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THE EARLY WARNING APPLICATION ROLE IN FACING THE ENVIRONMENTAL CRISIS AND DISASTERS. "PRELIMINARILY RISK MANAGEMENT STRATEGY FOR THE GREATER CITY OF CAIRO"

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Natural disasters are inevitable and it is almost impossible to fully recoup the damage caused by the disasters. But it is possible to minimize the potential risk by developing disaster early warning strategies, methods using the new technology applications which play a crucial role in efficient mitigation and management of disasters.

This paper describes the importance of the remote sensing and Geographical Information System (GIS) in evolving a suitable strategy for disaster, crises and risk management using these technologies.

The main objective of this paper is to make a Preliminary risk management plan (it is a logical and systematic method of identifying, analyzing, treating and monitoring the risks involved in any activity or process. This process helps Administrations to focus on priorities and in decisions on deploying limited resources to deal with the highest risks) using the Environmental risk map of the greater city of Cairo demonstrating the most high-risk administrative areas in the city, supported by field evidence and different sources of information. to reduce the loss of life and property and protect the Nation from all hazards, including natural disasters and other man-made disasters, by leading and supporting the Nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation.

This study has shown that how can the early warning Applications can be useful in analyzing, Integrating and managing different datasets for predicting the environmental crises and disasters that may affect the urbanism inside the city and help in the preparation of the Risk management plan.

Key words: ***Early warning, Disasters, management, risk analysis, mitigation, Cairo.***

INTRODUCTION

Natural disasters cause damage to life and property all over the world in various forms. The pressure on the earth's resources caused by increased population has resulted in increased vulnerability of human and their infrastructure to the natural hazards, which have always existed. The result is a dynamic equilibrium between these forces in which scientific and technological development plays a major role. Recurring occurrences of earthquakes, floods, landslides and forest fires need to be studied using today's advanced technology to find effective preventive measures. Space technology can help the disaster mitigation process through better future scenario predictions, detection of disaster prone areas, location of protection measures and safe alternate routes, etc.

The main objective of this study is to determine the risks that threaten the Great Cairo City to conduct a preliminary risk management strategy/ plan. Moreover this paper provides a conceptual and theoretical background for the hazard and risk assessment, which provides guidance to help those in authority to address the affects of natural and environmental hazards on community's vision for future.

The following provides a brief description of the main research questions and sections that this paper intends to discuses:

Section 1

What is Disaster Management?

- Overview on Disasters/ Crisis management.
- The objectives and motivations for managing the Disasters and Crisis.

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Section 2

What is the Risk Management? And what are Risk analysis steps?

- Introduction to Risk Management.
- Risk Management Procedures.

Section 3

What is the importance of the Early Warning and its applications in disaster/Risk Management?

- Approach to Early Warning systems.
- Challenges facing E.W. Systems.
- E.W. applications and its importance in disasters, Crisis and Risk Management.

Section 4

What are the Natural and Environmental threatens in Egypt?

- Introduction About Egypt.
- Natural and environmental Hazards in Egypt.
- The Governmental Authorities and non-Governmental Organizations trends to confront the natural and environmental environmental disasters.
- Egypt disaster mitigation (ongoing and Completed) projects and activities.

Section 5

What are the main guidelines for proceeding a preliminary risk management for Greater Cairo City?

- Geographic description for Greater Cairo City (Case Study).
- The main Guidelines for proceeding the risk management.
- Risk description Table.
- Conclusion.

DISASTER DEFINITION, CHARACTERISTICS AND TYPES

Disaster can be defined as a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources (UNEP). Those hazards can be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, area affected, intensity, speed of onset, duration and frequency.

The objectives and motivations for managing Disasters and Risks

All Strategies and plans that concern with mitigating, reducing and even preventing the disasters and Crisis impacts have the same objective, which is having a disaster resilient cities, which characterized by its capacity to withstand or absorb the impact of hazard through resistance or adaptation, for enabling it to maintain certain basic functions and structures during a crisis and recover from an event. The resilient city is the city where:

- The city has steps to anticipate and mitigate the impact of disasters, incorporating monitoring and early warning technologies to protect infrastructure, community assets and individuals, including their homes and possessions, cultural heritage, environmental and economic capital, and is able to minimize physical and social losses arising from extreme weather events, earthquakes or other natural or human-induced hazards.
- It is able to respond, implement immediate recovery strategies and quickly restore basic services to resume social, institutional and economic activity after such an event.

