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Research Paper

# APPROPRIATE POLICIES AND POLITICAL WILL IN MAKING EGYPTIAN CITIES RESILIENT TO NATURAL HAZARDS: A CASE STUDY FROM CAIRO

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Natural hazards become a development concern when they threaten people, communities, business and the environment. A disaster occurs only where a natural hazard event affects a vulnerable community. Cities in Egypt are the main sources of economic activities and services to a wider amount of population and they are contained capacities that are not replicated, nor replicable. According to past natural hazards occurred in Egypt, some of the cities are faced exposure to natural hazards such as earthquakes and floods. On the other hand, there is informal development in many urban cities which reflected that about 40% of the people of Egypt is living in informal unplanned areas, and six governorates including Cairo have life threatening informal areas because of their location in a geological hazardous area. All these may increase vulnerability of the Egyptian cities to natural hazards. Cairo governorate is accommodating about 45% of life threatening informal areas which is increasingly putting pressure on governmental policies and resources to solve this problem. From 2009, the government started ambitious program to solve this problem and transfer the people living in these areas to a safer houses but it was faced by different obstacles in polices and resources because of the political changes which faced Egypt from 2011. In the last few years, the government had given the priority to this issue and had different successful approach on the ground. This paper is highlighting the current situation of natural hazards in Egypt; life threatening informal areas with focusing in Cairo governorate. It described the current governmental programs and policies towards making Cairo government as a resilient city to natural hazards. It is concluded that there are big changes in the current policies which supported by a political will and it is reflected to different action plans for disaster risk reduction in Cairo governorate.

Keywords: Policy, Natural, Hazards, Resilient, Cities

## INTRODUCTION

Much of this growth in disasters due to natural

hazards is attributable to an increase in vulnerability (Philip Buckle, 2007). The reasons

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behind these changes are complex, and they include:

- The growth in population numbers, resulting in more people being exposed to hazards
- The movement of large numbers of people to urban areas and to coastal areas, in particular to mega-cities
- Poor land use and inadequate enforcement of planning, design and building standards
- The growth in the amount and value of assets and infrastructure exposed to hazards, including private properties (including dwellings), economic assets and public infrastructure.

On the other hand, communities living in informal settlements in many parts of the world are particularly vulnerable to environmental hazards, whether these are as a result of the nature and the locations of the settlement itself, or from external threats which come from outside of the settlement (Mark Napier and Margot Rubin, 2002).

As a result of increasing migration of population into the urban areas, growth of urban population has resulted in the expansion of human settlements into the problematic sites such as flood prone areas and landslide prone slopes.

There are many reasons for governments to prioritize resilience as part of their political and sustainable development agenda. For local government leaders, reducing disaster risk can be a legacy opportunity-paying attention to protection will improve environmental, social and economic conditions, including combating the future variables of climate change, and leave the community safer and secure than before.

For any active intervention of disaster preparedness, it is necessary to identify the major areas of vulnerability to each hazard. It is very important to carry out hazard zonation mapping with a view to identifying the areas and the magnitude of the risk assessment in order to work out the cost of damages.

## REVIEW OF NATIONAL AND INTERNATIONAL LEGAL COMMITMENTS

There are different national and international legal commitments of Egypt towards making Egyptian cities safe and resilient to natural hazards.

The International Covenant on Economic, Social and Cultural Rights which ratified by Egypt on 1982, which states in Article 11 about the recognition of the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions.

On 1, January 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development had officially come into force. Over the next fifteen years, with these new goals that universally apply to all, countries will mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind.

The Heads of State and Government of the 193 member states of the United Nations have agreed on new global goals for the sustainable development of humanity and of our planet. The agenda include Goal 11. Which states that: "Make cities and human settlements inclusive, safe, resilient and sustainable" and stated also that by year 2030, all states shall significantly reduce the

number of deaths and the number of people affected by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

In order for Goal 11 to succeed, local governments will need to be motivated in working within their local communities. In turn, national governments will need to assist local governments to increase funding and develop greater political will to create more resilient communities that are safe and inclusive.

In the national level, the Prime Minister Decree no.1537/2009 had formed a National Committee for Crisis and Disaster Reduction (NCCMDRR). This comes from the Egyptian commitment to develop its national institutions and policies. The NCCMDRR is a multi-stakeholder mechanism that provides coordination, develops a culture of prevention and disaster risk reduction, and facilitates. This integration of disaster management and risk reduction shall be reflected to national policies, planning and programs.

