.0	162.3	15.0
Bushes or trees, at least some	114.7	139.6	12.8	24.7	291.8	27.0
Other	152.6	165.6	20.7	3.4	342.3	31.7
<b>GRAND TOTAL</b>	<b>593.0</b>	<b>417.0</b>	<b>34.7</b>	<b>36.2</b>	<b>1,080.9</b>	<b>100.0</b>
Percentage	54.9	38.6	3.2	3.3	100%	

More than one quarter of the estimated contaminated surface area is covered by short grass only or nothing at all. In another quarter, however, bushes and trees form potential obstacles to some clearance techniques. Tall grass makes up another 15 percent of the ground cover. More than half the suspected areas are flat. Terrain containing wadis, hills, and ridges makes up a further 38 percent. More than one third of the terrain consists of moving sand dunes, mostly in the departments of Borkou and Ennedi. This is supported by the type of soil found in these contami-

nated areas—nearly one third of the soil consists of sand. Another one quarter of the soil is rocky and one tenth is made up of argile and soft soils. Information on soil types is contained in Table 20.

Based on the information gained in the survey, one quarter of the estimated contaminated area is flat land with little to no

vegetation and presents the lowest degree of difficulty for clearance. Two fifths of the contaminated land in Chad includes rugged features with some vegetative cover or moving sand dunes and presents significant obstacles to clearance. The remaining surface presents intermediate degrees of difficulty for clearance operations.

Chad has three particularly difficult terrain types that deserve special mention. First, are moving sand dunes, which present a particular set of problems for demining programs because contaminated areas are covered and uncovered by shifting sands. This is a particular problem in the region of Lake Chad and in the north. Second, wadis and their proximity to polluted sites are areas of particular difficulty because mines and UXO may be displaced by water and flooding. Finally, the prevalence of argile soils, which are very common in some parts of Chad, presents special problems. In the wet season, these soils turn to slick viscous mud, and in the dry season they become extremely hard and nearly impenetrable.

Seasonal differences in Chad must also be considered during mine action planning because flooding or inundation may make work impossible in some areas. The wet season will restrict access to certain areas and make the logistical support for teams in the field nearly impossible. Vegetation and soil conditions also change with the coming of the rains. The rainy season is usually between June and September and the further south in Chad, the longer the season. This constraint does not exist in the north but strong winds from November to January can disrupt work activities.

## CONTAMINATED LAND, BY ORDNANCE CLASS

Information regarding the type and distribution of munitions in the contaminated areas is important when choosing clearance technique and identifying support requirements. The survey collected information about certain types of munitions, including anti-personnel mines, anti-tank mines, and UXO.

Table 21 (see next page) provides a breakdown of the contaminated areas by munitions type. Significantly, more than two fifths of the surface area and two thirds of the contaminated areas are affected by UXO only. More than half of the

TABLE 20

### CONTAMINATED SURFACE AREA, BY TYPE OF SOIL

Nature of terrain	Contaminated areas	Estimated surface (sq km)
Sand	168	300.7
Argile	94	110.3
Rock	76	277.6
Soft ground	42	106.0
Other	30	284.3
Unknown	7	2.0
<b>TOTAL</b>	<b>417</b>	<b>1,080.9</b>

TABLE 21

**AFFECTED COMMUNITIES, CONTAMINATED AREAS AND SURFACE, BY MUNITIONS TYPE**

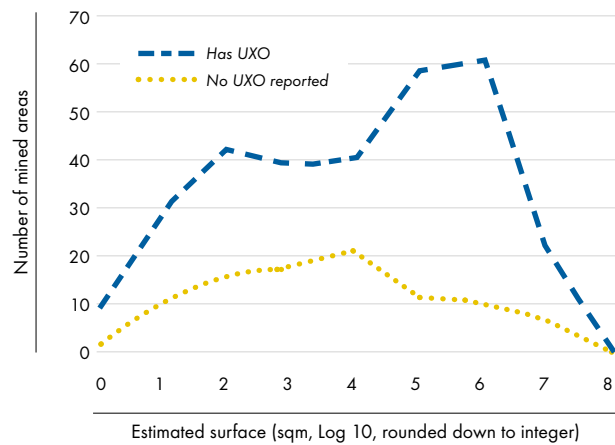
	Number of communities							Contaminated areas	Contaminated surface (sq km)
	North	East	Center	South	Greater Baguirmi	West	TOTAL		
UXO only	43	30	24	11	18	29	155	269	418
AT only	1	12	3	2	2	0	20	60	115
AT and UXO	8	3	3	1	3	0	18	10	108
AP only	0	2	0	1	1	0	4	10	6
AP and UXO	0	1	0	2	1	0	4	7	27
AP and AT	5	3	0	1	2	0	11	29	60
AP, AT and UXO	34	0	0	2	1	0	37	32	347
<b>TOTAL</b>	<b>91</b>	<b>51</b>	<b>30</b>	<b>20</b>	<b>28</b>	<b>29</b>	<b>249</b>	<b>417</b>	<b>1,081</b>

contaminated areas have mixed contamination, with a mixture of UXO, AP, and/or AT mines. Another considerable portion of the surface area (about ten percent) is reported by the survey to be contaminated with AT mines only.

While the north bears the brunt of the effect of all types of contamination, UXO contamination is acutely felt throughout the country. In the north, 43 communities are contaminated with UXO only and the majority of the rest are affected by a mix of AP, AT, and UXO. In the east, 30 out of 50 of the communities have only UXO, with another quarter reporting anti-tank mines. In the Center, the South, and Greater Baguirmi regions, again the majority of pollution comes from UXO, with only a small number of communities reporting the presence of mines. In the west, there are no mines reported at all, with every one of the 29 impacted communities reporting the presence of UXO. Figure 9 highlights the fact that the reported presence of UXO in a contaminated area has a pronounced influence on the estimated size of that area.

FIGURE 9

**MAGNITUDES OF CONTAMINATED AREAS**







# Community Background and Mine Effects

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## COMMUNITY ADAPTATION

The history of conflicts that created the landmine and UXO hazard in hundreds of local communities is well known to the Chadians and is not the subject of this survey. However, much less is known about how the impacted communities have responded to the hazard. As noted, 28 of the 249 impacted communities reported some local clearance effort. This is a small but significant number. Little, however, is known about their methods and success, or what distinguishes these communities from others that did not attempt to clear mined areas by their own means.

Where the hazard is ongoing, it may be assumed that the communities continually refine their response to it. This includes the communications that community members exchange on threat assessment and reduction, the circumspect use of resources in dangerous areas, and the continued search for, and development of, alternatives to contaminated lands.

Social science assumes that the response depends not only on the nature of the hazard, but also on the social factors that influence 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 landmine and UXO problems 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 possible indicator is the ability to avoid mine incidents. It stands to reason that 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 can reasonably assume that not all communities can build this ability to similar degrees. Moreover, the choice of this indicator is motivated by the belief that the data about recent mine incident victims are reliable. For instance, it is often assumed that the more time that has passed since the various devices were left, the more time the community has had to become familiar with the locations of the mines and UXO and to find ways around them, as well as to develop alternatives to blocked resources.

The Landmine Impact Survey uses statistical methods to find associations between recent mine incidents and the social characteristics of the communities in which they occurred. Knowledge of such correlations can help to determine indicators of vulnerability to which the mine action community in Chad (and elsewhere) should be sensitive. Also, it may help validate the method used to score and classify the impacted communities for priority attention.

It does not, however, obviate the need to listen to the concerned communities and to other knowledgeable groups regarding long-term adaptation and rehabilitation. It is hoped that the case studies included on the CD-ROM will be explored for their invaluable insight and local knowledge.

## **Factors considered for the adaptability of the communities**

A great many factors affect a community's ability to deal with mines and UXO; the survey did not gather information on all of them. The survey did, however, collect data on a number of variables that are commonly thought to be relevant to community adaptation and/or landmine situations.

### **1) THE SIZE OF THE CURRENT POPULATION**

Other things being equal, more people means more chances to interact with the hazard. In poor communities with few alternatives, more people may increase the pressure on the available resources, with a probable increase in incidents. However, it is possible that mines may affect the land or property of a few people only and not the entire population. In this case, the relationship between population size and incidents is not direct.

### **2) THE INSTITUTIONAL ENDOWMENT OF THE COMMUNITY**

The more complex the local institutions, the more abundant the skills should be to reduce the hazard and develop alternatives. The method for measuring this is described below.

### **3) THE EXTENT TO WHICH MINES BLOCK CRITICAL RESOURCES**

Previous analysis showed that when mines or UXO block access to water resources, in particular irrigated farmland, it is a critical problem for communities. It is assumed that a community cut off from its water resources tends to have more incidents than a community that has easy access.

### **4) THE LEGACY OF THE CONFLICT**

The legacy of the conflict includes the estimated surface of the contaminated areas in the community; the intensity of regional landmine use as indexed by the distance to the nearest other community with some recent victims; and the number of years that have passed since mines or UXO were last planted in the community. The location of contaminated areas vis-à-vis the dense social space, as measured by the distance from the center of the community to the nearest contaminated area, was also considered. The special situation of the North was marked in the model as the history and current contamination situation in this region is very different from the rest of the country.

Readers may readily appreciate the first and third factors. The second and fourth demand more explanation. The non-technical part is given here, and technicalities are included in the Appendix.

It has been thought that the intensity of armed conflict is spatially concentrated and that this extends to the density of mining or UXO contamination. This results in conflicts of greater intensity generating a greater density of mines or

UXO in a region. Incidents in one community may allow one to assume the likelihood of incidents in neighboring communities, based on the distance to the nearest community with recent incident victims. This should be taken into account when trying to explain different mine effects.

### **The institutional endowment of the community**

There is a long-standing belief in the social sciences that richer and more complex institutions can transact information more effectively and can thus help their host communities solve problems. However, this belief needs to be tested in the field in light of bureaucratic and social barriers. To measure the institutional complexity of Chadian communities, the survey used nine indicators:

1. Is the community an ordinary village, or is it the center of a higher administrative tier (canton or upward)?
2. Does the community have a primary school?
3. Does the community have a secondary school?
4. Does the community have a health care facility?
5. Do at least some of the households have access to an improved water supply?
6. Does the community have access to a radio receiver?
7. Does the community have a weekly market?
8. Is motor fuel available locally?
9. Is there a village development organization in this community?

Further analysis revealed highly significant correlation among certain of these indicators. These nine indicators tend to cluster into two groups that seem to reflect the relative strength of the connection with government on the one hand and the strength of civil society on the other. It is important to note that the characterization of the first factor as the “strength of the community’s connection with the government” and the second as expressing “civil society factor” is totally arbitrary.

Caveats aside, these categories are useful in that the variables of the first five indicators are closely linked to the strength of the ties existing between community and government. Thus, if a community has access to health care facilities, fuel is available, and it has a radio connection and a secondary school, then it is characterized as having better communication with local and national authorities than those communities ranking lower in these traits. The second cluster of indicators reflects more the community’s ability to deal with problems and to develop solutions and take initiatives of its own. Having its own primary school, weekly market, and local development organization are the indicators that characterize these communities. Similarly, improvements in water supplies often are the result of local initiatives.

Table 22 shows the percentage of impacted communities that have these characteristics. A more technical exposition is found in the Appendix, included on the CD-ROM.

### Factors that influence the probability of mine incidents

As noted previously, 102 of the 249

impacted communities suffered one or more incidents with UXO or mines in the last two years. There were a total of 339 victims. The number of victims in a particular incident depends on situational factors and is not likely correlated with the social structure of the community. Over a large number of incidents, however, statistical analysis can see through the fluctuating number of victims per incident. Associations between differing numbers of victims per community allow structural factors to emerge.

The Chad survey identified several structural factors, which contribute to the possibility of a particular community experiencing a mine incident. These factors are presented in descending order of influence:

#### REGION

This is the strongest determinant of a community's ability to adapt to the threat of mines and UXO. Communities in the north find it much harder to work out arrangements that allow their people to avoid incidents consistently. Note that this difference holds after adjustments for the effect of contaminated surface area, which on average is larger in the north. Other, poorly understood factors must drive up the hazard for communities in the north.

#### POPULATION

One would expect that larger population would mean more interactions with contaminated areas, leading in turn to more incidents. In Chad, however, this effect is weak. More robust is the association between community population and ability to avoid incidents consistently. Among smaller communities, a greater than expected number reported no recent victims.

TABLE 22

### COMMUNITY MODERNIZATION INDICATORS

Modernization factor	Indicator	Percent affected communities with this feature
Strength of government connection	Ordinary village	82%
	Health care facility	23%
	Fuel is available	19%
	Has radio connection	15%
	Secondary school	6%
Civil society	Primary school	49%
	Has improved water supply	40%
	Has weekly market	27%
	Has local development organization	21%

### REGIONAL DYNAMICS OF CONFLICTS ALSO EXERCISE A LASTING EFFECT

Communities in areas that saw intense mining or fighting are often clustered together. Communities that are close to other communities reporting recent victims are themselves likely to have continued incidents.

### TIME ELAPSED SINCE THE LATEST ACTIVE CONTAMINATION

As more years elapse since mines were laid, or UXO was last littered, incidents become fewer, and eventually may cease altogether. This result is expected because communities learn from tragic experience which areas are dangerous, and which others are apparently safe.

### PRESENCE OF UXO, PRESENCE OF MINES, AND ESTIMATED CONTAMINATED SURFACE

As expected, these three factors together describe directly the nature and extent of the physical contamination.

### STRENGTH OF CIVIL SOCIETY

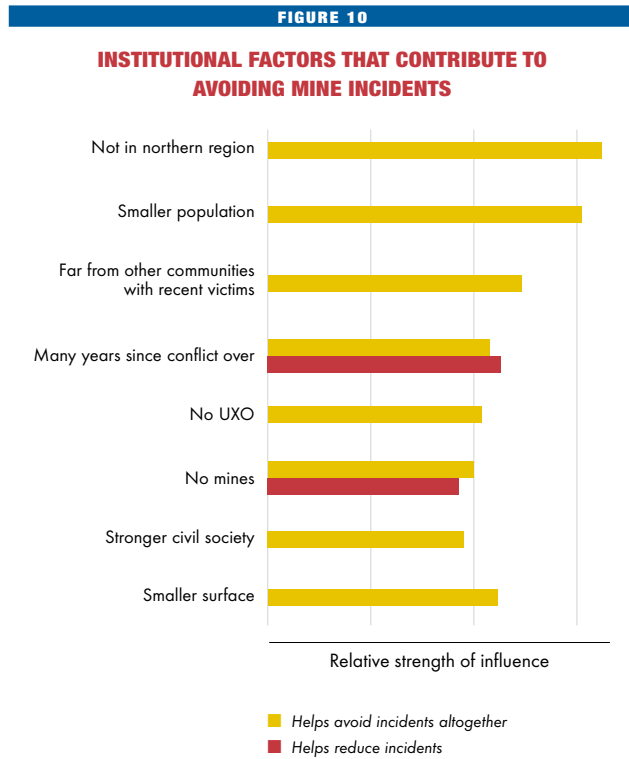
Communities that have a strong civil society and greater access to resources and infrastructure are more likely to avoid incidents, although the specific mechanisms for this tendency are not known. Greater local activism may produce better mine awareness

among groups at risk. Or strong communities may be more adept at quickly and/or equitably devising alternatives to the use of contaminated land.

This last element is important particularly in the light of the other institutional factor—the strength of connections with government. This factor has no relationship to the number of recent victims.

Communities with strong connections to government do

not seem better positioned to avoid or reduce landmine or UXO incidents than others communities are. A summary of the factors that help communities avoid or reduce mine incidents is shown in Figure 10.



## COMMUNITY PROFILES

Six community profiles, three that rank very high for mine incident risk and three that rank very low, are used to illustrate the predictive model. These profiles are presented in Table 23. These six communities are from four different departments.

The three communities with a high probability of incidents had some incidents in the two-year period prior to the survey. None of the three low-probability communities had an incident. All three high-probability communities saw all or some of their irrigated cropland blocked, whereas cropland was not blocked for any of the three low-probability communities.

TABLE 23

### MINE INCIDENTS AND COMMUNITY BACKGROUND VARIABLES—EXAMPLES

	Communities with very high incident probabilities			Communities with very low incident probabilities		
	Koukry	Tchang-Sous	Guigrizimi	Chigui-Obina	Kamadaye	Dilbini
Concentration zone/canton	Yarda	Faya	Faya	Kapka	Dar Salim	Tania
Department	Borkou	Borkou	Borkou	Biltine	Salamat	Dabada
Region	North	North	North	East	Center	Greater Baguirmi
Probability of some incidents within two-year period	0.9	0.98	0.99	0.01	0.03	0.03
Impact score	10	30	10	2	4	4
Total recent victims	1	11	1	0	0	0
Year mines last laid	1987	1986	1986	1978	1978	1969
Total estimated surface (sq m)	14.6 million	115.0 million	13.8 million	16	4	4
Distance to nearest other community with recent victims (km)	1.3	1.2	0.4	38.5	153.1	125.3
Has AP	Yes	Yes	Yes	No	No	No
Has AT	Yes	Yes	Yes	Yes	No	No
Has UXO	Yes	Yes	Yes	No	Yes	Yes
Irrigated cropland impacted	Yes	Yes	Yes	No	No	No
Pasture impacted	No	Yes	Yes	No	No	No
Drinking water impacted	Yes	Yes	Yes	No	Yes	Yes
Other water uses impacted	Yes	No	Yes	No	Yes	Yes
Roads/trails impacted	Yes	Yes	Yes	Yes	No	No
Current population	200	3,000	2,700	70	786	2,000
Weekly market	No	No	No	Yes	Yes	Yes
Primary school	Yes	Yes	No	No	Yes	Yes
Collective organizations	No	No	No	No	Yes	Yes

# Consequences for Mine Action

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## GENERAL PLANNING CONSIDERATIONS

A number of practical actions emerge from the survey findings:

- *The North and East regions of Chad merit the highest priority for mine action programs.* The North region departments of Borkou and Ennedi are the most heavily affected areas in the nation. The North contains 91 of the impacted communities, 37 of these being highly impacted. It also reported 57 percent (194) of all recent victims. The East, including the departments of Assongha, Biltine, Ouaddaï, and Sila, has 51 impacted communities, 12 of which are rated as highly impacted. The East has 22 percent (75) of the total number of recent victims.
- *Prioritize areas with large numbers of high-impact communities* for mine action program interventions. This step increases logistical efficiency and reduces risk. High-risk communities tend to be clustered in the same geographic area.
- *Remember small communities when allocating mine action resources.* This important step is easily overlooked because larger communities tend to be more heavily impacted. Depending on national and local development priorities, demining and clearing UXO from smaller communities that are experiencing incidents will reduce risks to vulnerable populations.
- *Respond to data that show the high prevalence of upper body injuries* caused by tampering and manipulation of mines, and primarily, UXO. This knowledge justifies development of both a focused mine awareness education program aimed at reducing tampering with munitions and targeted demolition of highly concentrated UXO sites.
- *A strategic planning process by the Government of Chad* could integrate the results and findings of the survey into the nation's development priorities. Such an effort is highly recommend. HCND and the relevant ministries can assist by developing strategic planning documents in various mine action activity areas such as clearance, victim assistance, and mine awareness education.
- *Strengthen local civil society initiatives to increase a community's ability to reduce or even avoid incidents.* Those communities with schools, markets, and local community organizations are better equipped to successfully adapt to the presence of mines and UXO than communities that lack these items. Communities can further reduce their risk of mine incidents through locally organized community awareness and community marking programs.

## TECHNICAL SURVEY, MARKING, AND MINE CLEARANCE

The Landmine Impact Survey did not investigate technical mine clearance or explosive ordnance demolition issues in detail. This will occur during subsequent technical surveys. However, the Landmine Impact Survey indicates some of the challenges to mine action and EOD strategic planning and suggests some solutions:

- *Conduct a technical survey, beginning with area reduction and marking* of those mined areas that pose the greatest risk to local population. Very little marking of mined areas has been done in Chad, although some localized community initiatives using rocks and branches have been put in place. Unfortunately, in the North, where the need is most pressing, the terrain and scale of the effort pose immense practical difficulties.
- *Assign priority to minefields that are close to inhabited areas*, that are used regularly by the local community for daily activities, and that have had recent victims. Such areas have been identified by the Landmine Impact Survey and can be quickly accessed and analyzed by using IMSMA.
- *When conditions allow, conduct a Landmine Impact Survey in Tibesti*, which is affected by mines and UXO.
- *Control access to military firing ranges*, dispose of ordnance left on these ranges, and provide mine awareness education to surrounding communities.

## EOD CLEARANCE

While normally considered a component of mine clearance activities, conditions in Chad warrant the *creation of mobile EOD teams* to quickly and efficiently address identified areas of UXO contamination. Areas deserving the highest level of attention include UXO collection points, abandoned munitions points, military firing ranges and contamination that is located close to or in areas of habitation.

Cache points do not always register high in terms of immediate socio-economic impact, but can potentially cause major incidents in inhabited areas. This risk increases over time because the munitions, as well as the buildings or the sites themselves, deteriorate. These sites are often abandoned, without formal control or security measures. A list of such contaminated munitions sites can be readily generated using the data stored in IMSMA.

## MINE AWARENESS

Detailed analysis at a local level is needed for community awareness teams to target their programs, create specific messages, and develop appropriate methods of delivery. The findings of the survey suggest a number of factors, which will influence this analysis.

- *Mine awareness programs must target high-risk behaviors among the most affected groups.* The survey data clearly indicates that boys and young men,



particularly herders and farmers, are the ones most likely to be injured by a mine or UXO. These groups have the opportunity and inclination to tamper with munitions, putting them at greater risk.

- *Seasonal constraints must be considered when scheduling the delivery of mine awareness education.* For instance, mine awareness teams will have their greatest access to the population and nomadic communities in the north during the date harvest between the months of June and August. In other regions, the local population is not available during periods of harvest and sowing. The best time to contact nomadic communities is during their sojourn in concentration areas in the eastern, central, and southern parts of the country during the dry season. In the Kanem, water points where natron (mineral salts) is produced are resting points and places of passage for nomadic communities.
- *Age and sex of victims affect both the message and method of delivery.* It is clear that in Chad male victims predominate. Of the 339 victims, 44 are female and 295 are male. Children under 15 account for one third of victims, of which 92 are male and 18 are female. Nearly half of the victims are between 15 and 29, the largest age group. The vast majority of these are again male victims (134), with a small number of females (16). This means that community awareness programs need to focus predominantly on boys and young men.
- *Location of victims,* the vast majority of the incidents occurred in the North and East, making these regions strong candidates for future mine awareness activities, particularly in the departments of Borkou and Ennedi in the North and in the department of Biltine in the East.
- *Activity of victims at the time of injury.* For both male and female victims, tampering with dangerous devices is the main cause of incidents, making up over one third of cases. Herding animals leads to one fifth of incidents. Other activities during incidents include traveling across contaminated areas (14 percent), farming (8 percent), household work (2.6 percent), and collecting food or water (1.8 percent).

## VICTIM ASSISTANCE

- *Strengthen and develop the capacity to provide emergency medical treatment* for injuries resulting from mine and UXO incidents. This is especially critical in areas where this capacity is limited or nonexistent. Emergency care to victims was provided in 181 of the cases, but the standard of care in more remote areas is reportedly very poor.
- *Broaden the range of rehabilitation services and expand access to these services.* A technical capacity to provide prosthetics already exists in Chad at the central level. This capacity needs to be reinforced and reorganized to provide an accessible network of services nationwide. At present, not one impacted community reported access to rehabilitation services for victims.

Rehabilitation services that deal with the physical, social, and psychological needs of victims need to be established in heavily affected areas. Systems must be developed to allow access to these services by people from more isolated areas.

■ *Develop the capability to cope with victims in need of upper limb prosthetics.*

The overwhelming majority of victims have suffered amputation of the arm or fingers. Forty-five of the survivors had amputations of the upper limbs and another 20 victims reported losing all or some of their fingers. Only 17 victims had lower limbs amputated. Sixteen completely lost their vision and another ten had partial loss of vision. Another 119 sustained other types of injuries.

The geographic distribution of care and types of injuries received by victims are shown in Tables 24 and 25.

**TABLE 24**

**CARE RECEIVED BY MINE VICTIMS**

	<b>Emergency</b>	<b>Rehabilitation</b>	<b>Other care</b>	<b>No care</b>	<b>Fatal</b>	<b>Total</b>
Center	6	0	1	3	5	15
East	44	0	1	0	30	75
Greater Baguirmi	11	0	3	2	18	34
North	100	0	23	7	64	194
South	1	0	0	1	1	3
West	19	0	1	1	4	25
<b>TOTAL</b>	<b>181</b>	<b>0</b>	<b>29</b>	<b>14</b>	<b>122</b>	<b>346</b>

Note: Some victims had more than one injury, total number of recent victims being 339.

**TABLE 25**

**TYPE OF INJURIES, BY REGION**

	<b>Fatal</b>	<b>Amputation</b>			<b>Loss of sight</b>		<b>Other</b>	<b>Unknown</b>	<b>Total</b>
		<b>Upper limb</b>	<b>Lower limb</b>	<b>Fingers</b>	<b>Total</b>	<b>Partial</b>			
Center	5	0	0	0	0	0	8	0	13
East	30	8	1	11	1	2	21	2	76
Greater Baguirmi	18	2	2	0	2	2	7	0	33
North	64	31	13	8	10	6	68	2	202
South	1	0	0	0	1	0	1	0	3
West	4	4	1	1	2	0	14	0	26
<b>TOTAL</b>	<b>122</b>	<b>45</b>	<b>17</b>	<b>20</b>	<b>16</b>	<b>10</b>	<b>119</b>	<b>4</b>	<b>353</b>

## Incident described by a blacksmith in canton Koumogo in the sub-prefecture of Sarh Rural in the south

In Chad, the metal from munitions left on the battlefield attracts the attention of the local population. Often of good quality, it can be used to fabricate solid agricultural tools. The light and strong metal, aluminum, can be transformed into cooking pots and other domestic utensils. Even though the recovery and use of these metals appears to be limited, this practice still kills in Chad.

One day in May 1998 at Maïgoro, three men died as the result of an explosion of a shell placed into the fire of a forge. The son of the blacksmith, then age 12, survived the incident, and provided the following account:

My father found a shell one morning on returning from the market. Upon his return to the village, he told me to light the forge. He then placed the shell in the fire while being watched by two other village men who were with us. I remember saying to him, 'Papa, take out that thing from the fire, it's not good to do this.' My father replied, 'What do you know? This is good for making hoes.' I was scared and I decided to leave. I was only 20 meters from the forge when the explosion took place. My father and the two men died during the explosion. Myself, I had burns to my back.

## DATA COLLECTION AND DATABASE MANAGEMENT

- *HCND should expand upon the existing information collection and management systems* to share this information effectively with mine action operators in Chad, as well as other stakeholders including government agencies and development organizations.
- *HCND should continue to utilize the IMSMA database* to process the information collected, including reconnaissance and technical surveys, clearance surveys, and incident and victim reports. The database needs to be updated on a regular basis.
- *Assign high priority to allocating resources to sustain and maintain the database*, primarily through investment in staff recruitment and training.

## DISTRIBUTION CONSIDERATIONS

The 49 communities classified as highly impacted have a combined estimated contaminated surface area of 689 square kilometers or three quarters of the entire estimated contaminated surface area. A large proportion of these communities are concentrated in the departments of Borkou and Ennedi in the north. The community of Ouddai Doum II in the department of Ennedi makes up almost 20 percent of the total estimated area by itself. Another community in the north, Tchang-Sous in the department of Borkou, makes up another ten percent.

Mine and UXO types are important factors in determining clearance methods and equipment requirements. For instance, machines designed for clearing areas with anti-personnel mines cannot be safely used for clearing anti-tank mines. The area's size, relative to munitions type and vegetation coverage, is shown in Table 26. The majority of contaminated areas in Chad are less than 10,000 square meters in size and are mostly contaminated by UXO and a significant number by anti-tank mines. The vegetation cover is diverse for these areas, a large number of which are covered by bushes and trees, presenting difficulties for clearance teams.

**TABLE 26**

**SIZE OF CONTAMINATED AREAS, BY MUNITIONS TYPE AND VEGETATION COVERAGE**

Area (sq m)	Type of munitions					Vegetation						Total
	AP only	AT only	Mixed mines	UXO only	Mines and UXO	None	Short grass	Tall grass	Bushes and trees	Other	Unknown	
Less than 10,000	6	35	8	115	10	38	26	19	65	23	3	174
10,001 - 100,000	2	10	7	33	8	11	6	10	21	11	1	60
100,001 - 500,000	0	3	4	30	6	8	6	10	15	4	0	43
500,001 - 1,000,000	1	4	2	27	1	4	3	6	10	12	0	35
1,000,001 - 5,000,000	1	2	4	26	9	6	3	8	11	14	0	42
More than 5,000,000	0	5	4	25	14	8	0	6	21	13	0	48
<b>Total</b>	<b>10</b>	<b>59</b>	<b>29</b>	<b>256</b>	<b>48</b>	<b>75</b>	<b>44</b>	<b>59</b>	<b>143</b>	<b>77</b>	<b>4</b>	<b>402*</b>

\*It should be noted that after the database consolidation 15 contaminated areas remained without a reported vegetation coverage.

## CLASS OF MUNITIONS

Of the 417 contaminated areas, 269 covering a total of 418 square kilometers are contaminated with UXO only. Another 60 areas are contaminated by AT mines only, covering 115 square kilometers. Only ten areas are reported by the survey to be contaminated by AP mines only, covering an area of six square kilometers. Another important category of contamination is by a mix of UXO, AT, and AP mines, covering 347 square kilometers. Table 27 provides more details on the type of contamination and the number and size of contaminated areas.

**TABLE 27**

**ALL CHAD—  
CONTAMINATED AREA DISTRIBUTION,  
BY CLASS OF MUNITIONS**

Type of pollution	Contaminated areas	Contaminated surface (sq km)
AP only	10	6
AP, AT only	29	60
AP, AT, UXO only	32	347
AP, UXO only	7	27
AT only	60	115
AP UXO, only	10	108
UXO only	269	418
Unknown	0	0
<b>TOTAL</b>	<b>417</b>	<b>1,081</b>

TABLE 28

## TYPE OF UXO, BY REGION

Munitions type	Center		East		Greater Baguirmi		North		South		West		All regions
	Mined areas	Surface (sq km)	Mined areas	Surface (sq km)	Mined areas	Surface (sq km)	Mined areas	Surface (sq km)	Mined areas	Surface (sq km)	Mined areas	Surface (sq km)	Total
Bombs	0	0.0	1	0.0	3	0.0	24	76.7	3	30.0	4	0.6	35
Submunitions	2	0.0	32	25.7	9	4.5	31	237.5	6	30.0	12	9.5	92
Projectiles (mortars, LRM, artillery shells)	20	3.5	79	91.9	28	19.2	157	1,064.8	17	51.8	45	44.0	346
Grenades	7	1.9	18	36.6	17	5.3	25	306.2	6	34.6	14	7.7	87
Rockets	14	5.4	71	69.1	27	17.0	105	852.9	10	42.3	26	31.2	253
Missiles	1	0.0	27	40.1	4	0.2	20	165.3	5	34.6	4	7.3	61
Unknown	2	0.0	1	0.1	7	2.4	1	0.0	2	0.0	0	0.0	13
<b>TOTAL</b>	<b>46</b>	<b>10.8</b>	<b>229</b>	<b>263.6</b>	<b>95</b>	<b>48.6</b>	<b>363</b>	<b>2703.4</b>	<b>49</b>	<b>223.3</b>	<b>105</b>	<b>100.3</b>	<b>887</b>

More detailed analysis at a local level is needed for mine clearance and EOD teams to target their programs to meet local needs. Table 28 gives details by region.

