An Assessment on Disaster Risk Reduction in the Occupied Palestinian Territory

تقييم للحد من مخاطر الكوارث في الأراضي الفلسطينية المحتلة

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Abstract

In Palestine (the occupied Palestinian territories - oPt) there are a number of challenges in the field of Disaster Risk Reduction (DRR), notably natural hazards such as earthquakes, floods, desertification and droughts. Seismological studies show that there is a high probability of damaging earthquakes occurring in the region. At the same time, engineering studies show that seismic vulnerability of common buildings and infrastructures in the oPt is high. Major events triggered by climate changes and seismic activities may become trans-boundary. The objectives of this paper are to help establish a profile of DRR in the oPt and further help identify the needs of the oPt in the field of disaster risk reduction and management. In addition to the risk assessment, a review of existing legislation, capacities and shortages in various areas of needs, strengths and weaknesses in all elements of DRR plus institutional mechanisms towards disaster preparedness and prevention has been carried out. National and international initiatives toward DRR and case studies of (best) practices in the oPt were also reviewed. Historic data on recorded disaster related incidents pertaining to the number of people killed, the number of people affected and the economic loss incurred provides the main criteria for the risk assessment. The recommendations

include regional cooperation, improvement/formulation of legislation toward disaster preparedness and prevention, linking policies and operations, coordination of central and local governments, political resolution, awareness and training, integration of DRR and management into national development, and developing a risk management database.

Key words: Palestine, Hazards, Risk, Vulnerability, Capacity, Risk, Disaster Management, Risk reduction, Earthquakes, Floods, Need Assessment.

ملخص

هناك عدد من التحديات في مجال الحد من مخاطر الكوارث في الأراضي الفلسطينية المحتلة، وبشكل خاص، المخاطر الناتجة عن الأخطار الطبيعية، مثل: الزلازل، والفيضانات، والتصحر، والجفاف. فقد أظهرت دراسات الزلازل أن هناك احتمالاً كبيراً لحدوث زلازل في المستقبل في المنطقة، وستؤدي هذه الزلازل إلى حصول أضرار كبيرة، وفي نفس الوقت، أظهرت الدراسات أن قابلية الإصابة الزلزالية لأنماط المباني الدارجة محلياً، ولمنشآت البنى التحتية مرتفعة. يهدف هذا البحث إلى المساعدة في إنشاء ملف تعريف بالحد من مخاطر الكوارث في الأراضي الفلسطينية المحتلة، والمساعدة في تحديد الاحتياجات اللازمة لمواجهة الكوارث وإدارتها. إضافة إلى تقييم المخاطر، تم إجراء مراجعة للتشريعات القائمة، وللقدرات، وللنقص في الاحتياجات، ولجميع عناصر القوه والضعف في مجال الحد من مخاطر الكوارث، بالإضافة إلى طرح آليات مؤسسية تتعلق بالاستعداد للكوارث والوقاية منها. وتم إجراء استعراض لتجارب محلية ودولية في مجال الحد من مخاطر الكوارث، ودراسة أفضل التجارب، وتم كذلك استعراض البيانات التاريخية ذات الصلة بأحداث الكوارث المدونة، وما نتج عنها من خسائر بالأرواح وأضرار في الممتلكات. وتتضمن ورقة العمل عدداً من التوصيات التي تتعلق في التعاون الإقليمي، وتطور التشريعات المتعلقة بالاستعداد لمواجهة الكوارث والوقاية منها، وربط السياسات والعمليات، والتنسيق بين الحكومية المركزية والمحافظات، والقرار السياسي، والتوعية وبناء القدرات، ودمج برامج الحد من مخاطر الكوارث وإدارتها مع برامج التنمية على المستوى الوطني، وتطوير قاعدة بيانات لإدارة المخاطر.

كلمات مفتاحيه: فلسطين، أخطار، مخاطر، قابلية الإصابة، القدرات، إدارة الكوارث، الحد من المخاطر، الزلازل، الفيضانات، وتقييم الاحتياجات.

1. Introduction

The **overall goal** of the Disaster Risk Reduction (DRR) programmes are to ensure a safe life and sustainable livelihood for the population by

minimizing the effects of natural disasters through appropriate use of natural resources, fostering a safe environment, and improved coping mechanisms, thus contributing to poverty reduction and sustainable development in the world. The national, regional and international DRR Programmes should enhance and support the implementation of the Hyogo Framework for Action 2005-2015 "Building the Resilience of Nations and Communities to Disasters" at the local, national, and, optimally, regional level.

During the last three decades, there has been a continuous evolution in the practice of disaster management emphasizing disaster reduction. International organizations including the UN and World Bank are emphasizing and encouraging countries to shift relief, response and humanitarian support towards disaster preparedness, and in doing so integrate disaster management into planning policies of the governments. The efforts towards this development paradigm have been well received in many countries. For this, many nations have established national and local bodies mandated to coordinate disaster mitigation activities, and integrate disaster reduction into development projects and programmes.

The world is experiencing long-term changes such as sea level rise, reduction in water supply and quality, and bigger, more frequent natural disasters. In the face of these inherent threats, the world's populations and governments are challenged to plan for the future to create safer, more sustainable cities and to protect our natural environment. These generic concepts are present in all planning, including city development and environmental improvement planning.

Every year, the Earth's atmospheric, geologic, and hydrologic systems generate tens of thousands of thunderstorms and floods, thousands of landslides, over a hundred damaging earthquakes, hundreds of wild fires, scores of windstorms plus dozens of volcanic eruptions, tsunamis and droughts. Natural disasters worldwide have killed over 3 million lives and adversely affected the lives of nearly 1 out of every 4 people in terms of economic well-being, health, and environmental impact during the past 20 years (IFRC and RCS 2006). As the potential for disaster expands, in terms of numbers and impacts, it becomes

increasingly critical that governments at all levels strive to establish and improve disaster management capabilities. Governments must be able to provide leadership and assistance for disaster response and recovery. More importantly, governments must go beyond these reactive postures and focus efforts on lessening or preventing disaster impacts through preparedness and mitigation actions.

