Egypt Landmine Problem: History, Facts, Difficulties and Clearance Efforts

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Abstract

Egypt is contaminated with Landmines, UneXploded Ordnances (UXO), and Explosive Remnants of War (ERW) which are normally buried under deep layers of sand and mud from World War II. Most of the battles took place in the area between the Quattara Depression and Alamein at the Mediterranean coast. Other affected areas lie around the city of Marsa Matruh and at Sallum near the Libyan border. In addition, Explosive Remnants of War and Mines Other Than Anti-Personnel Mines (MOTAPM) from armed conflicts between Egypt and Israel in 1956, 1967, and 1973 remains unclear, especially in the eastern areas (Sinai Peninsula and Red Sea coast). No reliable figures for the extent of contamination exist. The joint Egypt/UNDP project document of November 2006 referred to 2,680 km^2 of contaminated area, which is almost four times the estimated contaminated area in Afghanistan. Similarly, the number of landmines, UXO, ERW and MOTAPM that remaining unclear can be little more than speculation. The Egyptian army has estimated that 16.7 million explosive items have still to be found, including both antipersonnel landmines (APL) and anti-tank landmines (ATL) and much larger quantities of UXO. This problem has a serious impact on Egypt National Income. This paper presents the scope of Egypt landmine problem, and clearance efforts. The paper is organized in the following main sections:

- *· Scope of Egypt Landmine Problem*
- *· Egypt Socio-Economic Effects*
- *· Egypt Landmine Monitoring Reports.*
- *· Difficulties in Humanitarian Demining*
- *· Egypt Landmines Clearance Efforts*

Keywords: *Egypt Landmine Monitoring Report, Detection, Clearance*

1. INTRODUCTION

Landmines represent a serious danger in a number of regions of the whole world. Many Landmine fields are known, mapped and mostly even fenced-in. Other Landmines, however, no information exist so that they pose the greatest threat. The problem of Landmines at these regions has a serious effect on their national incomes and on the safety of personal living in such regions. According to the Civil Right Organization, "a Landmine is some object placed on or under the ground or any surface, conceived for exploding by the simple fact of the presence, the proximity or the contact of a person or a vehicle". There are more than 100 countries affected by Landmines, UXO and/or ERW. Approximately 20 countries are heavily-affected, including Angola, Afghanistan, Croatia, Egypt, and Cambodia. More than 12 countries produce Landmines, including Cuba, Egypt, Singapore, and Vietnam; and almost 20 countries or rebel groups use Landmines, including some countries that produce them. As estimated 45-50 million Landmines infest at least 12 million km2 of land around the world.

These Landmines:

- kill or maim a reported 10,000 people annually;
- create millions of refugees and internally displaced persons;
- prevent hundreds of thousands of square kilometers of agricultural land being used;
- deny thousands of kilometers of roads for travel;
- create food scarcities, causing malnutrition and starvation;
- interrupt health care, increasing sickness and disease;
- inflict long-term psychological trauma on Landmine survivors;
- hinder economic development;
- undermine political stability.

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Table 1 lists the most important areas around the world infected with Landmines, UXO and/or ERW with their field type.

Table 1: Estimated Number of Landmines in the Most Infested Countries

Country/region	# Landmines(Million)	Field type (NA= Not available)
Egypt	22	Sandy desert
Angola	10-15	NA
Afghanistan	9-10	Dry, desert, rocky, clay, vegetation, Residential
Cambodia	8-10	Vegetation
Kuwait	5-10	Sandy desert
Yugoslavia	6	NA (without Kosovo)
Bosnia & Sarajevo	NA	Vegetation wild among ruined houses
Lebanon	NA	Rocky high ground
Mozambique	2	NA
Somalia	1	NA
Latin America	0.3-1	NA
Croatia	NA	Vegetation, residential/ industrial, machinery
Iraq	NA	Semi-arid region
Other countries	6.7-33	NA
Total	70-110	

2. SCOPE OF EGYPT LANDMINE PROBLEM

The Egyptian government cites a figure of 22 million Landmines: 16.7 million affect 268,000 hectares (km2) in the western desert area and 5.1 million affect 20,000 hectares (km2) in the eastern areas. Other Egyptian officials have stated that: Only 20-25% of these Landmines are really Landmines, the remainder being other types of UXO and ERW. In the next paragraphs, the available information about Egypt Landmine Maps, time Effect on landmines characteristics and its Socio-Economic Effects.