According to Greater Cairo Urban Development Strategy published by GOPP in 2012, the future vision of Cairo aims at developing the greater Cairo in a manner benefiting from its positions as a capital that combines the constituents of global cities, the comprehensives of services and utilities as well as the sustainability of resources. There are ten priorities objectives to be achieved and one of them is to complete evacuation of population from all life threatening informal slum areas that pose a hazard for life of its residents (General Organization for Physical Planning (GOPP), 2012).

In 2015, the government had formulated a long-term vision and had developed a Sustainable Development Strategy (SDS): Egypt 2030 which

aims at creating a modern, open, democratic, productive, and happy society.

To deal with urban development issues, an integrated dynamic urban plan that incorporates historical and modern architecture and that maximizes the utility and balance between energy, water and land is developed. The new urban development plan is capable of doubling the urban space, geographically redistributing development and citizens to maximize the use of available resources; replacing and developing of slum areas, and improving the quality of life.

The main Key Performance Indicators (KPIs) aims to: increase the urbanized area by about 5 percent of its total area, establish 7.5 million housing units and solve the problems of slum areas. The two main investment opportunities suggested by the sector strategy are the new capital city and the development of informal settlements (Government of Egypt, 2015).

The above commitment calls for more dedicated action to tackle underlying disaster risk drivers “such as the consequences of poverty and inequality, climate change and variability, unplanned and rapid urbanization, poor land management and compounding factors such as demographic change, weak institutional arrangements, non-risk informed policies.” So, these commitments had set the base for the goals and targets of the Egyptian government in relation to recognized conditions, trends and needs to evaluate and put disaster risk reduction as policy priority.

## DEFINITION OF RESILIENT CITIES

As per the definition of the International Council for Local Environmental Initiatives (ICLEI) glossary

which has been compiled and adapted by ICLEI in 2016 from several authoritative sources including the UNISDR, UNFCCC and the World Bank. Resilient cities are defined as cities that have the ability to absorb, recover and prepare for future shocks (economic, environmental, social and institutional) and also promote sustainable development, well-being and inclusive growth (International Council for Local Environmental Initiatives (ICLEI), 2016).

A resilient city is a city that supports the development of greater resilience in its institutions, infrastructures, social and economic life. Resilient cities reduce vulnerability to extreme events and respond creatively to economic, social and environmental change in order to increase their long-term sustainability (United Nations International Strategy for Risk Reduction (UNISDR), 2012).

According to International Federation of Red Cross and Red Crescent Societies, (2012), a disaster resilient city can have the following characteristics:

- Is one where disasters are minimized because the population lives in homes and neighborhoods with organized services and infrastructure that adhere to sensible building codes (without informal settlements built on hazardous areas such as flood plains or steep slopes).
- Has an inclusive, competent and accountable local government that is concerned about sustainable urbanization and that commits the necessary resources to develop capacities to manage and organize itself before, during and after a natural hazard event.
- Is one where the local authorities and the population understand their risks and develop

a shared, local information base on disaster losses, hazards and risks, including who is exposed and who is vulnerable.

- Is one where people are empowered to participate, decide and plan their city together with local authorities and value local and indigenous knowledge, capacities and resources.
- Has taken 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.
- Is able to respond, implement immediate recovery strategies and quickly restore basic services to resume social, institutional and economic activity after such an event.
- Understands that most of the above is also central to building resilience to adverse environmental changes, including climate change, in addition to reducing greenhouse gas emissions.

## RESILIENCE ARGUMENTS

There are two broad arguments for resilience, one political, the other technical. The political argument is that, since the shocks and stresses that causes crises can often not be prevented, the task is to ensure that people are better able to cope with. Thus, the overriding objective of development policy and finance must be alleviating the predicament of the most vulnerable.

The implicit criticism is that, in past and current practice, tackling vulnerability has not been a high enough priority in political media. As such, 'resilience' is a flag for rallying political will behind institutional change in the way decisions are made and resources allocated.

The technical argument for resilience is that addressing the challenges of the future requires a different way of thinking and a different way of programming because the old ways have proved technically inadequate. Previous thinking has not properly incorporated ideas related to risk and complexity or challenges such as climate change, and new ideas will have to be included when analyzing options for development support. 'Resilience' is here used as a conceptual umbrella under which different disciplines can come together to tackle complex problems with more holistic interventions (Simon Levine, 2014).