National capacities for DRR are generally weak at all levels in most of the countries in the region, but they are especially critical (worst) in the oPt. This is due the uniqueness of the Palestinian case (the effects of occupation upon sustainable development in the oPt, lack of resources, lack of building codes and land use planning as well as very weak institutional capacities.)

The objectives of this paper are to assess risks and common vulnerabilities, to identify the capacities and needs of the oPt in the field of DRR and management, as well as to support the development of a database of technical institutions.

2. National Context

Humanitarian and Geopolitical Situation

Historical Palestine was under the mandate of Great Britain during 1948 when a Jewish agency declared an independent state of Israel, annexing a large portion of Palestinian land though not the West Bank of the River Jordan, which was then part of the Hashemite Kingdom of Jordan and the Gaza Strip, which was under the Authority of Egypt. In the year 1967, the West Bank and Gaza Strip were occupied by Israel thus creating what is now commonly referred to as the occupied Palestinian territories, thereby taking control of all areas of Palestine. After the Oslo Agreement in 1993, part of the West Bank and Gaza Strip were handed over to the Palestinian Liberation Organization (PLO), creating for the first time a temporary and conditional 'Palestinian country' governed by the Palestinian Authority (PA). Unfortunately, Israel is still denying its obligations in this agreement and all Palestinian areas are now under the direct or indirect control of the Israeli forces.

According to the reports of the Palestinian Central Bureau for Statistics (PCBS), the politically volatile situation continues to worsen as a consequence of occupation and crises and, as a result, the number of Palestinians dependent on foreign assistance is increasing continually**.** Currently 4.3 million Palestine refugees are living in the Middle East. In the oPt with their 3,761,646 inhabitants (Report by PCBS 2008), all humanitarian indicators continue in a downward spiral.

This rapid deterioration has created a problem within the refugee camps that were established directly after 1948, of which many have been absorbed within the natural urban texture of a Palestinian homeland. Nevertheless, until today these camps are accommodating large numbers of refugees and are evidently overcrowded with limited access areas which are filled with unsanitary and vulnerable housing units with very low standards of living. Also, due to the large volume of refugees situated in these areas there is a considerable stress applied to the local economy which has culminated in a number of socioeconomically related challenges.

In the highly sensitive political issues of the Middle East, social welfare programmes and conflict resolution are often given greater emphasis by individuals, governments and international organizations rather than disaster risk reduction dealing with natural hazards only.

Size, Demographic and social Indicators

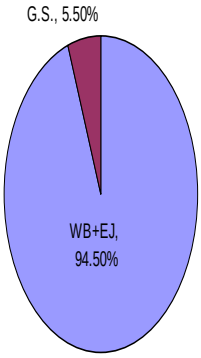
As mentioned above, the oPt includes East Jerusalem, the West Bank and the Gaza Strip (EJ, WB & GS) which are very small in area (6095 km^2 net area)**,** see figure (1-a). The WB consists of eleven governorates namely, Jerusalem, Jenin, Tulkarem, Qalqylia, Salfeet, Nablus, Ramallah, Jericho, Bethlehem, Tubas and Al-Khalil (Hebron). The total area of the WB is 5760 KM^2 and about 60% of this area is rural, see figure (1-b).

The area of the GS is only 365 KM^2 and it is phsycially separated from the West Bank i.e. no geographical continuity exists between the two areas. Based on the latest statistics by the Palestinian Central Bureau

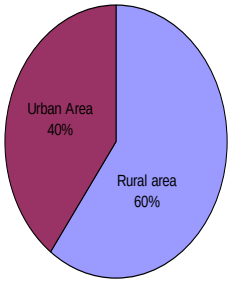
of Statistics (PCBS) which were conducted in 2007, the Palestinian population in the WB and the GS comes to 3,761,646. These figures, in addition to those living in "Israel", represent about 50% of the total Palestinian population. The remaining 50% is distributed mainly in neighboring Arab countries and in other countries of the world.

To clarify then, the total population of the WB and the GS is 3,761,646 as of the end of 2007. In the WB the total population is 2,345,107; while in the GS, it is 1,416,539 (see figure 1-c). Overall, in the oPt the governorates of Hebron and Gaza are considered the most populated areas; with their shares of population totaling 14.7% and 13.2%, respectively. The least populated governorates are Jericho, with 1.1%, followed by Salfeet and Tubas. The Palestinian society is constituted of two main categories: citizens and refugees, whose problems remain a priority in any political settlement. According to a report released by UNRWA representing the period ending December 2007 (UNRWA reports 2007), the total number of Palestinian refugees reached 1,794,000. This number represents 39% of the Palestinian refugee total (16% in West Bank and 23% in Gaza Strip), see figure (1-d). The Palestinian refugees still live in very crowded areas and desperate health conditions. The population density in the Gaza Strip is **3880** persons per 1 sq. km. and it is the highest in the region. The density in the West Bank is **407** persons per sq. km (**see figure 1-e**).

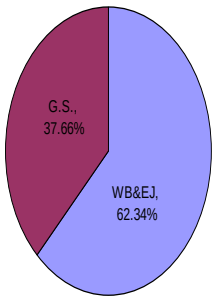
The Israeli settlements occupy large areas (see figure 2), affecting the population density. The population growth rate is considered the highest in the region reaching 5.2% in 1995 and 3% in 2000. This rate decreased drastically after 2000 due to the prevailing complicated conditions in all aspects of people's lives which resulted in the emigration of people especially newly graduated students (Reports of PCBS 2008).