Egypt Landmines Maps: There are different and inaccurate maps for the Landmines in Egypt as indicated in Figures 1 and 2 with the Maps of Alamein area drawn from memory indicative only of Landmine field records. These Maps are partly misleading because of the limited accuracy of those records. UXO and some Landmines lie scattered across entire area so that the entire area has to be cleared. Clearance activities are severely hampered by having only limited maps, sketches and minefield records. Maps and data sources that have been provided by Germany, Italy and Britain have proven to be inaccurate or incomplete.

Landmine Types: Table 2 gives the types of landmines used in World War II and Israeli-Egypt conflicts. There is also a wide variety of ERW in the infested land of Egypt including air dropped bombs.

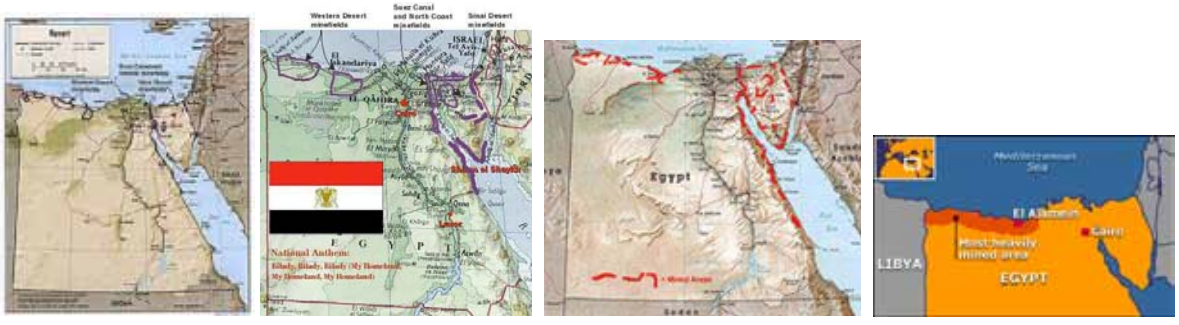


Fig. 1: Egypt Landmines Distribution Maps

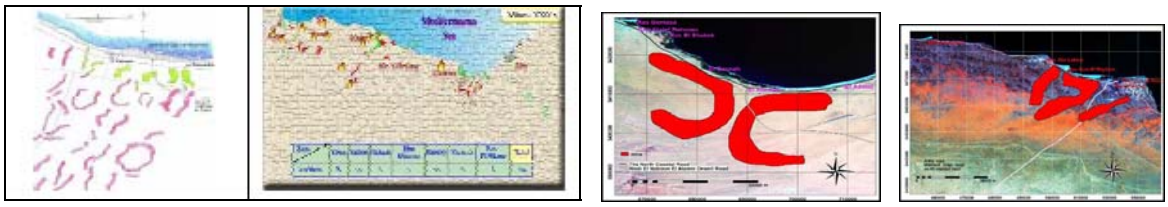


Fig. 2: Alamein Landmines Affected Areas

Maps Data Sources

- North Western Coast Soil Survey and Reports: FAO 1970.
- Land Master Pla: Euro consult-pacer Consultants (LMP, 1986).
- The Geology of Egypt. EGPC 1988.
- Topographic Maps 1: 100,000: Department of Survey and Mines. EGSA 1970.
- Landsat ETM+ of 5 scenes of year 2001 (P178 R039, P179 R038, P179 R039, P180 R038, and P180 R039) and Mosaic Landsat TM of zone 35 year, 1990
- Water Science Department, Alexandria University.