## VEGETATION AND SURFACE

More than one quarter of the estimated contaminated area in Chad is covered by short grass or nothing at all. In another quarter of the estimated area, bushes and trees pose potential obstacles to some clearance techniques. Long grass makes up another 15 percent of the ground cover.

## AGE OF CONTAMINATION

Based on community responses, there are five distinct periods of contamination: 1977-1983, 1984-1987, 1988-1990, 1991-1994, and after 1995. Tables 29 through 31 give details of the age of the conflict and the number and size of contaminated areas.

TABLE 29

## AGE AND SIZE OF CONTAMINATED AREAS

Age of conflict	Contaminated areas	Contaminated surface (sq km)
1977-1983	99	57
1984-1987	154	869
1988-1990	92	96
1991-1994	38	45
> 1995	21	14
<b>TOTAL *</b>	<b>404</b>	<b>1,081</b>

\*NB: It should be noted that, for 13 localities (20 total contaminated areas), field teams were unable to specify the last year mines or UXO were laid or left.

TABLE 30

## AGE AND SIZE OF MINED AREAS FOR COMMUNITIES IN HIGH-IMPACT CATEGORY

Age of conflict	Mined areas	Surface area (sq km)
1977-1983	4	19
1984-1987	78	607
1988-1990	35	63
1991-1994	0	0
> 1995	7	1
<b>TOTAL</b>	<b>124</b>	<b>690</b>

Older contaminated areas make up nearly one quarter of reported areas. Two-fifths of the total contaminated surface area were created during the conflicts of 1984-1987. This means that many impacted communities in Chad have had between 13 and 17 years to adapt to the mine and UXO risk.

TABLE 31

**SUMMARY: COMMUNITIES AND POPULATIONS AFFECTED, BY GOVERNORATE AND DISTRICT**

District	Communities affected	Population affected	Mined areas	Contaminated surface area (sq m)	Victims					
					Recently killed	Recently injured	Killed earlier	Injured earlier	All victims	
Center	Batha East	12	9,398	14	5,092,105	0	0	14	20	34
	Batha West	2	2,250	2	21,600	5	5	0	1	11
	Guéra	13	24,255	23	2,956,978	0	3	63	42	108
	Salamat	3	6,186	4	303,013	0	0	1	0	1
	<b>TOTAL</b>	<b>30</b>	<b>42,089</b>	<b>43</b>	<b>8,373,696</b>	<b>5</b>	<b>8</b>	<b>78</b>	<b>63</b>	<b>154</b>
East	Assongha	2	225	2	15,900	0	0	16	3	19
	Biltine	36	38,662	68	70,892,614	28	41	129	71	269
	Ouaddaï	10	22,108	18	829,875	2	4	13	7	26
	Sila	3	1,600	5	958,824	0	0	2	19	21
	<b>TOTAL</b>	<b>51</b>	<b>62,595</b>	<b>93</b>	<b>72,697,213</b>	<b>30</b>	<b>45</b>	<b>160</b>	<b>100</b>	<b>335</b>
Greater Baguirmi	Baguirmi	7	20,300	9	1,386,880	0	1	6	4	11
	Dabada	5	10,400	9	3,600,120	0	0	19	7	26
	Hadjer Lamis	5	825	9	4,820,600	2	2	6	9	19
	N'Djamena	11	18,970	16	4,404,336	16	8	20	38	82
	<b>TOTAL</b>	<b>28</b>	<b>50,495</b>	<b>43</b>	<b>14,211,936</b>	<b>18</b>	<b>11</b>	<b>51</b>	<b>58</b>	<b>138</b>
North	Borkou	42	30,765	81	397,506,485	23	76	88	154	341
	Ennedi	49	42,730	93	489,553,819	41	54	252	200	547
	<b>TOTAL</b>	<b>91</b>	<b>73,495</b>	<b>174</b>	<b>887,060,304</b>	<b>64</b>	<b>130</b>	<b>340</b>	<b>354</b>	<b>888</b>
South	Barh Kôh	6	2,348	6	22,732,500	0	0	5	4	9
	Lac Iro	9	7,231	13	30,070,158	1	1	24	3	29
	Logone Oriental	1	1,070	1	60,000	0	0	0	1	1
	Mandoul	1	532	1	90,000	0	0	0	0	0
	Mayo Boneye	2	840	2	60,000	0	0	2	9	11
	Monts de Lam	1	240	1	30,000	0	1	0	0	1
	<b>TOTAL</b>	<b>20</b>	<b>12,261</b>	<b>24</b>	<b>53,042,658</b>	<b>1</b>	<b>2</b>	<b>31</b>	<b>17</b>	<b>51</b>
West	Barh El Gazal	5	3,800	9	6,708,712	4	11	35	26	76
	Kanem	4	5,000	4	761	0	7	6	14	27
	Lac	20	34,700	27	38,979,048	0	3	2	14	19
	<b>TOTAL</b>	<b>29</b>	<b>43,500</b>	<b>40</b>	<b>45,688,521</b>	<b>4</b>	<b>21</b>	<b>43</b>	<b>54</b>	<b>122</b>
<b>GRAND TOTAL</b>	<b>249</b>	<b>284,435</b>	<b>417</b>	<b>1,081,074,328</b>	<b>122</b>	<b>217</b>	<b>703</b>	<b>646</b>	<b>1,688</b>	

# Background & Methodology

# Background & Methodology



# Project Timeline

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The first conceptual planning for the Landmine Impact Survey in Chad began in mid-1999. The final draft of the survey report was submitted to SAC by the HI team in May 2001. The following timeline shows the main project milestones that occurred between initial planning and the withdrawal of the survey team from Chad.

- **May 1999—*Impact Survey process initiated*** when UNMAS issued a formal request to SAC to begin planning and resource mobilization to conduct a Landmine Impact Survey in Chad. This request was initiated, in part, due to the urgings of the United Nations Chief Technical Advisor in Chad.
- **July 1999—*Advanced survey mission*** by HI France—This mission was conducted to gain an appreciation of the general situation in Chad and to collect information to support the creation of a basic project document and survey budget. This mission met with key government officials, United Nations agencies, NGOs, and local informants. The mission also visited mine-affected areas.
- **August–September 1999—*Project proposal***—using information gathered by the advanced survey mission, SAC developed a project proposal and a survey operations plan. These documents were then used to mobilize donor support and financial backing for the survey.
- **October–November 1999—*HI France was selected by SAC*** to implement the survey and a contract for the project was developed and signed by SAC and HI.
- **November–December 1999—*Arrival of HI team leader and deputy***—HI team leader Marc Lucet and deputy team leader Kim Spurway arrived in Chad.  
***Development of working relationship and common understanding with local partners***—Coordination and liaison meetings were held with the main government partners, HCND, the Ministry of Plans, and the United Nations Development Program (UNDP). A memorandum of understanding was drafted in collaboration with local partners.  
***Arrival of HI administrator***—HI administrator Eric Rouyez assumed his post at the end of December 1999.
- **January 2000—*Administrative structure and HI office established***—Administrative and accounting procedures were put in place, and an office established. An agreement was reached allowing the database portion of the survey to be conducted inside HCND premises.  
***Arrival of HI Geographic Information System (GIS) expert***—HI GIS expert, Frédéric Cussigh, started work on the project, collecting and organizing geographic information, and setting up the information system.

*Meetings with local informants commenced*—Local informants met to collect information on the situation of landmines and UXO. Contact was made with a number of local networks—notably the administrative and ex-military personnel; traditional chiefs; religious leaders; local NGOs and international NGOs; and UN agencies.

■ **February 2000**—*Memorandum of understanding signed*—HI, SAC, and the Government of Chad signed a final memorandum of understanding.

*Recruitment of local staff*—Final selection was made for the posts of survey advisor (chargé d'étude), regional supervisors, field editors, and office staff.

*Adaptation and translation of survey tools*—English versions of survey protocols and the questionnaire were translated into French, re-edited, and adapted by the HI team.

*Arrival of UN Quality Assurance Monitor (UN QAM)*—The first UN QAM, Alain Dazy, arrived in Chad to commence work on the Impact Survey.

■ **March 2000**—*Training workshop for regional supervisors and field editors*—

A three-week training workshop for candidates for the positions of regional supervisor and field editor was held. Aldo Benini, the Survey Action Center's sociologist, visited Chad to assist with training and to further brief the HI coordination team on survey methodology.

*Pretest 1*—Following the training workshop, candidates for the post of regional supervisor and field editor were deployed during a field test of the survey methodology and tools.

*Meeting with local experts regarding survey methodology and tools*—The survey methodology and a French version of the survey tools were discussed and adapted during meetings with HCND, United Nations Office for Project Support (UNOPS) mine action technical advisors, and the UN QAM.

*Budget revision 1*—The Landmine Impact Survey budget was revised to meet Chad's specific operational requirements. This was done in close cooperation with Nelly Schneider, SAC administration and finance officer.

■ **April 2000**—*Selection of first batch of field enumerators*—Testing, selection, and recruitment of candidates for enumerator positions were held for the North (Borkou and Ennedi) and West (Lac and Kanem) survey regions.

*Preparation for initial expert opinion collection*—A questionnaire for distribution to local informants was finalized and distributed via local networks, such as the National Assembly.

*Arrival of computer equipment*—Computer equipment arrived and was set up in HCND. The IMSMA database was installed and the network established.

■ **May 2000**—*Training of first batch of enumerators*—A four-week training workshop was held for enumerators for the North and West regions.

**Expert opinion collection**—Supervisory teams were deployed for expert information collection in all departments of Chad, except for those in the North region.

**Training of data entry operators**—Candidates were selected for the post of data entry operator following a specialized training workshop held by the GIS expert.

**Preparation for Pretest 2**—Planning and preparations were made for the second field test of the methods and tools used in the survey.

**IMSMA Version 2 installed**—The second version of IMSMA was installed, and the database network and system were consolidated.

**Replacement UN QAM**—Alain Dazy, the UN QAM, was unable to obtain final medical clearance to work in Chad and was replaced by a second UNOPS consultant, Alan Trevor.

**Selection and training of drivers**—Drivers were selected through interviews and technical tests. A three-week training workshop was organized to prepare them for driving during the fieldwork. This training included not only instruction on safe driving techniques but also classes on vehicle maintenance, recovery, and repair.

**Establishment of the radio communication system**—The radio system was put in place and tested with the active support of HCND Communications Service.

■ **June 2000—Pretest 2**—Thirty-six field staff were deployed in four teams for the final test of the survey methodology and instruments before full deployment into the field.

**Operational plan finalized**—Following the results of the second pretest, planning meetings concerning logistics and operational issues in the country were held and a final operational plan was developed. The country was then divided into seven survey zones: North, West, East, South, Center, the prefecture of Chari Baguirmi, and the city of N'Djamena. Due to impossibility of working in the East, Center, and South during the wet season, fieldwork in these regions was delayed until mid-October 2000.

**Arrival of survey vehicles**—After many weeks of delays and problems, the two Toyota Hardtops and six Hilux vehicles were cleared through customs and were finally ready for fieldwork.

**Preparation for fieldwork**—Extensive administrative and logistical preparations were undertaken to adequately support the upcoming deployment of the field teams. This preparation included the finalization of staff contracts, purchase of extra tools and equipment for the vehicles, and establishment of basic field kits of sleeping, cooking, and office equipment.

■ **July 2000—Pilot test commenced in the North and West regions**—The pilot test involved the full deployment of teams to test the operational capacity of the project in the prefectures of Borkou and around Lake Chad.

*Start of data entry*—Data verification and data entry into the IMSMA database began with the reception of data from the first pilot test in the North and West regions.

*Driver training workshop*—Nine additional drivers were trained in basic mechanics, field skills, and first aid techniques.

*Standard Operating Procedures (SOPs) finalized*—SOPs, incorporating lessons learned from the pilot test, were finalized and distributed to field teams.

*Beginning of data entry into IMSMA*—HI data entry team started to enter into IMSMA the data collected in the field.

■ **August 2000—Operational review**—Bill Barron (SAC) and Bill Howell, the director of HI's Mines Service, were present for an operational review of the Chad Impact Survey.

*Debriefing for pilot test*—A debriefing was held with the regional supervisors and the coordination team to draw out the lessons of the first pilot test.

*Recruitment of second batch of enumerators and preparation for enumerator training workshop*—Testing, selection, and recruitment of enumerators for the East, Center, and South regions were finalized and a second enumerator training workshop was organized for these teams.

*Ongoing data collection*—Data collection continued in the regions of the North, West, and around the capital of N'Djamena.

■ **September 2000—Training workshop for enumerators of East, Center, and South regions**—A four-week workshop was held for the enumerators of the East, Center, and South regions. The final selection and recruitment of enumerators occurred following evaluations made during the training workshop.

*Ongoing data collection*—Data collection and data entry and verification continued for the regions of the North, West, and N'Djamena.

■ **October 2000—Preparation and planning began for deployment of teams** for the start of the survey in the East, Center, and South regions.

*Pilot test in East, Center, and South regions*—Teams deployed to start the second pilot test for the remaining three regions. A separate special team was established solely to finalize the certification of cantons in the South.

*Survey completion in West region and N'Djamena*—Survey teams finalized work in Lac, Kanem, and the city of N'Djamena.

■ **November-December 2000—Collection, verification, and quality assurance of data**—The HI team concentrated on the collection, verification, and quality assurance of data in the four survey regions still working.

*Preparation for mid-cycle review*—A review of the progress of the survey, including new planning and budgets, was prepared by the HI coordination team to be presented to SAC during a mid-cycle review of the project in December.

*Global Landmine Survey operational review and Chad Survey mid-cycle review*—The HI team leader participated in the Global Landmine Survey operational review in Washington, DC. During the review of the program with the SAC team, a proposal was made to extend the Chad Landmine Impact Survey to mid-May 2001.

*Ongoing data collection*—Data collection, data entry, and verification continued for the North, East, Center, and South regions.

■ **January 2001—Ongoing data collection, verification, and quality assurance—**

The HI Chad teams continued with the collection, verification, and quality assurance of data in the four survey regions.

*UN QAM leaves project*—After producing a preliminary final report, the UN QAM finished his contract in Chad on January 31, 2001.

*Final budget revision*—Following the decisions made during the mid-cycle review, the survey budget was revised and a final version decided upon.

■ **February 2001—Survey completed in all four remaining regions—**

All teams completed survey work in their regions during the month of February. The North team returned to N'Djamena for a final debriefing and the preparation of regional reports.

*Survey of Greater Baguirmi area started*—The remaining survey area to be surveyed, covering the former prefecture of Chari Baguirmi, was divided between the teams of the East, Center, and South. The teams were deployed into their respective areas in the prefecture during the last weeks of February.

■ **March 2001—Greater Baguirmi survey completed—**

By the second week of March, the field teams had completed the survey of Greater Baguirmi.

*Data verification and consolidation by field team*—The regional supervisors and field editors worked with the coordination team to double-check data and to solve any outstanding problems.

*Regional reports prepared*—Regional supervisors and field editors worked with the coordination team to write a preliminary draft report in French for each region.

■ **April–May 2001—Preparation for data analysis and report writing—**

Organization and verification of data was finalized and final data entered into the database. The database was consolidated and prepared for data analysis. Sections of the final report were started, all data were entered, and analysis was started in April. The HI coordination team wrote a draft of the survey report in collaboration with the SAC sociologist and GIS system assistant.

*Preparations for project closure*—Administration and logistics prepared to close down the HI survey office and hand over all nonexpendable equipment to the U.S. Embassy.

■ **June-July 2001**—*Drafting and revision of the final report*—SAC reviewed and revised the draft final report and submitted a version to the Government of Chad on the 5th of July 2001. Comments from the government were received and addressed in the version of this document sent to the UN Certification committee.

# Key Participants

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**A**s the implementing organization of the Landmine Impact Survey in Chad, HI worked in close cooperation with a number of governmental, national, and international agencies. The survey was very much a collaborative effort that required the support and involvement of a large number of diverse organizations.

■ **Haut Commissariat National au Déminage (HCND—National High Commission for**

**Demining)** is the national agency responsible for all mine action policy, strategic planning, and the coordination of all mine action activities in the country. HCND comes directly under the auspices of the Ministry of Economic Cooperation and Development in the Republic of Chad. HCND coordinates the National Plan for Mine Action.

■ **Government Ministries and Departments:** A number of government departments assisted HI during the survey process. These included the Bureau Central du Recensement (BCR—Central Census Office) under the leadership of the Direction de la Statistique, des Etudes Economiques et Démographiques (Department of Statistics and Economic and Demographic Studies) in the Ministère de la Promotion Economique et de Développement (Ministry of Economic Promotion and Development); the Centre National d'Appui à la Recherche (CNAR—National Center for Research Support) under the Ministère de l'Enseignement Supérieur (Ministry of Higher Education) and the Direction de l'Hydraulique (Department of Hydraulics) under the Ministère de l'Environnement et de l'Eau (Ministry of Environment and Water Resources).

■ **Handicap International (HI)** is an international NGO with a long history of involvement in mine action. HI was created in 1982 to assist mine victims in the Cambodian refugee camps in Thailand. Since then, it has expanded its operations into all areas of mine action. HI now works in 49 countries running programs geared toward the social and physical rehabilitation of the handicapped and support to vulnerable groups. HI Belgium managed and implemented a national socio-economic Landmine Impact Survey in Laos.

■ **The Survey Action Center (SAC)** is a Washington, D.C.-based nonprofit organization affiliated with the Vietnam Veterans of America Foundation. SAC provides technical and methodological support to national impact surveys and coordinates information exchange between all ongoing impact surveys.

■ **United Nations Mine Action Service (UNMAS)**, a body within the United Nations Department of Peacekeeping Operations (DPKO), serves as the 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 Development Programme (UNDP)** is the UN agency responsible for developing and supporting local mine action capacities, normally accomplished through a mine action technical advisory team.
- **United Nations Office for Project Support (UNOPS)** was the agency responsible for contracting the Impact Survey's QAM in Chad as well as the UNDP mine action technical advisors.
- **Famine Early Warning System (FEWS)** is an agency established in Chad by the U.S. Agency for International Development (USAID) to act as an early warning system for famine control. The agency provided the survey team with geographic information.
- **The Chadian Armed Forces** through its Military Engineers Corps, supported by two French EOD specialists working in cooperation with the French military, shared some information with the survey team on contaminated areas. During the main data collection phase, an active exchange of information also took place between military commanders and some of the Impact Survey's regional teams.
- **UNICEF** is the UN agency responsible for developing mine awareness programs. In Chad, such a mine awareness program has been developed and is ready to start operations soon. UNICEF shared with the Survey team reports and program evaluations related to this domain of activity.
- **HELP** is a German mine action NGO working in Chad as part of the national mine action program coordinated by HCND. Since August 2000, HELP has been running a demining and EOD program in North Chad, and has deployed one mobile EOD team.
- **International Committee of the Red Cross** is in the process of launching a landmine victim assistance program in Chad. It shared information with the Impact Survey.
- **SECADEV** (Catholic Relief and Development) is a Chadian NGO that, among other activities, runs an important prosthetics center in N'Djamena. SECADEV shared information on this activity with the Impact Survey.
- **INADES** (African Institute for Economic and Social Development) is a regional NGO that supports local development organizations and training activities. INADES shared its knowledge with the Survey team on how to approach communities in Chad.
- **Local government administrative structures** supported data collection at the regional level as well as overall project coordination and access. This support involved all prefects, sub-prefects, members of Parliament, canton chiefs, mayors, village chiefs, and a diverse group of local leaders.
- **The members of, and interview participants from, all the communities visited.**



# Administrative Structures

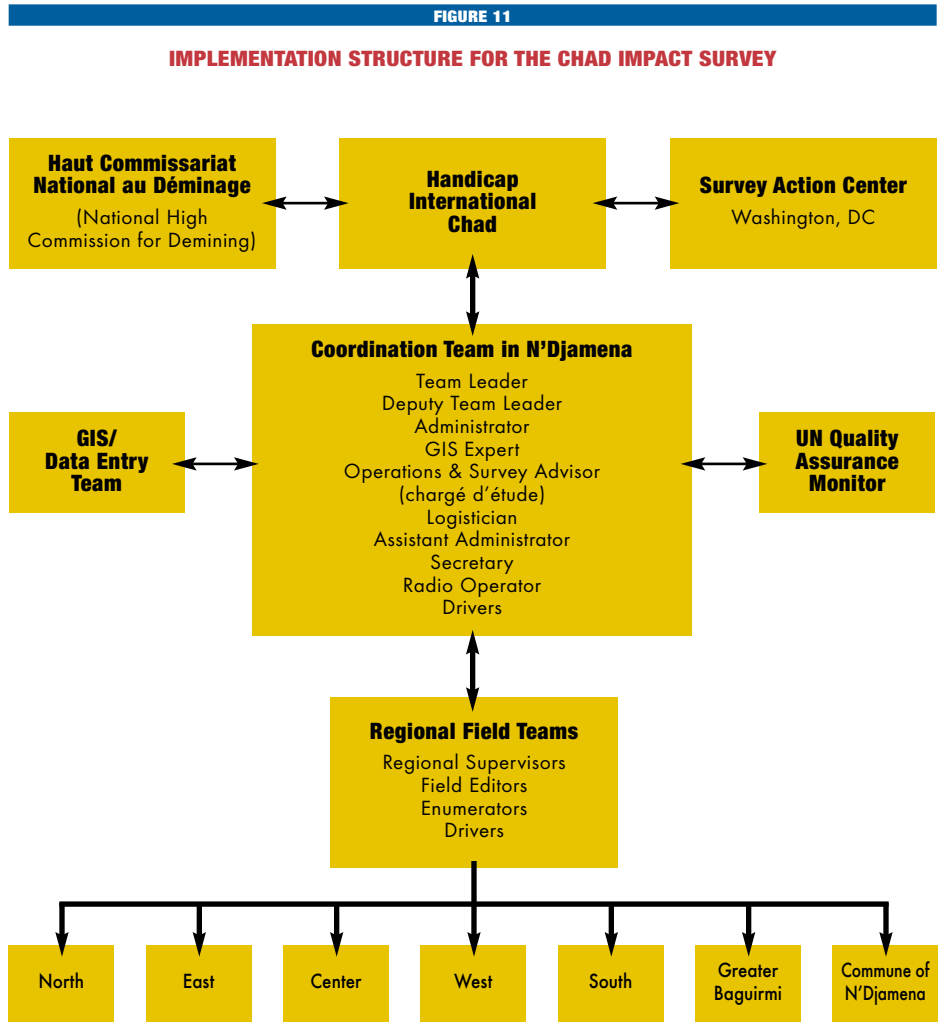
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- **Local partners:** HI implemented the Chad Landmine Impact Survey in partnership with HCND. Weekly meetings were held to brief the management of HCND on the survey's progress and to discuss important issues related to the survey. Larger meetings were also organized to provide briefings for operational and community awareness personnel in HCND.
- **Survey office:** HI Chad's coordination office was located in the capital city, N'Djamena. To ensure a close relationship with HCND, HI's offices were located within 300 meters of HCND. The IMSMA database was located within the HCND building itself and HI's GIS expert and his team worked there on a daily basis. The establishment of regional offices or fixed bases was deemed to be impractical due to the tremendously complex logistics and long travel times required to support such facilities. Further, returning to a fixed base was impossible due to the distances and local road conditions. In operational terms, the field teams were mobile for the entire period of the survey, moving their temporary bases from canton to canton as the work progressed.
- **Project staff:** The expatriate team consisted of a team leader, deputy team leader, administration/finance officer, and GIS expert. This group, plus a locally recruited operations and survey advisor (*chargé d'étude*), made up the coordination team of the project.

The field teams were composed of a regional supervisor, field editor, enumerators, and drivers. The regional supervisor was responsible for overall team leadership, management, and the organization of the day-to-day survey operations. The field editor was responsible for verification and quality assurance of the incoming data. To allow for operational flexibility, the regional supervisors and field editors were interchangeable and they shared the responsibilities of day-to-day team management. This proved very useful in a number of instances when one of them had to leave the field. The enumerators traveled to each impacted community, administered the questionnaire, and collected the village-level data. A total of 75 local field personnel worked for the survey during field operations.
- **Technical advisory team:** SAC provided specialists in the areas of social science, survey methodology, survey design, information management, and statistics according to the needs expressed by the Landmine Impact Survey coordination team. SAC took the main responsibility for mobilizing the funds, and also acted as intermediary between HI and certain donors. In this respect, SAC provided expertise in administration and financial management.
- **Quality Assurance Monitor:** The quality assurance monitors used the UNMAS-specified Landmine Impact Survey Certification Guidelines to monitor and document the progress of the survey. Two reports were produced during the

course of survey operations: “UN QAM Interim Report” and “UN QAM Preliminary Final Report.”

The first UN QAM, Alain Dazy, greatly assisted the coordination team in the development of standard operating procedures for security and participated in every session as a support trainer in the workshops for supervisors and field editors. He also trained on subjects concerning his post, particularly relating to the quality assurance process itself and security measures for mined or contaminated areas when performing data collection. Alan Trevor also assisted with one session of the second training workshops for enumerators and performed field missions to observe and monitor operations during the second pretest, the pilot tests, and the main data collection phase. While performing this job, Mr. Trevor observed group interviews, expert opinion collection sessions, and field reconnaissance of suspected communities, as well as itinerary planning and the sampling process. Mr. Trevor also produced a photographic chronology of all the steps required to execute a community level interview including preparation, the interview itself, proximity verification, and field editing.



# Finances

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## BUDGET AND EXPENDITURE

The budget for the Chad Landmine Impact Survey was developed by SAC following the HI advanced mission of July 1999. The budget included a large amount for non-expendable equipment (25 percent of total). The initial budget of \$1,152,221 was reviewed in February 2000 to take into account specific operational conditions. As a result, the amount was increased to \$1,258,464. During the project's mid-cycle review at the end of 2000, the budget had to be modified to meet the deadline for the end of fieldwork and to finalize survey operations by May 2001. The final budget amount approved by HI and SAC was \$1,639,585. The final total projected expenditure is \$1,962,065.

HI (survey)	\$1,455,800
SAC (technical support)	\$ 323,165
UN (QAM)	\$ 183,100
<b>Total expenditure (projected)</b>	<b>\$1,962,065</b>

## FUNDING MECHANISMS

Funding for the Chad survey was provided by donations received from the U.S. State Department, United Nations Funds for International Partnerships (UNFIP), and the United Kingdom Department for International Development (DFID). To make up the final additional budgetary requirements, both SAC and HI had to support the survey with their own funds.

The following donors provided funds for the Landmine Impact Survey on Chad:

U.S. Department of State	\$688,900
UNFIP (DoS=\$456,733 UNF=\$228,367)	\$685,100
DFID	\$352,685
SAC	\$85,380
HI	\$150,000
<b>Total</b>	<b>\$1,962,065</b>



# Chad Methodology

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## **SURVEY METHODOLOGY IN CHAD**

The Chad Landmine Impact Survey followed the standard practices and methodology developed by SAC and approved by the SWG. In essence, the survey teams systematically collected information, or “expert opinion,” from knowledgeable informants on the location and impact of landmines and UXO in Chad. The team supervisors then performed a thorough reconnaissance of all impacted communities, a sampling frame was created for non-impacted communities, and plans were developed for data collection in impacted communities.

Village interviews were held in all impacted communities. The teams followed the prescribed practice of conducting a community mapping exercise, a group interview with a questionnaire, and the visual verification of contaminated areas in each and every impacted community. In villages thought to be without impacts, a short one-page questionnaire was used to verify that no mines or UXO were located in the community. The data collected were verified in the field by the field editors and then rechecked before being entered into the IMSMA database. Analysis of the data collected in the field then commenced.

During the survey, special care was taken to respect local customs and traditions during the village visits. All enumerators were selected and recruited from the regions in which they eventually worked and each enumerator spoke one or more of the local languages, plus French. French was chosen as the language of the questionnaire due to its widespread use in the country and because other commonly used languages, such as Chadian Arabic and Sara, are oral languages and do not have any universally recognized written form. Enumerators used a total of 11 local languages during the community interviews, retranslating the villagers’ responses into French and entering these onto the questionnaire.

During the village interviews, participatory methods and techniques commonly employed in the NGO community for rapid rural appraisals were used to encourage the active participation of a diverse range of villagers. Enumerators were encouraged to take an open, respectful, and listening attitude to the communities during the interviews and to establish a good rapport with the village chief and other community members. At the same time, enumerators were made aware of the need to be observant, to take notes, and to develop a critical approach to the information they were collecting. This was to ensure that any inconsistencies or contradictions in the data were noted during the interview and resolved before the enumerators returned to base for their debriefing.

## ADMINISTRATIVE STRUCTURE, OPERATIONAL CONSIDERATIONS, AND SURVEY REGIONS

The administrative structure for the Republic of Chad is divided into hierarchical levels:

- Department
- Sub-prefecture
- Canton
- Village (community)

The administrative structure was used to guide survey operations, with expert opinion collection taking place in departments, sub-prefectures and cantons, while community interviews and sampling took place at the village level. In general, the teams developed operational plans at the sub-prefecture and canton levels. Eventually, though, the canton level became the base for all operations in the field because survey teams found that information quality and reliability were greater here than at the higher administrative tiers. Canton chiefs, traditional leaders, NGO representatives, and other local informants at this level were intimately aware of the location of contaminated communities.

In order to adequately reflect the diversity of the ethnic and linguistics differences found in Chad, it was decided to form seven field teams to cover the country's regions and departments. These teams were assigned as follows:

- North: Borkou and Ennedi
- East: Assongha, Biltine, Ouaddaï, and Sila
- Center: Batha East, Batha West, Guéra, and Salamat
- South: Barh Kôh, Lake Iro, Kabia, Tandjilé East, Tandjilé West, Mayo Boneye, Mayo Dala, Mandoul, Logone Occidental, Logone Oriental, and Monts de Lam
- West: Lake Chad, Kanem, and Barh El Gazal
- Greater Baguirmi: Baguirmi, Bokoro, Dababa, Hadjer Lamis, and the commune of N'Djamena (surveyed by the seventh team).

## EXPERT OPINION AND SELECTION OF AREAS FOR STUDY

As soon as the HI team arrived, it began collecting information on those areas of Chad suspected to have a problem with mines or UXO. The team worked in close collaboration with HCND, and the Ministry of Economic Promotion and Development. The HI team also developed a strong relationship with the UNOPS mine action technical advisory team located at HCND.