## MAPPING OF NATURAL HAZARDS IN EGYPT

Hazard mapping and risk assessment are essential to the establishment of a comprehensive risk management program. Hazard mapping is a tool to display one element of the risk triangle, which includes hazards, exposures (inventory), and exposure vulnerability. Risk mapping may display a combination of these three elements modeled to determine the resulting impact or as isolated elements that can be overlaid to demonstrate contributions to risk.

The mapping of natural hazards has long been a key element of scientific programs to better understand the causes and impacts of natural hazards, such as landslides, floods, volcanic eruptions, earthquakes, erosion, etc. Mapping facilitates the identification of relationships between the distribution of geologic materials and

evidence of geologic processes to reveal connections that would not be obvious if relying on analytical approaches alone.

Natural disasters known in Egypt are: flash floods, dust, sandy storms and earthquakes. The two biggest disasters in the last years were the earthquake of 1992 and the flash floods that occurred in 1994 in Upper Egypt and Sinai.

### **National Seismic Map of Egypt**

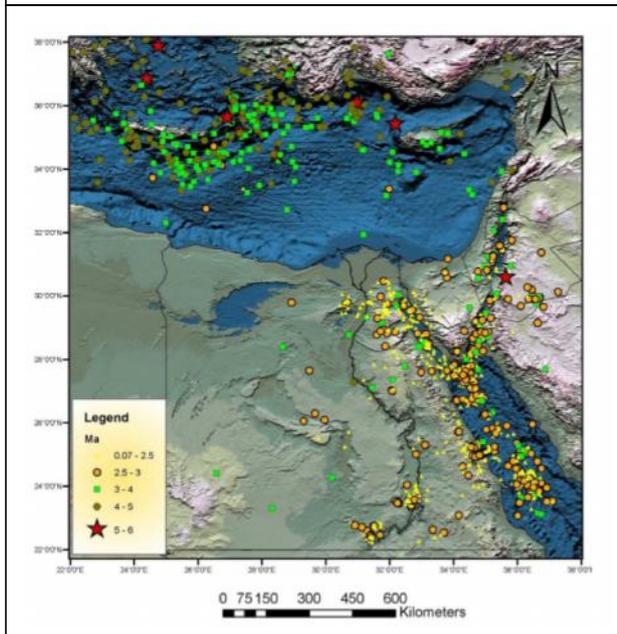
Egypt is located close to one of the continental fracture systems (Hellenic arc) at the convergence boundary of two big lithospheric plates (Eurasia and Africa). Also, Egypt is affected by the opening of the Red Sea (Mid Oceanic System) and its two branches (the Gulf of Suez and the Gulf of Aqaba transform system). Thus the seismicity is due to the interaction between the three plates of Eurasia, Africa and Arabian plates. Thus it could be concluded that although the damaging earthquakes occurred infrequently, its risky consequences could not be ignored.

According to the Egyptian Earthquake Bulletin published in January 2015 by National Research Institute of Astronomy and Geophysics (NRIAG). The recorded seismic activity within the year 2014 in and around Egypt reflects the same seismicity picture that gotten during previous years and it is shown in Figure 1. The research noticed that about 67% of the total recording earthquakes having magnitude less than three (National Research Institute of Astronomy and Geophysics (NRIAG), 2014).

### **National Floods Map of Egypt**

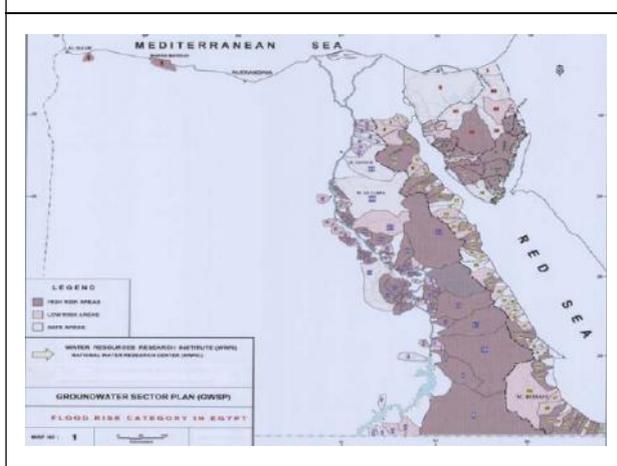
Flash floods are the result of short period of heavy storm that occur in some areas in Egypt such as Red Sea coast and Southern Sinai and in some cases in Upper Egypt. Velocity of flood water