When the hazard or threat becomes a reality, when it materializes, the risk becomes a disaster. Hence Focusing on disasters after they occur is essential, but not sufficient for reducing their tragic consequences to people, economies and the environment. However those impacts of natural disasters can be reduced through a proper disaster management, including disaster prevention (hazard and risk assessment, land use planning and legislation, building codes), disaster preparedness (forecasts, warning, prediction) and rapid and adequate disaster relief. Mitigation of natural disasters can be successful only when adequate knowledge is obtained about the expected frequency, character, and magnitude of hazardous events. Some types of disasters, like, floods or earthquakes may originate very rapidly and may affect large areas. (Pelling, 2003)

INTRODUCTION TO THE RISK MANAGEMENT

Risk Management is defined as the systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental Crisis and disasters. This comprises all forms of activities, including structural and non-structural measures to avoid or to limit adverse effects of hazards.

Risk Management Procedures

At the broadest level, risk management has a proactive concept which is clearly present in Focusing on Vulnerability instead of Focus only on Hazards. It includes a range of management and policy-making activities. But to achieve the essential objectives of risk management, those activities must be subjected in sequence according to organized procedures as following (**Risk Assessment to determine** what hazards present more danger than society is willing to accept. And it consists of two main phases (**Risk Analysis** - **Risk Evaluation**) - **Risk Reporting** - **Risk Treatment** - **Monitoring and Review**).

Risk Assessment

Risk assessment is conducted to estimate how much damage or injury can be expected from exposures to a given risk agent and to assist in judging whether these consequences are great enough to require increased management or regulation. Depending on the kind of hazard, the loss of habitat, and other kinds of ecosystem damage.

Risk assessment has widely range in scope and complexity, depending on the application from simple screening analyses to major analytical efforts that require years of effort and a substantial budget. Many methods and sequence of steps are involved in conducting risk assessments vary with the kind of risk and its possible consequences.

Risk Assessment Methods

- Qualitative methods are used when the assumed level of risk does not justify the time and effort of collecting the vast amount of data needed for a quantitative risk assessment, and where the possibility of obtaining numerical data is limited.
- Quantitative approaches They mostly follow an engineering approach and focus on the evaluation of the direct physical losses resulting directly from the impact of the hazard. Risk can also be visualized spatially in the form of maps which shows the spatial variation of risk over an area.

Phases of Risk Assessment

In its most general form, Risk Assessment is defined by the ISO/ IEC Guide 73 as the overall process of risk analysis and risk evaluation (UNEP), 2010.

1. Risk Analysis

Recently, risk analysis is being used to evaluate and manage the potential of unwanted circumstances in a large array of areas. Four steps must be conducted to complete the risk analysis (FEMA):

- **Risk Identification** sets out to identify an organization's exposure to uncertainty. Risk identification should be approached in a methodical way to ensure that all significant activities within the organization have been identified and all the risks flowing from these activities defined.
- **Risk Description**: The objective of risk description is to display the identified risks in a

structured format by using a table. The risk description table overleaf can be used to facilitate the description and assessment of risks.

• **Risk Estimation**: Risk estimation can be quantitative or qualitative in terms of the probability of occurrence and the possible consequence.

• **Risk Profile**: The result of the risk analysis process can be used to produce a risk profile which gives a significance rating to each risk and provides a tool for prioritizing risk treatment efforts. This ranks each identified risk so as to give a view of the relative importance. This process allows the risk to be mapped describes the primary control procedures in place and indicates areas where the level of risk control.

2. Risk Evaluation

It is known also as **Risk characterization**; and considered the concluding step of a risk assessment, when the risk analysis process has been completed, it is necessary to compare the estimated risks against risk criteria which the organization has established. The risk criteria may include associated costs and benefits, legal requirements, socioeconomic and environmental factors, etc. Risk evaluation therefore is used to make decisions about the significance of risks to the organization and whether each specific risk should be accepted or treated.

Risk Treatment

Risk treatment is the process of selecting and implementing measures to modify the risk. It includes as its major element, risk control/mitigation, but extends more further to risk avoidance, risk transfer, risk financing. Those proposed controls need to be measured in terms of potential economic effect if no action is taken versus the cost of the proposed actions and invariably require more detailed information and assumptions than are immediately available.

Monitoring and Review

Effective risk management requires a reporting and review structure to ensure that risks are effectively identified and assessed and that appropriate controls and responses are in place. The monitoring process should provide assurance that there are appropriate controls in place for the organization's activities and that the procedures are understood and followed.

EARLY WARNING – RISK AND VULNERABILITY INDICATORS

In 1997, the UN's Guiding Principles for Effective Early Warning stated that the objective of early warning "is to empower individuals and communities, threatened by natural or similar hazards, to act in sufficient time and in an appropriate manner so as to reduce the possibility of personal injury, loss of life, and damage to property or nearby and fragile environments" (UNEP), 2010.