The first phase in this process involved interviews with former Chadian combatants and with members of HCND and the UNOPS teams knowledgeable about certain aspects of the conflict and the location of contaminated areas. Maps of areas that had suffered military conflict and which were potentially polluted or mined were created using the GIS database. During this phase, an expert opinion questionnaire was developed for distribution. This questionnaire was distributed to government departments, parliamentary deputies, and national and interna-

tional NGOs. However, even though the survey received some valuable information from a small number of informants, this method did not yield much useful, detailed information. This failure resulted from the need to rely on the extremely poor communication networks available in Chad. In particular, the nation's telephone and postal networks are limited in size and coverage. Some attempts were made to collect information by using national radio networks, but these too proved to be of limited utility.

In the second phase, teams of regional supervisors and field editors were deployed to collect expert information at sub-prefecture level. This method proved to be more successful since teams had direct access to the canton chiefs or their representatives. Reports on impacted communities were collated and analyzed by the survey team, and were a first indicator of the level and dispersal of contamination by mines and UXO in Chad. This information allowed HI to prepare an overall strategy and operational plan for the following phase of data collection.

During the second phase of expert opinion collection, the teams found a total of 201 suspected communities in a total of 121 territorial units. They also certified as non-impacted 146 territorial units, leaving 221 to be verified during the main data collection phase.

## **VERIFICATION AND CERTIFICATION OF ALL NON-IMPACTED COMMUNITIES**

During the main data collection phase, the field teams continued to collect the opinions of local informants in those cantons not covered during the second phase outlined above. Thus, teams visited all territorial units within their survey regions not already visited to establish whether they were affected by mines and UXO. A territorial unit in Chad represented either individual cantons, a group of cantons with overlapping territories, concentration zones (the North Chad region), communes, or arrondissements. Arriving in a new area to be surveyed, the supervisor met with local leaders or their representatives and relevant other local informants including local gendarmes, national NGOs, international NGOs, UN agencies, development organizations, military commanders, and medical staff in charge of health facilities.

If local informants reported that the territorial unit was not affected by landmines or UXO, the unit and the communities contained within it would be "certified non-impacted." In the South region, due to the high population density, the large number of canton-level territorial units, and the immensity of the territory, a separate team was established just to visit and certify cantons. This special certification team for the South region alone visited 163 cantons, certifying 141 as non-impacted in 18 sub-prefectures. The team found 17 new suspected cantons and reconfirmed that five cantons were affected.

Figure 12 (see next page) shows the workflow for all territorial entities and communities certified or verified non-impacted in Chad. Work on a territorial unit was considered final once it was certified as non-impacted by local authorities and informants. Reconnoitered units were those geographical entities found to be

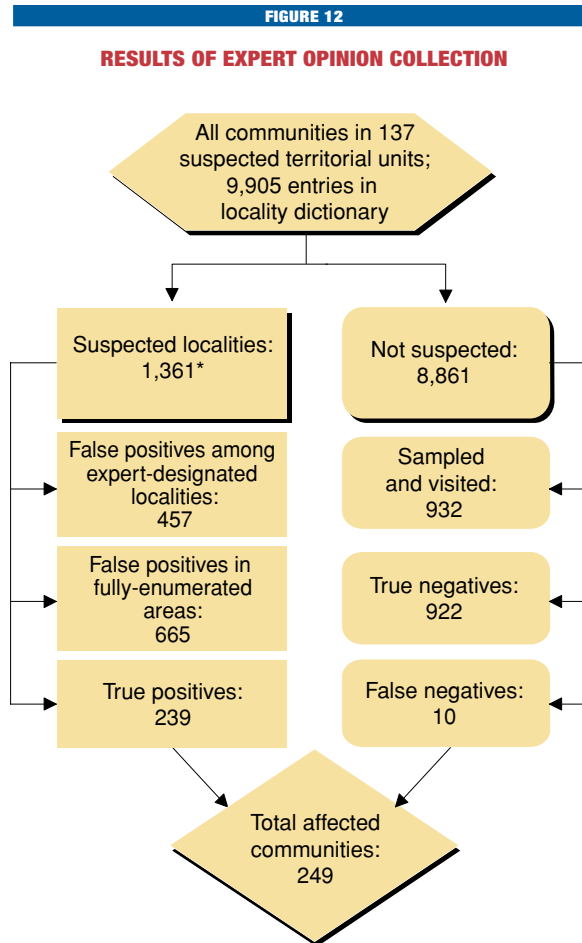
non-impacted during full enumeration, systematic reconnaissance, or sampling (see full explanations below). The Landmine Impact Survey verified or certified as non-impacted 137 territorial units, 35 of these during full enumeration, another 54 during sampling, and the remaining 48 during systematic reconnaissance by regional supervisors.

### SYSTEMATIC RECONNAISSANCE OF SUSPECTED COMMUNITIES

The survey performed systematic reconnaissance when a territorial entity reported communities suspected of being impacted by mines or UXO. The team would produce a list of suspected communities based on meetings with local informants, and would produce a map of impacted communities. The regional supervisor would then visit all suspected communities within that territorial unit to check on the information. If the supervisor found that the community was not impacted during this exercise, the community could be verified as non-impacted.

Those communities found to be non-impacted during systematic reconnaissance were considered to be part of the Impact Survey’s list of “false positives.” This definition also included those non-impacted communities located in proximity to a suspected community and which could possibly be impacted. Those communities close to other suspected communities were treated using “neighboring community search.” All non-impacted communities were certified by local authorities or, if necessary, verified directly by a visit from a survey team using one of the Impact Survey’s documentation forms.

If, during systematic reconnaissance, the supervisor confirmed the community as being impacted, an appointment would be made with the village for the administration of the full community interview by the enumerators. Based on the



\*618 by experts; 743 fully-enumerated



## Extreme conditions, reconnaissance for the certification of the Erg of Manga in the West region

The members of a small team sent into the field from March 19-26, 2001, will recall the mission to Manga as the most difficult undertaken during the survey. The absence of tracks, the extreme heat, and the sandstorms, which sometimes engulfed the entire landscape, allowing only 100 meters of visibility, were among the obstacles that had to be overcome.

The Erg of Manga is an immense desert zone in the north of the department of Kanem, where one finds the large desert plains of Borkou and the rocky mountain chains of Tibesti. To the west is the frontier with Niger. Nomadic herders taking their animals to pasture between May and October use wells tucked away in various locations throughout this vast region. At other times, a small population remains in the region to await the return of the animal herds coming up from southern Kanem or from Niger. This area was passed by during data collection in the Kanem, but the survey team began to suspect that the area was contaminated.



Poor conditions in Manga

In the absence of precise information and in view of the logistical constraints, the regional supervisor decided to visit the region, focusing on contamination at wells. Leaving from the community of Ziguey, the team circled up north to the community of Nokou, verifying wells on the way. By verifying water points, the team was able to meet with representatives of nomadic communities using the zone and to collect information on the location of any possible dangerous areas.



Verified non-affected wells

After traveling 250 kilometers, eight wells were verified as being non-impacted. Local informants agreed that the area was a theater for military activities at the beginning of the 1980s. Military convoys were crossing regularly on a north-south axis. Indeed, there still remains the trace of a road, since abandoned, created by the passage of heavy vehicles. Despite this, no actual military conflicts had occurred in the Erg and the population reported no dangerous areas.

information collected during the reconnaissance and on the sampling frame developed, the supervisor would produce itineraries of villages for the enumerator teams to visit.

## **USE OF CONCENTRATION AREAS IN THE NORTH**

The survey was able to adapt its basic approach to fit the needs of specific situations in certain geographic areas. Northern Chad is a massive area, with very few inhabitants. These inhabitants tend to concentrate in very specific locations such as towns, wells and wadis, or are engaged in an almost continuous cycle of movement. The administrative hierarchy of sub-prefecture, canton and village as used in the remainder of Chad, did not adequately reflect the conditions in this region. To help organize survey operations in the North, the HI team divided the region up into population “concentration zones.”

These zones, while arbitrary, are centered on a larger town in the region and include the surrounding villages, nomadic routes, wells and pasturelands. As creations of the survey, these zones added structure and form to a difficult methodological challenge and enabled operations to proceed in an organized and thorough manner. Each concentration zone was named according to the township or administrative center around which it was organized. Thus, the team visited 13 concentration zones, namely those around the towns of Faya, Kouba, Kirdimi, and Yarda in Borkou department and those around Fada, Gouro, Ounianga Kebir, Bahai, Kalaït, Bao, Kaoura, Ouddai Doum, and Mourdi in the department of Ennedi.

Security conditions prevented any survey activity from taking place in the region of Tibesti and certain localities north of Borkou. Tibesti is known from reliable sources to be affected by the presence of landmines and UXO.

## **FULL ENUMERATION IN LARGER COMMUNES AND THE CAPITAL**

The Impact Survey’s approach also had to be adapted to meet the requirements of working in the large cities, including the country’s capital, N’Djamena. The larger population centers are organized much like the rural areas of Chad with different administrative tiers. These tiers are the:

- City
- Urban District (quartier)
- Neighborhood (arrondissements)
- Neighborhood Block (carré)

In this hierarchy, the neighborhood block was used as the “community” for which the data was recorded. The teams adopted a method of “full enumeration” in order to separate out impacted from non-impacted portions of an affected city. To do this, the survey teams—in addition to executing a community interview on each impacted neighborhood block—would also verify as impact-free other neighborhood blocks and certify those neighborhoods and urban districts thought to be

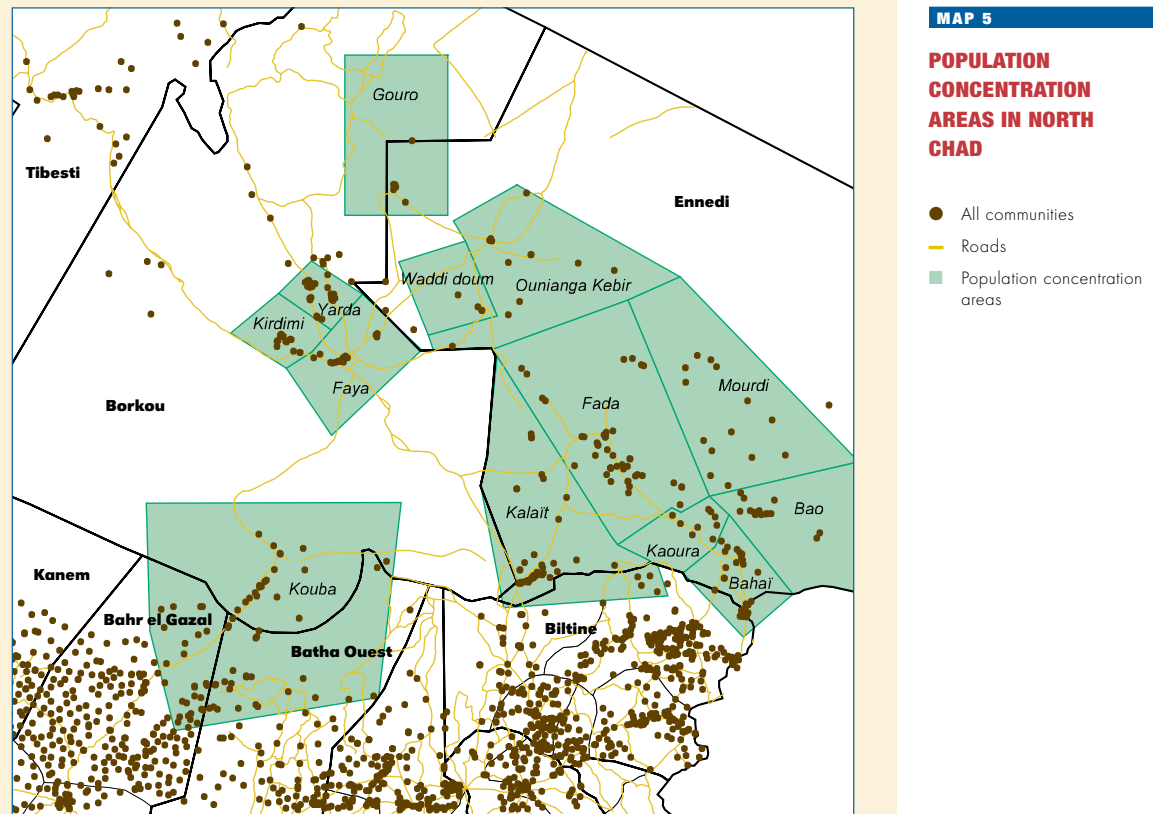
## The use of population concentration zones

The North region of Chad comprises half of the country, and constituted an important challenge for the Impact Survey. Situated in the Saharan zone with precipitation of less than 300 millimeters per year, this immense territory is scantily inhabited. Only 72,500 people live there, according to estimation by the BCR. Access is difficult due to poor condition of tracks in some places, and the absence of roads in others.

These constraints led the coordination team very quickly to conclude that it must adapt its survey method if it were to achieve its goals for data collection in this region. Based on the little information available and on preliminary field experience, the team decided to divide the region into 13 zones, typically organized around an urban center, which played a role in attracting the local people.

The determining factors for a town to attract the population were: the status of being an administrative center, the presence of traditional authorities representing different ethnic groups, and access to certain services such as wells, markets, health centers and a means of communication. In order to take into account the flux in population due to the phenomena of nomadic herding practices, the most important wells were also integrated into the concentration zones to be covered by the survey. This explains the enormity of those zones where pastoral activities are particularly important. (See Map 5).

*(continued on next page)*



In the zones bordering the East and Central regions, these concentration zones did not take into account the administrative divisions of the country. This is particularly true in the zone of Kouba, which encompasses a section of the department of Batha West. The survey accepted the fact that certain impacted communities included in the North region for the purposes of the survey were actually located in other regions.

The concept of a population concentration zone is a new element of the survey method and could be useful in other countries undertaking surveys. Its strength is that it allows a clear delineation of the territory to be covered without putting into question the quality of the coverage obtained during data collection.

mine free. This method is more expansive and thorough than visits to only suspected communities.

To verify a neighborhood block as non-impacted, a team visited the block directly and completed the necessary documentation during an interview with the villagers. The certification process was performed at a higher level, where local authorities would be the ones to certify an entire neighborhood or urban district as being free of contamination by landmines and UXO.

This method was first tested in the city of N'Djamena, which has an official population of 793,893. Ten percent of the national population lives within the boundaries of this one municipality. The size of the population in this city is very seasonal, increasing significantly during the dry season as rural people come to the capital to find employment to support their families. Due to the high concentration of people living in this city and to the fact that city officials are frequently rotated or changed, the team encountered some difficulties in collecting reliable expert opinion. Nonetheless the team was able to certify 417 neighborhood blocks in eight neighborhoods as non-impacted as well as to conduct full community interviews in 11 impacted blocks.

Using the method developed in N'Djamena, all large urban communes were studied using full enumeration. However, the teams verified these communes at the level of the urban district (quartier), rather than at the level of the block. The communes surveyed using this method include: Abéché, Amdam, Am Timan, Ati, Am Zoer, Biltine, Bokoro, Doba, Dourbali, Gama, Guélandeng, Guéréda, Iriba, Koumra, Kyabé, Mangalmé, Massénya, Melfi, Mongo, Moundou, and Oum Hadjer.

The North team also used full enumeration to visit all communities in 11 out of the region's 13 concentration areas because local informants indicated that all localities in these regions were impacted.

## CONCEPT OF SAMPLING FRAME AND DEFINITION OF ITINERARIES FOR TEAMS

Communities were selected for “false negative” sampling in accordance with SAC’s “Landmine Impact Survey Sampling Protocol for High Coverage.” This sampling method, adapted from lot quality assurance practices, was used to test for false negatives among communities thought to be non-impacted. The sampling universe was the set of all non-suspected communities in affected cantons that had not been visited under the systematic reconnaissance or full enumeration methods. False negatives are communities said by local expert informants to be non-impacted, but which are later found to be impacted. False negatives were rare; most informants tended to generate false positives. “True negatives” are those communities believed to be non-impacted and which were visited and confirmed to be so.

The sampling frame was created using dictionaries of villages from the 1993 national census and maps BCR provided to the survey teams for use in surveying each canton. These lists of villages and maps were checked with local authorities when teams first visited a canton, adding new villages, noting villages that no longer existed, and tracking the movement of others. Using these tools, the sampling method ensured that the communities sampled were widely dispersed geographically and gave a good coverage of Chad. The teams visited 54 territorial units during the sampling and, on average, 17 communities per unit were sampled for quality assurance.

If any community sampled for false negatives or indicated during the reconnaissance phase that it was impacted by landmines or UXO, it was surveyed. In addition, the original expert opinion that classified nearby communities as non-impacted was rejected and nearby areas were visited to establish if they were impacted. If, during this process, another false negative were found, then the area around this community would also be visited for verification. The size of the area to be verified around a false negative was based on the local population density. The team selected one of the following area definitions:

- All communities within five kilometers of an impacted community
- The five nearest communities
- All communities, if practical, within the area circumscribed by the four closest sampled-and-found-negative communities

In practice, the reality of fieldwork often demanded that the method used to draw the sample be adapted to the existing conditions in the field. In particular, field teams often had to adapt the criteria used to draw the sampling frame for communities.

These criteria were:

1. *Geographic dispersal to allow for good coverage.*
2. *Size of the population*—if the population was too small, then a decision had to be made whether to replace it with another larger community or to group it with another village nearby.

3. *Safe access to villages along tracks that had been recently used by vehicles in the near past*—this ensured both the accessibility of the community by car and the safety of the teams traveling in areas with mined roads and contaminated areas of potential high risk.

A technical paper attesting to the statistical validity of this process is included on the CD-ROM. Occasionally, the size of the sampling area was smaller than planned due to the difficulty of finding isolated villages. Some villages, once located, had been abandoned by the population due to lack of water.

## **THE TOTAL VISIT AND SURVEY EFFORT**

In total, during all phases of their fieldwork, the teams visited all 28 departments, and 98 sub-prefectures. The only region not examined was Tibesti in the North region. The teams found a total of 23 departments affected, containing 42 affected sub-prefectures and 249 impacted communities. A total of 54 sub-prefectures were visited for the control of false negatives, with only ten communities identified as false negatives being found.

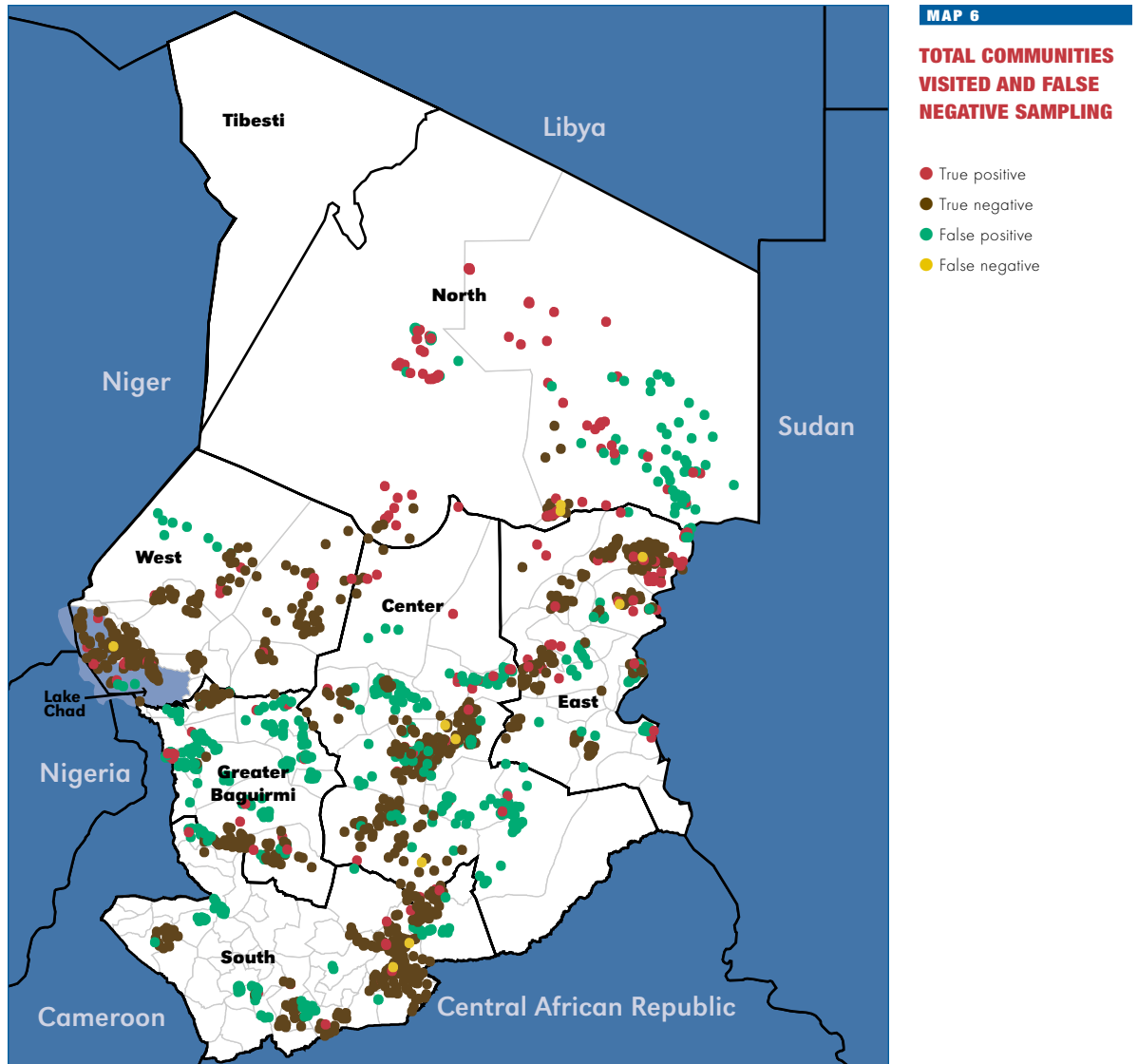
As these figures indicate, the number of communities visited and the total survey effort were considerably larger than the mere number of impacted communities. This is demonstrated in Figure 12 (see page 78) and Map 6 (see next page), which shows impacted communities as red dots. These are greatly outnumbered by the number of false positives (green dots) and the number of sampled communities which were found to be true negatives (confirmed landmine and UXO-free), and which are represented by brown dots.

## **CHANGES FOLLOWING THE MID-CYCLE REVIEW**

Following the Impact Survey's mid-cycle review in December 2000 and six months after initiating data collection, a decision was made with the agreement of SAC to change the method used for sampling in the limited number of remaining communities. Previously, regional supervisors performed systematic reconnaissance of all impacted villages in a given prefecture, and then teams performed a sample from the remaining villages. However, in order to meet project deadlines and in view of the reliability of the expert information collection and systematic reconnaissance performed by survey teams up to that point, it was decided to:

1. Limit the time-consuming sampling method conducted in geographically dispersed villages.
2. Perform systematic reconnaissance in all villages in the immediate vicinity of an impacted village.

This approach proved to be a logical evolution that increased operational efficiency while continuing to ensure high levels of certainty regarding the level of coverage.



## COMMUNITY INTERVIEWS

The data collection activities at the level of the village included two distinct operations by the enumerator teams. The first activity was the administration of the survey questionnaire performed by the enumerators in impacted communities. The second activity was the administration of the verification form for those localities believed to be non-impacted. This second operation was normally carried out by the enumerators but, according to the operational needs or limitations of the teams, was occasionally undertaken by regional supervisors or field editors.

## Demographics of community interviews

Of 246 surveyed communities a total of 3,351 key informants were recorded on the group interview attendance sheets. The vast majority were men, making up 3,128 of the participants. Despite concerted efforts by the teams to broaden involvement, only 223 participants were women. All men and women interviewed were more than 15 years old.

Most participants (2,807) were ordinary community members, such as herders, farmers, home workers, artisans, and merchants. The number of recorded participants per community ranged from four to 21, with 13.6 being the median number.

Thirty-two of the participants described themselves as survivors of mine incidents.

## SEQUENCE OF WORK IN VILLAGE-LEVEL DATA COLLECTION

After receiving their itinerary from the regional supervisor during a regular team meeting, the enumerator teams were deployed to the villages to perform

verification tasks or to administer the questionnaire.

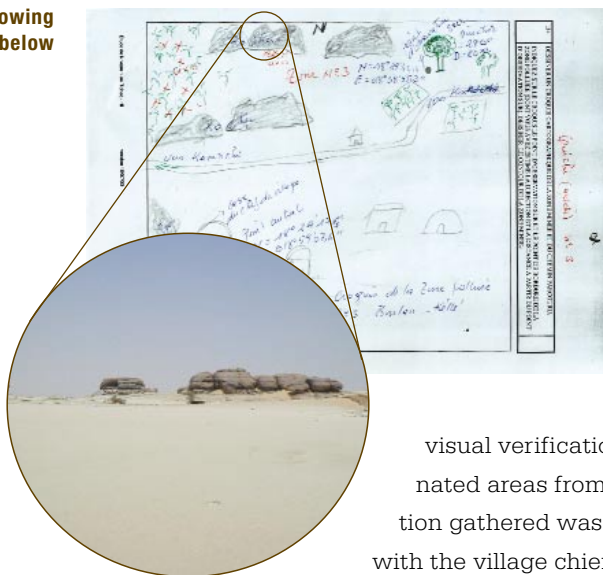
An enumerator team usually performed one community interview per day, and spent most of the day interviewing key informants. The team spent the remainder of the time confirming the information with community members not present during the main interview, and conducting the

visual verification of individual mined or contaminated areas from a safe viewing point. The information gathered was clarified during a final meeting with the village chief.

Each team that went to an impacted village performed the following steps in the administration of a questionnaire:

1. A team of two enumerators would meet with the village chief and other community members, presenting the team and explaining the goals of the day's work. The enumerators then organized a meeting with a small group of local inhabitants who were representative of the village.
2. The enumerators commenced the community interview with a community mapping exercise, asking the villagers to draw a map showing the main features of the village and indicating the location of the mined or polluted areas.

Community map showing mined area pictured below





3. The enumerators then administered the standard survey questionnaire, noting the impacts that blocked livelihood areas, infrastructure, and mine incidents were causing in the community. Within this group discussion, the enumerators tried each time to encourage the attendance and participation of women.
4. After completing the questionnaire, a GPS coordinate of the point considered as the center of the village was taken.
5. The enumerators then performed the visual verification of the mined or contaminated area. Once there, they took the coordinates of a safe viewing point with a GPS unit and one or more photographs of the area. The enumerators also drew a sketch map showing how to access the area, the location of the safe viewing point, the direction of the contaminated zone from this point, and any important or notable features.
6. The enumerator team then analyzed the information already collected and noted any inconsistencies for the final discussion with the village leaders.
7. In the final step, the enumerators returned for a meeting with the village chief with whom they discussed and resolved any contradictions or problems in the information gathered. The team then closed the village meeting and thanked the community and the chief.

In those villages thought to be non-impacted, the enumerators held a meeting with the chief of the village and often a small group of villagers. They used a simple, one-page form to verify that landmines or UXO did not affect that community. Certification of the village was completed when both the village chief and two other community members signed this form.

## **COMMUNITY INTERVIEW QUESTIONNAIRE**

The questionnaire contains four modules that mirror the structure of the relational database (IMSMA) that stores the information. The modules are further subdivided into segments that anticipate the logical flow of conversation. The modular structure of the questionnaire appears in the box, “The Modules and Segments of the Community Interview Questionnaire” (see next page).

## **DEBRIEFING BETWEEN FIELD EDITORS AND ENUMERATOR TEAMS**

Upon returning to their base, the enumerators checked and organized all data collected during the village interviews that day. All forms, maps, and questionnaires would then be handed over to a field editor. As a quality control measure, the editor would review all data, noting ambiguities, incomplete responses, or inconsistencies. During regular debriefing meetings with the enumerators, each field editor discussed the data received. Thus, most of the problems were resolved in the field. If the data were found to be in some way inadequate, the village concerned would be added to a list of communities that were to be revisited and it would be reintegrated into the enumerator teams’ itineraries.

## **The modules and segments of the community interview questionnaire**

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### **Community-level module—Part 1**

- Segment 1: Identification
- Segment 2: Certification
- Segment 3: List of attachments and checking
- Segment 4: Background observations on this community
- Segment 5: Introduction
- Segment 6: Community mapping and mined areas summary
- Segment 7: Historical context
- Segment 8: Total victim numbers

### **Mined-area module (one for each mined area)**

- Segment 9: Reference point, description and size
- Segment 10: Marking, terrain, suspected ordnance
- Segment 11: Impact
- Segment 12: Verification from a safe point

### **Individual victim module (one for each recent victim)**

- Segment 13: Victim descriptors
- Segment 14: Incident and consequences

### **Community-level module—Part 2**

- Segment 15: Victims of less recent date
- Segment 16: Mine action
- Segment 17: End of the meeting
- Segment 18: Observations after the meeting

### **Meeting attendance sheet**

The field editor also used these meetings to verify the impact score for each community, indicating if the impact on the community of landmines or UXO was high, medium, or low. This score was established by giving weights for certain impact indicators: the presence of mines and/or UXO, the socio-economic impact on the community, and the number of recent victims. The experience of the enumerators, their observations and ideas regarding the village, and its problems were also summarized and entered as text into the questionnaire and eventually the database.

## **CODING THE DATA AND FINAL DATA ANALYSIS**

After discussing the data with the enumerators, the field editor's next task was to transcribe the data from the questionnaire onto a coding sheet. The use of the coding sheets was an essential aid in verifying and double-checking the data collected. All data, including verification forms, maps, questionnaires, photographs, coding sheets, and other documentation was then sent on to the coordination team in N'Djamena. Here, the data was rechecked, photocopied as a security measure, and sent on to the database operators.

Data entry operators working for HI used the coding sheets filled by the field editors. This data was entered into the IMSMA database located at HCND in N'Djamena. The Handicap International GIS expert checked their work and authorized modifications to the database through a password-protected computer network. Daily backups were made of the data and regular copies of the data pool were forwarded on to SAC in Washington, D.C.

Before leaving the country, the HI coordination team worked in close collaboration with a technical team from SAC, consisting of a GIS specialist and sociologist. Together they produced the final data analysis and the presentation of the results and began work on the production of a draft national report.

## **COMMUNITY CASE STUDIES**

After data collection was completed in March 2001, a small number of community case studies were undertaken in certain impacted communities. The objectives of these case studies were:

- To balance out the statistical nature of much of the survey data with more personalized testimony from members of impacted communities
- To visualize the contamination history of these villages and subsequent attempts by community members and local authorities to ameliorate it
- To verify some of the central information collected by the enumerators during field work

Communities were selected to represent the diverse range of geography, social categories, and populations present in Chad: one community from the North region of Chad, one from the South, and one from the East. Three communities were visited, all highly impacted by landmines and/or UXO and all with recent victims. Two former regional supervisors, two field editors, and two enumerators were selected to make up two of the teams, which were composed of two women and three men. The teams were selected for their French writing skills, analytical ability, local language ability, and knowledge of the terrain.

The teams received briefings and written guidelines. The teams were equipped with digital cameras and hand-held GPS units. They each spent a minimum of two days in each community, interviewing a cross-section of community members and, without being too intrusive, meeting with mine incident survivors and their families.

All three case studies included people who were not involved in the original survey work in these communities, plus one member of the original team.

The teams performing the community case studies used three different languages: Gorane in the North, Chadian Arabic in the East, and Sara in the South. All three reports were produced originally in French, translated into English, and edited by members of the coordination team.