Figure 1: All Recorded Seismic Activity by ENSN in 2014, National Institute of Astronomy and Geophysics (NRIAG)



depends mainly on the topography of the basin (height, slope and capacity of drainage network), and its soil type and characteristics. Some of these flash floods cause severe damage to people and infrastructures. In Egypt, different flash floods had been occurred such as in year 1979, a flash flood over El Qusair and Marsa Alam which led to

Figure 2: Flood Risk Category in Egypt, Institute for Water Resources Researches, Ministry of Public Works, Water Resources and Irrigation, March 2015

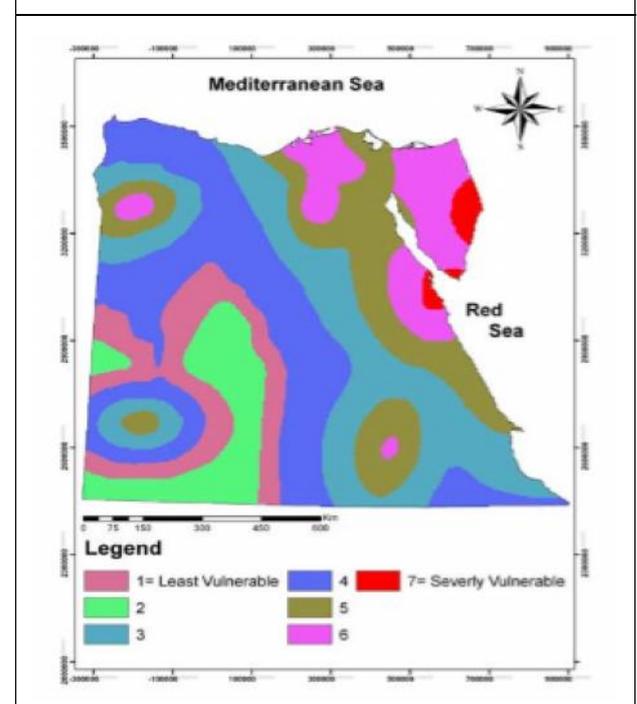


the destruction of both Red Sea coastal road and Qena – El Qusair road, in 1991, another flash flood hit Marsa Alaam where about 37000 m<sup>3</sup> of water was received in very short period. Also, in the last years a heavy storm and flash floods hit different cities such as Alexandria, Taba, Asiat and had caused severe damages. Figure 2 shows the flood risk category in Egypt (United Nations International Strategy for Risk Reduction (UNISRD), 2005).

### National Land Collapse Map of Egypt

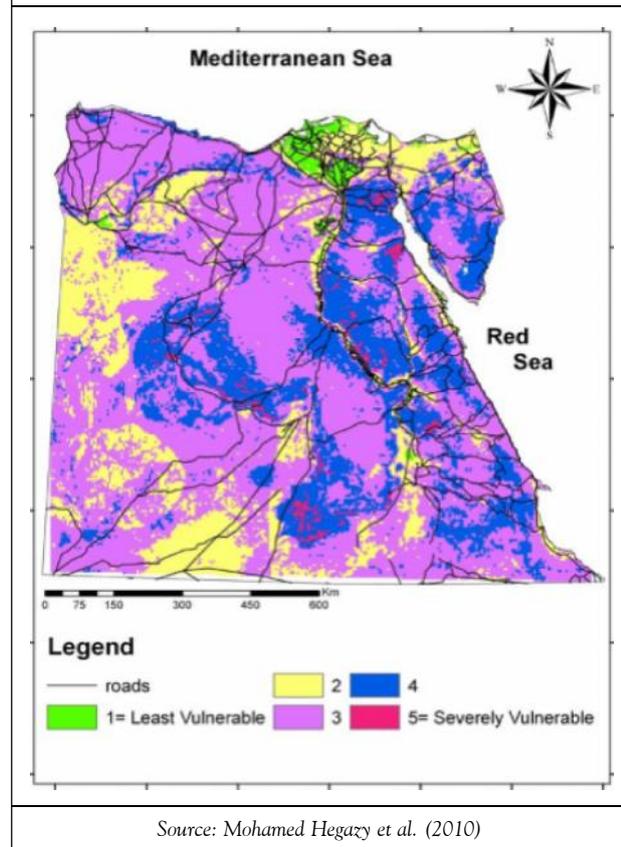
Land Collapse is a serious hazard that reflects a threat to the human development. Specific zones are more vulnerable to this phenomenon than others according to their physical environment parameters. Land slides or rock falls are components of the land collapse hazard. Impacts are the damage of infrastructure, roads and buildings. A research study of the land collapse