The Early Warning to be effective and complete, it needs to comprise four interacting elements:

1. **Risk knowledge**: knowledge of the relevant hazards, and of the vulnerabilities of people and society to these hazards
2. **Monitoring and warning service**: a technical capacity to monitor hazard precursors, to forecast the hazard evolution, and to issue warnings.
3. **Dissemination and communication**: the dissemination of understandable warnings, and prior preparedness information, to those at risk.
4. **Response capability**: knowledge, plans and capacities for timely and appropriate action by authorities and those at risk.

Early warning systems require a broad multidisciplinary knowledge base, building on the substantial existing discipline-based research in the geophysical, environmental and social science fields. There is a need for more systemic, crosscutting and applied research, including on the following topics:

1. Development and use of geospatial data models, risk maps and scenarios.
2. Cost-effective observations systems.
3. Data generation and assimilation.
4. Improvement of core prediction system models and prediction tools.
5. Warning decision system tools for disaster managers.
6. Management under warning uncertainty.
7. Evaluation and comparison of warning communication methods.
8. Models of human response behavior including evacuations.
9. Visualization of impacts and response options for community Preparedness.
10. Warning system performance, indicators, benchmarks, and economic assessments of warning system effectiveness.

Challenges facing Early Warning Systems

• Early warning systems have to meet several requirements, including the use of appropriate technology and know-how, clear responsibilities of parties and effective decision taking mechanisms, a functioning communication system and well-prepared evacuation and response structures.

• Different hazards require different early warning systems.

• Experiences gathered around the world show that some hazards are difficult to predict.

• At present, many systems that are able to issue warnings for a number of natural hazards are in place. A frequent problem, however, is the weak linkage between the technical capacity to issue the warning and the public's capacity to respond effectively to the warning, the capacity of the warning to trigger the appropriate response by emergency management agencies, community-based organizations and the public at large.

Early warning applications and its importance in disasters, Crisis and risk management

Most of the data required for disaster management, has special components and also changes overtime. Therefore the use of remote sensing and GIS has become essential in urban disaster management. Moreover A range of tools exist to help in providing warnings about events that could threaten the stability of a given society.

Remote Sensing Applications

In a number of countries, where warning systems and building codes are more advanced, remote sensing of the earth has been found successful to predict the occurrence of disastrous phenomena and to warn people on time.

The term "remote sensing" is broadly defined as the technique(s) for collecting images or other data about an object from measurements made at a distance from the object, and can refer, for instance, to satellite imagery, to aerial photographs or to ocean bathymetry explored from a ship using radar data (FEMA). The vantage point of space, particularly when combined with the results of field based vulnerability assessments in a GIS, has proven remote sensing to be a valuable tool for the early warning and disaster management communities, and is increasingly being applied by governments and non-governmental organizations to decrease the impacts of climate, water and weather related hazards.

Geographic Information Systems (GIS)

Since risk is a spatially varying phenomenon, GIS technology is now the standard tool for the production and presentation of risk information. Risk can be presented in the form of statistical information per administrative unit, such as a Risk Index value resulting from qualitative risk assessment, the Probable Maximum Loss or Average Annual Loss , Loss Exceedance curve for economic risk, or F-N curves for societal population risk.

GIS can be used to analyze the spatial characteristics of the data over various digital layers. If sequential data are available

quantification of spatial changes becomes possible through overlay analysis. Most importantly, the combination of both types of database can ensure sustainable management.

NATURAL AND ENVIRONMENTAL THREATENS THAT EGYPT MUST CONFRONT

Introduction about Egypt (Profile and Context)

The Arab Republic of Egypt is located in the North-Eastern and South-Western corners of Africa and Asia respectively. It is bounded to the North by the Mediterranean Sea, from the East by Palestine, from the South by Sudan, and from the West by Libya.

Geographically Egypt Consist of Four major parts (The Nile Valley and Delta – Western Desert – Eastern Desert – Sinai Peninsula). Egypt's borders run about 1,085 km from North to South and about 1,255 km from east to west encompassing an almost square-shaped total area of about 1 million square km. The average altitude is 50 ft below sea level; the highest point being Mount St. Catherine at a high of 8,668 ft and the lowest the Qattara Depression at 436 ft below sea level. (Environmental Profile of Egypt, 2001).

Natural Hazards and Environmental Crisis in Egypt

Each Hazard or Environmental Crisis known in Egypt has many causes and sever affects and impacts on community as following (Egypt state of the Environmental Report, 2009):

1. Flash floods

Flash floods are the result of short period of heavy storms that occur in the red sea area and southern Sinai. Velocity of floodwater depends mainly on the topography of basin and its soil type and characteristics. Some of these flash floods caused severe damage to people and infrastructures. Many studies have been undertaken to determine possible measures to avoid hazards that flash floods cause.

2. Dust and Sand Storms

They are common phenomena in Egypt during the spring and late winter seasons. Dust storms can result in high concentrations of particulate matters, which affect the visibility contributing to increased road accidents, and negatively affect air traffic.