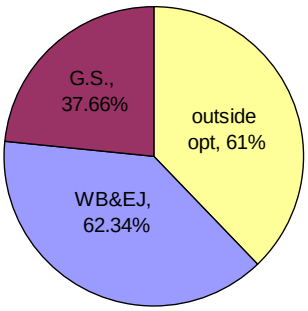
a) Distribution of Net area of opt



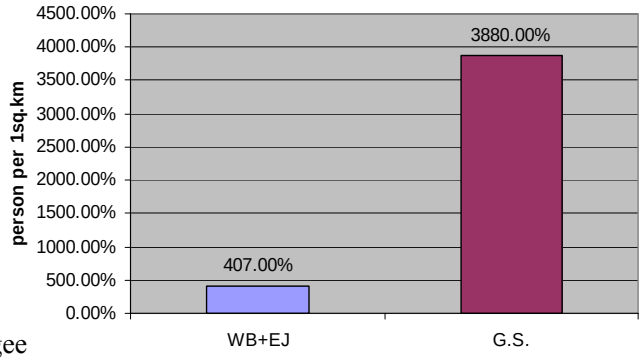
b) Percentage of Urban area and rural area (Land use)



c) Distribution of population in opt



d) Distribution of Palestinian refugee



WB: West Bank **EJ**: East Jerusalem **G.S**: Gaza Strip

Figure (1): Size, Demographic and social Indicators.

Land Use:

Reports of the PCBS show that the total percentage of the agricultural land is less than 25% and the Palestinian built-up area is less than 10%. As for housing, reports also show that the percentage of

families that will need houses in the next ten years will be around 70%, and those who will not be able to build their own houses will be 82%.

Environment, Water, Solid Waste and Wastewater:

Reports of the PCBS show that the total percentage of the people connected to a public water network has reached around 90%, whereas those connected to a public sewerage network is less than 50%. The use of a cesspool is still the most common alternative (around 50% of the houses use one).

Domestic Produce:

The PCBS indicated that the size of GDP in 1998 reached 4,484,500 US$. In 2007 and after 9 years, the GDP decreased to 4,135,800 US$.

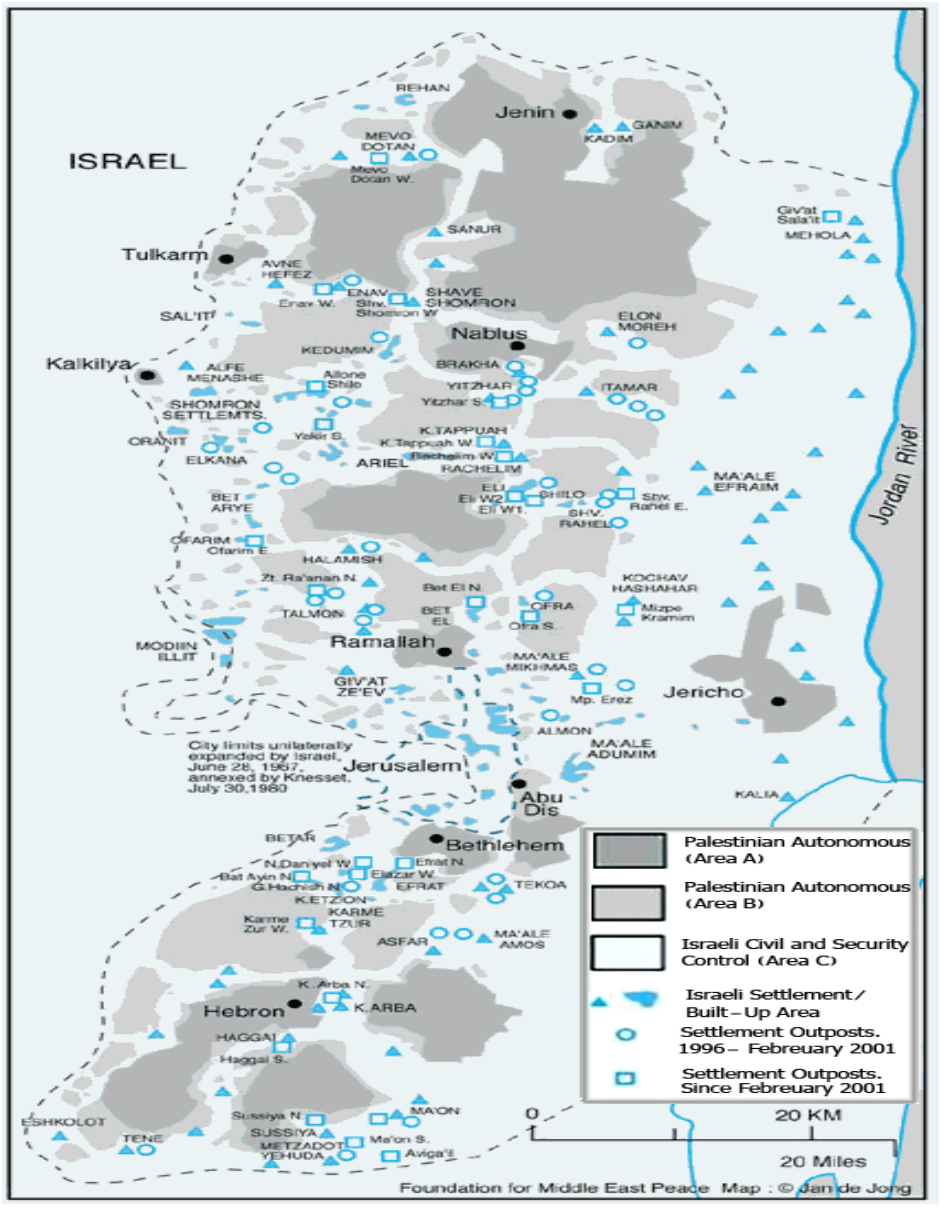


Figure (2): Settelement in West Bank.