Three case studies, in both French and English, are included on the CD-ROM.

# Team Leader Report

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## **ANALYSIS OF THE SOCIOECONOMIC IMPACT OF NON-EXPLODED MINES AND MUNITIONS IN CHAD**

*(As translated from the original French, which is included on the CD-ROM)*

In July 1999 I traveled across Chad from west to east for the first time to go to sites contaminated by unexploded ordnance and mines located in the Biltine and Ouaddaï geographic departments. During the course of that trip, our small team, which was commissioned to research the feasibility of the survey, was transported by plane to Faya. During this flight I saw for the first time the vastness of Chad with seemingly endless plains of land, soaked with rainwater during the wet season, as well as immense arid plateaus invaded by sands. Assessing the prospect of conducting an impact survey I was forced to ask, "How is it conceivable to cover such a large territory? How would it be possible to one day state, 'We're finished with it?'" These are the locations affected by the presence of ordnance left by the wars. Here are precisely the problems the populations face in each one of them." At the end of an 18-month project, however, this objective was achieved.

It cannot be reiterated too often that this result is the fruit of a joint undertaking. Several organizations helped make the survey possible. Our Chad partners, particularly the National High Commission for Demining (HCND) which, playing its role as coordinating institution for the national program for action against mines, was able to offer tremendous support to the Handicap International team in the country. This support, including the sharing of key information, equipment, and skilled staff, was invaluable to the success of the project. Among the international partners who contributed to the success of the survey, we'd like to mention the Survey Action Center team which managed to provide tactical support throughout the process. Thanks to the critical eye of its technical advisor in charge of quality assurance, the UNOPS will manage without a doubt to present the results to the certification committee meeting under the aegis of UNMAS. The Geneva International Center for Humanitarian Mine-clearing also deserves its share of the success for developing the IMSMA database software thanks to which the information gathered was able to be systematically formalized and qualified for processing, analysis and dissemination.

A joint undertaking, the survey is, above all, the success of 75 local staff members who participated in this adventure. During the nine months that were required for six regional teams to wrap up the collection of information, courage, endurance and rigor were necessary. More than 400,000 kilometers of dirt roads were traveled. Some towns, inaccessible to the vehicles, had to be reached by camel, on horseback, by pirogue (boat), on bicycle or simply on foot. Day after day, the bivouacs were set up, dismantled and set up again in the cold or the heat, in

the bush, in the villages, in the vicinity of feriks established by nomadic breeders, in school yards, in the middle of the desert or in caves. Thousands of data sheets, forms and notepads were completed. Hundreds of maps and sketches were produced, handled or annotated. The team radios were used for thousands of hours to exchange instructions or progress reports on everything from the routes to be taken to the statistics concerning each community. The team leaders, known as “rhino,” “cabri,” “gazelle,” “ocean,” “tropical,” or “pacific” communicated for hours in all of Chad’s languages to generously provide advice to each other, to support each other or just plain greet each other, across hundreds and sometimes thousands of kilometers. Thanks to their colleagues’ friendliness, some were able to communicate with relatives to whom they had not spoken for several years. Lastly, during the course of hundreds of discussions and group meetings, these teams were tirelessly able to explain the survey process and to establish the bonds of trust with the authorities and the local communities that were absolutely necessary to gather precise information and to gain a full understanding of the situation. In the communities most tried by conflicts, the legitimate mistrust caused by topics able to revive old demons had to be overcome. Also, the means sometimes had to be found to temper the enthusiasm of some inhabitants’ who, excited by the prospect of relief, went as far as proposing to go gather mines and munitions for purposes of explanation. The people of the affected communities in Chad placed a great deal of trust in our teams in order to show, explain, and communicate the dramatic difficulties inherited from past armed conflict. The challenge now is to meet the expectations of local communities and to act upon the information revealed by the survey.

The survey has produced important results that can be summarized in the form of the following recommendations.

1. Mines and unexploded ordnance are scattered throughout the entirety of the country, and the problems their presence causes do not involve only the northern geographic departments. Other departments are severely affected even though the proportion of the population affected is small. This should bring the players to consider interventions that are more spread out and focused as a priority toward concentrations of the towns that are most seriously affected.
2. The number of victims of incidents caused by the presence of mines and munitions remains high despite the age of the contamination, which sometimes dates back more than two decades. In Chad, every two days a person is injured or killed by the explosion of a mine or an UXO. The presence of recent victims in an affected town is an indicator of the difficulties encountered by the population to adapt to the contamination, i.e., to find the means to limit the harmful effects caused by the presence of such devices. This indicator must be taken into account by the national program to define priorities.
3. Unexploded ordnance, not just mines, are the cause of a large portion of the negative effects and difficulties facing the population. Their presence in the immediate vicinity of inhabited areas or on routes taken by the inhabitants

during the course of their activities results in numerous incidents. Handling of non-exploded munitions is presently the primary cause of incidents in Chad. This finding suggests the need to intensify more quickly the actions aiming to “clean” sites where such incidents occur.

4. The northern region of Chad, while recognized as suffering from the impacts of mines, is often not considered suitable for effective mine action. In addition to the logistical difficulties related to putting operations in place in this region, the reason often cited to justify this position is the region's overall low population density (on the order of 0.1 inhabitant per square kilometer). The analysis is incomplete. The ability to quickly achieve results and provide effective aid to the most exposed populations without deploying massive resources is suggested by the following: the concentration of the population living in this region around a limited number of nerve centers, the noted closeness of the contaminated area to these centers, and the prevalence of incidents caused by non-exploded munitions relative to those caused by mines.

The database put in place during the course of the survey represents a formidable analytic tool that opens up new prospects for the national mine action program in Chad. Equipped with this tool, HCND has the means to sponsor a planning process aimed at generating a long term strategic national plan that lists priorities for the coming years and which focuses mine action on overall development objectives. This plan should constitute a new basis for dialog between the government of Chad and its international partners in order to mobilize the resources necessary to finance mine action within the country. Another significant advancement is that the results of the analysis should make it possible to define precise indicators to evaluate the effectiveness of the actions undertaken. Indeed, the possibilities opened up by the analysis of impact survey data and of the IMSMA system are quite significant, whether in support of the information dissemination work, project formulation and management, or simply that of research. Achievement of this potential by HCND will depend on its capacity to integrate the tool in its day-to-day work and proceed with information gathering on all aspects of mine action. Indeed, as reliable as they are, the results of the impact survey are a snapshot of the situation in 2000-2001 and will gradually become obsolete over time if no further updating is undertaken. An essential role of HCND is to continue the efforts started during the survey by proceeding with information gathering, processing and dissemination; whether it is a matter of information concerning incidents, dangerous areas not yet catalogued, results obtained during the technical survey or mine-clearance activities. Among the tasks yet to be accomplished is the pressing need to conduct an impact survey in the geographic department of Tibesti. In the same way, HCND must continue to stay in contact with other organizations that are working to further develop a complete geographic information picture for Chad in order to share and enrich the geographic data the institution has and thus continue to develop its ability to produce maps. The integration and systemization of information management activi-

ties is an essential task of HCND. The full potential of this activity for mine action, as well as for other organizations, requires an open mind set on the part of HCND. The quality and scope of the data gathered and the resulting value of the decision making will depend on the organization's ability to establish with its partners relationships based on the open exchange of information.

The impact survey carried out by Handicap International in Chad provides mine action operators with a strong reference point for the development of future actions. It can be used to define the priority areas for intervention at the local level. Technical surveys may be carried out by relying on the sketches and maps produced during the group meetings, as well as on the information, digital photos and sketch maps recorded during visual observation of dangerous areas. Indeed, these two levels of survey complement each other. The impact survey process places the affected populations in the positions of "experts" in regards to gathering information about the location and nature of perceived areas of contamination. The technical survey process in turn exactly delineates within the hazardous areas indicated by the population the perimeters actually contaminated by mines and UXO. These two levels of survey, the impact survey and the technical survey, allow knowledge to be gained first on the effects of mines and then using this information to prioritize resources in order to gain an exact definition of the problem in the most severely affected areas.

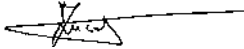
What happens when these two survey processes indicate that distortions exist between the danger as perceived by the local population and actual danger ascertained by the technicians? It is of interest to analyze and understand this type of situation. A perceived danger can indeed have as great an impact as an actual danger, particularly when it is a matter of the presumed presence of mines prohibiting access to a territory and thus to resources. The case encountered during the analysis in the Faya region in the Borkou geographic department seems interesting in this respect. Indeed, the tasks carried out by HELP and HCND to detect minefields in the locations indicated as dangerous by the population at the time of the impact survey seem to have been in vain. One possible explanation for this phenomenon is in the mine-clearing actions carried out in the region in the past, particularly by the French army in 1987, may have addressed the underlying problem in specific locations, yet the population continues to preserve an overall vision of danger. The continued high rate of incidents in and around Faya, no less than 55 persons have been maimed or killed in the last 24 months, undoubtedly continues to fuel the impression of danger. Yet this situation has yet to be analyzed in precise manner, hazardous area by hazardous area, incident by incident, past clearance work by current perceptions. The information and expertise now exist to conduct an in-depth analysis regarding the effectiveness of past mine action and its value to affected communities.

The data contained in the database regarding victims and mine incidents can also serve as another anchor point for future analysis. This sizeable amount of data has yet to be analyzed for use from the perspective of providing aid to victims or incident prevention and sensitizing the public to the danger of mines. The geographic distribution of the incidents, breakdown of victims by age and by sex,



activity at time of incident, and types of wounds suffered by the survivors are all variables requiring a systematic, specialized analysis that can inform and support future mine awareness and victim assistance activities.

Above and beyond our team's success in completing an impact survey using a rigorous set of methodologies in as extreme an environment as Chad and beyond the value of the survey findings per se, the true value of the survey process has yet to be proven. At present, everything depends on how the players manage to utilize the survey findings to put forward concrete actions in order to bring about a Chad that is free from the effects of mines. So let's get to work!



**MARC LUCET**

*Team Leader*

Handicap International

The HI Chad team would also like to thank especially the local staff, without whose hard work the Landmine Impact Survey in Chad could not have been a success. The names of all who participated directly in the Landmine Impact Survey in Chad are also listed below:

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 Ahmat Mahamat Gachimi

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Dionadji Topinanty Brigitte  
 Adoum Mahamat Adoum  
 Yaya Mahamat Outmane  
 Mahamat Abakar Bakari  
 Mahamat Assileck Abakar  
 Aggar Djoua  
 Abdel Aziz Brahim Seid  
 Hassan Faki Adoum  
 Hassan Tchere

##### **South**

Nandjingar Korite  
 Karé Kamso Migna  
 Moutede Doungar Maurice  
 Tamba Tamaya  
 Madjidaye Honorine  
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 Tedebaye Rogoum  
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##### **Members of Administration Team**

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 Adoum Mahamat  
 Ali Moussa  
 Hissein Chidi Mahamat  
 Hissein Koreimi  
 Oumar Goudja

# Items Included on the CD-ROM

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

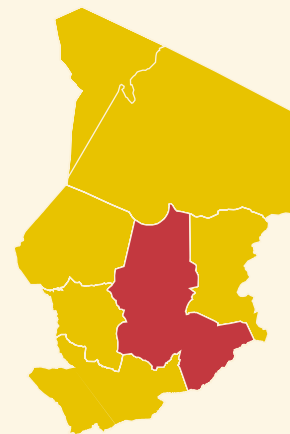
- Fully populated IMSMA database containing all the data collected during the impact survey as well as all tables and queries.
- Three case studies providing a more subjective and descriptive presentation of typical conditions to be found in mine impacted communities in Chad. These case studies were originally written in French by Chadian members of the HI survey team and are provided in both the original version as well as in English translation. Marabé, Bourba and Kouba are the communities profiled in these case studies.
- A technical paper entitled “Explanation on Scoring, Weighting and Classifying Communities.” Written by Dr. Aldo Benini of SAC, this paper explains in detail the method used to determine whether a community is considered to of high, medium or low impact.
- “Estimation of Prevalence of Mine-Affected Localities in Chad” by Dr. Lawrence H. Moulton provides the mathematical justification for the claims made regarding the coverage and completeness of the survey.
- A chapter entitled “Chad, Supporting Analysis” written by Dr. Aldo Benini provides a detailed academic explanation of the analysis and procedures used to reach the conclusions that have been presented in the main report.



# Regional Reports

# Regional Reports

# Center Region



Center

## REGIONAL CONTEXT

- Data collection in the Center took place between 10 October 2000 and 25 February 2001.
- The Center region is composed of the four departments of Guéra, Batha West, Batha East, and Salamat.
- Map 7 (see next page) illustrates the dispersion of affected communities in the Center. As in other regions, they form clusters, most strongly in the sub-prefectures of Oum Hadjer (Batha East), and Mongo (Guéra).

## AFFECTED COMMUNITIES

As Table 32 shows, the survey documented 30 affected communities in 10 sub-prefectures of the Center region. This represents a total of 42,089 people living in communities directly affected by mines and/or UXO. Ninety percent of this population, however, lives in low-impact communities. The only high-impact community in the region is in the sub-prefecture of Yao. Two medium-impacted communities were documented: one in the sub-prefecture of Mangalmé and one in Mongo.

TABLE 32

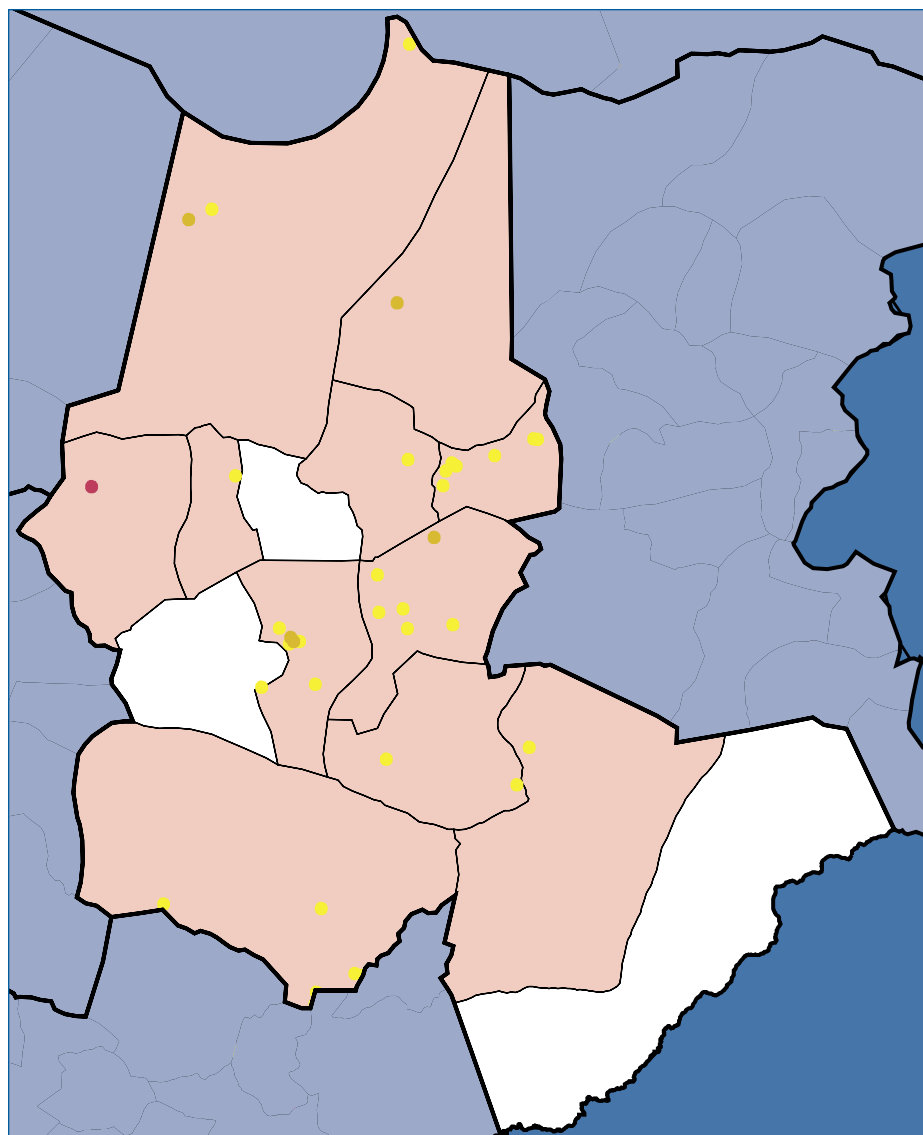
### AFFECTED COMMUNITIES, BY IMPACT CATEGORY

Department	Sub-prefecture	Affected communities			Total affected population
		Low	Medium	High	
Batha East	Assinet	1	0	0	520
	Haraze Djambo Kibit	2	0	0	625
	Oum Hadjer	9	0	0	8,253
Batha West	Ati	1	0	0	750
	Yao	0	0	1	1,500
Guéra	Mangalmé	3	1	0	7,800
	Melfi	2	0	0	90
	Mongo	6	1	0	16,365
Salamat	Aboudeïa	1	0	0	400
	Am Timan	2	0	0	5,786
<b>TOTAL</b>		<b>27</b>	<b>2</b>	<b>1</b>	<b>42,089</b>

MAP 7

**AFFECTED SUB-PREFECTURES AND COMMUNITIES, BY CATEGORY OF IMPACT**

- Impacted sub-prefectures
- Village impact
  - High
  - Medium
  - Low



## Population

The population of the region is mostly composed of agro-pastoralists. The territory is populated in a very uneven manner. The population tends to concentrate around the large urban centers with an administrative status. These centers also feature important local markets and are close to water sources or wadi (used for cultivation during parts of the year). Outside of these population centers, the vast spaces are sparsely populated, and are being used mostly for nomadic herding activities.

The seasonal movement of the population is very important in this region. Although this movement is part of their nomadic lifestyle, this tendency is reinforced during the dry season when males (in particular males between 15 to 50 years old) migrate toward larger urban centers. This seasonal employment allows



them to earn enough hard cash to last until the start of the next agricultural season. During years of drought, such as 2000 and 2001, this phenomenon was accentuated, so that the villages were populated essentially by women and children.

### **Languages and cultures**

The more than 50 ethnic groups that live in this region include the Hadjarayes, Lilala, Kouka, Mesmédje, Bidaya, and the Gorane. These populations share common territory but have a strong tendency to group into communities based on language and custom. Marriage is generally endogamous and often takes place at a young age, particularly for young women. The system is patriarchal and the dominant religion is Islam. Even though many languages are spoken in the region, Arabic remains the dominant language. The survey was always administered in Arabic.

As in other regions in Chad, the canton chiefs have an important power base, especially with regard to judicial power. They are surrounded by elders and counselors chosen by community members.

The canton chiefs are the essential interface between the local population and the state. These functions and titles, in principle hereditary, are sometimes subject to the vote of the community.

The women of the region play an important economic role. They participate in all agricultural tasks, run market stalls and, in pastoral societies, are responsible for the collection, distribution, and treatment of milk. In addition, they assume complete responsibility for managing the communities during periods of transhumance or when the men migrate towards the large urban centers for work.

### **Main economic activities**

The two principal activities of the region are agriculture and herding. Salamat and Guéra are considered the “bread basket” of Chad. The most important product is cereal, in particular sorghum and millet cultivated on rain-fed land. Vegetable cultivation is practiced particularly on low-lying land or in the wadi beds. The cultivation of beans and sesame is also well developed.

Goats and sheep make up the majority of the animal herds, although further north, camel herding becomes increasingly important. Regional trade is primarily in agricultural products and livestock, with imports coming from Libya and from neighboring Sudan.

### **Main concerns of the population**

During the interviews, local communities expressed a number of concerns and preoccupations apart from the specific problems relating to mines and UXO.

These include:

- Access to reliable supplies of potable water
- Food security, particularly because the recent drought raised fears of famine
- Insufficient health care infrastructure

## Difficulties encountered during data collection

The survey teams reported a number of issues and difficulties that specifically influenced the survey process within this region:

- The tracks and roads are often in a very poor state, which adds to travel time and operating costs.
- Distances and travel times between localities are very long.
- Local populations are cautious of outsiders. The subjects of the survey initially constrained discussions, forcing the teams to work slowly and with patience.

## PATTERN OF MINE AND UXO POLLUTION

### Type of contamination

Table 33 shows the type and area of contamination distributed among the sub-prefectures of the region. Three out of four of the reported areas are contaminated by UXO only.

TABLE 33

### AFFECTED COMMUNITIES, BY MUNITIONS TYPE

Department	Sub-prefecture	Type of munitions			Total estimated surface (sq m)
		Mines only	Mines & UXO	UXO only	
Batha East	Assinet	0	0	1	80,000
	Haraze Djambo Kibit	0	0	2	3,000,000
	Oum Hadjer	1	0	10	2,012,105
Batha West	Ati	0	0	1	9,600
	Yao	0	0	1	12,000
Guéra	Mangalmé	1	0	5	272,915
	Melfi	1	0	1	460,000
	Mongo	5	0	10	2,224,063
Salamat	Aboudeïa	0	0	1	9
	Am Timan	2	0	1	303,004
<b>TOTAL</b>		<b>10</b>	<b>0</b>	<b>33</b>	<b>8,373,696</b>

### Main contamination sites

Numerous successive conflicts took place in the region between 1969 and 1990. By period, the sub-prefectures most affected are:

- 1969                    Mangalmé
- 1978-1979          Am Timan, Mangalmé, and Oum Hadjer
- 1980-1983          Haraze Djambo, Oum Hadjer, Ati, Mangalmé, Melfi, Mongo, and Am Timan

- 1985-1988 Melfi and Mongo
- 1990 Oum Hadjer, Mangalmé, and Aboudeïa

Most of the contamination left by these conflicts is UXO, although it is suspected that some areas are mined. Contaminated areas in this region fall into three general categories:

#### BATTLEFIELDS

Most of the contamination in the region is caused by UXO scattered across former battlefield areas. The major part of the contaminated areas documented by the survey resulted from engagements from 1980-1983. The other periods of conflict resulted in low levels of contamination, either because the combat was of low intensity, such as in 1978 and 1985-1988, or because the conflict was within an area of limited size, as in 1990.

#### MUNITIONS MAGAZINES AND UXO CACHES

Point sources of high-density contamination were created when the local population collected UXO and abandoned munitions after the conflict ended. In the town of Oum Hadjer, capital of Batha East, two munitions magazines were created at the initiative of local authorities. Both of them are situated in the center of town and represent an ongoing hazard for local populations. The survey identified three other such caches.

#### MINED AREAS

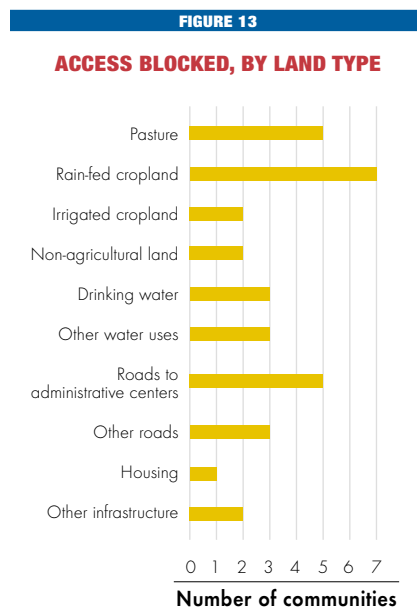
Reports indicated that there are ten localities in the region where AT mines were used to block a road or track. This kind of pollution is the result of guerrilla action from 1980-1983. The five sub-prefectures affected by this phenomenon are: Oum Hadjer in the department of Batha East, Am Timan in Salamat, and Mangalmé, Melfi, and Mongo in Guéra.

## IMPACT ON COMMUNITIES

### Main blockages

Seven communities reported blocked access to rain-fed cropland and five reported blocked pastureland. The effect of such blockages on the community is generally limited due to the vastness of the territory and the range of readily available alternatives.

Eight communities reported blocked road access, either roads to administrative centers or secondary tracks to adjacent communities. In certain localities, these blocked roads are in close proximity to housing areas and



## The case of the former route leaving from Ati south towards Mongo

In April 1999, one of the survey teams was sent to Ati to test the survey tools. During interviews with the local experts, one of the zones initially identified as mine-affected was a 30-kilometer stretch of road south from Ati to Mongo. The investigation discovered, however, that the actual effects were much less severe than described.

The survey team traveled parallel to the contaminated road to approach villages from the unaffected side. In village after village, the verification process found that different sections of the road were in fact unaffected. It was not until the team reached the locality of Amsawassil, located eight kilometers to the south of Ati, that any negative consequences were reported specifically when one mine had exploded in 1981, destroying a military vehicle, and year later, a mine explosion killed a village young boy and his horse. No other contamination was suspected by the people who use the neighboring land for cultivation or for pasturing their animals. Later, the team discovered that the road was regularly used since the beginning of the year by a vehicle of a school cafeteria and that the inhabitants of the localities along this route were using the road again to bring their animals to market. When asked how this change came about, the people described how military vehicles had passed by in 1999. Through further investigation, the team deduced that a Franco-Chadian EOD team had performed a reconnaissance on this axis looking for mines.

If this experience reveals some of the particular difficulties in the region, it also demonstrates the need for urgent technical survey *and for all agencies involved in mine action to adequately communicate to local populations the outputs of their efforts.*

population centers, increasing the risks to local inhabitants. The abandonment of certain sections of roads can range from a marginal problem that is easily solved by creating a short detour, to a major problem in which community phobias cause an entire roadway to be avoided, and the process of enclavement (isolation) made more pronounced.

Blocked access to water resources constitutes the next most important problem for local populations. Six localities reported a problem with water: three for drinking water sources and another three for water for animals, washing laundry, and other uses. In five affected communities in the region, munitions were thrown down wells making them unusable. Four of these wells were improved variants and their loss has been profound, forcing a return to less reliable traditional wells.

Residents of two communities mentioned the blockage of land set aside for irrigated agriculture. Because such high value land is scarce, this blockage is particularly harmful. In certain cases, survey teams also documented the loss of animals due to incidents with mines and/or UXO, although this data is not included in Figure 13.

## Victims

Map 8 shows the number of recent victims and affected population by sub-prefecture.

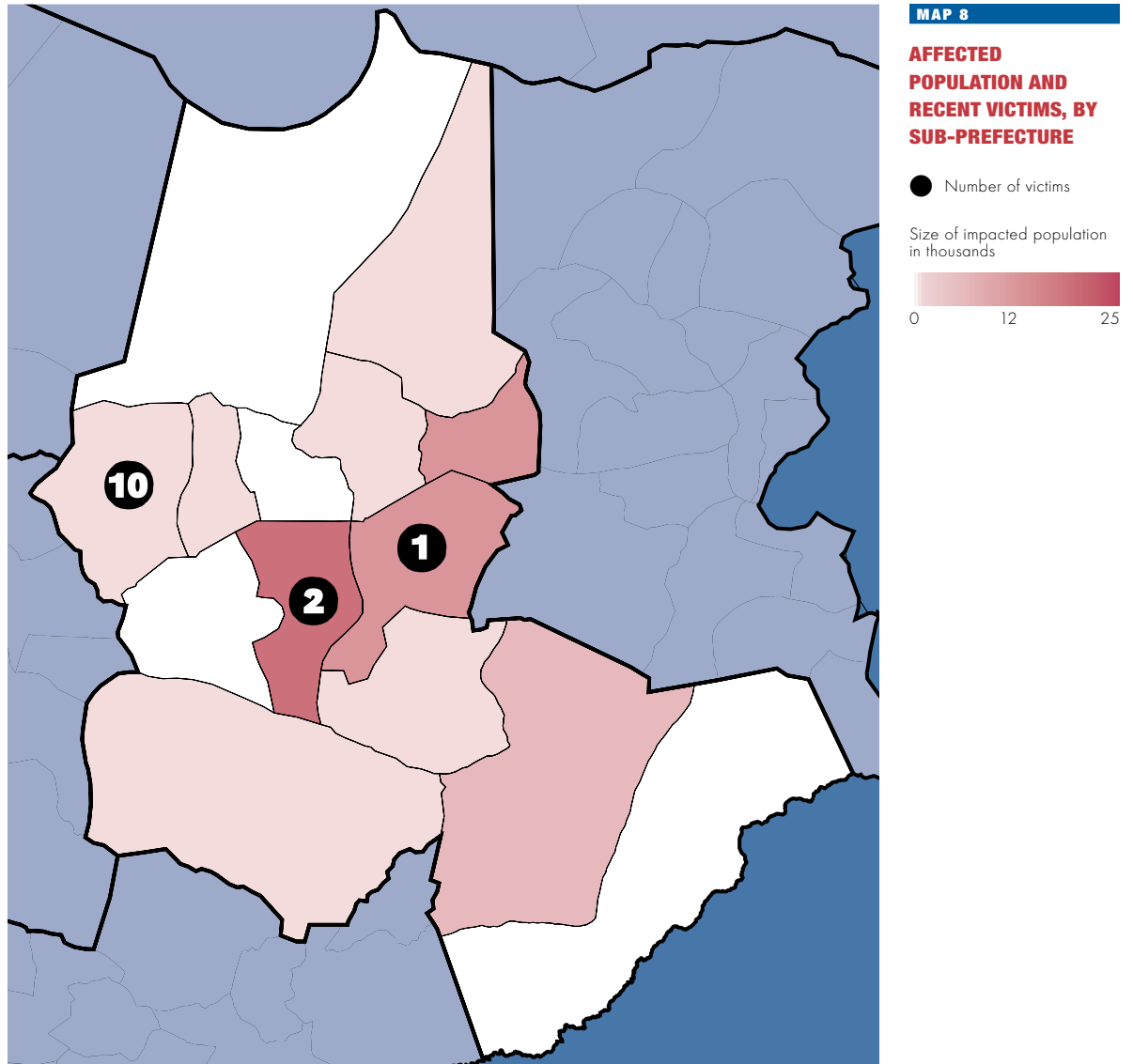


Table 34 (see next page) shows all victims by sub-prefecture for the Center region. As in other regions in Chad, a large number of victims were involved in incidents more than two years ago. A number of sub-prefectures that had incidents previously now reported one, two, or no recent victims at all. This is very much the case in Mangalmé, which had 61 victims documented for the period prior to two years ago, yet could identify only one recent victim. A very significant break in this trend occurs in the sub-prefecture of Yao, which experienced ten recent victims.

TABLE 34

## ALL VICTIMS, BY DATE OF INJURY

Department	Sub-prefecture	Recent victims		Earlier victims		All victims	
		Victims	Communities involved	Victims	Communities involved	Victims	Communities involved
Batha East	Assinet	0	0	10	1	10	1
	Haraze Djambo Kibit	0	0	7	1	7	1
	Oum Hadjer	0	0	17	5	17	5
Batha West	Ati	0	0	0	0	0	0
	Yao	10	1	1	1	11	1
Guéra	Mangalmé	1	1	61	3	62	3
	Melfi	0	0	11	2	11	2
	Mongo	2	1	33	5	35	5
Salamat	Aboudeïa	0	0	0	0	0	0
	Am Timan	0	0	1	1	1	1
TOTAL		13	3	141	19	154	19

TABLE 35

## RECENT VICTIMS, BY AGE AND GENDER

Age ranges	Male	Female	Total
5-14	8	0	8
15-29	3	1	4
30-44	1	0	1
TOTAL	12	1	13

Table 35 clearly shows that the overwhelming majority of the victims were young males, mostly of school age.