3. Earthquakes

Sudden movements along geological faults in rocks specifically near the surface of the earth result in earthquakes. The main faults of Egypt and their tectonic setting and seismic records indicate there are at least three main seismic active trends:

- Northern red sea – Gulf of Suez – Cairo – Alexandria trend.
- Eastern Mediterranean – Cairo – Fayoum depression trend.
- Gulf of Aqaba trend.

4. Landslides

Due to the special nature of the earth crust in Egypt and its geology together with the uprise of subsurface water have caused several types of landslide.

5. Rock fall

In 2002 and 2008 a Rock slides on the edges of the brittle Muqattam hills - Cairo, crushed a shantytown in the eastern Duwayqa area. And Up to 200 people have been buried under their homes after rockslides.

6. Uprise of Subsurface water

This problem poses a great threat to old Cairo and its all Islamic monuments and almost all other pharaonic and Christian heritage. The area affected in Greater Cairo reaches almost 2000sq.km whereas the affected population ranges between 12-15 million people.

7. Coastal erosion

This phenomenon is observed along the shores of the delta. Buildings of the high dam deprives the northern shores from the silt they used to receive annually (approx. 35 million tons of sand and 45 mill. tons of mud and silt). The shore line retreated to a great extent in different areas like Rashid, Borollos and Ras El-Bar.

8. Environmental pollution

Oil pollution in sea water, wastes reaching the Nile water and soil polluted with excessive use of agricultural chemicals such as fertilizers and pesticides. Air polluted with various Chemicals and suspended matter.

The Governmental Authorities and Non-Governmental organizations trends to Confront the Natural and Environmental Disasters

In Egypt there are several protocols between relevant agencies and institutions pertaining to Disaster Management and Risk Reduction including but not limited to the Ministry of Interior, the Egyptian Atomic Energy Authority, the Academy of Scientific Research and Technology, the Ministry of Housing, Utilities and Urban Communities, the Egyptian Environmental Affairs Agency and the Armed Forces (Riad, 2002). These protocols intend to organize and coordinate the participation of these agencies in disaster management and reduction and elaborating codes and plans for protecting humans and facilities in case of disastrous accidents. Public agencies, both central and local, and civil society organizations allocate necessary resources for preparedness. Disaster risk reduction is on the agenda of various institutions including, executing agencies, research centers and NGOs, however Egypt has a national strategy and necessary legislations that address disaster risk reduction. (The National Environmental Action Plan 2002-2017, 2001)

Examples for some sectors participations

- **The government established an information database and hazard mapping** for each governorate, which includes data about residents of each village and their characteristics, administrative information, data on social, physical infrastructures and on economic establishments as well. The database also includes complete survey on vital target places, such as power stations, water plants, hospitals.
- **The ministry of planning has established** an integrated hazard mapping system and complete projection on the possible hazards that were divided according to their nature.
- **Central Agency for public mobilization and statistics** uses its Geographic information System (GIS) to find stabile alternatives in the management of disasters. According to the location of the event and means to utilize the resources at neighboring sites, a plan for evacuation and reallocation of inflicted population is possible.

Egypt disasters mitigation Projects and activities (ongoing and Completed)

- **Identification of hazard zones (Hazard assessment)**
  - Earthquake hazards and assessment in Egypt.
  - Detailed seismological field studies of the October 1992 earthquake and its after-shocks.
  - Mitigation of flash flood hazard in Egypt.
  - Hazards due to ground-water condition in Egypt.
  - Desertification of arable lands in Egypt.
- **Monitoring, prediction and warning**
  - Earthquakes monitoring network.
  - Monitoring, prediction and warning of flash floods. Monitoring, prediction and warning of radiation hazards.
- **Land-use and risk management**
  - National land-use map.
- **Public education and information**
  - Holding training courses and workshops, international conferences covering all aspects of disaster mitigation.