Economic Situation:

The Palestinian economic situation is very bad due to the following reasons:

- The special type and nature of the Palestinian issue.
- The lack of access and control over national resources.
- The closure of the oPt by Israeli Forces.
- The availability of only two major access routes (Jordan and Egypt) to the Arab countries and other parts of the world which are under the complete control of Israel.

All the above has rendered the Palestinian economy dependant on donations from the resources of different parties. The unemployment rate and the level of poverty come far below the red lines among a high percentage of the Palestinian population.

National Policy on Disaster Risk Reduction

Currently, there's no clear legislation regarding DRR in the oPt. The Palestinian case is very unique because of the occupation. There is no national control on the airports, harbors and borders. There is no national force or army and also most of the governmental institutions are not capable of meeting their obligations as per their mandates due to the restrictions imposed as a result of occupation. This applies to the Civil Defense and other related governmental institutions. The result of this has been an increase in the role of the non-governmental organizations in providing assistance and the increased need for this assistance in many aspects of life. This is obvious when looking at NGOs such as the Palestinian Red Crescent Society (PRCS) and other health relief and emergency medical organizations and societies. Based on the rich personal experience of the consultant, it has been concluded that these NGOs have strong capabilities and experience within the oPt, especially in comparison with many Arab countries.

The Higher Council of Civil Defense (HCCD) represents the main body of the Palestinian governmental institutions. It was established in 1998 based on the civil defense law # 3 for

year 1998, and based on a decision by the board of ministers. The members include all ministries and governmental bodies and the HCCD is chaired by the minister of internal affairs, whereas the non-governmental organizations are represented as supervisor's members in the board. In addition to the HCCD, the Palestinian Red Crescent Society has paid special attention to the issue of disasters since it was established in 1968.

3. Methodology

Based on the understanding of national responsibility of the Palestinian Community including all governmental and non-governmental organizations, the private sector, men, women, youth, students and professionals who all play an important role and contribute in the DRR, the methodology of common sharing in identifying the risk and mitigating its effect in Palestine was adopted.

The processes of identification of the needs of DRR in oPt included a number of processes and activities including the following:

– Initiating the collection of information on DRR in the oPt by localizing the standard questionnaire in order to ensure that the questionnaire matches and fits the Palestinian case and captures the relevant information pertaining to it. The questionnaire contains around 110 questions, the main elements of the questionnaire are: Disaster Profile for the occupied Palestinian territory, Disaster Risk Reduction (DRR), National policies, Plans and Projects, Government Structure, Non-government Structure, UN Country Office, Material and Human Resources, Funding, International and National Assistance Organizations, Links outside the country, Strengths, Gaps, Outstanding Needs & Requirements, Disaster Management Institutions, Partnership Arrangements, Best Practices in Disaster Risk Management and Success Stories in Disaster Risk Reduction.

- Conducting two workshops during the study (see figure 3**)**. All concerned ministries, governmental and non-governmental organizations participated in these workshops. All participants represented the decision making level of their institutions. The workshops aimed to exlpian and to discuss the main topics of the questionnaires and identify the needs. All concerned institutions who participated shared in filling out the questionaires as well.
- Organizing forty six meetings and discussions with most of the governmental and non-governmental organizations, research centers and concerned academic institutions to the present and explaining the idea of the research project and the topics of the questionnaires to be used for identifying the needs. The discussions aimed at pointing out where Palestine stands in terms of DRR and challenges and needs for strengthening and developing the infrastructures and human resources required in the DRR.
- Analysis of the data presented in the questionnaires by different organizations.
- Using the results of related scientific papers and research projects.
- Meetings with UNDP/PAPP.

Figure (3): Workshops and meetings.

4. Disaster Risk Management and Disaster Risk Reduction

The process of disaster risk management embraces a wide range of linked activities and assessment, decision making, planning, testing, implementing and feedback. It covers the entire disaster spectrum from preventive action to all stages of recovery. Disaster management is not an isolated activity, it is best regarded as an integrated element in many sectors, including health, agriculture, public works, and economic activity, as well as within government line ministries that control such activities. Risk management is the basis for informed (scientifically based) decision-making for all aspects of disaster risk management: risk assessment, prevention, preparedness, response and recovery (see figure. 4).