## Main causes of incidents

The presence of UXO in direct proximity to inhabited areas or on routes used during herding activities constitutes the major risk factor for the affected populations. As in other regions of Chad, the main cause of incidents is the tampering and manipulation of UXO by children or young people, in particular, young shepherds and goatherds. In the Center region, 11 victims, all male, were reportedly tampering with dangerous devices at the time of the incident.

## Past mine action

To date, mine action activities in the region have been very limited. There have been interventions involving clearance or reconnaissance activities under the auspices of Franco-Chadian military cooperation. These activities include the destruc-

TABLE 36

## RECENT VICTIMS, BY MILITARY STATUS, ACTIVITY AT TIME OF INCIDENT, AND GENDER

Activity	Male	Female	Total
Military	0	0	0
Civilian	12	1	13
Tampering	11	0	11
Collecting food/water	1	0	1
Household work	0	1	1
TOTAL	12	1	13

tion of a UXO depot in 1999. Local populations have undertaken various efforts to mark dangerous areas using rocks and branches or to collect and/or bury UXO in “safe” places.

## IMPLICATIONS FOR MINE ACTION

### Type of devices and surfaces

Table 37 shows the distribution of the contaminated areas based on the munitions type.

Thirty-three of the areas are contaminated by UXO only, with a total estimated surface area of nearly eight square kilometers. Another ten areas are reportedly mined, with a total surface area of 517,600 square meters. All of the mines reported are AT mines that are used to block roads in the region.

Type of pollution	Contaminated areas	Contaminated surface (sq m)
AP only	0	0
AP, AT only	0	0
AP, AT, UXO only	0	0
AP, UXO only	0	0
AT only	10	517,600
AT UXO, only	0	0
Unknown	0	0
UXO only	33	7,856,096
<b>TOTAL</b>	<b>43</b>	<b>8,373,696</b>

### Vegetation and terrain profile

Significantly, nearly two thirds of the contaminated areas were reported to be less than 10,000 square meters in size. Sixteen out of 42 areas have no vegetation or only short grass. The majority of the areas consist only of flat land.

Contaminated area (sq m)	Type of munitions					Vegetation					Ground profile				Total	
	AP only	AT only	AT & AP	UXO only	Mines & UXO	None	Short grass	Tall grass	Bushes & trees	Other	Unknown	Flat land only	Wadis, hillsides or ridges	Other		Unknown
Less than 10,000	0	6	0	21	0	6	7	5	8	1	0	15	9	1	2	27
10,001 - 100,000	0	2	0	3	0	0	1	1	3	0	0	4	1	0	0	5
100,001 - 500,000	0	2	0	4	0	0	0	5	1	0	0	5	1	0	0	6
500,001 - 1,000,000	0	0	0	2	0	0	0	1	1	0	0	1	1	0	0	2
1,000,000 - 5,000,000	0	0	0	2	0	0	2	0	0	0	0	1	1	0	0	2
More than 5,000,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>32</b>	<b>0</b>	<b>6</b>	<b>10</b>	<b>12</b>	<b>13</b>	<b>1</b>	<b>0</b>	<b>26</b>	<b>13</b>	<b>1</b>	<b>2</b>	<b>42</b>

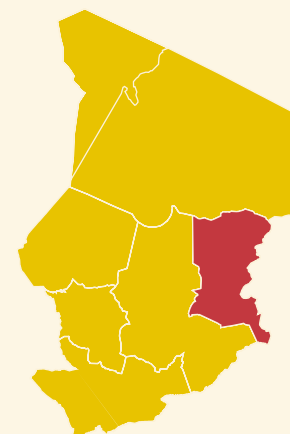
## PLANNING CONSIDERATIONS

The survey findings suggest a number of planning considerations for the future composition and deployment of mine action resources in the region.

- The clustering of affected communities in close proximity to one another should form the basis for the allocation of mine action resources.
- The sub-prefecture of Yao, with high numbers of recent victims, requires immediate intervention.
- Technical survey and route reconnaissance should take place along affected roads. Most notable are those sections that are reported to be causing particular hardship during the wet season. These include Oum Hadjer in Batha East, Am Timan in Salamat, and Mangalmé, Melfi, and Mongo in Guéra.
- Rehabilitation and prosthetics services need to be designed to be viable in an area with very limited pre-existing health facilities and a large number of isolated communities.
- Since the pollution is so dispersed and the population is already aware of the problem, the mine risk education program for the Center region should be focused only on the most at-risk groups and behaviors.



# East Region



## REGIONAL CONTEXT

- Data collection in the East region took place between 10 October 2000 and 25 February 2001.
- The East is made up of the entire Ouaddaï geographic region, which is comprised of the departments of Assongha, Biltine, Ouaddaï, and Sila.
- Map 9 (see next page) gives an overview of the situation in the East region regarding mines and UXO contamination. The map clearly shows that contamination is especially strong in the sub-prefectures of Iriba, Guéréda, Arada, and Biltine.

## AFFECTED COMMUNITIES

As Table 39 shows, the survey found 51 communities in nine sub-prefectures with a total population of 62,595 affected by the presence of mines and UXO. The sub-prefecture of Iriba is the most adversely impacted in the region with more than one third of all identified impacted communities and nine out of ten communities listed as being highly impacted.

TABLE 39

### AFFECTED COMMUNITIES, BY IMPACT CATEGORY

Department	Sub-prefecture	Affected communities			Total affected population
		Low	Medium	High	
Assongha	Adré	2	0	0	225
Biltine	Arada	2	0	0	2,500
	Biltine	4	1	0	4,920
	Guéréda	4	2	1	6,532
Ouaddaï	Iriba	11	2	9	24,710
	Abéché	4	2	0	17,858
	Chokoyan	4	0	0	4,250
Sila	Addé	1	1	0	700
	Goz Beïda	1	0	0	900
<b>TOTAL</b>		<b>33</b>	<b>8</b>	<b>10</b>	<b>62,595</b>

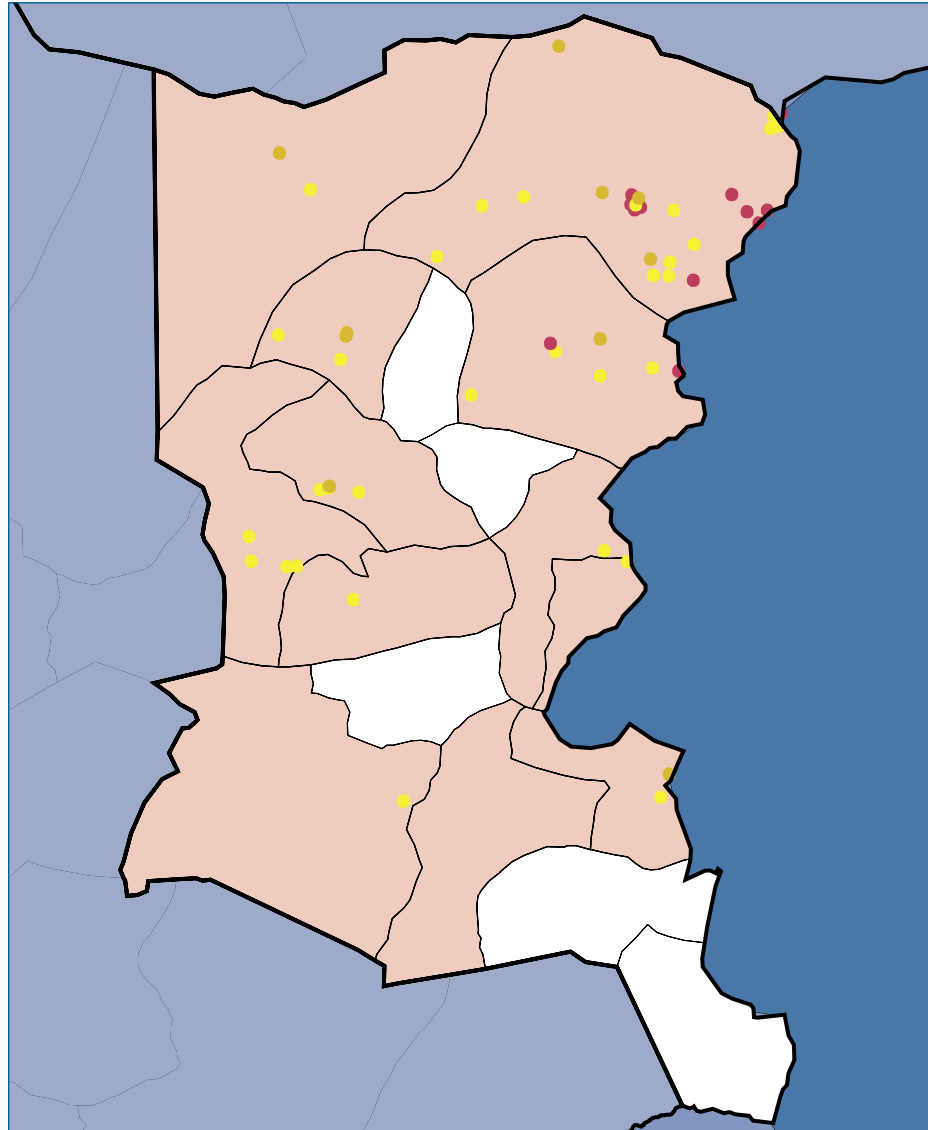
## Population

The department of Ouaddaï is the most populated in the region. The city of Abéché serves as the commercial center in the East and is an obligatory stop for traders or others traveling from Chad to Sudan.

MAP 9

**AFFECTED  
SUB-PREFECTURES  
AND COMMUNITIES,  
BY CATEGORY OF  
IMPACT**

- Impacted sub-prefectures
- Village impact
  - High
  - Medium
  - Low



Heading towards Biltine, the population density diminishes as natural conditions become more and more like that of the Sahara in the north. In the south of the region, the population density is the highest, and herding activities and rain-fed agriculture are dominant activities.

The population of this region is mostly rural and is composed principally of sedentary farmers. A significant portion of the population is nomadic for all or part of the year. In general, the rains regulate the seasonal movements of the population. In November, the herds move south, and return north along the same routes in May or June.

Certain areas in the region become totally isolated during the rainy season, a process often referred to as “enclavement.” After a period of heavy rainfall, agricultural activities are impeded, and the absence of viable routes and methods of communication intensifies the villages’ isolation. This situation causes the con-

cerned populations to migrate before the rainy season begins, and seriously limits the growth of the local economy.

## Languages and cultures

The principal ethnic groups by department are:

- *Ouaddaï*: Ouaddaïan and Arab ethnic groups make up the majority, along with Arab-Zhagawa nomadic communities that are dispersed throughout the territory and administered under the nomadic sub-prefecture of Abougoudam. The Dadjo ethnic group is concentrated in the sub-prefecture of Amdam and the Massalat dwell mostly in the sub-prefecture of Amdam.
- *Biltine*: The Mimi and the Ouaddaïan groups form the majority; the Tama are concentrated in the sub-prefecture of Guéréda; the Zhagawa in the sub-prefecture of Iriba and nomadic Arabs in the sub-prefecture of Arada.
- *Sila*: The Ouaddaïan and the Massalat groups are the majority.
- *Assongha*: The Massalat form the majority group.

Apart from nomadic Arabs and other groups coming from the north, the populations of this region are principally sedentary. Arabic is the main language and tends to supplant Ouaddaïan. The survey in this region was administered principally in Arabic, but at times in Zhagawa. Islam is the predominant religion of the region.

The dominant social organization is a patriarchal one. Women are generally limited to household tasks or have tasks linked to herding, in particular the treatment and sale of milk. Particularly in nomadic groups, young girls of the community are responsible for guarding the herds. In the more sedentary societies, women participate equally in agricultural activities. In the sub-prefecture of Iriba, Zhagawa women are responsible for a major part of the commercial activities, even large-scale trade in goods. Women can also be the primary property owners.

## Main economic activities

Agriculture is the primary economic activity; millet and sorghum are cultivated during the raining season from September to December. The principal agricultural zones are in the sub-prefectures of Amdam and Goz Beïda.

Animal herding is the second main activity and is practiced in the whole region. The largest pasturelands are in the sub-prefectures of Goz Beïda, Adré, and Guéréda. Nomadic communities tend two thirds of the animals, including beasts entrusted to their care by sedentary farmers and merchants based in the population centers.

A major portion of Chad's trade with Libya and Sudan passes through the trading towns of the East. Animals raised in Chad leave the markets of Abéché, Biltine, Tiné, and Adré. In return, cooking oil, sugar, plastics and textiles are brought in from Sudan, and petroleum products arrive from Libya.

## Main concerns of the population

During the interviews, local communities expressed a number of concerns and preoccupations apart from the specific problems relating to mines and UXO.

These include:

- The lack of water for drinking and for watering animal herds
- The lack of medical and educational infrastructure
- The lack of reliable roads during the rainy season
- The theft of animals, increasing insecurity, and armed bandits

## Difficulties encountered during data collection

The survey teams themselves reported a number of issues and difficulties that allow the findings of the work in this region to be put in a more specific context.

- Access to certain zones, particularly areas in Iriba and Guéréda, was particularly difficult due the absence of viable tracks.
- The low rainfall during the wet season in the year 2000 resulted in the temporary migration of normally sedentary populations. It was not uncommon that localities suspected to be affected by mines and UXO were deserted by the population at the time of the survey, particularly in the sub-prefecture of Iriba. This, at times, forced the survey teams to go looking for the relevant community, to administer the questionnaire in a location some distance from the actual affected locality, and return afterwards to perform the visual observation of the contaminated areas.
- During the time the survey was conducted in the East, many of the males had left the region to seek temporary employment in the cities or were engaged in nomadic transhumance. As a result, it was difficult to establish a rendezvous with certain communities, to hold group interviews, and to undertake visual observation of the contaminated areas.

## PATTERN OF MINE AND UXO POLLUTION

### Type of pollution

The pollution discovered in the East shows a clear distinction between land that is contaminated only by UXO and only by mines. Sixty-two out of 93 contaminated areas identified in the East are affected by UXO only.

As stated in Table 40 (see next page), the highest density of contamination is found in the sub-prefecture of Iriba; two-thirds of these areas are contaminated by UXO. The estimated surface areas of the contaminated zones in Iriba alone make up 88 percent of the region's total. Another 29 communities report being contaminated by mines and two by both mines and UXO.

TABLE 40

## AFFECTED COMMUNITIES, BY MUNITIONS TYPE

Department	Sub-prefecture	Type of munitions			Total estimated surface (sq m)
		Mines only	Mines & UXO	UXO only	
Assongha	Adré	2	0	0	15,900
Biltine	Arada	0	0	2	100,000
	Biltine	0	0	9	6,892,560
	Guéréda	2	1	4	259,800
	Iriba	10	1	39	63,640,254
Ouaddaï	Abéché	7	0	7	199,555
	Chokoyan	3	0	1	630,320
Sila	Addé	4	0	0	58,824
	Goz Beïda	1	0	0	900,000
<b>TOTAL</b>		<b>29</b>	<b>2</b>	<b>62</b>	<b>72,697,213</b>

## Main contamination sites

Between 1978 and 1990, this region was the theater for successive conflicts, made up of large-scale battles for control of the terrain. By period, the sub-prefectures or communes most affected were:

- 1978-1979 Arada, the communes of Abéché and Biltine
- 1980-1981 Abéché, Arada, Amdam, Biltine, Guéréda, and Iriba
- 1981-1982 Adré, Arada, Guéréda, Iriba, and the commune of Biltine
- 1989-1990 Abéché, Adré, Guéréda, and Iriba

## BATTLEFIELDS

Today, few traces remain of the first three periods of conflict. This can, in part, be explained by a UXO collection campaign organized during the 1980s by the local authorities and communities. However, the contamination left in the fields during the last conflict in the region is important. This is, no doubt, linked to the number of battles and to the intensity of the combat at the time. Part of the contaminated land resulting from these conflicts is located to the north, around the area of Bahaï. However, for linguistic, ethnic, and operational reasons the regional team of the North surveyed this area.

## CONCENTRATIONS OF UXO AND OF ABANDONED MUNITIONS

The survey recorded numerous sites where munitions had been abandoned during conflict or collected by local communities after hostilities ceased. In 1990, large amounts of arms and munitions were abandoned, not only in special caches, but also on the roads or in population centers. The larger munitions and UXO deposits were found in towns, usually the capitals of departments or sub-prefectures or in former military camps. Such repositories exist in the towns of Arada, Amdam, Am Zoer, Biltine, Guéréda, Goz Beïda, and Iriba. The direct socio-economic impact of these sites is, in general, hard to predict, but it is clear that

having such large quantities of unstable and unsecured munitions situated within major population centers poses a long-term hazard to the community.

### FIRING RANGE

The presence of a firing range in the sub-prefecture of Abéché directly affects two localities and contributed to four recent incidents caused by persons tampering or collecting scrap from the range.

### MINED AREAS

One third of the contaminated areas in the East are minefields that were emplaced in order to protect the military base at Chigui Obina in the sub-prefecture of Iriba and to restrict movement on roads. There is significant contamination by AT mines that were laid between 1978 and 1981. The survey did not receive any reports of mines being laid after 1981.

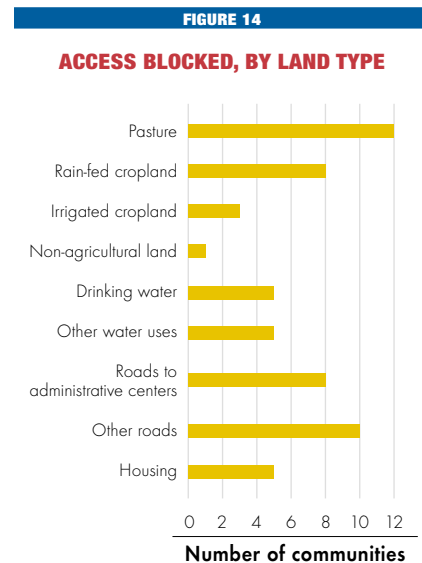
## IMPACT ON COMMUNITIES

### Main blockages

Figure 14 shows the number of communities that report blocked access to a resource. Communities mostly reported problems relating to access to pastureland (21 percent), roads and tracks (17.5 percent), and rain-fed crops and roads to administrative centers (both 14 percent). Blocked access to other resources such as drinking water, housing, and other water sources was reported less often (8.7 percent). Only three communities reported blocked access to irrigated cropland. Irrigation systems are rare in Chad, so the loss of access to such high-value areas is of great concern to the affected communities.

For the 29 areas reported during the survey as mined, the main resources blocked are roads, pastureland, and non-agricultural land. The population has adapted to these mined areas by creating detours of several hundred meters around suspected road contamination and by avoiding other mined areas all together.

In the urban settings, mines and UXO did not pose any significant blockages to current activities, but many communities indicated that future expansion plans were constrained due to the presence of half-destroyed munitions magazines. Inhabitants of affected localities sometimes mentioned the loss of animals, but the phenomenon appears to be limited.



## Victims

Map 10 shows the distribution of recent victims and affected populations by sub-prefecture in the East region of Chad. It can clearly be seen that most affected populations and most of the victims live in the department of Biltine, notably in the sub-prefectures of Arada, Biltine, Guéréda, and especially, Iriba. Abéché sub-prefecture in the north of the department of Ouaddaï is also a distinct area, with high numbers of recent victims. Interestingly, the sub-prefecture of Abougoudam, which stands out in Map 9 for its abundance of impacted communities (that is, socio-economic blockages), does not have any recent victims.

The number of recent victims and the number of incidents more than two years old documented by the survey show that the risk of death or injury by mines and/or UXO is high in certain communities in the region. In addition, a very high number of incidents were reported to have occurred more than two years prior to the survey.

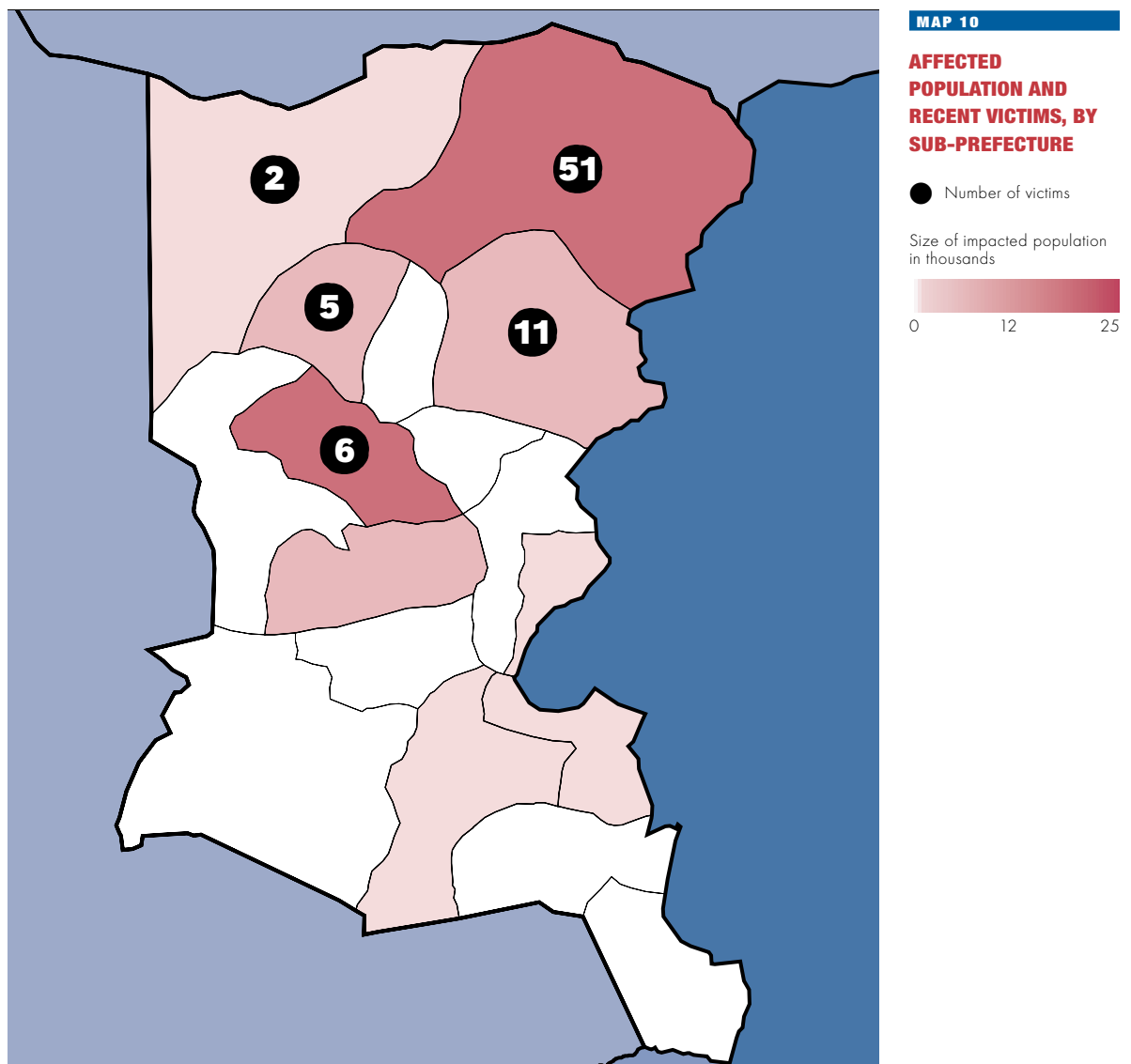


TABLE 41

## ALL VICTIMS, BY DATE OF INJURY

Department	Sub-prefecture	Recent victims		Earlier victims		All victims	
		Victims	Communities involved	Victims	Communities involved	Victims	Communities involved
Assongha	Adré	0	0	11	1	11	2
Biltine	Arada	2	1	18	2	20	2
	Biltine	5	2	30	4	35	5
	Guéréda	11	3	21	4	32	5
Ouaddaï	Iriba	51	12	131	14	182	16
	Abéché	6	2	13	3	19	4
Sila	Chokoyan	0	0	7	1	7	1
	Addé	0	0	21	2	21	2
	Goz Beïda	0	0	0	0	0	0
<b>TOTAL</b>		<b>75</b>	<b>20</b>	<b>252</b>	<b>31</b>	<b>327</b>	<b>37</b>

The sub-prefecture of Iriba stands out in Table 41 as the area with the most mine incidents. Iriba had 182 of the 327 incidents recorded and contains nearly half of the communities reporting victims. The sub-prefectures of Guéréda (11 recent victims) and Abéché (six recent victims) are two other areas notable for their very high incident rates.

Interestingly, both the sub-prefectures of Arada and Biltine had significant numbers of victims prior to the last two years. Biltine had 30 (nearly 12 percent) and Arada had 18 victims (seven percent) out of a total of 252. This suggests that the problem is an old one and that either the population now avoids these areas or, somehow, the mines have been cleared or the situation improved, possibly through local initiatives.

As Table 42 shows, nearly all the recent victims in this region were male (87 percent), and more than half were between 15 and 29 years old. One third of all recent victims were between 5 and 14 years old, and most of these also were male (88 percent). This follows the general national trend regarding the age and sex of victims.

TABLE 42

## RECENT VICTIMS, BY AGE AND GENDER

Age ranges	Male	Female	Total
5-14	22	3	25
15-29	34	7	41
30-44	6	0	6
45-59	1	0	1
60 and above	2	0	2
<b>TOTAL</b>	<b>65</b>	<b>10</b>	<b>75</b>

## Main causes of incidents

The frequency of incidents, in particular at the beginning of the 1990s, appears to have heightened public awareness of the problem. Some communities in Iriba claim that every household has had at least one family member or friend injured or killed by a mine or UXO explosion. However, even this level of direct experience has not been enough to curtail all dangerous behaviors.



Table 43 outlines the activities of victims at the time of the incident. This table highlights the threat characteristics and behaviors that put local citizens at risk.

The tampering and manipulation of UXO accounted for nearly two thirds of incidents. Such behavior is thought to be caused by a cavalier attitude on the part of males who are accustomed to handling arms and munitions or to recovering scrap metal for sale or for fabrication of household utensils.

Many instances of tampering are associated with daily herding activities. Herders are constantly on the move and have greater opportunities to discover and interact with UXO and mines.

UXO is often used for domestic purposes such as hobbling animals, immobilizing vehicles, or for construction.

### Past mine action

Formal mine action activities in the region have been very limited. Certain urban areas have been informally decontaminated through the collection and concentration of discarded munitions and UXO. This changes but does not eliminate the nature of the threat. Local initiatives also include informal marking, using branches and rocks, of contaminated areas.

## IMPLICATIONS FOR MINE ACTION

### Type of devices and surfaces

The number of contaminated areas and the estimated size of these areas are displayed in Table 44. According to the data collected by the survey teams, the most significant type of contamination is

by UXO of various types. This category accounts for more than two thirds of the

TABLE 43

#### RECENT VICTIMS, BY MILITARY STATUS, ACTIVITY AT TIME OF INCIDENT, AND GENDER

Activity	Male	Female	Total
Military	0	0	0
Civilian	65	10	75
Tampering	39	7	46
Herding	12	0	12
Travel	6	1	7
Household work	0	2	2
Farming	1	0	1
Playing	1	0	1
Other	5	0	5
Unknown	1	0	1
<b>TOTAL</b>	<b>65</b>	<b>10</b>	<b>75</b>

TABLE 44

#### CONTAMINATED AREAS, BY CLASS OF MUNITIONS

Type of pollution	Contaminated areas	Contaminated surfaces (sq m)
AP only	7	930,310
AP, AT only	2	50,300
AP, AT, UXO only	0	0
AP, UXO only	1	250,000
AT only	20	21,606,619
AT UXO, only	1	250,000
UXO only	62	49,609,984
<b>TOTAL</b>	<b>93</b>	<b>72,697,213</b>

## Former military camp in the locality of Mabrouka on the route Iriba-Sessisba, East region

In the East region of Chad, UXO and unused munitions have been abandoned in plain view and close proximity to a number of townships. The case of the community of Mabrouka in the sub-prefecture of Iriba is representative of the type of danger to which the local population is exposed.

Near Mabrouka is an area known locally as the "military camp." This area more closely resembles a cemetery for abandoned vehicles than an organized camp. It contains a collection of abandoned tanks, armored cars, and the carcasses of both light and heavy military transports. Munitions are scattered all around and in some cases stacked intact on shipping trays. Vehicles and nomads use a path that crosses through this junkyard.

Mabrouka is only two kilometers from the camp. Within Mabrouka is a Koranic school where children between eight and 15 years old come from Iriba and other villages in the

region to study. The students residing at the Mabrouka school often venture into the surrounding area to search for firewood, collect donations for the school, or just for pleasure. Many incidents occur during such expeditions. Throwing stones, climbing up on the carcasses of vehicles and tampering with dangerous objects have caused three incidents during the last two years. These incidents have accounted for seven victims, all males, two of whom were between the ages of 5 to 14. The HI team collected eyewitness accounts concerning victims of incidents that occurred more than two years ago, which involved 12 additional victims, seven of them deceased.



Abandoned military vehicle and munitions

total number of contaminated areas and 94 percent of the estimated contaminated surface area in the region. Anti-tank mines are also an important category, accounting for 20 mined areas and more than 21 square kilometers of minefields.

### Vegetation, terrain profile, and nature of soil

Table 45 (see next page) shows the contaminated areas by type of munitions, vegetation, terrain, and nature of the soil. All of these are important factors to be considered when planning mine clearance and EOD activities. The majority of con-

TABLE 45

## CONTAMINATED AREAS, BY EXTENT AND TYPE OF POLLUTION AND TYPE OF LAND

Contaminated area (sq m)	Type of munitions					Vegetation						Ground profile				Total
	AP only	AT only	AT & AP	UXO only	Mines & UXO	None	Short grass	Tall grass	Bushes & trees	Other	Unknown	Flat land only	Wadis, hillsides or ridges	Other	Unknown	
Less than 10,000	5	16	1	36	0	8	12	9	26	3	0	32	22	1	3	58
10,001 - 100,000	1	2	1	8	0	0	1	4	6	1	0	5	7	0	0	12
100,001 - 500,000	0	0	0	6	2	0	4	2	2	0	0	3	5	0	0	8
500,001 - 1,000,000	1	1	0	4	0	0	1	2	3	0	0	3	3	0	0	6
1,000,000 - 5,000,000	0	0	0	4	0	1	0	2	1	0	0	1	3	0	0	4
More than 5,000,000	0	1	0	4	0	0	0	0	5	0	0	3	1	1	0	5
<b>TOTAL</b>	<b>7</b>	<b>20</b>	<b>2</b>	<b>62</b>	<b>2</b>	<b>9</b>	<b>18</b>	<b>19</b>	<b>43</b>	<b>4</b>	<b>0</b>	<b>47</b>	<b>41</b>	<b>2</b>	<b>3</b>	<b>93</b>

taminated areas (62 percent) are less than 10,000 square meters in size. This holds true for both UXO-contaminated areas and minefields. Nearly one third of the areas have either no vegetation or only short grass.