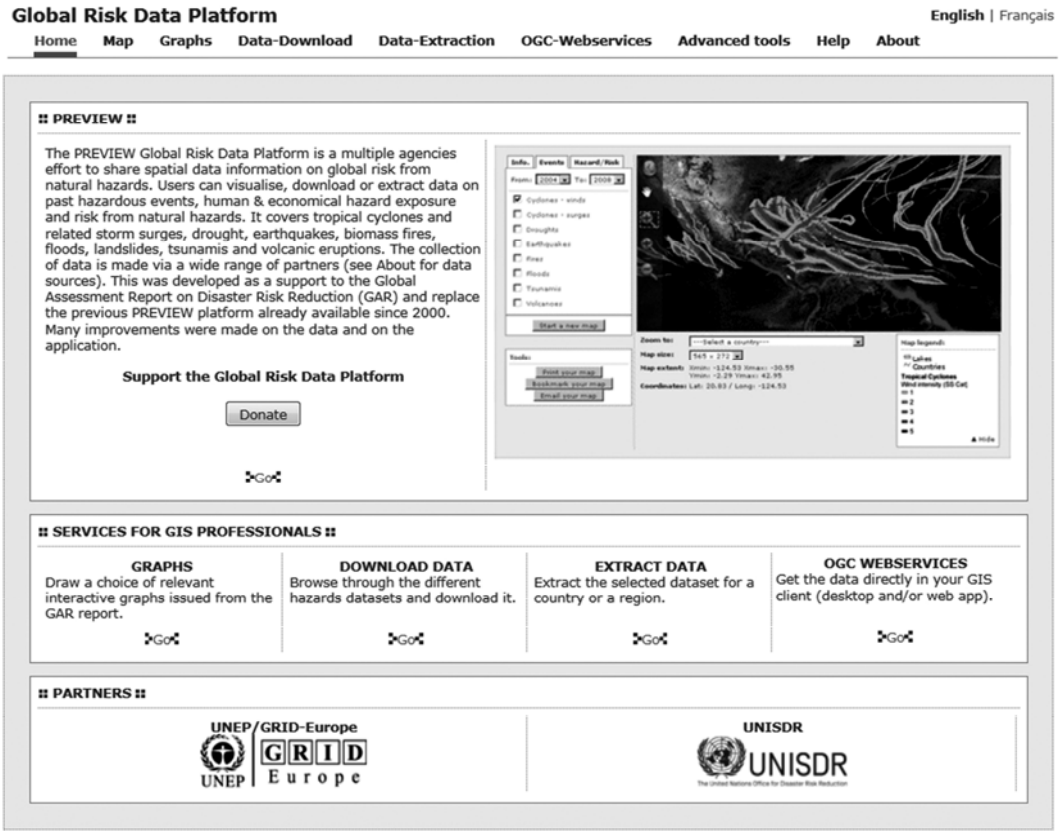


Figure 1. The PREVIEW Global Risk Data Platform is a multiple agencies effort to share spatial data information on global risk from natural hazards (EM-DAT)

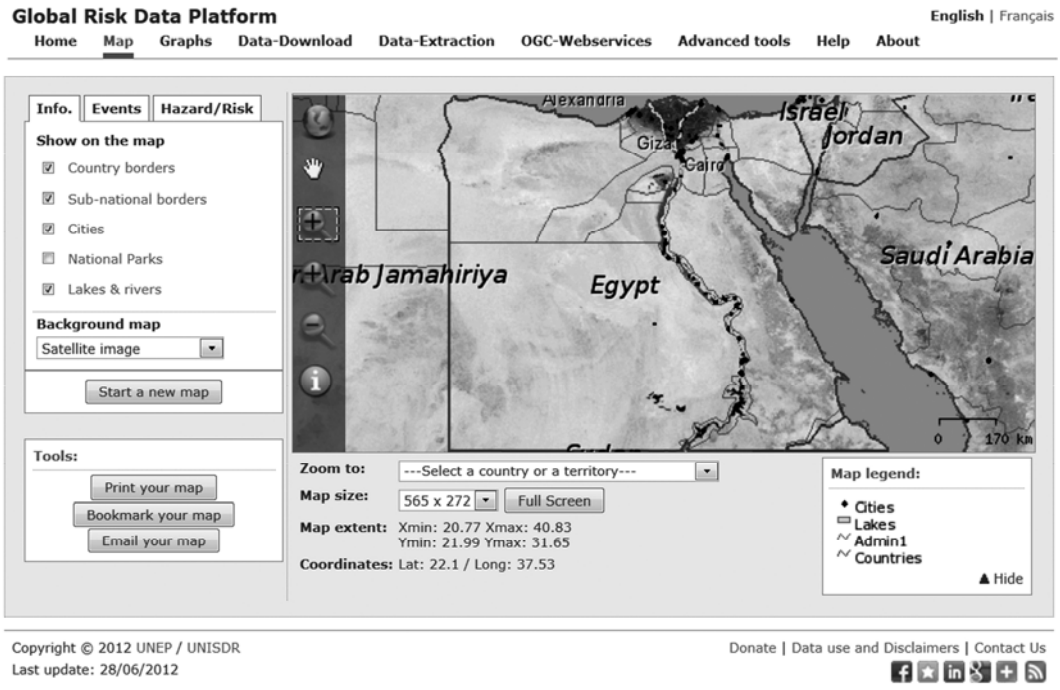
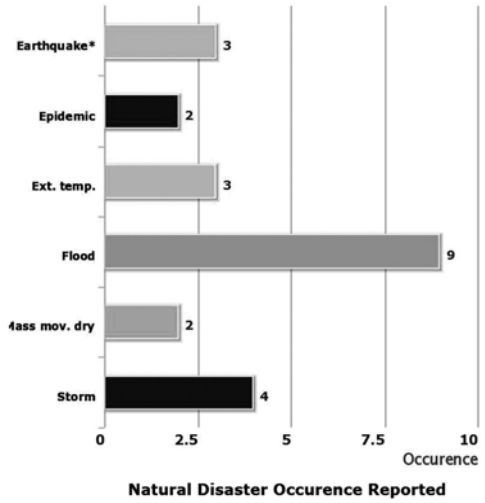