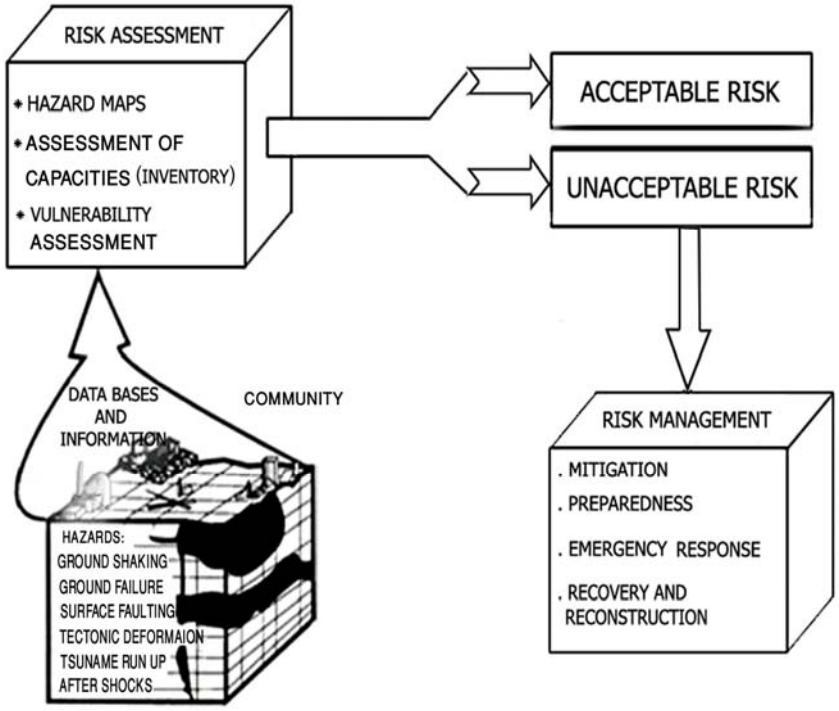


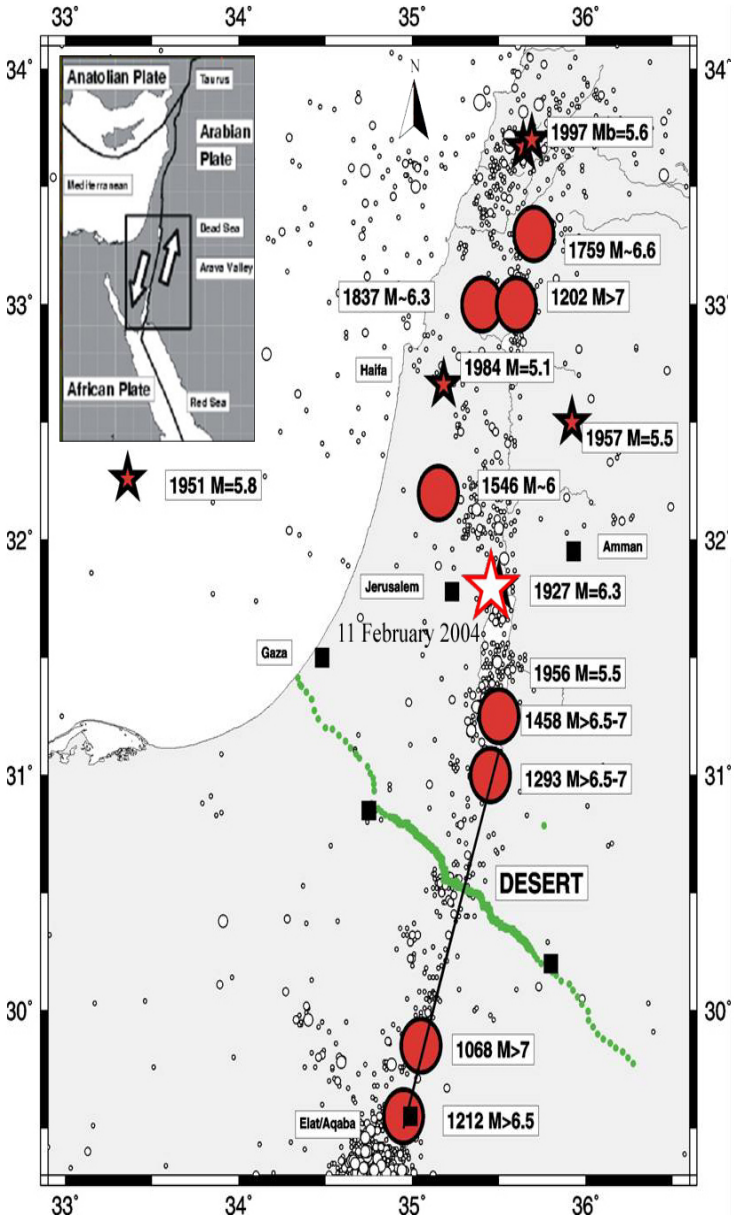
Figure (4): Schematic illustration of the link between risk assessment and risk management.

Risk Assessment

The extent of damage caused by disasters depends on the vulnerability of the affected areas. Harmful impacts of disasters, or in other words the risk level, depends on the following main parameters: severity of hazard events, vulnerability of the affected areas and the institutional capacity. Prior hazard forecasting and improving the resilience of people and property would certainly help in reducing the impacts of hazards. The sequences of disaster planning have the following stages: risk assessment, defining levels of acceptable risk, preparedness and mitigation planning (see figure 4), testing the plan and feedback from lessons and lessons learnt. Risk assessment is ideally a three part process that has to be undertaken in the following sequence: hazard mapping, vulnerability assessment and resource assessment.

Hazard Mapping (Natural Hazards)

The oPt is highly vulnerable to natural hazards: mainly earthquakes, floods, landslides, droughts and desertification. The whole region frequently faces small to mid-scale disasters and bears a high potential for large-scale (urban) disasters. Details on natural disasters are given in table 1. Seismicity in the oPt is largely affected and controlled by the geodynamic processes acting along the Dead Sea Transform- DST. The DST is a left-lateral fault between the Arabia and the Sinai tectonic plates that transfers the opening at the Red Sea to the Taurus-Zagrous collision zone (figure 5). The left-lateral shear along the Dead Sea transform since the middle Miocene explains the systematic 105 km offset of numerous pre-Miocene geologic features (Quennell 1959 and 1983, Fruend 1968).



(Abou Karaki 1987, Shapira 1988, Ambraseys et al 1994) for the period 1000-2007. Also shown is the studies (Al-Tarazi 1994 and 1999) and DESERT deep seismic sounding line (Weber

Figure (5): Seismicity map of the Dead Sea transform region.

It is also consistent with paleoseismic and archaeoseismic observations revealed in the sedimentary and archaeological sections excavated along the DST (El-Isa 1987). The estimated MMS intensities of historical earthquakes in the Dead Sea region reach up to IX, where the determinable magnitudes of the recorded earthquakes range between 1.0 and 6.5, on the local magnitude scale, ML (Shapira 1983, 1987,1988, Abou Karaki 1987). Seismic information including historic and prehistoric data indicate that major destructive earthquakes have occurred in the Jordan- Dead- Sea region, causing several cases of severe devastation and many hundreds and sometimes thousands of fatal casualties (Al-Tarazi 1994 and 1999).