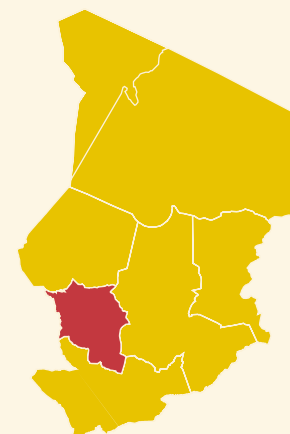
## PLANNING CONSIDERATIONS

The survey findings suggest a number of planning considerations for the future composition and deployment of mine action resources in the region.

- The dense clustering of affected communities with high numbers of recent victims could serve as the basis for prioritizing and allocating mine action resources. Specifically, the communities in the sub-prefectures of Iriba, Guéréda, Biltine, Arada, and Abéché offer opportunities in this regard.
- Composite mobile teams capable of conducting technical surveys, EOD clearance, and mine awareness could be developed to meet the needs of impacted communities affected by mines and UXO but outside of the major clusters mentioned above.
- Based on victims data, specific mine risk education programs could be developed that focus on the behavior of young men and herders, particularly their propensity to tamper with dangerous munitions.
- A case could be made to develop a regional rehabilitation and prosthetics service for incident survivors and other handicapped persons, including a component to address social integration and psychological assistance for victims traumatized by mine and UXO injuries.



# Greater Baguirmi



# Greater Baguirmi

## REGIONAL CONTEXT

- Data collection took place in Greater Baguirmi in several phases. The first phase occurred in June 2000, during the test of the survey methodology. The second phase took place in the nation's capital, N'Djamena, from July to September 2000. The final stage of the survey covered the remainder of the region and took place in March 2001.
- The region includes N'Djamena and the three departments of Hadjer Lamis, Dababa, and Baguirmi.<sup>4</sup>
- Map 11 (see next page) shows the affected population and recent victims by sub-prefecture in the region of Greater Baguirmi. In most of the rural areas in the region, affected communities are dispersed across a wide territory. The exception is those communities in and around N'Djamena and a cluster of communities in the sub-prefecture of Massakory in the department of Hadjer Lamis.

## AFFECTED COMMUNITIES

As Table 46 shows, the survey documented 28 affected communities in seven sub-prefectures, representing a total of 50,495 inhabitants directly affected by the presence of mines and/or UXO. In N'Djamena alone, 11 communities with a combined population of 18,970 inhabitants are affected.

Another interesting result presented in Table 46 is that all three of the highly impacted communities are located in N'Djamena. The other departments and sub-prefectures contain a dispersed mix of low- and medium-impact communities.

TABLE 46

### AFFECTED COMMUNITIES, BY IMPACT CATEGORY

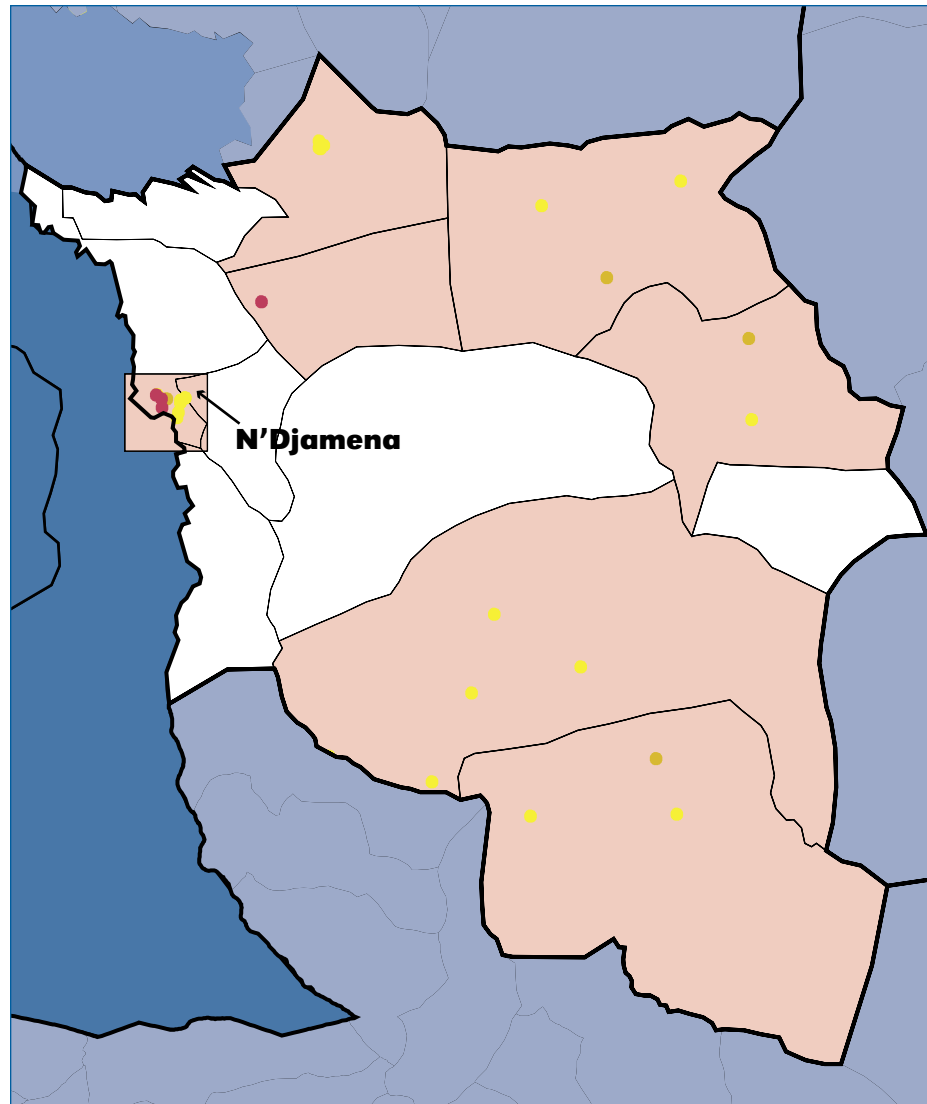
Department	Sub-prefecture	Affected communities			Total affected population
		Low	Medium	High	
Baguirmi	Bouso	3	1	0	8,900
	Massénya	3	0	0	11,400
Dabada	Bokoro	1	1	0	5,500
	Moïto	2	1	0	4,900
Hadjer Lamis	Massaguet	0	1	0	75
	Massakory	4	0	0	750
N'Djamena	N'Djamena	7	1	3	18,970
<b>TOTAL</b>		<b>20</b>	<b>5</b>	<b>3</b>	<b>50,495</b>

<sup>4</sup> These three departments make up the old prefecture of Chari Baguirmi.

MAP 11

**AFFECTED  
SUB-PREFECTURES  
AND COMMUNITIES,  
BY CATEGORY OF  
IMPACT**

- Impacted sub-prefectures
- Village impact
  - High
  - Medium
  - Low



## Population

Apart from N'Djamena, the population of Chari Baguirmi is essentially rural. Both the urban and rural populations fluctuate widely throughout the year.

Nomadic herding brings an influx of people to the plains of Madiago, Dourbali, and Bousso from November to May. The population of N'Djamena also fluctuates with the political and security situation in the outlying regions, and with the inflow of rural labor during the dry season. The changing demography of Chad also causes the overall population N'Djamena to expand, placing large demands on the physical infrastructure of the capital.

## Languages and cultures

The capital area attracts people from all regions of Chad. Because of this, N'Djamena is considered the nation's melting pot, even though the events of the years 1979-1980 have remodeled the city into districts based on regional and ethnic lines.

Each group tends to conserve its own language, which is still spoken within the family or in the urban districts and villages. In N'Djamena, Arabic and French are the two languages most used in the public arena.

## Main economic activities

N'Djamena, as the capital of Chad, accounts for a very large proportion of the country's economic activity. A good part of the import-export business and large-scale commerce is controlled from N'Djamena. N'Djamena is a city in which bureaucrats are numerous and, at the same time, where a large part of the population makes a living in the informal sector.

In the departments of the region, the principal economic activities are agriculture and herding. The main crops are cereals such as millet, vegetables, and gum arabic. Herding, primarily of cattle, takes place in all parts of the region. The region is also the point of departure for an important border trade in animals, particularly with Cameroon. Fishing is practiced on the banks of the Logone and Chari Rivers, as well as on Lake Chad.

## Main concerns of the population

During the interviews, communities expressed a number of concerns and preoccupations apart from the specific problems relating to mines and UXO:

- In N'Djamena, people are most concerned about unemployment, the high cost of living, and access to housing. Problems related to sanitation, water supply, and drainage were listed frequently.
- In the rural departments, access to potable water remains the dominant concern despite the fact that this region is more developed than the rest of Chad. The survey teams noted worsening conditions due to the ongoing drought and the resulting consequences for agriculture and herding.

## Difficulties encountered during data collection

The survey teams themselves reported a number of issues and difficulties that put the findings in this region in a more specific context.

- The city of N'Djamena had to be treated in the same way as juxtaposed villages. This meant that the teams were required to identify affected localities in 417 neighborhood blocks, and to treat each block as a separate community.
- In the rural departments, the state of the roads and difficulties in crossing the Chari River posed significant challenges when trying to reach some communities.

## PATTERN OF MINE AND UXO POLLUTION

### Type of contamination

Table 47 presents the number of contaminated areas found in Greater Baguirmi according to munitions type. As is common in many parts of Chad, the majority of the areas are affected by the presence of UXO only. In fact, three quarters of the total contaminated areas reported fit this category.

The largest area affected by mines and/or UXO totals more than four square kilometers and is in or near N'Djamena. An enormous area contaminated by UXO only is reported in Massaguet, totaling by itself four square kilometers. Bokoro also has two large areas reported to be polluted. These cover a total of 3.5 square kilometers.

TABLE 47

#### AFFECTED COMMUNITIES, BY MUNITIONS TYPE

Department	Sub-prefecture	Type of munitions			Total estimated surface (sq m)
		Mines only	Mines & UXO	UXO only	
Baguirmi	Bouso	3	1	1	51,880
	Massénaya	4	0	0	1,335,000
Dabada	Bokoro	0	1	1	3,500,004
	Moïto	0	2	5	100,116
Hadjer Lamis	Massaguet	0	0	1	4,000,000
	Massakory	0	0	8	820,600
N'Djamena	N'Djamena	0	2	14	4,404,336
<b>TOTAL</b>		<b>7</b>	<b>6</b>	<b>30</b>	<b>14,211,936</b>

### Main pollution sites

A series of conflicts beset the region between 1979 and 1991. By period, the sub-prefectures most affected are:

- 1979-1980 N'Djamena, with contamination caused by heavy ground combat that used heavy artillery, armored vehicles, and aerial bombardments
- 1982-1983 Bouso and Massénaya in the department of Baguirmi, Moïto, and Bokoro in the department of Dababa
- 1991-1994 Massakory in the department of Hadjer Lamis

The contamination left by these conflicts can be divided into the following classifications:



**BATTLEFIELDS**

In a limited number of localities, pollution has been caused by battlefield contamination originating in the clashes of 1982-1983. N'Djamena also has several contaminated battle areas dating from combat in 1979-1980.

**MUNITIONS MAGAZINES AND OTHER CONCENTRATIONS OF UXO**

The survey identified many sites of abandoned munitions as well as UXO and munitions collection points. The communities of Boutal Wali and Amsinene in N'Djamena, and of Moïto in the sub-prefecture of Moïto<sup>5</sup> are affected in this manner.

In the town of Bokoro, the survey revealed the existence of a munitions depot, which was slowly falling apart on the site of an abandoned military base. The survey reported this site to local officials and it was subsequently cleared by a joint French and Chadian military contingent.

**MINED AREAS**

Most mined areas in the region originated from guerrilla actions to mine roads and tracks during the period 1982-1983. Indeed, out of 28 affected communities in this region, nine reported that the principal impact was blocked sections of road.

**FIRING RANGES**

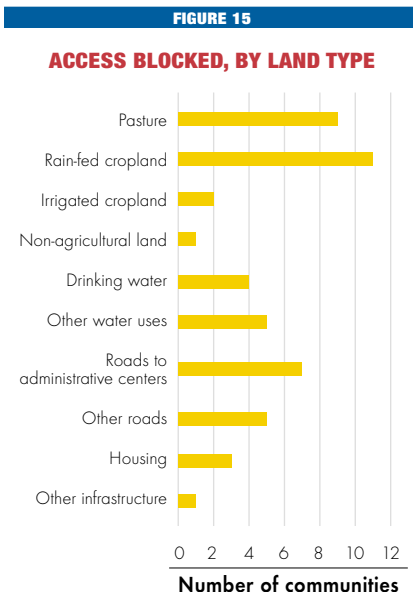
The survey also documented the impact on the region's population of two active military firing ranges. These are the firing range at Farcha in N'Djamena and at Tibné near the town of Massaguet. The former, located in close proximity to housing areas, directly affects five communities. In the 24 months preceding data collection, these localities experienced 20 victims, including 15 deaths. In Massaguet, the people report four recent victims, two of whom died. All of these incidents resulted from the manipulation of UXO originating from the firing range.

**IMPACT ON COMMUNITIES**

**Main blockages**

As Figure 15 shows, 11 of the communities reported blockages to rain-fed cropland in the region. Nine communities mentioned blocked pastureland, and seven reported the loss of livestock caused by incidents with mines and/or UXO.

Twelve of the communities reported problems due to blocked roads to administrative centers and blocked secondary roads and tracks. However, in the majority of the cases, a detour of several hundred meters



<sup>5</sup> After data collection for the survey, this site was the object of a clearance operation headed by the NGO HELP.

allows the communities to avoid the danger. This is not to discount the fact that in certain cases the presence of mines on the roads has caused entire regions to be cut off during the wet season. For example, in the sub-prefecture of Bousso, the route from Bousso to N'Djamena, passing by Bogomoro, Onoko, and Linia is currently not used, although it could allow access to the capital in all seasons.

### Victims

Map 12 shows the affected population and distribution of recent victims by sub-prefecture in Greater Baguirmi. N'Djamena clearly stands out as the area with the highest number of recent victims. The sub-prefecture of Bousso (Baguirmi) and Massaguet (Hadjer Lamis) are the only other sub-prefectures with victims.

MAP 12

**AFFECTED POPULATION AND RECENT VICTIMS, BY SUB-PREFECTURE**

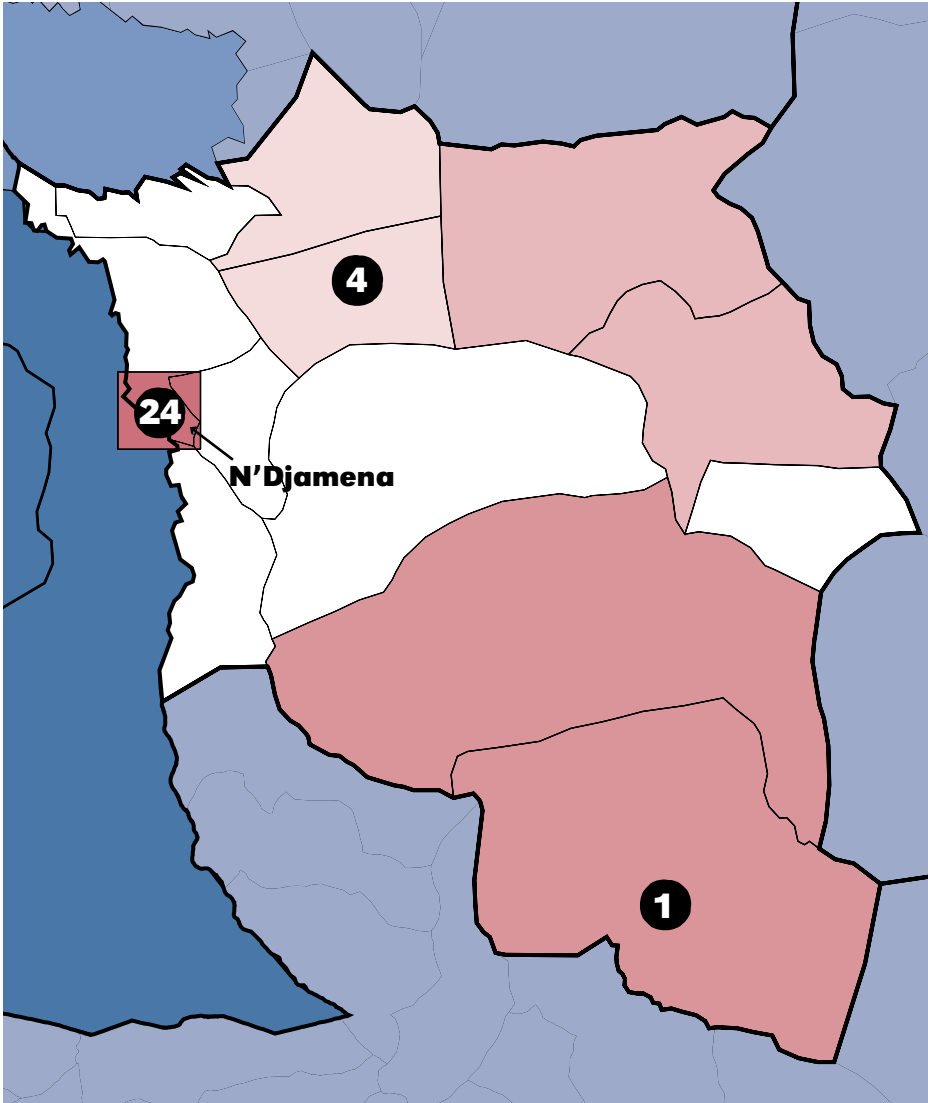
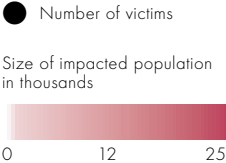


TABLE 48

## ALL VICTIMS, BY DATE OF INJURY

Department	Sub-prefecture	Recent victims		Earlier victims		All victims	
		Victims	Communities involved	Victims	Communities involved	Victims	Communities involved
Baguirmi	Bouso	1	1	5	1	6	1
	Massénya	0	0	5	1	5	1
Dabada	Bokoro	0	0	6	1	6	1
	Moïto	0	0	20	2	20	2
Hadjer Lamis	Massaguet	4	1	10	1	14	1
	Massakory	0	0	5	3	5	3
N'Djamena	N'Djamena	24	5	58	10	82	10
<b>TOTAL</b>		<b>29</b>	<b>7</b>	<b>109</b>	<b>19</b>	<b>138</b>	<b>19</b>

Incidents at the firing ranges at Farcha in N'Djamena and at Tibné near Massaguet accounted for most of the recent victims listed in Tables 48 and 49. These ranges are an ongoing and serious problem for communities in the vicinity. Neither is secured nor marked, the general public can enter and cross these ranges at will, and herds of animals can be seen wandering the ranges in search of grassland.

Greater Baguirmi follows the national tendency regarding the age and sex of the victims: Most are male and most are children and young adults. Forty-five percent of recent victims are between five and 14 years of age and nearly one third are between ages 15 and 29. The male-to-female ratio for recent victims is more than six to one.

### Main causes of incidents

Table 50 shows that, as in other regions of Chad, tampering with ordnance is the activity most frequently cited at the time of an incident. Eleven of the 29 recent victims were tampering with mines or UXO at the time of the incident; ten of these victims were male. The presence of

TABLE 49

## RECENT VICTIMS, BY AGE AND GENDER

Age ranges	Male	Female	Total
5-14	11	2	13
15-29	8	1	9
30-44	1	1	2
45-59	4	0	4
60 and above	1	0	1
<b>TOTAL</b>	<b>25</b>	<b>4</b>	<b>29</b>

TABLE 50

## RECENT VICTIMS, BY MILITARY STATUS, ACTIVITY AT TIME OF INCIDENT, AND GENDER

Activity	Male	Female	Total
Military	0	0	0
Civilian	25	4	29
Tampering	10	1	11
Travel	5	1	6
Farming	4	0	4
Household work	2	1	3
Playing	2	0	2
Collecting food & water	0	1	1
Other	2	0	2
<b>TOTAL</b>	<b>25</b>	<b>4</b>	<b>29</b>

## The recovery of metal by the blacksmiths of N'Djamena

**D**uring data collection in N'Djamena, eyewitnesses told of recurring explosions at several of the forges in the city. These incidents attracted the attention of the survey team towards the subject of recovery of metal from munitions. A more thorough investigation among the many blacksmiths and venders revealed the existence of a small industry fabricating saucepans and other utensils for domestic use based on the working of metal reclaimed, in particular, from munitions. Well-known suppliers organize the supply of "primary materials." The pieces most sought after are artillery shells, grenades, rockets, and pieces of metal recovered from the wings of airplanes.

In 1981, an artillery shell, which had been placed into the fire of a forge, killed three people in one explosion. In 1995, a passing water seller was examining a grenade yet to be worked on by the blacksmith. It exploded and took his life.

The blacksmiths tended to minimize the danger. Speaking of the risk of an incident, one blacksmith declared, "If something has to be, then human beings cannot escape it. It is destiny."

Despite this fatalistic attitude, the prime attraction is financial gain through the production and sale of household items. When an incident does occur, the blacksmiths' cooperative takes care of any damage suffered by its members.

these devices so close to inhabited areas adds to the dangers experienced by the population. In N'Djamena, several cases were documented in which an incident took place when children took explosive devices home with them.

### Past mine action

When hostilities stopped, local populations and government authorities often collected UXO into informal cache points or burned surrounding grasses in hopes that the heat would detonate the mines or UXO.

Several more formal clearance activities have taken place under the auspices of Franco-Chadian military cooperation. In 2001, based on the information collected by the survey, contaminated areas in the town of Bokoro were cleared. Also in 2001, the organization HELP, acting under the aegis of the national program and using data provided by the impact survey, undertook clearance programs in the localities of Moïto and Massénya. At Massénya, an airport, which was impossible to use for 20 years, was reopened following demining operations by HELP.

## IMPLICATIONS FOR MINE ACTION

### Type of devices and surfaces

In Table 51, the distribution of contaminated areas by class of munitions is shown for Greater Baguirmi.

Clearly, those areas contaminated by UXO dominate the findings both in terms of number of areas and size. Thirty out of the 43 contaminated areas are caused by UXO only, covering more than nine square kilometers of territory.

Type of pollution	Contaminated areas	Contaminated surfaces (sq m)
AP only	1	1,000
AP, AT only	2	105,040
AP, AT, UXO only	2	100,000
AP, UXO only	1	40,500
AT only	4	1,230,040
AT, UXO, only	3	3,524,085
UXO only	30	9,211,271
<b>TOTAL</b>	<b>43</b>	<b>14,211,936</b>

### Vegetation, terrain profile, and nature of soil

Table 52 documents the size of the contaminated areas by type of munitions, vegetation, and ground profile. More than one third of the areas are less than 10,000 square meters in size. Six of the areas have either no vegetation or short grass only, although eight of the 14 are covered with bushes and trees, which make clearance operations more difficult. Fortunately, most of these areas (78.6 percent) are found on flat land, and only a few are in wadis, hillsides, or ridges.

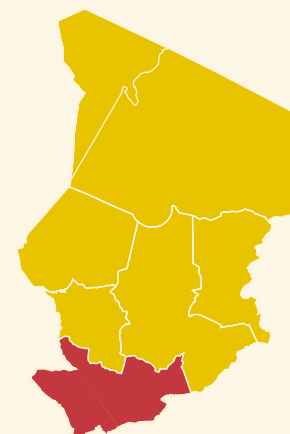
Contaminated area (sq m)	Type of munitions					Vegetation					Ground profile				Total	
	AP only	AT only	AT & AP	UXO only	Mines & UXO	None	Short grass	Tall grass	Bushes & trees	Other	Unknown	Flat land only	Wadis, hillsides or ridges	Other		Unknown
Less than 10,000	1	1	1	10	1	1	5	0	8	0	0	11	2	1	0	14
10,001 - 100,000	0	1	0	5	3	0	1	1	5	2	0	6	1	2	0	9
100,001 - 500,000	0	0	1	5	0	1	2	0	3	0	0	3	2	1	0	6
500,001 - 1,000,000	0	2	0	2	0	0	1	2	1	0	0	2	2	0	0	4
1,000,000 - 5,000,000	0	0	0	2	1	1	1	0	1	0	0	1	1	1	0	3
More than 5,000,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>24</b>	<b>5</b>	<b>3</b>	<b>10</b>	<b>3</b>	<b>18</b>	<b>2</b>	<b>0</b>	<b>23</b>	<b>8</b>	<b>5</b>	<b>0</b>	<b>36</b>

## PLANNING CONSIDERATIONS

Some general planning considerations for the region of Greater Baguirmi include the following:

- Special attention should be focused on the two firing ranges found in this region, since they are responsible for a large number of victims. In addition to community outreach and education, efforts should include marking and securing the perimeters of each range.
- Consideration should be given to the establishment of a UXO and EOD clearance capacity to work in and around N'Djamena.
- The capacity to mark and/or clear mine-affected roads in this region is also required.
- Very good and well-financed emergency services, some rehabilitation services, and a prosthetics center already exist in N'Djamena. However, the prosthetics center is underutilized and outreach efforts should be undertaken to ensure broader access to its services.
- Current mine risk education efforts are readily apparent in much of N'Djamena. Consideration should be given to targeting even more specifically high-risk groups and behaviors.

# South Region



South

## REGIONAL CONTEXT

- Data collection in the South took place between 10 October 2000 and 10 March 2001.
- The South region covers the following 11 departments: Barh-Kôh, Kabia, Lac Iro, Logone Occidental, Logone Oriental, Mandoul, Mayo Boneye, Mayo Dala, Monts de Lam, Tandjilé East, and Tandjilé West.

## AFFECTED COMMUNITIES

As Table 53 shows, the survey identified 20 affected localities with a total of 12,261 inhabitants in the South region. With only one highly impacted community, and the fewest people directly affected, the South suffers fewer adverse consequences from mines and UXO than any other region in Chad.

TABLE 53

### AFFECTED COMMUNITIES, BY IMPACT CATEGORY

Department	Sub-prefecture	Affected communities			Total affected population
		Low	Medium	High	
Barh Kôh	Sarh	5	1	0	2,348
Lac Iro	Béhobé	2	1	1	5,610
	Kyabé	5	0	0	1,621
Logone Oriental	Doba	1	0	0	1,070
Mandoul	Moïssala	1	0	0	532
Mayo Boneye	Guélandeng	2	0	0	840
Monts de Lam	Baïkoro	1	0	0	240
<b>TOTAL</b>		<b>17</b>	<b>2</b>	<b>1</b>	<b>12,261</b>

## Population

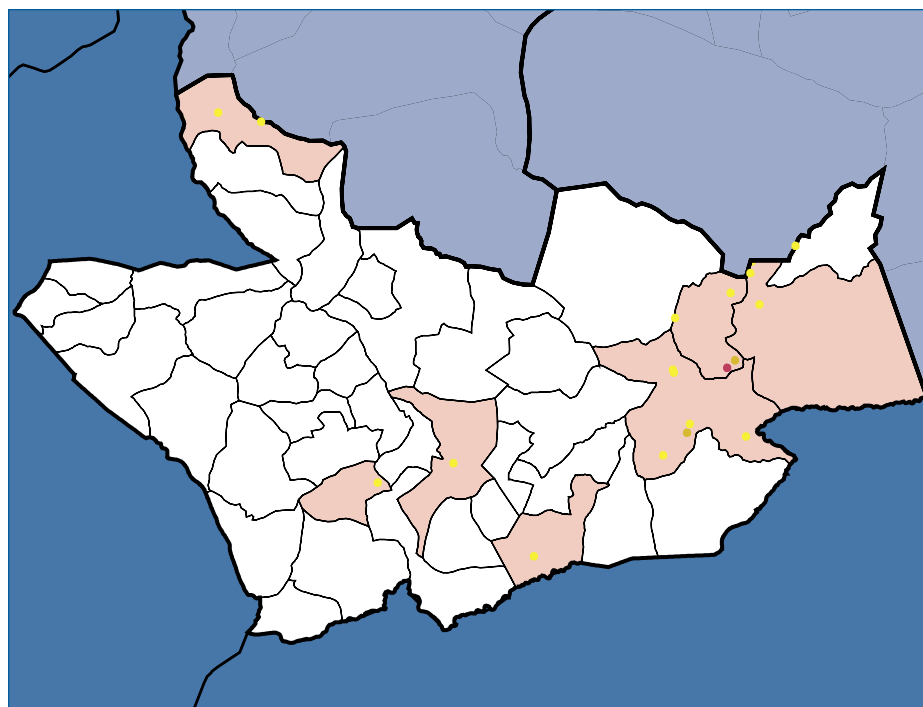
The South region contains roughly half of Chad's total population. The region is characterized by a network of towns and cities not found in the less populated parts of the country. The two main towns in the South, Moundou and Sarh, are respectively the second and third largest towns in the country. These urban centers are linked to dozens of other towns of medium size thanks to a set of tracks and roads of sufficient quality to allow the circulation of vehicles in all seasons.

Due to soil and climate conditions, the majority of the population in South Chad engages in farming. Still, a large number of nomadic communities pass through the South as they move their herds. The resulting increase in numbers

MAP 13

**AFFECTED  
SUB-PREFECTURES  
AND COMMUNITIES,  
BY CATEGORY OF  
IMPACT**

- Impacted sub-prefectures
- Village impact
  - High
  - Medium
  - Low



of animal herds and of the populations traveling with them creates friction between the nomads and the sedentary agriculturalists. Fishing communities can be found on the banks of the Lakes Iro, Eré and Léré, as well as on the banks of the Logone and Chari Rivers. Hunting as a livelihood is disappearing. The conflict of 1979 and the use of military arms for hunting have decimated game in the region.

### **Languages and cultures**

The South of Chad is a mosaic of ethnic groups known by one name, the Sara. This name refers in particular to a unique linguistic group that brings together different dialects. These groups have common characteristics, traditions, rites and myths such as practices involving the initiation of the young, circumcision, a culture of hunting, animism with individual dominant gods for each group, of dancing, and of wrestling during the harvest season.

The questionnaire used by the survey was administered in three dialects of Sara in this region, as well as Chadian Arabic.

In the land of the Sara, the society is traditionally very hierarchical. The canton and village chiefs serve as the link to the central administration and hold local judicial power. Each canton and each village has, in addition, “chiefs of the land” or sometimes a “chief of initiation.” These chiefs are the repositories of symbolic power and magic and serve as the link between the community and its ancestors, heritage, and the surrounding natural forces.



With regard to religion, animism and Christianity dominate in the South. The migration of the population south, along with the movements of the nomads, has expanded the practice of Islam in the border regions with Salamat, Guéra, and Baguirmi.

The active and equal participation that women showed during the survey process in the South reflects their more public role compared to those of women in other parts of the country. Economically women perform a variety of roles in the South including the chores of collecting water and wood, cooking, going to market, household tasks, and educating the children. They participate equally in the agricultural work in the fields. Women fully participate in fishing in those communities in which this is the main economic activity. Women are also responsible for the majority of merchandise sales in the markets. They produce cereal-based alcohol (commonly called Bili-bili), an important source of supplementary revenue for the families.