Figure 3: Seismic Intensity Reclass Map of the Egyptian Terrain



Source: Hegazy and Effat (2010)

Figure 4: Road Network Vulnerability to Land Collapse



Source: Mohamed Hegazy et al. (2010)

hazard of Egypt has been done by using a Shuttle Radar Topography Mission (SRTM) to derive the elevation zones grid for the Egyptian terrain. By using ArcGIS 9.2 software, the slope angle, lithology (rock type) and the faults distribution were derived from the geological map of Egypt (Hegazy and Effat, 2010). Figure 3 shows the seismic intensity reclass map of the Egyptian Terrain and Figure 4 shows the road network vulnerability to land collapse in Egypt.

So, it is important to integrate the up to date data of seismicity, land collapse, and floods hazards in any region of development in Egypt and the urban planner should take into consideration these data in the design of strategic and detailed plans for any new development or new city master plans.

## INFORMAL AREAS IN EGYPT

Many people find the major cities in Egypt particularly, Cairo and Alexandria, the most attractive place to work and live. The Egyptian urban system, as other urban systems of many developing countries, is suffering from the inappropriate and informal development problem that negatively affects the distribution of resources and investments, and hence, the national development policy.

The Informal Settlements Development Facility (ISDF) was established by the Presidential Decree No.305 in 2008. Its main goal is to contribute to ensuring safe housing in Egypt and to improve the quality of life of the residents in slum areas. In 2010, ISDF prepared a national plan for the development of slums areas in governorates in cooperation with different stakeholders, academic institutions, and research centers. This plan provided the decision maker with required data and information for monitoring and assessment of risks of these areas supported with a geographical information database system of slums/vulnerable areas.

The newly Egyptian approach developed by ISDF, has been replaced the formerly called "informal settlements" with the two terms of "unplanned areas" and "Slums (unsafe areas)" and classify the later according to the degree of risk to life and property. The ISDF approach is very useful in identifying priorities for intervention; based on the distinction between slum areas and unplanned areas, the former requires immediate action, while the later requires either a medium or long term strategy. ISDF had developed the national map of slum areas which had identified the slum areas in all urban cities of Egypt as shown in Table 1 and it is based on organizing continuous and accurate data-collection systems,

Table 1: National Map of Slums in Egypt, ISDF (February, 2016)					
Slum Areas According to the Degree of Risk and Property Ownership					
ISDF, February 2016					
Grade	Type	Private	State	Central Organization	Total
1	Life threatening areas	2	22	1	25
2	Shacks	146	74	31	251
3	Health hazardous areas	41	16	2	59
4	Lacking of land tenure areas	0	12	4	16
	Total	189	124	38	351

making use of Geographic Information System (GIS), databases, expert systems, models, and the like. The map is renewed every year.

Slum areas are classified into four groups according to their degree of vulnerability (the degree of risk to life and property) and it has been categorized as follows:

- First degree: Very Highly at Risk (life threatening areas).
- Second degree: Highly at Risk (shacks).
- Third degree: Medium Risk (Health hazardous areas).
- Fourth degree: Low Risk (Lacking of tenure areas).

### Informal Areas in Cairo Government

Cairo governorate located on the east bank of the Nile, and it is extending from south to Helwan, and from north to Shubra, and from north east to Heliopolis and Nasr City.

The greater Cairo residents was 16 million in 2012 and according to Centre Agency for Public Mobilization and Statistics (CAPMAS) it had reached about 22.5 million in April 2016, which is about 24% of the total population of Egypt and which make Cairo ranked among the world's most densely populated urban areas.