Table 2: Types of Landmines in Egypt

World War II	Israel-Egypt Conflicts
British: MK5, MK7 **German:** Rieglmine 43, S mines, and Tellermine 35, 42, 43 **Italian:** B-2, V-3.	**Israelian:** MOTAPM **Egyptian:** M71, TM46, T79 , TS50, MOTAPM

Time Effects on Landmines Characteristics: The time has many unpredictable effects on landmines characteristics especially under sand contaminations. The age of much of these Landmines is up to 66 years. Much of Landmines, UXO and ERW are covered by thick deposits of mud or sand so that conventional detection techniques are often of little value. The military analysts said that storms have increased the depth at which many Landmines are buried by 8 meters, thus ruling out the use of normal mine-detection methods. The trigger mechanisms on many of the weapons have been corroded. Mines that were intended to be set off by the hefty bulk of a tank may be detonated by weight of a baby. Some mines may explode by themselves. All surveys and researches state that the mines status is totally unpredictable especially under sand contaminations.

3. EGYPT SOCIO-ECONOMIC EFFECTS

According to Egypt Landmine monitoring Report*s* (www.icbl.org)**,** the mine/ERW causalities include men, women, boys, girls, children under the age of 18, civilian and military people. Among, 50 accidents cases: (16 accidents were reported at suspected areas (32%) and 34 accidents were reported outside the infected areas (68%)). An Egyptian Non-Governmental Organization (NGO) gathered data on ERW and landmine casualties reported similar data. There is no national mechanism to record victims of Landmines, UXO, ERW and MOTAPM. Table 3 presents the reported mine/ERW causalities as reported in Egypt Landmine Monitoring Reports for the period 1999-2009.

Table 3: Estimated and reported number of Mine/ERW causalities in Egypt

Year	Causality Analysis						
	Total	Killed	Injured	Men	Women	Boys	Girls
1945-1999[1]	8313	696	7617	NA	NA	NA	NA
2000	12	NA	12	NA	NA	NA	NA
2001	11	NA	11	NA	NA	NA	NA
2002	18	5	13	NA	NA	NA	NA
2003	14	NA	14	NA	NA	NA	NA
2004	10	NA	10	NA	NA	NA	NA
2005	16	6	10	NA	NA	NA	NA
2006	22	9	13	NA	NA	NA	NA
2007[2]	25	8	17	NA	NA	NA	NA
2008[3]	40	14	26	28	1	11	0
2009[4]	22	13	9	13	0	8	1
Total	8503	751	7752	NA	NA	NA	NA

1. Year 1999: Estimation by the Egyptian Official Authorities and Egypt Landmine Monitoring Report.

2. Year 2007: 1 incident in May 2008 in Alexandria governorate, the explosion of a World War II SHELL that was being dismantled for scrap metal caused 17 casualties (4 killed and 13 injured).

3. Year 2008: 40 Landmine/ERW causalities in eight governorates from 11 incidents. ERW caused 33 of casualties, landmines caused 6, and an unknown device caused 1 casualty. 3 incidents involving 4 casualties in Matruh governorate, 2 incidents in Ismailia, and 1 incident in each of Albihira, Al Suez, Alqaliobia, Alexandria, North Sinai, and Alsharqia governorates. 2 incidents causing 5 casualties occurred while people were illegally crossing Egypt-Libya border and 29 casualties in scrap metal trade. 3 casualties in each of playing with ERW, playing/recreation, and travel, and 1 casualty in each of agriculture and fishing/hunting.

4. Year 2009: 4 causalities in each of agriculture, fishing/hunting, 3 causalities in each of travel, playing with ERW, and playing/recreation, and 1 causality providing security; in addition to 4 unknown causalities. In May 2009, a police officer was injured when he handled a landmine while working at the Egypt-Israel border.