### **Main economic activities**

In the agricultural domain, the essential products, by order of importance, are the cultivation of cotton, peanuts, millet, sorghum, and rice as well as fishing. Animal herding remains important in all portions of the South. A center for petroleum production is under construction at Doba in the department of Logone Oriental. Once the site and the supporting pipeline to the Atlantic Ocean are completed, this area is expected to become a major source of revenue for the region and for Chad. Important border trade takes place with Cameroon and Nigeria; Chad exports agricultural and animal products in exchange for manufactured goods and petrol. The production and exportation of cotton takes place under the government-run society, "Cotton Tchad."

### **Main concerns of the population**

During the interviews, local communities expressed a number of concerns and preoccupations apart from the specific problems relating to mines and UXO, including:

- Fear of famine following a particularly bad rainy season in the year 2000
- More tension and conflict with the nomadic communities coming from the regions to the north
- Insufficient provision of education and health care particularly in isolated areas or areas inaccessible during the rainy season
- Insufficient potable water, and lack of improved wells, water pumps, or modern wells

## Difficulties encountered during data collection

The survey teams themselves reported a number of issues and difficulties that allow the findings of the work in this region to be put in a more specific context.

- Communities were suspicious of survey motives particularly with regard to any information on arms and conflict. They feared that the survey team was sent to search for local arms caches. This fear could be a significant source of bias for the survey in the South.
- Road and river crossing conditions made access to many communities extremely difficult.
- Considerable distance between localities increased travel times and operational costs.
- Visits by the survey teams often stimulated the communities to consume substantial quantities of alcohol. This interfered with the execution of the group interview.

## PATTERN OF MINE AND UXO POLLUTION

### Type of pollution

As Table 54 shows, the total estimated surface area for the two of the most affected sub-prefectures, Sarh and Béhobé, is surprisingly large. For only six contaminated areas, the total surface area believed to be contaminated in Sarh is more than 22 square kilometers. Béhobé estimates the size of its five contaminated areas to be 30 square kilometers.

In the South, as in other regions in Chad, the majority of the contamination is caused by UXO alone. Roughly one third of the reported sites contain only land-mines, and the presence of mixed mine and UXO contamination is limited.

TABLE 54

### AFFECTED COMMUNITIES, BY MUNITIONS TYPE

Department	Sub-prefecture	Type of munitions			Total estimated surface (sq m)
		Mines only	Mines & UXO	UXO only	
Barh Kôh	Sarh	0	1	5	22,732,500
Lac Iro	Béhobé	1	2	3	30,000,498
	Kyabé	6	0	1	69,660
Logone Oriental	Doba	0	0	1	60,000
Mandoul	Moïssala	0	0	1	0
Mayo Boneye	Guélandeng	0	1	1	60,000
Monts de Lam	Baïkoro	0	0	1	30,000
<b>TOTAL</b>		<b>7</b>	<b>4</b>	<b>13</b>	<b>53,042,658</b>

## Main pollution sites

Many successive conflicts took place in the region between 1979 and 1991.

- 1979            Gounou Gaya and Kim
- 1982            Commune of Moundou
- 1982-1984    Béhobé, Guélandeng, Kyabé, Maro, and Sarh
- 1982-1985    Béboto, Bodo, Goré, Maro, and Moïssala
- 1995-1996    Béboto, Bodo, Doba, and Moundou

The pollution left behind by these conflicts can be divided into various types of sites:

### BATTLEFIELDS

Battle area contamination involving UXO and discarded munitions occurred across wide areas of the South during the years 1982-1984. Subsequently, limited guerrilla activity has added smaller but more dispersed pockets of contamination.

### CONCENTRATIONS OF UXO AND ABANDONED MUNITIONS

In certain localities, UXO and abandoned munitions have been collected at the request of the local authorities. In particular, this is the case of the locality of Lana in the sub-prefecture of Guélandeng. In 1999, the French army destroyed munitions in the communities of Kyabé and of Sarh. Based on information given by the local population, the survey documented two munitions magazines in the towns of Doba and Koumra.

### MINES

Mines have been used in the region in a limited fashion and the surface areas contaminated by them are small. Emplaced during the period 1982-1984, these mines were put along key routes in the region to restrict vehicle movement. Many sections of road have subsequently been abandoned. In 1990, the former route running between Sarh and Kyabé was reopened by earthmoving equipment without encountering any problems. However, it is possible that the machines simply displaced several mines up onto the road embankment.

The survey also collected reports on the use of AT and AP mines for defending temporary military camps or other strategic points in the sub-prefectures of Béhobé and Guélandeng.

## IMPACT ON COMMUNITIES

### Main blockages

Figure 16 shows the categories of blockage listed by the communities in the South.

Blocked water resources of all types, followed by blocked access to cropland, were the most commonly reported impacts. In this later category, blocked access to land used for the cultivation of rice in the sub-prefectures of Béhobé stands out as a pronounced loss.

Only two communities noted blocked access to roads in general (including small tracks and secondary roads) and one community reported blocked access to an administrative center. The minor level of impact is probably related to the extensive use of detours around mined sections of the roads—in many cases this represents only a minor handicap for these localities. For some localities, this problem could accentuate the issue of enclavement that occurs each rainy season.

### Victims

Map 14 (see next page) shows the distribution of recent victims and affected populations by sub-prefecture in the South region of Chad. It can clearly be seen from this that most affected populations and two of the victims were living in the department of Lac Iro, in the sub-prefecture of Béhobé. The one other recent victim was living in the sub-prefecture of Mbaïboro in the department of Monts de Lam.

Table 55 shows the distribution of victims by sub-prefecture. Most significant are the large numbers of incidents previous to the last 24 months—these account

FIGURE 16

### ACCESS BLOCKED, BY LAND TYPE

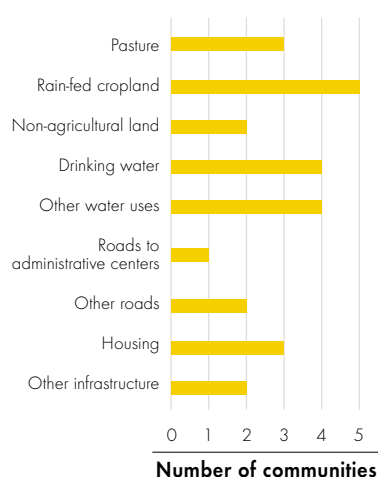
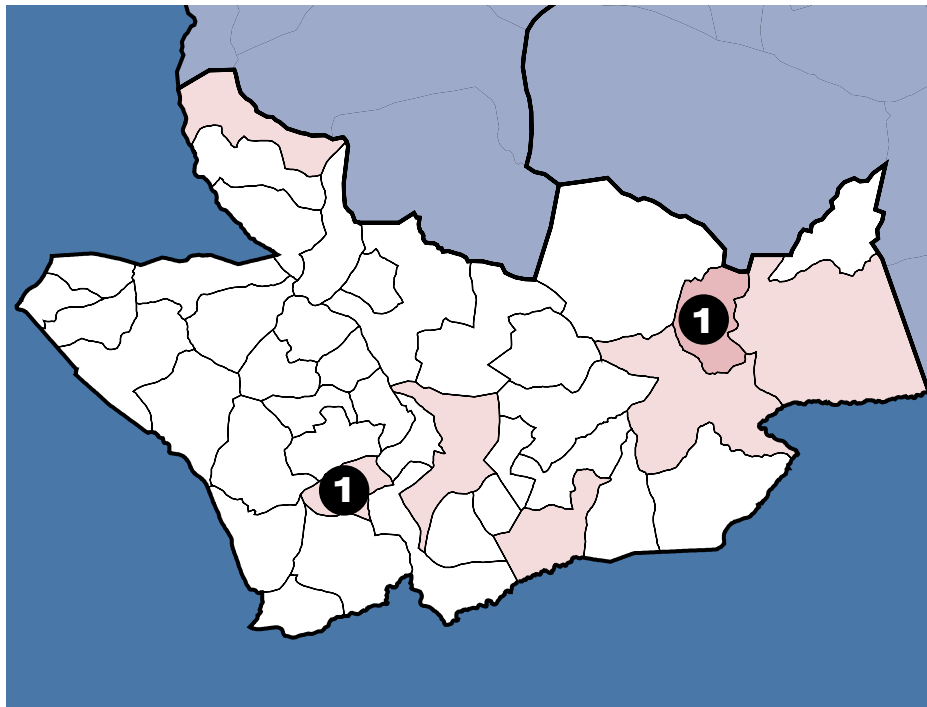


TABLE 55

### ALL VICTIMS, BY DATE OF INJURY

Department	Sub-prefecture	Recent victims		Earlier victims		All victims	
		Victims	Communities involved	Victims	Communities involved	Victims	Communities involved
Barh Kôh	Sarh	0	0	9	3	9	3
Lac Iro	Béhobé	2	1	23	4	25	5
	Kyabé	0	0	4	2	4	2
Logone Oriental	Doba	0	0	1	1	1	1
Mandoul	Moïssala	0	0	0	0	0	0
Mayo Boneye	Guélandeng	0	0	11	1	11	1
Monts de Lam	Baïkoro	1	1	0	0	1	1
<b>TOTAL</b>		<b>3</b>	<b>2</b>	<b>48</b>	<b>11</b>	<b>51</b>	<b>13</b>



**MAP 14**  
**AFFECTED POPULATION AND RECENT VICTIMS, BY SUB-PREFECTURE**

● Number of victims

Size of impacted population in thousands

0 12 25

for 94 percent of total victims. The sub-prefecture of Béhobé accounts for nearly half of these older incidents and two out of the three recent incidents.

**Main causes of incidents**

As Table 57 shows, the most common activity reported at the time of the incident is that of tampering or manipulating UXO and/or mines. Two out of the three recent incidents were caused by this behavior and involved only men. Of the three recent victims, one was between five and 14 years of age, another between 15 and 29 years of age, and the third was between 30 and 44 years of age.

As highlighted above, the majority of incidents in the South are not recent—48 out of 51 reported incidents occurred more than two years before the survey. During interviews, communities told the survey teams that in all periods, incidents most frequently occurred during the following circumstances:

**TABLE 56**

**RECENT VICTIMS, BY AGE AND GENDER**

Age ranges	Male	Female	Total
5-14	1	0	1
15-29	1	0	1
30-44	1	0	1
<b>TOTAL</b>	<b>3</b>	<b>0</b>	<b>3</b>

**TABLE 57**

**RECENT VICTIMS, BY MILITARY STATUS, ACTIVITY AT TIME OF INCIDENT, AND GENDER**

Activity	Male	Female	Total
Military	0	0	0
Civilian	3	0	3
Tampering	2	0	2
Other	1	0	1
<b>TOTAL</b>	<b>3</b>	<b>0</b>	<b>3</b>

- Munitions were in proximity to inhabited zones or on the tracks frequently used by herders or farmers. This situation is considered the most common danger for communities. Incidents are often caused by the manipulation of these devices. This practice was reportedly common for many members of the community—young men, children, and passing nomadic groups.
- In some areas, munitions have been buried by the local population. They are not visible, and the population, unaware, continues to undertake possibly dangerous agricultural activities.
- The recovery of UXO and abandoned munitions presents a recurring danger for the population. The metal is used for the fabrication of agricultural tools such as hoes, or for household utensils such as teacups made from the bases of grenades.

### Past mine action

Formal mine action activities in the South have been very limited. The Chadian military engineering corps, in cooperation with experts from the French army, did conduct some clearance in the towns of Kyabé and Sarh in 1999.

Several local mine clearance initiatives were documented by the survey. These initiatives normally involved burning vegetation to detonate the mines, informal marking activities, or destruction by a local “deminer.”

## IMPLICATIONS FOR MINE ACTION

### Type of devices and surfaces

Table 58 shows the distribution of contaminated areas in the South by type and class of munitions. The type of pollution most commonly reported by communities is UXO only, followed

distantly by AT minefields. The presence of mixed mine and UXO areas is limited, but the size of just two areas is immense, upwards of 30 square kilometers. In all likelihood, this figure represents an aggregate estimation of the entire area in which

a battle was fought, rather than the pockets of contamination that exist within this area. Nonetheless, local inhabitants are cautious about using any portion of this land and thus experience a significant loss.

TABLE 58

#### CONTAMINATED AREAS, BY CLASS OF MUNITIONS

Type of pollution	Contaminated areas	Contaminated surfaces (sq m)
UXO only	13	22,940,548
AT only	5	12,010
AP, AT, UXO only	2	30,000,000
AP, UXO only	2	40,000
AP only	1	50,000
AP, AT only	1	100
AT UXO, only	0	0
<b>TOTAL</b>	<b>24</b>	<b>53,042,658</b>

## Vegetation, terrain profile, and nature of soil

Table 59 shows the contaminated areas by type of munitions, vegetation, terrain, and nature of the soil. All of these are important factors to consider when planning mine clearance and EOD activities. The majority of contaminated areas (ten areas or 43 percent) are less than 10,000 square meters in size. However, a significant number of areas (seven acres or 30 percent) are between 10,000 and 100,000 square meters. Nearly three quarters of the areas occur on flat land and that vegetation is only to be encountered in a minority of sites.

TABLE 59

### CONTAMINATED AREAS, BY EXTENT AND TYPE OF POLLUTION AND TYPE OF LAND

Contaminated area (sq m)	Type of munitions					Vegetation						Ground profile				Total
	AP only	AT only	AT & AP	UXO only	Mines & UXO	None	Short grass	Tall grass	Bushes & trees	Other	Unknown	Flat land only	Wadis, hillsides or ridges	Other	Unknown	
Less than 10,000	0	5	1	4	0	0	1	2	4	2	1	7	1	0	2	10
10,001 - 100,000	1	0	0	4	2	0	3	3	1	0	0	6	1	0	0	7
100,001 - 500,000	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1
500,001 - 1,000,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,000,000 - 5,000,000	0	0	0	2	0	0	0	1	1	0	0	1	0	1	0	2
More than 5,000,000	0	0	0	1	2	1	0	1	1	0	0	2	0	1	0	3
<b>TOTAL</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>12</b>	<b>4</b>	<b>1</b>	<b>4</b>	<b>8</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>17</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>23</b>

## PLANNING CONSIDERATIONS

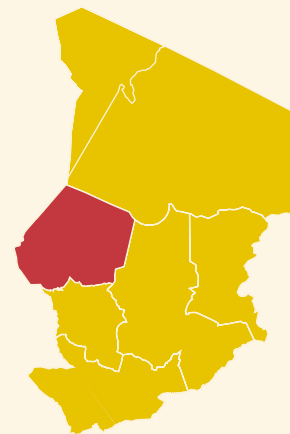
The relatively low density of mine impacts in the South suggests that mine action interventions in the region can be focused and prompt.

- Mobile composite mine action teams should be created that are capable of conducting technical surveys, marking, limited clearance, and mine awareness to reduce the most pronounced risks experienced by affected communities.
- Technical survey and route reconnaissance should take place along affected roads located between Sarh and Béhobé and between Sarh and Kyabé.
- The destruction of abandoned munitions and UXO collection points is a relatively efficient way to eliminate risks to specific communities and areas.
- Future improvements to the health care system could allow for the development of rehabilitation and prosthetics services to meet the needs of mine incident survivors as well as other members of society suffering mobility impairments.





# West Region



West

## REGIONAL CONTEXT

- Data collection took place in the West region between 17 July and 14 October 2000.
- The West region is comprised of three departments: Barh El Gazal, Kanem, and Lac.
- Map 15 (see next page) shows the distribution of affected communities by category of impact for the West region. Unexploded ordnance is present in the region, but mine contamination was not found. The contamination is dispersed throughout the region with a cluster of affected communities located on Lake Chad and another cluster in the sub-prefecture of Moussoro where ordnance from a firing range impacts the surrounding communities.

## AFFECTED COMMUNITIES

As Table 60 shows, the survey found 29 affected communities in seven sub-prefectures with a combined population of 43,500 persons. The sub-prefecture of Liwa recorded the largest affected population. It contains 43 percent of the region's affected population and seven of its affected communities.

Most of the communities in the region are considered to be either low- or medium-impacted. The two high-impact communities have been placed in that category due to the high level of recent victims caused by manipulation of UXO collected at a nearby firing range.

TABLE 60

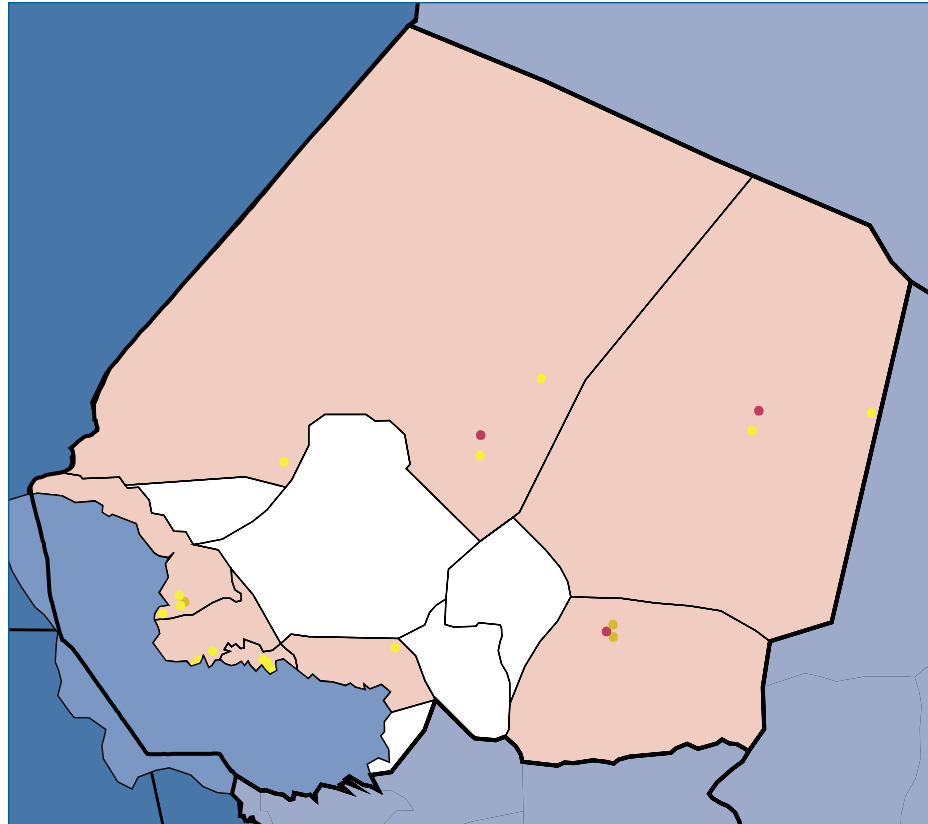
### AFFECTED COMMUNITIES, BY IMPACT CATEGORY

Department	Sub-prefecture	Affected communities			Total affected population
		Low	Medium	High	
Barh El Gazal	Moussoro	0	2	1	1,200
	Salal	1	1	0	2,600
Kanem	Nokou	3	0	1	5,000
Lac	Baga Sola	7	0	0	12,010
	Bol	4	1	0	3,540
	Liwa	5	2	0	18,800
	Ngouri	1	0	0	350
<b>TOTAL</b>		<b>21</b>	<b>6</b>	<b>2</b>	<b>43,500</b>

MAP 15

**AFFECTED  
SUB-PREFECTURES  
AND COMMUNITIES,  
BY CATEGORY OF  
IMPACT**

- Impacted sub-prefectures
- Village impact
  - High
  - Medium
  - Low



## Population

The population of the West region is concentrated in the urban centers of Bol and Baga Sola. The heavily affected town of Moussoro is also an important population and administrative center as well as the site of a major military training area.

In the vicinity of Lake Chad, the population is composed mainly of agro-pastoralists. The population in the rest of the region primarily supports itself through herding. The population in and around Lake Chad is relatively stable, but further from the lake in the departments of Kanem and Barh El Gazal, the population decreases significantly during the dry season (November to June) as people move towards the urban centers or undertake trading activities. The poor rainfall for the previous few years and the drying up of Lake Chad have forced the population to concentrate more in the areas with polder (low-lying or river bed) agriculture.

## Languages and cultures

The population of the region is composed of three large ethnic groups: the Gorane, the Kanembou, and the Boudouma. This later group is only found in the area of Lake Chad. The Arab and Foulbé nomadic groups, coming from other regions, cross the area searching for pastureland.

Each group has its own language. In the department of Lac, the *lingua franca* is Kanembou, although in Kanem and Barh El Gazal the main language used is

Gorane. Arabic is spoken in the large urban centers, but only has a marginal importance in the region.

Despite linguistic and ethnic differences, the three dominant groups share common traditions. They are all patriarchal societies with a strong Islamic religious heritage. Traditional chiefs still maintain an important power base, in particular the sultan of Mao and the canton chiefs, whose titles and functions are hereditary.

In the agricultural areas, in particular in the department of Lac, women work in the fields. They are equally present in the markets where they often are in charge of the stalls. In Kanem and Barh El Gazal where agro-pastoralists are dominant, women participate in the herding activities. They are particularly responsible for the collection, treatment, and sale of milk.

### **Main economic activities**

The two great sources of wealth for the region are herding and agriculture. Herding cattle dominates the department of Lac. In the other two departments, camels are the main livestock. Agriculture is based on pluvial cultivation along the sides of dunes in the entire region, but also in the polders on the banks of Lake Chad and in the wadis of Kanem and Barh El Gazal. The principal regional products are cereals (maize, wheat, and millet) and market garden cultivation in the polder areas.

Fishing is an important activity along the banks of Lake Chad. The fishing catch is traded locally or exported to Nigeria. Fishermen coming from Mali, Cameroon, and Nigeria also fish in the territorial waters of Chad after paying for a license from the Chadian government.

The sale of natron (a type of salt, mostly used for animals) in the sub-prefectures of Baga Sola, Liwa, and Nokou also represents an important source of revenue. Natron is sold via large-scale trade with Nigeria, Niger, and N'Djamena. A traditional local market in natron with various herding communities also continues in the region.

### **Main concerns of the population**

During the interviews, local communities expressed a number of concerns and preoccupations apart from the specific problems relating to mines and UXO:

- Access to potable water supplies is the dominant concern of the population.
- Insufficient local medical infrastructure encourages the use of “choukou,” (false) doctors and the proliferation of counterfeit medicines.
- Access to education is very limited. Only the capitals of the sub-prefectures or the cantons have any kind of school.

### **Difficulties encountered during data collection**

The survey teams themselves reported a number of issues and difficulties that allow the findings of the work in this region to be put in a more specific context.

- Overland vehicle access to many communities near Lake Chad was not possible. The teams had to walk or, by turns, use pirogues (canoes) or camels to administer the questionnaire and to verify the localities in the region.
- Desert conditions in Kanem posed extreme difficulties for personnel and equipment.
- Geographic regions as outlined on maps did not match local perceptions regarding areas of authority and administration. After consulting with local authorities, and despite the sensitivity of the latter regarding this problem, certain cantons were grouped together as one entity for the purposes of the survey work.
- It was often difficult for teams to estimate the surface area of the polluted areas because moving sand dunes had covered much of the contamination.

## PATTERN OF MINE AND UXO POLLUTION

### Type of pollution

In Table 61, the data collected on contaminated areas by munitions type reported in the West are shown.

This region only reports a problem with UXO, most importantly in the sub-prefectures of Liwa and Baga Sola. Liwa, the most extensively contaminated portion of the region, reports more than 35 square kilometers of contaminated land resulting from a series of large-scale battles that took place from 1979 to 1980 and again in the early 1990s.

TABLE 61

### AFFECTED COMMUNITIES, BY MUNITIONS TYPE

Department	Sub-prefecture	Type of munitions			Total estimated surface (sq m)
		Mines only	Mines & UXO	UXO only	
Barh El Gazal	Moussoro	0	0	3	4,577,864
	Salal	0	0	6	2,130,848
Kanem	Nokou	0	0	4	761
Lac	Baga Sola	0	0	9	2,051,803
	Bol	0	0	6	1,510,000
	Liwa	0	0	11	35,417,217
	Ngouri	0	0	1	28
<b>TOTAL</b>		<b>0</b>	<b>0</b>	<b>40</b>	<b>45,688,521</b>

## Main pollution sites

There were successive conflicts in the region between 1979 and 1996. By period, the sub-prefectures most affected by this are:

- 1979–1980 Baga Sola, Bol, Liwa, on Lake Chad and Salal in the department of Barh El Gazal
- 1980–1982 Moussoro and Salal in the department of Barh El Gazal
- 1983–1984 Baga Sola and Bol, especially the border regions with Nigeria
- 1985–1986 Nokou in the department of Kanem
- 1992–1996 Baga Sola, Bol, and Liwa

According to information collected by the survey, the only contamination left behind by these conflicts is UXO. No mine contamination was found in the region. The different types of contaminated sites affecting the population are:

### BATTLEFIELDS

Large areas of battlefield produced contamination in all three departments in the region, particularly in the sub-prefectures of Salal, Nokou, Baga Sola, Liwa, and Bol. Liwa has some of the most recently contaminated land in the country with pollution occurring there in 1992-1996. In all areas, determining the exact locations of contamination is difficult due to the moving sand dunes that periodically cover and then uncover the offending UXO.

### MUNITIONS MAGAZINES AND OTHER CONCENTRATIONS OF UXO

Other legacies from the battles in this zone are concentrations of abandoned or stored munitions and the UXO collected by the local populations. Eleven sites of this type exist in the region: four in the department of Lac, one in Barh El Gazal, and six in Kanem. These concentrations of ordnance are often very dangerous in that they can be found in locations with little to no security, within towns, or in decaying or decrepit buildings.

### FIRING RANGES

The firing range situated in the vicinity of Moussoro is the origin of significant contamination by UXO, with pronounced effects on three localities. The French armed forces have used the firing range on a regular basis since 1964. The population indicates that these practice exercises take place every two months. Eleven people have been injured or killed during the last 24 months in incidents linked to the presence of these ranges.

## IMPACT ON COMMUNITIES

### Main blockages

As Figure 17 shows, the blockages most often reported by the population are rain-fed agricultural land (28 percent) and pastureland (24 percent). According to information gathered during interviews, these blockages have a limited effect on the population. The suspected pastureland is still used and the polluted agricultural land is generally also still being cultivated. The survey teams also noted the population's tendency to push UXO into the bushes or other places where they are out of the way of passers-by.

Other significant categories of blockages include blocked access to housing, drinking water, and irrigated cropland. As in other regions of Chad, having access blocked to irrigated crops is especially significant due to the scarcity of such irrigation schemes in the country.

### Victims

Map 16 (see next page) graphically illustrates the distribution of recent victims and affected populations by sub-prefecture in the West of Chad. It can clearly be seen from this map that the highest number of victims was reported in the sub-prefectures of Moussoro and Salal.<sup>6</sup> These communities reported a total of 56 incidents overall but only 11 recent victims. Most of these victims had incidents in the firing range that crosses the border between the two sub-prefectures.

FIGURE 17

### ACCESS BLOCKED, BY LAND TYPE

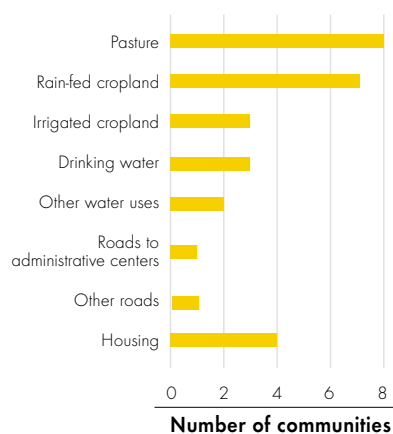


TABLE 62

### ALL VICTIMS, BY DATE OF INJURY

Department	Sub-prefecture	Recent victims		Earlier victims		All victims	
		Victims	Communities involved	Victims	Communities involved	Victims	Communities involved
Barh El Gazal	Moussoro	11	3	45	3	56	3
	Salal	4	1	16	2	20	2
Kanem	Nokou	7	1	20	3	27	3
Lac	Baga Sola	0	0	2	1	2	1
	Bol	0	0	5	3	5	3
	Liwa	2	1	9	4	11	4
	Ngouri	1	1	0	0	1	1
<b>TOTAL</b>		<b>25</b>	<b>7</b>	<b>97</b>	<b>16</b>	<b>122</b>	<b>17</b>

<sup>6</sup> Please note that the sub-prefectures of Moussoro and Salal were treated as one geographical entity by the survey team, due to the overlap of their frontiers.

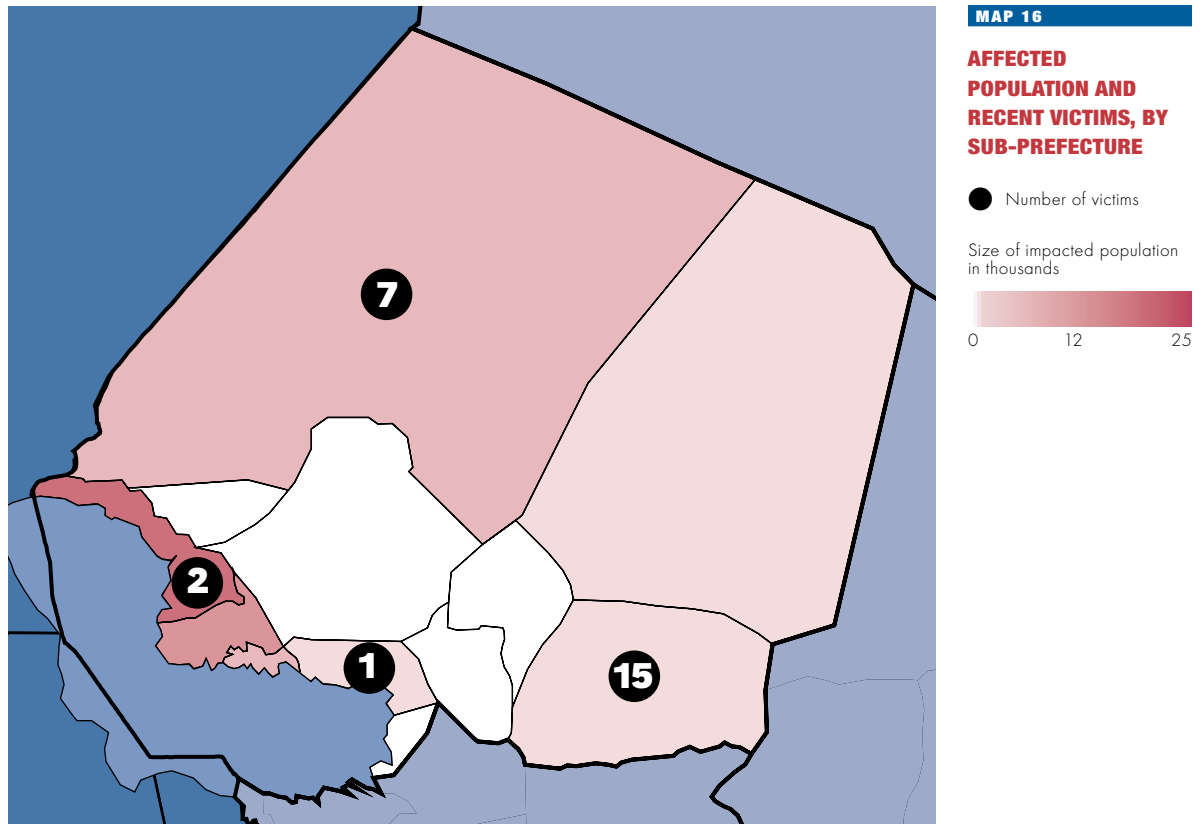


Table 63 indicates the age and sex of the recent victims. Unlike findings throughout the rest of Chad, there is a rough parity between the number of women and men coming to harm in the West. Among the younger victims, girls are as likely to be involved in an incident as boys are. In the largest affected age group, 15-29 year olds, three-quarters of the victims were males. Only women appear in the 45 to 59 age group. When considered as part of the overall figures, this distribution suggests that different conditions may exist in the West than in other regions in Chad.