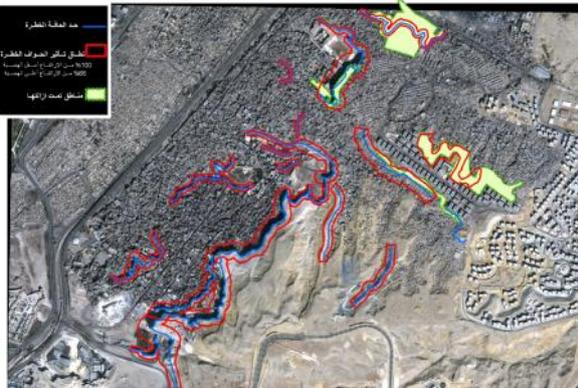
Cairo main urban mass currently suffers from massive over-population and high population density. Thousands of Cairo residents are living in life threatening slums areas, which their life being exposed to danger on a daily basis on the other hand unplanned informal areas spread widely to represent about 20% of the total urban areas. So, providing appropriate housing opportunities for such group of population and the development of these areas which they lives in are among the top priorities of the Egyptian government and this issue is a main prerequisite for achieving a resilient city.

Figure 5: Life Threatening Area, Manshiet Naser, Cairo



Source: Informal Settlements Development Facility (ISDF) (2013)

Figure 6: Map of Life Threatening Areas at Manshiet Naser, Cairo, ISDF (2013)



Source: Informal Settlements Development Facility (ISDF) (2013)

According to ISDF in 2013, Cairo governorate had about 64 slum areas which has about 69101 housing units and 16 areas of them are categorized as life threatening areas according to their geological hazardous location and it accommodate about 22159 housing units. These areas represent about 60% of the national life threatening areas (Informal Settlements Development Facility (ISDF), 2013). Figure 5 shows the life threatening area in Mainshiet Naser, Cairo. Figure 6 shows the map of life threatening areas at Manshiet Nasser.

## EVALUATION OF GOVERNMENTAL PROGRAM TOWARDS MAKING CAIRO AS A RESILIENT CITY

The UNISDR had suggested critical and interdependent steps that local governments may take to make their city more disaster resilient. It provides the rationale for each essential, pointing out strategic areas of intervention and identifying key actions. The actions identified under each essential step should be part of the overall disaster risk reduction planning process and influence urban development planning and design.

The Egyptian government had initiated an ambitious program towards upgrading of slums started from 2008 when it is established the Informal Settlements Development Facility (ISDF). This program had faced different obstacles during its implementations according to political changes and lack of resources and political will. From 2013 political will had been increased and it supported the government and all other stakeholders to put the plans of development of slums in actions and this effort matched also with Egypt SDG's plan 2030.

In this research paper, the Cairo governorate was taken as a case study to evaluate the governmental activities to make the Egyptian cities more resilient to natural hazards. It is used the UNISDR ten essentials checklist for Making Cities Resilient to evaluate the government program. The checklists include the followings:

- 1) Put in place organization and coordination to understand and reduce disaster risk, based on participation of citizen groups and civil society.

The Cairo governorate put the slum development specially the life threatening areas as a first priority for its agenda and action plans. Informal Settlements Development Facility (ISDF) prepared a national plan which put priorities of actions in governorates level and the first program was removing life threatening areas in Cairo governorate and it provided also funds to construct safe houses for people living in these areas. Cairo government cooperated with ISDF, in exchange technical knowledge, data bases, experiences and funds. All stakeholders had participated in different projects and these participation activities can be summarized as follows:

- Presidency Authority: Put the priority for the governor and government to set slum development as first priority in the policy and national plan and also to allocate resources such as land and fund.
  - ISDF: Set national plan and action plans with Cairo governorate and allocate fund, support the program and monitor the implementations.
  - Cairo Governorate: Take the lead in implementation, convene other actors, regulate, monitor.
  - Other Governmental Ministries (planning, education, health, transport, environment, etc.): Integrate risk reduction as part of their polices, resources, and activities.
  - Academia: Provide research, technical data analysis and action plans.
  - Citizens of life threatening areas: participate, be actively informed, and take individual responsibility.
  - Private sector/business community: Provide funds.
  - Civil society, non-governmental organizations: Participate, organize communities, coordinate, help oversee, monitor.
- 2) Assign a budget for disaster risk reduction and provide incentives for homeowners, low income families, communities, businesses and the public sector to invest in reducing the risks they face.

Egyptian government had allocated the needed fund through ISDF and Cairo governorate; also the governorate had allocated the new land. In In Al Asmaraat Project ISDF had allocated about 800 Million Egyptian pounds and Cairo government allocated about 700 Million LE

Figure 7: Map of Life Threatening Areas in Istabl Antar, Cairo, ISDF (2016)



beside the cost of land. Also, Tahia Masr (non-governmental organization funded by private investors and public) has allocated about 1 Billion LE for the project which aims to allocate the people from life threatening informal settlements to a new housing area.