The impact of contamination is significant on the following activities in Egypt:
1. Irrigation projects, which represent one of the essential facets of national development projects in desert areas, have experienced delays. This prevents the establishment of new communities in the northern coast area.
2. Oil and gas extraction are delayed from reserves estimated at 4.8 billion barrels of oil and 13.4 trillion cubic feet (379 billion m3) of natural gas in the western desert.
3. Tourist projects have been hindered on the northern coast. New kinds of tourism, such as safari and eco-tourism, can encroach on affected areas, increasing the risk of incidents. It is necessary to warn people of potential hazards, but there is a fear of discouraging travel to the country.

Peace Gardens Survey: The Ministry of Planning and International Cooperation (Egypt) with UNDP and the local NGO Peace Gardens conducted a mine/ERW survivor survey from January to May 2008, on the North West Coast (primarily in Matruh governorate). The primary objective of the survey was to verify existing information on survivors collected by the Office of the Governor of Matruh and the governorate Social Solidarity Department.
Interviews were also conducted to identify previously unknown survivors in cooperation with local authorities. It should be noted that this survey included only those injured and those who still lived on the North West Coast at time of survey. It is estimated that some 80–90% of mine/ERW-affected communities were covered by the survey. The survey identified 645 mine survivors living on the North West Coast, 94% of them were males and 3% children. Among the injured, 48% suffered upper body injuries, 37% lower body injuries, and 15% other injuries. The number of people injured annually from 2002 to 2004 was found to be 18, but by 2007 the number had decreased to 3. It should be noted the survey recorded the age of the person at the time of the survey, not when the mine/ERW incident occurred. The number of mine/ERW survivors recorded in the survey was considerably lower than the estimate of 8,000 mine/ERW casualties which, according to UNDP is "understood to relate to casualties in the whole country". A number of survivors particularly from Bedouin communities are assumed to have moved from the area since they were injured by mines/ERW. As a result, the survey does not capture all those injured by mines/ERW in the survey area. The survey did not include military casualties from mines/ERW. The Ministry of Defense estimated that about 700 people, soldiers and civilians, have been killed in mine explosions since 1945.

4. EGYPT LANDMINE MONITORING REPORTS

There are eleven available Landmine Monitoring Reports in the last 11 years (1999-2009) concerning Egypt. These reports indicate that (www.icbl.org):

- Egypt has not acceded to the Mine Ban Treaty, insisting that it needs antipersonnel mines for border defense. Egypt has abstained on every annual pro-mine Ban Treaty UN General Assembly resolution.
- In 2004, Egypt said that the government had imposed a moratorium on production and export of antipersonnel mines, claiming that it last produced in 1988 and exported in 1984.
- Egypt has often participated as an observer in Mine Ban Treaty meetings, most recently in November 2008.
- Egypt has made slow progress in setting up a civilian mine action program to support the clearance of mines and explosive remnants of war (ERW) on its territory dating back to World War II. Clearance operations, part of the first phase of a joint government-UNDP project related to the North West Coast, began in February 2009.
- There has never been a formal risk education program in Egypt, and only very limited ad hoc activities have been reported in the last 10 years, including in 2008. Progress in recent years has been made in providing

mine/ERW survivors in Egypt with medical care and economic support. However, there is no national victim assistance strategy in Egypt and the majority of survivors did not receive specialized assistance in 2008. Discrimination against persons with disabilities continued to be reported in 2008.

A summary of Egypt Landmines Monitoring Reports 2008 (January-December 2008) and 2009 (January-December 2009) are presented in Table 4. The detailed reports can be found on the website: www.icbl.org.