Figure 2. Egypt Risk Map (EM-DAT)

Natural Disasters from 1980 - 2010

Overview

No of events:	23
No of people killed:	1,527
Average killed per year:	49
No of people affected:	262,864
Average affected per year:	8,479
Economic Damage (US$ X 1,000):	1,342,000
Economic Damage per year (US$ X 1,000):	43,290



Natural Disaster Occurence Reported

Top 10 Natural Disasters Reported

Affected People

Disaster	Date	Affected	(no. of people)
Flood	1994	160,660	
Earthquake*	1992	92,649	
Flood	2010	3,500	
Flood	1995	3,000	
Flood	2002	800	
Mass Movement Dry	2008	697	
Mass mov. dry	1993	300	
Flood	1996	260	
Earthquake*	2002	250	
Flood	1991	208	

Killed People

Disaster	Date	Killed	(no. of people)
Flood	1994	600	
Earthquake*	1992	552	
Mass Movement Dry	2008	98	
Mass mov. dry	1993	34	
Extreme temp.	1995	32	
Storm	2010	31	
Storm	1987	30	
Extreme temp.	1996	22	
Storm	1997	18	
Epidemic	2006	15	

Economic Damages

Disaster	Date	Cost	(US$ X 1,000)
Earthquake*	1992	1,200,000	
Flood	1994	140,000	
Flood	1997	1,000	
Storm	1997	1,000	
Storm	1987	0	
Extreme temp.	2000	0	
Flood	2002	0	
Earthquake*	2002	0	
Flood	2002	0	
Storm	2004	0	

Statistics Per Event

Killed People

Drought:	...
Earthquake*:	187.33
Epidemic:	7.50
Extreme temp:	19.00
Flood:	74.33
Insect infestation:	...
Mass mov. dry:	66.00
Mass mov. wet:	...
Volcano:	...
Storm:	23.00
Wildfire:	...

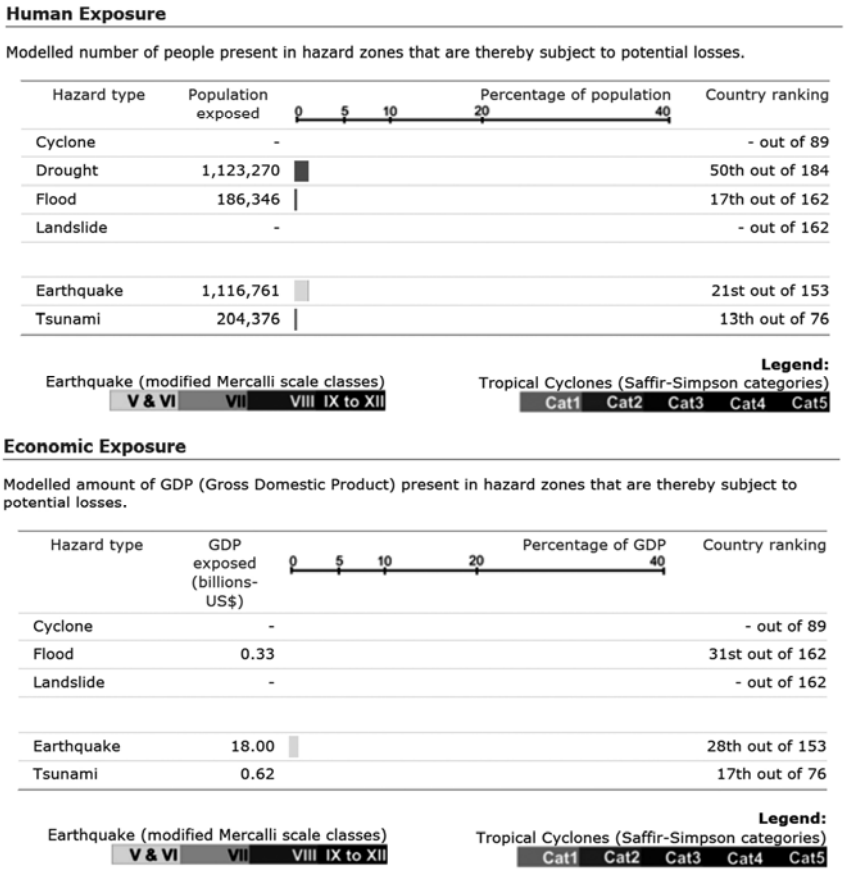
Affected People

Drought:	...
Earthquake*:	30,989.33
Epidemic:	71.50
Extreme temp:	35.00
Flood:	18,722.00
Insect infestation:	...
Mass mov. dry:	498.50
Mass mov. wet:	...
Volcano:	...
Storm:	38.25
Wildfire:	...