The instrumental seismicity of the region shows a concentration of earthquake activity along the major trends of the Rift and its associated zones. Based on the location and the seismicity of the region, an earthquake of magnitude more than 6 is expected to happen. Taking into consideration the earthquake which occurred in 1927 (6.25 magnitude and epicenters some 15 km north of the Dead sea), a major destructive earthquake is expected at any time in the near future and will be epicentered in the north of the Dead Sea, causing severe damage and loss due largely to the high vulnerability of common buildings. On the other hand the predicted earthquake could be epicentered in the southern part of the Dead Sea according to other studies in the region.

Local site effect (landslides, liquefaction, amplification and faulting systems) play an important role in the intensity of earthquakes. Thus, Earthquake- resistant designs of new structures and the evaluation of seismic vulnerability of existing buildings are taken into account in regards to site ground motions. The topography and geology of the West Bank have been the main reasons behind several quite large landslides occurring over the past ten years (Jardaneh, Al Dabbeek and Al Jawhari, 2004). Also, historical earthquakes indicate that historical Palestine suffered with several landslides. **Due to its geology and location the Gaza Strip is expected to face liquefaction phenomena in several areas if a strong earthquake occurred in the region in the future.**

Recent studies of large destructive earthquakes have shown that damages during the earthquakes are often caused by the amplification of seismic waves in near-surface geology, where the post disaster damage assessment showed that the local site effect may have a dominant contribution to the intensity of damage and destruction (Al Dabbeek and El Kelani, 2005). The effects of local geology on ground-motion amplification and building damage were studied recently in few areas in the West Bank (Al Dabbeek and El-Kilani, 2008). The results showed that the amplification factor varied between around 1 and 9 and even when the studied areas were small. ***To avoid the site effect: landslides, liquefaction, amplification and faulting systems in OPT, microzonation maps are needed***.

Incidents of **flash flooding** have claimed the lives of hundreds of people over the years and affected the lives and livelihoods of thousands in the region (Abu Safat 2000 and Abu Safat 2008, Stossel and Boss 2007). The most recent incident occurred in the Jordan Valley in March 2003, where flooding of the Jordan River due to heavy rains caused extensive damage to farmland, resulting in the loss of an entire season's crops for many families living in the area. An increased productivity and economic development in rural areas often leads to a higher concentration of people and valuable estates (infrastructures and production sites) in areas at risk, such as along rivers, valleys and in flood plains (Stossel and Boss 2007).

The probability of **drought and desertification** with their associated adverse consequences on economy and society are ever-present concerns in arid regions. Water has always been at the center of conflicts in the region. The recent experience with drought has renewed

Table (1): Main types of hazards expected in oPt.

Hazard Type	Probability of Occurrence	Probability of Damage	Priority **	Total damage in last 10 years	Last severe events
Floods	Low	Low - limited	third	Millions of dollars	1963, 1966, 1987, 1991
Floods	Low	Low - limited	third	Millions of dollars	1963, 1966, 1987, 1991
Earthquakes	High	High	first	*	1927
Droughts	Medium	High in the long run	second	Tens of millions	———
Land / mud slides, rock falls and avalanches	Medium	Medium-High	second	Millions	1992, 1997, 2003, 2005 ***
Epidemic outbreaks of disease	Low	Low	third	Millions	1981
Industrial accidents	High	Medium-High	first	Millions	1999, 2006
Population displacement /refugee influx	High	High	first	Tens of millions	2001-2006
Sea Disasters	Medium	High in the long run	second	Tens of Millions	———

… continue table (1)

Hazard Type	Probability of Occurrence	Probability of Damage	Priority **	Total damage in last 10 years	Last severe events
Pollution of Undergrou nd water	High	High	second	Tens of millions	———
Desertificat ion	High	High in the long run	second	Tens of millions	———
Occupation , Wars	High	High	first	Billions	2000-2006

* The earthquakes which hit the area in 1995 and 2004 had a limited effect on the oPt, but there is a possibility that the human losses may exceed thousands and the financial losses may exceed hundreds of millions (billions) of dollars if an earthquake of 6-7 magnitude on Richter scale hits the area and the epicenter is in Jordan Valley or Al-Jalil in the North.

** The priority was taken based on the following:

- Probability of occurrence.
- Probability of damage.
- Number of expected human losses and injuries and value of expected damage to national resources

*** Limited landslides.

Cncerns about the inadequacy of governments' contingency planning efforts and the lack of proper risk assessment, response plans and coordination between the different governmental levels.

The water shortage in the oPt and other countries in the region has been compounded by over-exploitation of water resources (Lange, J.,and et al 2008), recent droughts and a high population growth is another area of concern. Despite the development projects and plans for the upgrading of the water supply infrastructure and additional water resources, the race between demand and supply will continue and is expected to be aggravated in the very near future.

Pollution and environmental problems in oPt are exacerbated by limited natural fresh water, overgrazing, deforestation, soil erosion and desertification. To fight environmental pollution Palestinian governmental and non-governmental organizations have developed special measures and awareness programs and have participated in many international activities and agreements (Climate Change, Biodiversity, Endangered Species, Desertification, Hazardous Wastes, Law of the Seas, Wetlands, and Ozone Layer Protection). Major events triggered by seismic activity, namely climate change or climate variability may become trans-boundary.