Table 4: Egypt Landmine Monitoring Reports (2008 & 2009)

	2008	2009
Mine Ban Treaty Status	• Not a State Party	
Production, Transfer and Stockpile	• Unknown, but thought to be substantial	• Egypt has stated that it stopped production of antipersonnel mines in 1988 and export in 1984
Contamination	• Antipersonnel and anti-vehicle mines, UXO and ERW	
Estimated area of Contamination	• 2,680 km^2, to be significantly reduced by technical survey	
Demining progress	• None	• The "Support to the North West Coast Development Plan and Mine Action Project" between Egypt and UNDP was signed in November 2006. • An extension was due to run until December 2009
Mine/ERW casualties	• Total: 25 (2006: 22) • Mines: 10 (2006: 8) • ERW: 14 (2006: 8) • Unknown: 1 (2006: 6)	• Total: 40 (2007: 25) • Mines: 6 (2007: 10) • ERW: 33 (2007: 14) • Unknown: 1 (2007: 1)
Casualty analysis	• Killed: 8 (2006: 9) • Injured: 17 (2006: 13)	• Killed: 14 (2007: 8) • Injured: 26 (2007: 17)
Risk Education capacity	• Inadequate	• Risk Education was included in the joint UNDP/Egypt project signed in November 2006, yet little has been implemented. • In July 2008, the Chair of the State Information Service stated that a three-month RE campaign in Matruh, Alexandria, Suez, Al-Arish, northern and southern Sinai, and Ismailia governorates would take place, but no activities had taken place as of July 2009
Availability of services	• Unchanged-inadequate	
Mine action funding	• $500,000 (2006: none)	• $918,244 (2007: $500,000)
Key developments	• In mid-August 2008, it was announced that demining would begin before the end of the month.	• From 7 February 2009 until 31 July 2009, demining operations were reported to have cleared 210214 items of UXO and 13720 mines from 14474 acres (approximately 58.6 km^2). • It has not been possible to verify these figures, which seem high given the available resources

5. DIFFICULTIES IN HUMANITARIAN DEMINING

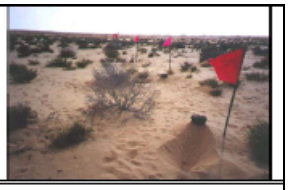
The fact that over the years many reference points and landmarks have disappeared by rain and sandstorms added to the complexity of drawing a comprehensive picture of the Landmine situation. The complete marking and fencing of huge areas in the western desert is not considered feasible by the Egyptian Military due to climatic conditions, sandstorms and scrap traders. Demining is the action of removing landmines, booby traps and (UXO) from an area; those are normally hidden and most often buried. Demining process is essentially two steps;

detection and clearing. Landmines are distributed in fields over wide areas, however not all the wide areas are contaminated. For optimum application of demining; contaminated regions should be detected at first, then it is possible to utilize uncontaminated areas for economic and human activities, while contaminated regions are treated for clearance. The process of locating region of interest (ROI) to exclude uncontaminated areas is called **Mine Field Area Reduction**. Therefore, it is usual to use sensors in two levels; wide view to locate region of interest (ROI), and detailed view to locate the specific mines. In military demining, a military force prepares a safe corridor for the troops to move through. Some losses are accepted as an expected part of the conflict.

Therefore a flail machine with an 80% clearance success can be used. This sort of clearance operation is not suited to humanitarian demining, in which, the entire land area must be cleared free of mines to be productive. The United Nations has specified a mine clearance standard of 99.6% for humanitarian demining. Currently the only way to achieve this is with manual demining methods. The main humanitarian demining technical problems are given in Table 5.