Economic Damages

Drought:	...
Earthquake*:	400,000.00
Epidemic:	...
Extreme temp:	...
Flood:	15,666.67
Insect infestation:	...
Mass mov. dry:	...
Mass mov. wet:	...
Volcano:	...
Storm:	250.00
Wildfire:	...

Figure 3. Egypt Disaster Statistics - Data related to human and economic losses from disasters that have occurred between 1980 and 2010 (EM-DAT)



Human Exposure

Modelled number of people present in hazard zones that are thereby subject to potential losses.

Hazard type	Population exposed	Percentage of population (0 5 10 20 40)	Country ranking
Cyclone	-		- out of 89
Drought	1,123,270		50th out of 184
Flood	186,346		17th out of 162
Landslide	-		- out of 162
Earthquake	1,116,761		21st out of 153
Tsunami	204,376		13th out of 76

Earthquake (modified Mercalli scale classes): V & VI | VII | VIII IX to XII

Legend:
Tropical Cyclones (Saffir-Simpson categories): Cat1 | Cat2 | Cat3 | Cat4 | Cat5

Economic Exposure

Modelled amount of GDP (Gross Domestic Product) present in hazard zones that are thereby subject to potential losses.

Hazard type	GDP exposed (billions-US$)	Percentage of GDP (0 5 10 20 40)	Country ranking
Cyclone	-		- out of 89
Flood	0.33		31st out of 162
Landslide	-		- out of 162
Earthquake	18.00		28th out of 153
Tsunami	0.62		17th out of 76

Earthquake (modified Mercalli scale classes): V & VI | VII | VIII IX to XII

Legend:
Tropical Cyclones (Saffir-Simpson categories): Cat1 | Cat2 | Cat3 | Cat4 | Cat5

Vulnerability and Risk

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

	Vulnerability Index	Risk Absolute	Risk Relative	Mortality Risk Index
Multiple				
Cyclone				
Flood				
Landslide				
Earthquake				

Legend:
Very low 0 1 2 3 4 5 6 7 8 9 10 Very high

Vulnerability Index: Estimated number of people killed per year (per mio. exposed)

Risk Absolute: Average killed per year

Risk Relative: Killed per million per year

Mortality Risk Index: Average of both indicators (RA+RR/2)

Class	Absolute risk	Relative risk	Mortality Risk Index	Vulnerability Index
0	0	0	Unknow exposure	0
1	> 0 - 0.3	> 0 - 0.03	Negligible	0.3
2	0.3 - 1	0.03 - 0.1	Very low	1
3	1 -3	0.1 - 0.3	Low	3
4	3 - 10	0.3 - 1	Medium low	10
5	10 - 30	1 - 3	Medium	30
6	30 - 100	3 - 10	Medium high	100
7	100 -300	10 - 30	High	300
8	300 - 1000	30 - 100	Very High	1000
9	1000 - 3000	100 - 300	Major	3000
10	> 3000	> 300	Extreme	10000

Figure 4. Egypt Risk Profile Statistics -
This risk profile is an analysis of the mortality and economic loss risk for three weather-related hazards: tropical cyclones, floods and landslides.
In addition new insights have been gained into other hazards such as earthquakes, tsunami and drought. (EM-DAT)

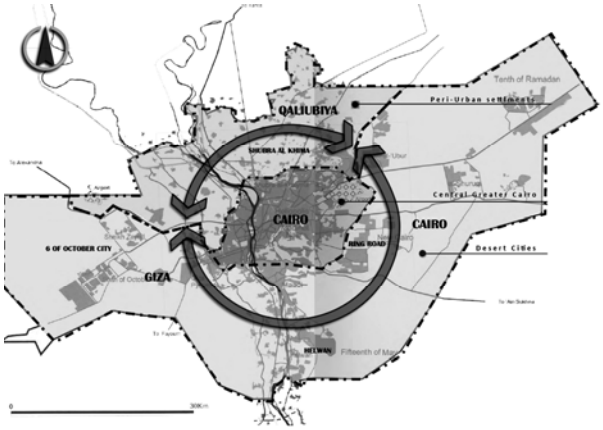


Figure 5. Administrative Boundaries of Greater Cairo

Table 1. Risks and Vulnerability Description
(Egypt state of the Environmental Report, 2009)

Analysis		Evaluation	Treatment	Monitoring and review
Nature of Risk	Priority of Risk (Low – High)	Consequences (damages & Losses)	Risk Treatment (Recommendation Solution)	Means, strategies and Policies
Flash Flood – Flood – Earthquake – Landslide - Rock fall - Coastal erosion - Environmental degradation due to agricultural practices - Air/ Soil/ Water Pollution - Dust & Sand Storms.				