The coast zone **(Coastal and Marine in Gaza Strip)** is economically and ecologically important for the Palestinian Authority. The beach is the only accessible recreational area for the 1.5 million people living in Gaza. At the same time the fishery sector has great value for the food supply of the local people and for exports. During the past decade the annual economical loss is estimated at hundreds of millions of US dollars and the awareness of protection needs of the coastal and marine areas of the Gaza Strip region have become increasingly apparent (Afifi et al 2002 and Afifi 2003). Recently, the problem of Solid Waste disposal, of which 60% is an organic matter, has become a real threat to the public health, natural resources (land) and the environment as well. The annual land requirement to bury solid waste generated in the Gaza Strip is more than 5 hectares. With the high population density and limited land resources it will be not possible to secure the required land areas for dumping solid waste (Afifi 2003).

Due to it's geopolitical situation, geographical and geological position, oPt could suffer in the future from the Hazard types shown in table 1**.** Also, due to the limited resourses and high vulnerability, it is expected that the effect of most of the above risks will be high. It will adversely affect the economy, society, environment, health and other sectors.

Vulnerability Assessment

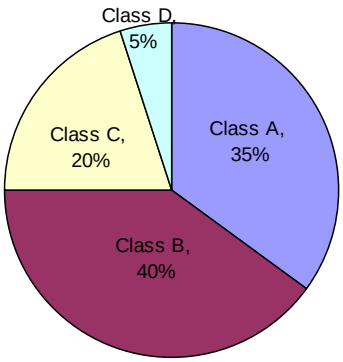
The next stage is to assess the vulnerability of persons or property to the hazard which has been mapped. These include social, economic, physical and environmental factors. Vulnerability analysis is always a 'site-specific' process with a concern for the unique characteristics of a local situation.

Generally disaster statistics tend to be more precise on a smaller scale, where the evaluation of damages is undertaken in a more systematic manner, based on agreed methodologies (UN ISDR, 2004). Academics and emergency managers are continuously working to develop appropriate methodology for assessing disaster risks and several methods have been published (Inter-American Development Bank 2005, UNDP 2004). There is a lot of effort taking place for bench-marking and vulnerability/risk indexing (ProVention Consortium 2006). The UNDP has published a global report called Reducing Disaster Risk a Challenge for Development (2004) in which they have developed a Disaster Risk Index and relative vulnerability assessment using various indicators. For relative vulnerability assessment, various economic and social variables have been used. Nevertheless, in most of these methodologies there are few common variables like the number of events, deaths, affected population and economic losses.

Like many countries, the oPt faces the challenges of rapid urbanization**.** Most of Palestinian cities are located in earthquake prone areas. This directly contributes to a rapid increase in the vulnerability in terms of the number of people and infrastructures exposed. A great variety of infrastructures exist in building materials, design and construction quality: structural and non-structural elements are common. Seismic-proof construction is rarely observed and building codes in design and practices are not enforced.

Recent studies on the "vulnerability of buildings" for the main Palestinian cities (Jerusalem, Hebron, Ramallah, Nablus, Jenin, Tulkarem and Jericho) have been conducted by the Earth Sciences and Seismic Engineering Center (ESSEC) at An-Najah National University (Al-

Dabbeek and Abdel Hakeem 2003, and Al-Dabbeek 2007a and 2007b). The results showed that around one third of the investigated buildings belong to the class A of seismic vulnerability "according to the European Macro-seismic scale 1998" (many buildings will suffer heavy damage), whereas about 40 percent of the buildings are in class B (many buildings will suffer moderate damage), see figure (6).



Classes A, B, C according to EMS-1998

Figure (6): Seismic Vulnerability of Palestinian Common Buildings **(**Al-Dabbeek 2007a)

Based on these vulnerability indicators and expected earthquake intensities, total damage of 5-15% and partial damage of 20% are predicted in some areas of Palestinian cities. The high vulnerability to damages and losses in the buildings and infrastructures in oPt are a direct result of the high percentage of weak buildings and infrastructures that do not comply with seismic resistant requirements. This situation was created by the following major factors:

- Bad construction practices and common fatal design mistakes of the buildings (soft storey, short column, lack of verticality and continuity of vertical structural elements, i.e. very high eccentricity and bad quality of material and workmanship).
- Lack of a national code for seismic design and construction;

– Absence of national legislative laws and regulations for protection against earthquakes; and
– Absence of effective mechanisms for control of application (design and construction) and enforcement of regulations.

The rapid assessment and site investigations in many areas in the West Bank showed that several urban areas have high vulnerability to landslides and the probability of these occurrences will be increased if these areas are hit by strong earthquakes. Lack of land use, planning code, random urban expansion and management practices have increased the vulnerability of seismic site effects (landslides, liquefaction and amplification). Droughts, desertification and floods are the main natural hazards faced by the rural population in the region. In addition to that the vulnerability of flooding has increased due to the lack of land use planning and policy. In addition to that the water flooding, landslides and desertification will reduce the use of land for agriculture, cause pollution of the underground water and reduce the amount of reliable drinking water as well.

In addition to the above mentioned vulnerabilities of properties, persons and institutions in the oPt could be classified as highly vulnerable. These include social, economic, physical and environmental factors.

Assessment of Capacities

Assessment of hazards and vulnerability will reveal a range of critical problems which precedes the final analysis of available resources, often termed an 'assessment of capacities'. These strengths can cover a wide diversity of elements: community coping mechanisms that help them to survive under hazard conditions, local leaders and institutions that can fulfill a vital role in times of acute need, community facilities, cash, credit, the location and quantity of goods that may be needed in an emergency etc. Undertaking a resource assessment after analyzing hazards and vulnerability is a therapeutic process that looks for solutions to all the risks that have been identified**.**

The status of existing legislation, capacity, awareness, training, institutional framework for disaster risk management, trans-boundary and regional cooperation were also assessed. Level of awareness and training, legislation, infrastructure and institutional capacities to cope with disasters can influence vulnerability. Country level reports and other documents available were also reviewed to understand the hazards and their impacts on the economy.