Table 5: Difficulties in Humanitarian Demining

Complications	Description	
Landmines locations are usually unknown	Because landmines are very cheap and easy to build weapons, they have been largely used in different types of conflict, by military or	
Often discovered by accidents	Associations like the Red Cross when they have to provide support for mine victims.	
Maps indicating the locations is useful in few cases	Demining operations may not start until years after the minefield was laid and during this time the conditions of the affected lands can drastically change.	
Mines that have been in place for years	Can be corroded, waterlogged or impregnated with mud or dirt, and then behave quite unpredictably.	 Photo: J. Trevelyan
Floods and heavy rains	May cause mines to move from the original place to another or to move deeper into the ground.	
Mines placed near buildings	may lie deep under fallen rubble, with yet more mines laid on top)	
Stakes supporting Fragmentation mines	May fall over and may rot, leaving the fragmentation mines half buried lying on their sides.	
Tripwires may run through	The branches of the scrub & may pull the pins from the fragmentation mine as the branches sway in the wind.	
The vegetation grown in many years after the landmines were laid	Border between Croatia and Republika Serbs, 8 years after mines were laid can represent a very big obstacle to demining operations.	  Photos: J. Trevelyan
Type of terrain itself can cause many problems to mine clearance	Plenty of metal fragments represent an obstacle for the use of metal detector. Uneven rocky terrains add complications to the mine removing operation	 Photo: MCPA, Afghanistan, Prof. J. Trevelyan

Mines buried in a sandy desert	Can easy move deeper when the wind blows the sand	 Photo: Western Desert, near to Al Alamein (Prof. J. Trevelyan)
Mine age implies high sensitivity of mines.	In Western Desert and Sinai Peninsula, age of most of the explosive materials is up to 65 years. (high sensitivity)	
In Western Desert and Sinai Peninsula, the climate is extremely unpleasant for deminers.	Temperatures up to 55°c are common. The conditions are either dusty, sandy or muddy (salty mud and swamps) along the coast: sometimes both. The muddy areas and marshes are particularly difficult to deal with as it is often impossible to stand in the mud.	
Mines state are not expected as well.	Array of mines as those German mines in the World War II waiting for press in order to be activated. Already pressed under certain weight of contaminations and waiting for release in order to be activated.	

6. EGYPT LANDMINE CLEARANCE EFFORTS

Since 1946, according to the Egyptian Official Authorities, 7 million mines have been cleared from the western desert in the past 15 years and 3 million from the Sinai desert. That leaves at least 20 million of Landmines/UXO/ERW/MOTAPM unclear. Egypt has set the year 2017 as the target for finally ridding its sands of Land mines. It is anxious for Egypt to be left alone in paying for and carrying out this huge task. Next are some other official acts:

- In July 2002, the Government of Egypt has established the **"National Committee for the Northwest Coast Development and Landmine Clearance"**. This Committee is headed by the Ministry of Planning and International Cooperation. Demining Programs aim to propose and implement regional developmental programs for the Northwest Coast and its desert back areas up to the year 2017.
- The responsibilities of this National committee are:

  a.) conducting studies and establish programs and plans for landmine clearance in the designated areas,

  b.) revising financial plans for the programs related to Landmine clearance as well as available grants and assistance from countries, agencies, international organizations,

  c.) presenting allocation suggestions within the scope of the designed objective,

  d.) verifying and following-up on the implementation of the programs and plans prepared for Landmine clearance, preparing draft laws and decisions and research necessary for Landmine clearance projects.
- All Demining work is handled by a division of the Ministry of Defense in Cairo the Egyptian Military Engineering Organization **(EMEO)**.
- The Egyptian government is now pursuing a more open policy, recognizing that information is needed to help secure assistance. Until recently, all aspects of minefields and Demining are classified.

7. COMMENTS AND CONCLUSIONS

This paper presents four main points: scope of Egypt landmine problem, socio-economic effects, available official data, and Egypt clearance efforts in addition to the faced difficulties of exploration, localization, mapping, and removal of Landmines in infested areas. Two questions are still with no answer for safe Landmine detection:

1. What is the most efficient technique for exploration, localization, and mapping of such Landmines?
2. What is the most efficient sensor(s) used in the detection process of different Landmines types?

The answers of these questions may be useful to develop safer, faster and cost effective Anti-Personal and Anti-Tank Landmines (APL & ATL) clearance. This will save human lives and will have a very positive impact on the Egyptian National Income.

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