THE MAIN GUIDELINES FOR PROCEEDING A PRELIMINARY RISK MANAGEMENT PLAN FOR GREATER CAIRO CITY

Defining the Greater Cairo Region

Before defining the study area, it should be noted that the term "Greater Cairo" is invariably applied in Egypt to describe different overlapping areas developed over years. Nowadays the Greater Cairo Metropolitan Area divided between five governorates; Cairo, Giza, Qalyobiya, the newly established Helwan and 6th October Before establishing the new Helwan and 6th of October governorates.

Greater Cairo Geographic location

The Greater Cairo (G.C.) area is situated between the 29°43 and 30°26 N latitudes and the 30°43 and 31°53 E longitudes with an area of 1.09 million Feddan. The Nile runs through this area in a flood plain 9 to 35 km wide, the topography of the region is almost flat, bounded by hills to the east and west.

Weather conditions

The region is located in the subtropical climatic region with a dry climate. In winter the general climate of the region is cold, moist and rainy with minimum mean temperature of 13°C, while during summer, it is hot, dry and rainless with maximum mean temperature of 28°C. In spring and autumn dust and sandstorms frequently blow.

The main Guidelines to conduct a preliminary risk management Strategy/plan

Table 1. for Risks and vulnerability description, drew the main guidelines to conduct the preliminary risk management strategy. All risk assessment process for the Greater Cairo city can utilize the Main Egyptian risk assessment. (See figures: 1,2,3,4).

CONCLUSIONS AND RESULTS DISCUSSION

Conclusions

According to what mentioned previously we can determine the main conclusions as following:

First: Monitoring of disasters using remote sensing, GIS and GPS has two aspects; one is to record the real status of damages due to those disasters (Data Collection) and the other is to analyze the cause of a disaster and to predict the occurrence of the disaster (Processing Data). Moreover remote sensing should be integrated with GIS technique in terms of risk management, hazard mapping and public awareness.

Second: Many Natural Hazards and Environmental Crisis occurred repeatedly in Egypt such as: flash floods, dust and sandy storms, Earthquakes, Landslides, Rock Fall, uprise of subsurface water, Costal erosion and Environmental pollution, each of them has causes and sever affects and impacts. This forced the Egyptian government to develop its National Policy Framework on Crisis Management and Disaster Risk Reduction.

Third: Egypt has advanced facilities for satellite reception of image and analysis of data collected by satellites. Egypt is also a participant in several international networks for regional monitoring to exchange information.

Fourth: Egypt's capability of environmental management is continuously improving, However, There are still main challenges that face the country, such as; air pollution, soil salinity and desertification, marine pollution, untreated sewage water, rapid increase of population which affects the natural resources and discord between development policies and environmental guiding principles.

Fifth: The Egyptian environmental affairs agency provided most of the cities specially the Greater Cairo region with indicators to monitor the Air and fresh quality and noise level, to ensure they are within the allowable rate, as a proactive early warning procedure.

Sixth: The presented indicators generally show trends in specific parameters that describe aspects of the state of Air and fresh water quality in Egypt. These indicators can be used by decision-makers to assess environmental policies in air and water sector. Unfortunately time constraints, as well as limitations or lack of data have been major obstacles toward the formulation of such indicators.

Seventh: Although a legal framework that consist several actions relevant to the Crisis Management and Disaster Risk Reduction exists in Egypt (more than 10 laws and decrees), there is a need for revised legislation and their enforcement and to institutionalize the legal structures.

Result Discussion and Recommendation

The Main Issue here is not how to make a disaster or risk reduction strategy; because there are plenty of those inefficient theoretical strategies, the main issue is the limitation of visions in proceeding those strategies, for example what if one of those strategies didn't achieve its goals? The disaster will be occurred. That what make the Egyptian Disaster risk reduction not completely efficient, because there isn't plan B which is necessary to deal with any variables may suddenly occur, not only that but also the conflict in responsibility between relevant agencies and institutions pertaining to Disaster Management and Risk Reduction.

An Efficient Action plan for Risk reduction must be set with many alternatives to each exposed threatens or Risk. Risks must be organized according to risk priority (High-Mid-Low) and this action plan must specify the protocols between relevant agencies and institutions pertaining to Disaster Management and Risk Reduction. Moreover the results and consequences must be subjected to monitoring and reviewing process to estimate the effectiveness of the plan.

Many proactive scenarios for disasters and Risks that threaten the Greater Cairo city must be conducted with utilization for the simulation programs to determine the different expectations and specify a proper Treatment methodology to each case individually according to the risk analysis matrix.

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