**TABLE 63**

**RECENT VICTIMS, BY AGE AND GENDER**

Age ranges	Male	Female	Total
0-4	1	0	1
5-14	3	6	9
15-29	9	3	12
45-59	0	2	2
Unknown	1	0	1
<b>TOTAL</b>	<b>14</b>	<b>11</b>	<b>25</b>

### Main causes of incidents

As indicated in Table 64 (see next page), the most frequent activity at the time of a mine incident in the West is the tending of animals. This may partially explain the parity between male and female victims. Seven female and seven male victims had incidents while herding animals. Tampering with munitions is a high-risk behavior.

Anecdotal information collected on victims who were injured more than two years ago suggests that the widespread presence of UXO affects all aspects of life in certain communities and poses a long-term hazard to those persons who must live, work, and support themselves in or near contaminated areas. Working in the agricultural fields, traveling on roads that cross former combat zones, and attempts to recover UXO for their metal were documented as reasons for past incidents. In some affected localities, UXO are everywhere, and are used to hobble animals, for construction material, or for adornment.

**TABLE 64**

**RECENT VICTIMS, BY MILITARY STATUS, ACTIVITY AT TIME OF INCIDENT, AND GENDER**

<b>Activity</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
Military	0	0	0
Civilian	14	11	25
Herding	7	7	14
Tampering	3	0	3
Collecting food/water	2	0	2
Playing	1	0	1
Travel	0	1	1
Other	1	3	4
<b>TOTAL</b>	<b>14</b>	<b>11</b>	<b>25</b>

### **Past mine action**

Mine action up to today has been very limited. Local initiatives are the most common effort. In many cases, UXO have been collected by the communities and placed at ad hoc collection points. The Chadian army, in collaboration with French experts, has undertaken occasional clearance activities in this region. Such a mission took place in the town of Ngouri in October 1999. Residents do not understand exactly what was cleared by this team. A recent incident in the vicinity of the team's work has caused the local inhabitants to continue to avoid the area. Using information provided by the survey, the military undertook another clearance mission and successfully cleared the urban center of Bol of UXO contamination.

## **IMPLICATIONS FOR MINE ACTION**

### **Type of devices and surfaces**

As mentioned above, all documented contamination in the West is by UXO of various types. The 40 contaminated sites cover a total surface area in excess of 45 square kilometers.

### **Vegetation, terrain profile, and nature of soil**

As Table 65 shows (see next page), nearly half of the contaminated areas in the West are less than 10,000 square meters. Five of these areas have no vegetation or only short grass and 12 areas are composed of flat land only, thus simplifying clearance tasks in these areas. Unfortunately, the majority of the areas are covered by bushes and trees (69 percent), which make clearance more difficult.



TABLE 65

## CONTAMINATED AREAS, BY EXTENT AND TYPE OF POLLUTION AND TYPE OF LAND

Contaminated area (sq m)	Type of munitions					Vegetation						Ground profile				Total
	AP only	AT only	AT & AP	UXO only	Mines & UXO	None	Short grass	Tall grass	Bushes & trees	Other	Unknown	Flat land only	Wadis, hillsides or ridges	Other	Unknown	
Less than 10,000	0	0	0	16	0	4	1	0	11	0	0	12	3	1	0	16
10,001 - 100,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100,001 - 500,000	0	0	0	10	0	0	0	2	8	0	0	6	2	2	0	10
500,001 - 1,000,000	0	0	0	3	0	0	0	0	2	1	0	1	0	0	2	3
1,000,000 - 5,000,000	0	0	0	2	0	0	0	0	2	0	0	2	0	0	0	2
More than 5,000,000	0	0	0	4	0	0	0	0	4	0	0	3	0	0	1	4
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>35</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>27</b>	<b>1</b>	<b>0</b>	<b>24</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>35</b>

## PLANNING CONSIDERATIONS

Mine action in the West region must address the problem posed by dispersed areas of UXO contamination.

- Immediately take steps to reduce the risk to communities close to the firing range on the border between Salal and Moussoro. This could include technical survey, marking, and clearance as well as improved site security and mine awareness education programs.
- Develop composite mobile teams capable of conducting technical surveys, EOD clearance, and mine awareness to meet the needs of impacted communities. Initially these teams should focus on the clusters of affected communities along the borders with Lake Chad and in the sub-prefectures of Liwa, Baga Sola, Bol, and Ngouri.
- Consider clearing the island of Tchoukou Hadjé to allow the displaced community to return.



# North Region

## REGIONAL CONTEXT

- Data collection took place in the North region between 17 July 2000 and 24 February 2001.
- During this period, the team surveyed the departments of Borkou and Ennedi, using a method of investigation based on population concentration zones.<sup>7</sup> The department of Tibesti, which is known to be contaminated by mines and UXO, was not surveyed due to security conditions.
- To conduct the survey in the North, the region was divided into 13 “population concentration zones” as follows:
  - Department of Borkou: Faya, Kirdimi, Kouba, and Yarda
  - Department of Ennedi: Bahaï, Bao, Fada, Gouro, Kalait, Kaoura, Mourdi, Ouddai Doum, and Ounianga Kebir.
- Map 17 (see next page) shows the departments of Borkou and Ennedi divided into population concentration zones by category of impact. Fifty out of 91 affected communities are in the department of Ennedi, but slightly more than half of the high-impact communities are clustered together in the department of Borkou.

## AFFECTED COMMUNITIES

The survey team found that 91 of the 210 localities (community or important nomadic waypoint) surveyed in these concentration zones were affected. Out of all the communities in the population concentration zones more than 40 percent were found to be affected by the presence of mines and UXO. The total population of 73,495 inhabitants resides in these communities.<sup>8</sup>

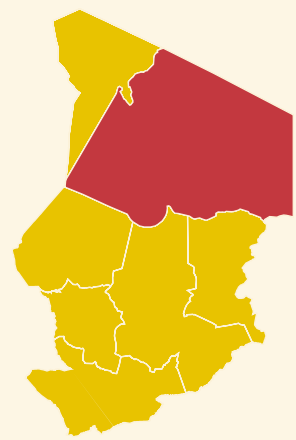
Table 66 (see page 155) shows the details of affected communities by department and concentration areas. Unlike other regions in Chad, the number of highly impacted communities makes up the largest impact category. The concentration zones named after the two departmental capitals, Faya (Borkou) and Fada (Ennedi), stand out as being the most severely impacted.

## Population

The departments of Borkou and Ennedi cover an area of 131,000 square kilometers. In relation to this immense area, the density of the population is low. Even

<sup>7</sup> See the definition of the concept of population concentration zone in the box on page 81 of the report.

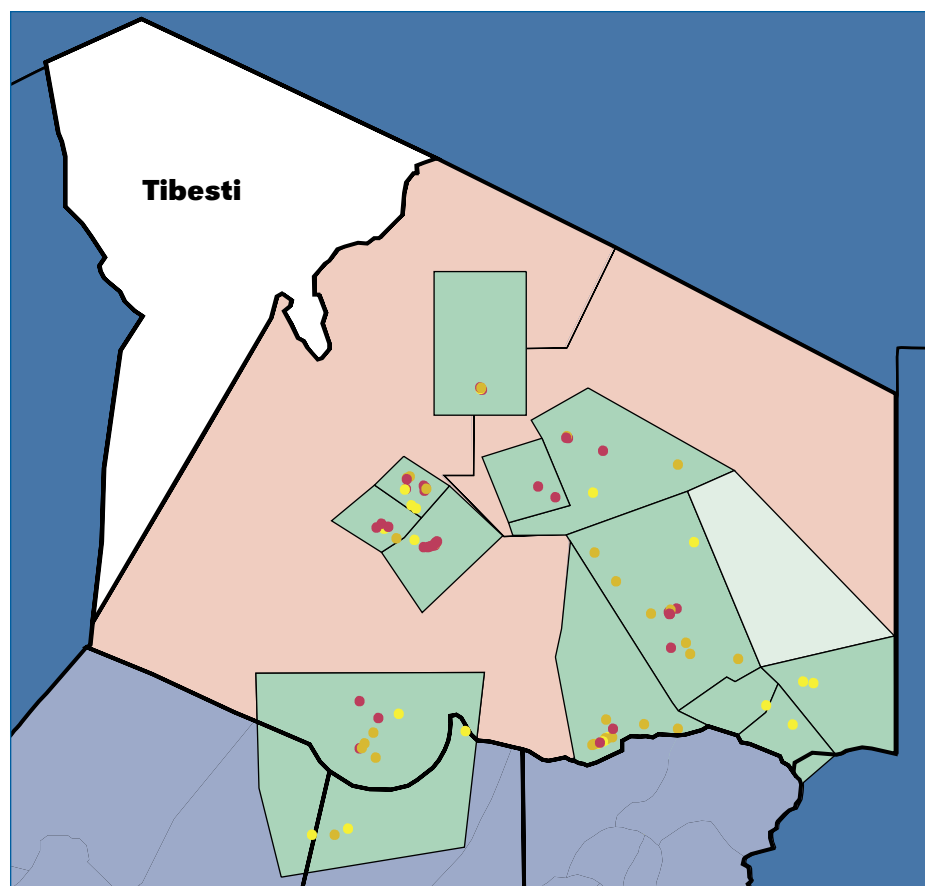
<sup>8</sup> These figures were obtained by adding up the population figures collected by the survey teams during the data collection phase. This number is higher than a comparable projection for the year 2000 based on the population census for 1993 by the BCR would indicate. This higher population figure can be attributed to the fact that the survey teams visited a larger number of communities, wells, and waypoints in affected areas than was done in the Census. The teams also faced difficulties associated with determining population in an area where the inhabitants live a primarily nomadic lifestyle.



North

**AFFECTED SUB-PREFECTURES AND COMMUNITIES, BY CATEGORY OF IMPACT**

- Impacted sub-prefectures
  - Affected population concentration
  - Not affected population concentration
- Village impact
- High
  - Medium
  - Low



so, there is a marked concentration of the population around certain urban centers, located at points of passage such as wells and oases, and in wadi channels.

Faya is the most developed urban center in the region. This capital of the department of Borkou has about 20,000 inhabitants, including an abundance of local bureaucrats and merchants. The town of Fada, recently made the capital of the department of Ennedi, is also an important urban center. The other populated areas are nomadic waypoints or crossroads for trade with Sudan.

The populations of Borkou and Ennedi fluctuate strongly according to the seasons. There are important population movements principally linked to nomadic herding practices and to the cultivation of certain crops, notably dates. The population is most numerous between June and September. This corresponds with the wet season in the Center region of Chad when animal herds are brought to the north of the country. The date harvest, anywhere between June and August, attracts the population towards the oases. The period of low population corresponds to the nomadic movement of herders towards the south starting from the month of October until their return in May or June. The period of transhumance is also the period of trade and traditional commercial activities as nomadic caravans transport natron, a natural salt, to the south and east of the country and return with basic foodstuffs and provisions. A section of the population engaging

TABLE 66

## AFFECTED COMMUNITIES, BY IMPACT CATEGORY

Department	Concentration zone	Affected communities			Total affected population
		Low	Medium	High	
Borkou	Faya	2	2	9	21,160
	Kirdimi	1	1	3	4,370
	Kouba	5	4	3	3,190
	Yarda	3	5	3	1,745
Ennedi	Bahaï	3	0	1	13,420
	Bao	2	0	0	1,550
	Fada	3	5	6	9,215
	Gouro	2	0	2	2,460
	Kalaït	6	9	1	10,945
	Kaoura	2	0	0	530
	Ouddaï Doum	0	0	2	600
	Ounianga Kebir	1	3	2	4,310
<b>Total</b>		<b>30</b>	<b>29</b>	<b>32</b>	<b>73,495</b>

in transhumance returns to the North in December and stays through February so that they can, in conjunction with the sedentary portion of the population, participate in the work of grafting the date palms.

### Languages and cultures

Arabic is spoken throughout the region and is the language of government and commerce. Residents continue to use local languages such as Gorane in the departments of Borkou and Ennedi and Zhagawa in the department of Biltine.

The population of the North region is composed of a mosaic of ethnic groups. Each group corresponds to a certain territory or canton. Authority rests with the canton chief, who is, in fact, the representative of a certain ethnic group. Islam is the dominant religion in the region. The society is patriarchal. Women participate in commercial activities and in the grafting and harvesting of the dates. They can also be landholders and participate in family councils.

### Main economic activities

Herding is the most important activity in the region. In certain population concentration zones, the population lives entirely on this activity. The cultivation of dates, and to a lesser extent vegetables, is the second biggest source of wealth in the region. The production zones are principally in Faya, Kirdimi, Yarda, Ounianga, Gouro, and Fada.

The exploitation of salt and of natron, used principally for the animal herds, is another important economic activity in the North.

Commerce consists mostly of nomadic trading. Dates, natron, and animals are exported to the other regions in exchange for cereals, sugar, and condiments.

Trade with Libya consists of the exportation of animals and sesame and the importation of manufactured foodstuffs, petroleum, and products for daily use such as textiles, utensils, and tools.

### **Main concerns of the population**

During the interviews, local communities expressed a number of concerns and preoccupations apart from the specific problems relating to mines and UXO, including:

- The shortage of water for all uses
- Poor access to education, and the notable lack of teachers in the schools  
School sessions often start in May and finish by June or July
- Absence of health infrastructure: In many cases, to consult a doctor it is necessary to travel by camel for weeks
- Lack of veterinary services
- The deadly stings of scorpions during the hot season

### **Difficulties encountered during data collection**

A brief summary of the particular difficulties encountered by the teams responsible for data collection allows a better understanding of the regional context:

- Difficult access to certain concentration zones in which there are no useable tracks for vehicles, notably in Mourdi and Yarda
- The enormous distances to be covered in the region
- The harsh climate
- Safety concerns that make it difficult, if not impossible, to visually verify mined areas

## **PATTERN OF MINE AND UXO POLLUTION**

### **Type of pollution**

UXO, either alone or in combination with mines, makes up the vast majority of the contamination in the North. Only 12 areas are reported to be impacted by mines alone.

Table 67 (see next page) gives detailed information for each concentration zone on contaminated areas by munitions type.

TABLE 67

## AFFECTED COMMUNITIES, BY MUNITIONS TYPE

Department	Concentration zone	Type of munitions			Total estimated surface (sq m)
		Mines only	Mines & UXO	UXO only	
Borkou	Faya	1	15	5	255,598,684
	Kirdimi	0	14	1	10,205,430
	Kouba	0	14	6	61,402,050
	Yarda	4	10	8	61,660,320
Ennedi	Bahai	0	2	4	3,360,500
	Bao	0	0	2	5,002,400
	Fada	2	21	6	106,757,117
	Gouro	3	6	2	22,723,269
	Kalaït	1	5	16	129,450,370
	Kaoura	0	1	2	88
	Ouddai Doum	0	7	0	206,330,000
	Ounianga Kebir	1	11	4	24,570,075
	<b>TOTAL</b>		<b>12</b>	<b>106</b>	<b>56</b>

## Main pollution sites

Numerous conflicts took place successively in the region between 1979 and 1996. By period, the population concentration zones affected are:

- 1973-1979 Low intensity combat occurred in Fada, Faya, Gouro, Ounianga, and Yada.
- 1979-1982 Intense conflict using armored vehicles and heavy artillery took place in and around the concentration zones of Fada, Faya, and Kalaït. Mines laid at Fada, Faya, and Ounianga protected important military bases.
- 1983-1986 Intense combat with air support took place in the concentration zones of Faya, Gouro, Kalaït, Kouba, and Ounianga. The townships of Fada, Faya, Kalaït, Kirdimi, and Ounianga suffered aerial bombardment. Protective mining of Libyan installations followed, in particular at Faya, Fada, Ounianga, and Ouddai Doum. The large routes were mined so as to block troop movements.
- 1986-1987 Conflicts took place in the concentration zones of Fada, Faya, Ouddai Doum, and Ounianga, as well as in Tibesti. Landmines were used to protect military installations and to drive populations into urban centers. Mines were also emplaced along roadways to retard movement of military forces and supplies.
- 1989-1990 Intense but localized combat took place in the zones of Bahai, Bao, and Kaoura.

The most important contamination left by this conflict can be classified as follows.

### **BATTLEFIELDS**

The repeated heavy fighting that took place over the past two decades has left the North with extensive battlefield contamination in the form of UXO and mines. Even though part of the conflict took place on open ground and far from the inhabited areas, analysis of the data collected by the survey shows a high level of contamination in the urban centers or their environs. This contamination is a major cause of continued incidents.

The survey documented the extensive surface area covered by large battlefields. A notable example is the battlefield of Goss, located in the concentration zone of Kouba. The battlefield spans an area between the departments of Borkou, Kanem, and Batha West. Another battlefield extends to the south of the town of Bahai towards the town of Tiné. It spans an area between the departments of Ennedi and Biltine.

### **DEPOTS AND OTHER SITES WITH CONCENTRATIONS OF UXO**

The remnants of conflict also include localities where munitions and UXO have been collected and stored. Some important munitions and mine depots resulted from the presence of military bases abandoned by Libyan forces, some of which remain under the control of the Chadian military. Other smaller depots were abandoned and exist in varying states of security and control. Those without any control or security pose serious risks to nearby populations.

### **MINED AREAS**

Important mined areas exist close to former military bases in Ouddai Doum, Gouro, Ounianga, Ingakala (Kirdimi), Chicha (Kouba), and Bir Koran (Fada). The survey teams received reports of similar circumstances throughout Tibesti, notably in Bardai, Zouar, Wour, Yebibou, and Aouzou. In certain cases, the original markings in the form of signs, barbed wire, and barrels have been preserved.

Other mined areas constitute a veritable belt of pollution around the larger population centers in the region. This is particularly true for the towns of Fada and Faya. These mined areas are often poorly delimited, even when they are found in proximity to inhabited areas, and cause numerous incidents.

Many major road routes remain mined and unusable. Detours are in place in certain cases and in others, entire routes have been abandoned. Despite significant effort on the part of the French army in 1987, entire communities remain cut off due to the presence of mines on access routes. Mined areas also limit access to some cultivated areas.



## IMPACT ON COMMUNITIES

### Main blockages

Figure 18 shows the percentage of communities reporting certain categories of blocked access to resources in the North.

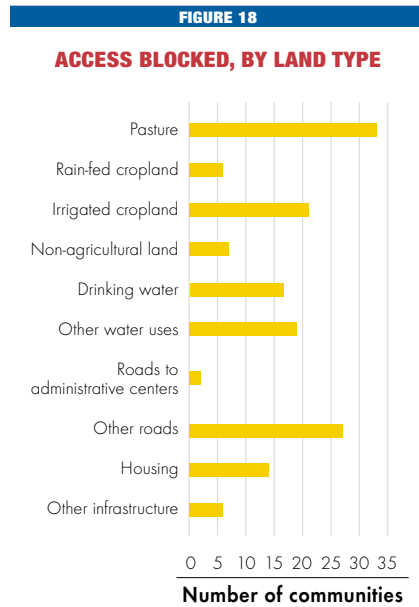
The most commonly reported impact in the North is blocked access to pastureland. Other impacts include blocked access to secondary roads and to irrigated cropland. Considering the scarcity of such cropland, particularly in the North, this blockage results in many serious consequences and loss of a most valued resource. Activities related to and involving the use of water are a major preoccupation for communities in this region. The loss of potable water as well as water for animals and food production was reported in 36 localities.

The mining of tracks and access routes for vehicles can be a major contributing factor to the enclavement of localities. Twenty-seven communities reported blocked access to secondary roads and tracks, while another 20 reported blocked access to administrative centers. Such blockages have negatively influenced the growth, development, and daily life of the region and have limited traditional nomadic routes. Today many caravan stops and wells lie abandoned due to the presence of mines, forcing herds to travel further and increasing the burden on the remaining accessible sites.

### Victims

Map 18 (see next page) shows the distribution of recent victims and the population density for all affected concentration zones in the North region of Chad.

Victims are especially concentrated in Faya (55 victims), Fada (35 victims), and Kalaït (24 victims).



MAP 18

**AFFECTED POPULATION AND RECENT VICTIMS, BY SUB-PREFECTURE**

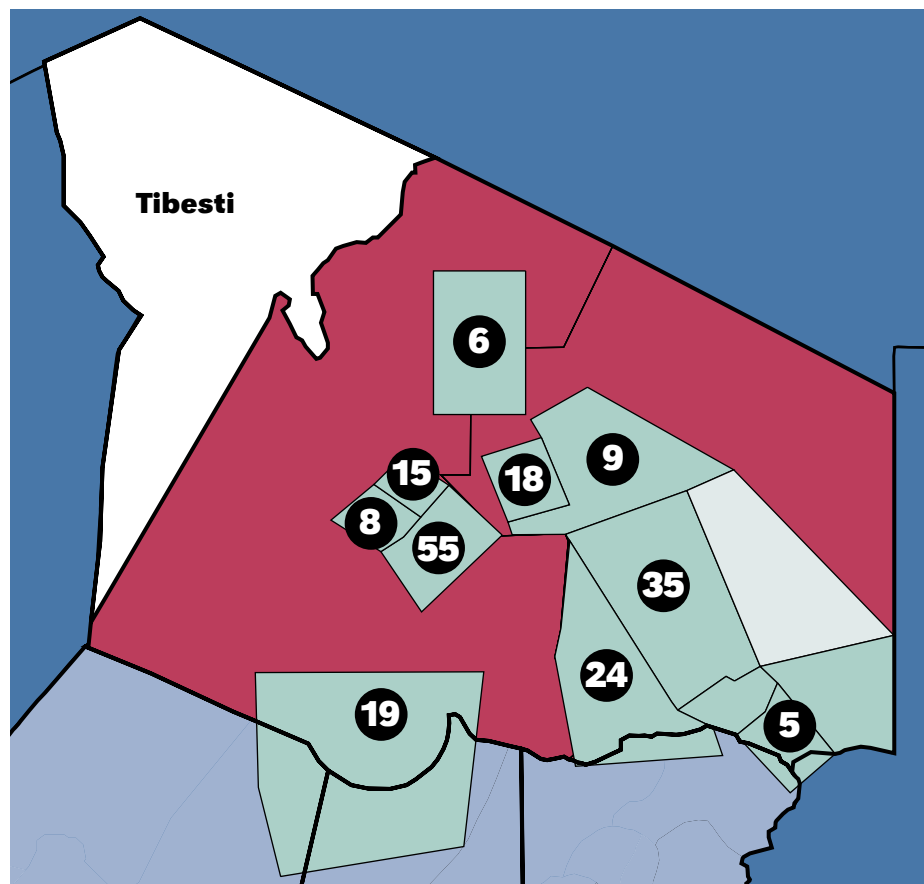
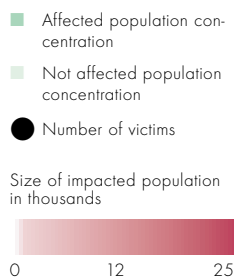


TABLE 68

**ALL VICTIMS, BY DATE OF INJURY**

Department	Concentration zone	Recent victims		Earlier victims		All victims		
		Victims	Communities involved	Victims	Communities involved	Victims	Communities involved	
Borkou	Faya	55	12	102	10	157	13	
	Kirdimi	8	4	16	2	24	5	
	Kouba	19	8	86	9	105	11	
	Yarda	15	7	31	7	46	9	
Ennedi	Bahaï	5	1	53	2	58	2	
	Bao	0	0	1	1	1	1	
	Fada	35	13	159	10	194	13	
	Gouro	6	2	31	4	37	4	
	Kalaït	24	10	46	6	70	11	
	Kaoura	0	0	0	0	0	0	
	Ounianga Kebir	9	4	68	4	77	5	
	Ouddaï Doum	18	2	101	2	119	2	
	<b>TOTAL</b>		<b>194</b>	<b>63</b>	<b>694</b>	<b>57</b>	<b>888</b>	<b>76</b>

Analysis of the figures for both recent and less recent victims as presented in Table 68 (see previous page) clearly shows that the communities in the North experience a continuing hazard from the presence of mines and UXOs. Despite the time since the hazard was created, injury rates have not dropped substantially. While the population in the North is low, the tremendous pressure on very scarce resources such as water points and oases limits opportunities for adjustment or adaptation. Incident rates for the North region are by far the highest in the country: 154 persons out of 100,000 (or more than one person in 1,000) have had a mine incident.

Table 69 shows the figures for the number of recent victims by age and sex. The North region follows the national trend regarding the sex of the victim—males constitute more than nine out of every ten victims. Most of the victims fall into the age categories of five to 14 (54 victims, 47 of them male) and 15 to 29 years of age (82 victims, 78 of them male).

### Main causes of incidents

As elsewhere in Chad, tampering, herding, and travel constitute the vast majority of activities at the time of an incident. These three factors are closely related in that herding and traveling often indicate the same overall activity—moving livestock from one place to another. These movements offer abundant opportunities for herdsmen to encounter and interact with UXO and mines.

In a resource scarce environment like North Chad there are a number of incentives for tampering with UXO. Metal scrap is used to fabricate saucepans, knives, and other utensils while explosives can be used as fireworks or as a poison to protect against predatory animals. In addition, UXO is used to fether animals, to decorate enclosures, and as construction material.

In the sandy areas, the movement of the sand dunes constitutes an additional risk factor because contaminated areas are continuously covered and uncovered. Thus, a traveler's knowledge of the area does not necessarily help avoid mined areas.

TABLE 69

#### RECENT VICTIMS, BY AGE AND GENDER

Age ranges	Male	Female	Total
0-4	1	2	3
5-14	47	7	54
15-29	78	4	82
30-44	28	3	31
45-59	20	2	22
60 and above	2	0	2
<b>TOTAL</b>	<b>176</b>	<b>18</b>	<b>194</b>

TABLE 70

#### RECENT VICTIMS, BY MILITARY STATUS, ACTIVITY AT TIME OF INCIDENT, AND GENDER

Activity	Male	Female	Total
Military	5	0	5
Civilian	171	18	189
Tampering	45	3	48
Herding	45	2	47
Travel	33	3	36
Farming	20	3	23
Playing	9	2	11
Household work	1	2	3
Collecting food & water	2	0	2
Other	15	3	18
Unknown	1	0	1
<b>TOTAL</b>	<b>176</b>	<b>18</b>	<b>194</b>

## Past mine action

After the retreat of the Libyan armed forces in 1987, initiatives were started in the region to secure certain zones and reopen the principal roads. In Tibesti, the Chadian army demined the route between Aouzou and Bardai. The French army also deployed up to 150 deminers in the field. The main roads leaving Faya towards the north and south were reopened. For more than 18 months, significant demining efforts took place in and around Faya. These efforts were curtailed because French troops suffered a high number of incidents. Demining work also took place in the town of Bardai in Tibesti up until 1998.

With more than 120 newly trained Chadian deminers, operations were restarted under the guidance of HCND. The German NGO, HELP, worked in Faya to open a new route the south. Both combined Chadian and French military resources and HELP undertook EOD work to destroy many tons of UXO and stored munitions. Local populations have also made informal efforts at demining in at least 13 communities.

## IMPLICATIONS FOR MINE ACTION

### Type of devices and surfaces

In terms of numbers, the majority of contaminated areas are affected by UXO only. However, in terms of the estimated size of these areas, more than 317 square kilometers are contaminated with a mix of AP and AT mines plus UXO.

In contrast, areas contaminated by mines, while large in number, are smaller in size. Contamination by AT and AP mines is found in 24 areas and covers an estimated surface area of 59.8 square kilometers. AT mines only are found in 21 areas, covering a surface of 91.6 square kilometers.

TABLE 71

### CONTAMINATED AREAS, BY CLASS OF MUNITIONS

Type of pollution	Contaminated areas	Contaminated surfaces (sq m)
AP only	1	5,000,000
AP, AT only	24	59,773,616
AP, AT, UXO only	28	317,153,825
AP, UXO only	3	26,700,000
AT only	21	91,643,775
AT UXO, only	6	104,032,108
UXO only	91	282,756,980
<b>TOTAL</b>	<b>174</b>	<b>887,060,304</b>

Table 71 outlines the distribution of contaminated areas by class of munitions for the North region.

## Vegetation, terrain profile and nature of soil

Table 72 presents details on the size of the contaminated areas by the type of munitions, vegetation, and ground profile.

In general, nearly one in three contaminated areas have no vegetation present, which is not surprising for such a dry area. This has to be balanced against the particular difficulties caused by moving sand dunes.

TABLE 72

### CONTAMINATED AREAS, BY EXTENT AND TYPE OF POLLUTION AND TYPE OF LAND

Contaminated area (sq m)	Type of munitions					Vegetation						Ground profile				Total
	AP only	AT only	AT & AP	UXO only	Mines & UXO	None	Short grass	Tall grass	Bushes & trees	Other	Unknown	Flat land only	Wadis, hillsides or ridges	Other	Unknown	
Less than 10,000	0	7	5	28	9	19	0	3	8	17	2	21	20	6	2	49
10,001 - 100,000	0	5	6	13	3	11	0	1	6	8	1	15	11	1	0	27
100,001 - 500,000	0	1	3	4	4	7	0	0	1	4	0	7	4	1	0	12
500,001 - 1,000,000	0	1	2	16	1	4	1	1	3	11	0	11	6	1	2	20
1,000,000 - 5,000,000	1	2	4	14	8	4	0	5	6	14	0	10	17	1	1	29
More than 5,000,000	0	4	4	16	12	7	0	5	11	13	0	15	19	1	1	36
<b>TOTAL</b>	<b>1</b>	<b>20</b>	<b>24</b>	<b>91</b>	<b>37</b>	<b>52</b>	<b>1</b>	<b>15</b>	<b>35</b>	<b>67</b>	<b>3</b>	<b>79</b>	<b>77</b>	<b>11</b>	<b>6</b>	<b>173</b>

## PLANNING CONSIDERATIONS

The survey findings suggest a number of planning considerations for the future composition and deployment of mine action resources to the North.

- The North experiences a more concentrated adverse set of impacts from landmines and UXO than any other region in Chad, and deserves priority mine action.
- Priority areas for mine action programs could be selected based on the clusters of affected communities with high numbers of recent victims such as Faya, Fada, Kalait, Yarda, and Kouba.
- There is a need for both traditional demining teams and battlefield teams to work on the concentrated mine and battlefield areas that surround the larger urban centers.
- Smaller, more mobile dual action mine clearance and EOD teams should be constituted to focus on contamination at wells, oases, and caravan waypoints, as well as on dispersed munitions and UXO collection points.
- Mine risk education programs need to be devised that reach young males and middle aged men, particularly those who are engaged in herding.
- Victim assistance capacities should be developed as part of a broader strengthening of the regional health care facilities.



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