- 3) Maintain up to date data on hazards and vulnerabilities. Prepare risk assessments and use these as the basis for urban development plans and decisions, ensure that this information and the plans for city's resilience are readily available to the public and fully discussed with them.

ISDF had provided the national map of informal areas which is updated yearly and it is available for all stakeholders and the technical committee of Cairo governorate had a detailed geological and hazards technical studies and maps to identify the vulnerable areas and set the priorities for implementation of the plan. Figure 7 shows the map of life threatening areas in Istabl Antar.

- 4) Invest in and maintain critical infrastructure that reduces risk, such as flood drainage, adjusted where needed to cope with climate change.

Cairo governorate through its technical committee had identified all the geological hazardous areas and they include areas vulnerable from landslides of geological formation and areas vulnerable to floods such as the area of El Zabaleen in 15<sup>th</sup> of May city which is vulnerable to natural floods. ISDF, Cairo governorate and Ministry of Water Resources and Irrigation had signed a protocol to build some engineering solutions to protect the area from the flood hazard and development of the slums in the same area, Figure 8 shows the area during last flood in 2011.

- 5) Assess the safety of all schools and health facilities and upgrade these as necessary.

Figure 8: EEI Zabaleen Area in 15<sup>th</sup> of May City During Flood in 2011 (ISDF, 2016)



Figure 9: Gamal Abdel Naser School Which Defined by the Scientific Committee of Cairo Governorate as Vulnerable Building (Ministry of Petroleum, 2009)



Cairo governorate through its technical committee had studied the safety of all schools in all vulnerable areas such as Manshiet Naser and it is set priorities for actions and these started from year 2008, Figure 9 shows Gamal Abdel Naser School which defined by the Scientific Committee of as a vulnerable school according to its location in the hazardous zone of Mokatem hill.

- 6) Apply and enforce realistic, risk compliant building regulations and land use planning principles. Identify safe land for low income citizens and upgrade informal settlements, wherever feasible.

Cairo governorate had allocated the land for Al Asmaraat project which was planned to construct about 11000 housing units at Mokatem district for the people living in the life threatening areas in Manshiet Nasser as shown in Figure 10. The first part of the project completed and the governorate started to transfer the people living in life threatening areas to the new houses as shown in Figures 11

Figure 10: Land Allocated for Al Asmaraat Housing Project, Mokatem District



Figure 11: Perspective of Tahia Misr Project at Al Asmaraat Area (ISDF, 2016)



Figure 12: First Part of Al Asmaraat Housing Project for Life Threatening Informal Areas in Manshiet Naser Funded by ISDF and Cairo Governorate



and 12. Also ISDF had funded a project in 2013 for development of 30 unplanned areas in Cairo governorate and the development activities include: infrastructures, paved roads, fire distinguisher networks, road lighting. Also it included the construction of some services such as health centers and sports facilities.

- 7) Ensure that education programs and training on disaster risk reduction are in place in schools and local communities.

An awareness workshops and drills had been organized by National Committee for Crisis and Disaster Reduction (NCCMDRR), IDSC, in 2014 and 2015 and it include different public facilities such as schools, underground metro, factories, etc.

Also, awareness workshops had been organized by ISDF and Cairo governorate for local people to inform them about the hazardous areas and the program of the government to transfer them to the new housing area in Al Asmaraat. These workshops organized in weekly bases. Also, a consultation meeting was held to discuss with them the services options in the new housing areas. Figure 14 shows the public consultation meeting in Manshiet Naser District Building, April 2015.

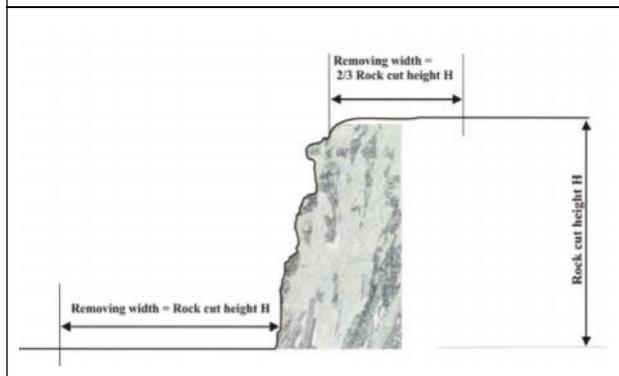
- 8) Protect ecosystems and natural buffers to mitigate floods, storm surges and other hazards to which your city may be vulnerable. Adapt to climate change by building on good risk reduction practices.

Cairo governorate had formulated a scientific technical committee for identifying the detailed locations which can be affected from natural geological hazards such as

Figure 14: A Consultation Meeting with Local Community of Manshiet Naser, April 2015 [By the Author]



Figure 15: Hazardous Zones in Mokatam Hill Defined by Scientific Committee of Cairo Governorate (Ministry of Petroleum, 2009)



landslides and floods and this committee had the rule also to align these areas in hazardous maps. Also, it is coordinates with the Cairo governorate for implementation by marking the hazardous zone on sites and calculates the number of effected houses to be relocated. The technical committee had defined the hazardous zone based on the rock cut height and it is defined the upper one to be  $2/3$  of rock cut height and lower one to be  $1/3$  of the rock cut height as shown in Figure 15. These vulnerable maps are the bases for demolishing of the housing in these hazardous areas.

- 9) Install early warning systems and emergency management capacities in the city and hold regular public preparedness drills.

Different ministries and organizations had an early warning systems and they are all coordinated through the National Committee for Crisis Management and Disaster Reduction (NCCMDRR), which it is based in the Information and Decision Support Centre (IDSC) of the Egyptian Cabinet. The committee includes: the Ministry of Public Works and Water and Irrigation for early warning of floods, Ministry of Petroleum for

Figure 16: A Drill for Emergency Action in Secondary School in Cairo, National Committee for Crisis and Disaster Reduction (NCCMDRR) (2015)



early warning of earthquakes, Ministry of Industry, the Ministry of Electricity and Energy, Egyptian Meteorological Authority for warning of climate changes. Egyptian Meteorological Authority is doing seasonal forecast every three months for prediction by using many climatic models before main rainy season (Tamer Nada *et al.*, 2014). Figure 16 shows a preparedness drill for emergency action in a secondary school in Cairo.

- 10) After any disaster, ensure that the needs of the affected population are placed at the center of reconstruction, with support for them and their community organizations to design and help implement responses, including rebuilding homes and livelihoods.

After Dewika accident which happened in October 2008, Cairo governorate had transferred the resident immediately to the available national housing project in 6<sup>th</sup> of October city, and by time with the help of NGO's it had provided the services. Figure 17 shows the children participatory workshop

Figure 17: Children Participatory Workshop for Designing the Sports Facilities in 6<sup>th</sup> of October Housing Project by Sharawy Foundation for Development NGO (2015)



for designing the sports activities in 6<sup>th</sup> of October housing project by Sharawy Foundation (Sharawy Foundation for Development (NGO), 2015).

## CONCLUSION

The study assessed and evaluated the policy and programs which had implemented by the Egyptian government and it is showed that the government had different successful steps towards making Cairo as a resilient city. It is concluded with the followings:

- Experience gained through the action plans in Cairo had shown that appropriate policies, political will and an institutional framework are preconditions for decision making and sound disaster risk reduction actions.
- A joined approach of decentralized power and resource allocations from central government can contributes to the cities' development and resilience objectives and sustainability.
- Scientific tools, data base and new technologies such as GIS to assess cities risks and vulnerabilities are appropriate frameworks required to develop resiliency strategies.
- To ensure resilient strategies are important approach.
- Support localized social resilience to leverage and enhance the ability of individuals, households, NGO's to respond to shocks and stresses while restoring and strengthening the urban systems that support them, such as social safety nets.
- Resilience planning should include community engagement and awareness building, community-based needs assessments, and stakeholder and political economy mapping, among other urban planning practices.
- Ensure that resilient strategies manage the impacts of urban displacement, specifically as an opportunity to strengthen existing services and infrastructure in new communities.
- Cities should plan for more new resilient urban growth especially for the poor, with socially inclusive communities and local policies that promote the accommodation.
- A resilient city is socially inclusive not only in achieving resiliency for all communities, but by also promoting inclusive decision-making, planning, implementation and monitoring of resilience strategies.
- The most vulnerable or financially marginalized people which living in hazardous slum areas must not be excluded from resilience programs or resilient systems, particularly more resilient housing.
- Lack of financial resources should not translate to increased vulnerability.

- Leadership, political will and stakeholder engagement are key enabling factors for sustaining the governmental efforts for resilience and risk reduction.
- Disaster risk reduction is a team effort and it needs an integration of all stakeholders which should be reflected in policies and political will of the government.

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