Based on interviews, workshops, analysis of data obtained from distributed questionnaires, local and international statistical reports and scientific research studies, the resources assessment (capacities) in the oPt have shown important conclusions, for more details see paragraph 7.

Mitigation Planning and Preparedness

Mitigation and prevention are the mechanisms for breaking the cycle of repetitive damage and redevelopment. But disaster planning is still all too often seen as separated from day to day decision making. The most effective approach to reducing the long-term impact of disaster is therefore to incorporate mitigation activities into the process of development planning and investment project formulation.

The impact of disaster is most of all felt at the community level. Governments should therefore facilitate the development of community based disaster management. Policy level support should however not limit itself to relief and recovery activities. Although governments should aim at the integration of mitigation concepts in community development planning, it should refrain from automatically imposing its programs upon the communities. Authorities should see non-governmental organizations as the principal enablers of community based mitigation techniques and therefore seek their active participation. Governments should therefore stimulate training in disaster management at all levels of society. Disaster reduction training should not only aim at raising awareness, but also try to improve the understanding of the disaster process, develop skills and enhance self – realization.

The risk will only be high when people, structures and values are exposed to hazards (exposure model) and if their vulnerability is significant. Low density of population, proper land use, safe constructions, good preparation and emergency response national programs etc., will result in lower risk even in high hazard areas. Consequently, the primary task is to reduce vulnerability through a scientifically based understanding of causes and effects, strategies, methods and technologies.

Strengthening disaster preparedness for effective response at all levels was considered one of the five priorities in Hyogo Framework for Action. Disaster preparedness is distinctive because it represents the important linkage between the disaster risk reduction activities and the operational abilities most often identified with emergency (or disaster) management. The main components of disaster preparedness and response are**:**

- Organizational capacities and coordination.
- Preparedness and contingency planning.
- Emergency response mechanisms.
- Participation and voluntarism.

Strengthened preparedness for disaster response is concerned with two main objectives:

- Reducing or avoiding possible damages of potential or impending threats.
- Being ready to assist those who have been adversely affected by a disaster and need help beyond their usual coping mechanisms.

Reaching an effective preparedness level, with the ability to define and carry out response plans, requires certain foundations. A strengthened institutional structure, capacities and approved legislative framework, including resource allocation, are the basis to define multi – stakeholder preparedness measures and responsibilities. Risk identification, including hazard monitoring, vulnerability analysis and

early warning systems, provide the tools for preparedness and contingency planning. Public awareness, knowledge development and communication systems facilitate the understanding and culture to apply preparedness in contingency plans. The identification of additional and underlying risk factors contributes to refine preparedness and contingency measures and plans.

Implementing and strengthening disaster preparedness for effective responses at all levels in the oPt requires a common understanding of what constitutes an effective disaster preparedness system. This entails the including and understanding of disaster risk factors. A disaster preparedness plan and programme should cover the assessment of existing capacities, the strengthening of management and coordination structures (including agreements with other countries), contingency planning and response readiness (such as evacuation and stand-by arrangements for the provision of essential services and supplies), and the periodic review, rehearsal and modification of the plan. Finally, preparedness for effective response requires the allocation of necessary financial resources, including an emergency fund.

Despite the very difficult political, social and economical situation in our region, the oPt is very well known for investment in human capital. Despite the very limited resources and dependency on outside aid, many Palestinian agencies have demonstrated professional capabilities in various sectors of risk reduction. These include the Red Crescent, the Earth Sciences and Seismic Engineering Center and other institutions (see paragraph # 5).

5. General Information about Risk Reduction Organizations

As previously mentioned, the Palestinian situation represents a unique case. There is no access to airports or harbors and the armed forces are nonexistent. This inability to control the territories applies to civil defense and other related governmental institutions as well. On the other hand, the possibility of non-governmental organizations providing more assistance and playing a more active role is increased. This is obvious when looking at some NGOs like Palestinian Red Crescent and

other health relief and emergency medical organizations and societies. These have good capabilities and experience compared to other organizations in the region. Concerning the awareness, training and studies relating to disaster risk reduction management, many organizations were founded and played a major role in educating people on natural disasters like earthquakes and landslides. The Earth Sciences and Seismic Engineering Center of An-Najah National University is the only center in the oPt in this field and its activities target all citizens, professionals and decision makers.

For the purpose of collecting a national database about the organizations working in the disaster risk reduction area, questionnaires and interviews have been conducted with the decision makers in GOs and NGOs.

Governmental Organizations (GOs)

The Higher Council of Civil Defense (HCCD)

Represents the national body for disaster management, headed by the Minister of Interior and the Director General of Palestinian Civil Defense.

The Ministry of Interior

Based on the law, the minister is considered the head of the HCCD. He has the authority to decide the necessary measures and actions to be taken in case of emergency. He has also the higher authority on the security forces, transportation, water, electricity, oils and food and to take any decisions for the benefit of the civil defense. The Civil Defense (CD) works under the Ministry of Interior, in addition to its important role in managing and coordinating HCCD activities. Also the CD manages and conducts the work of emergency and disaster teams.

The Ministry of Planning

The mission of the ministry is to support national development initiatives, establish, implement and monitor economic and development plans, as well as activate technical, financial and economic cooperation with the donors, international organizations and financing institutions to support and implement national development projects.

The Ministry of Health and related organizations:

The Ministry of Health works in emergency conditions all the time because of the political and security conditions. Also the resources they have are limited compared to the urgent and high demands made of it as a result of political situation. The ministry works within the capabilities available without a clearly defined plan to deal with disasters.

The Ministry of Local Government (Municipalities and Village Councils)

Dedicate all available resources for the rescue operations and all related actions in addition to their normal activities related to issuing building licenses; maintaining infrastructures and many other sectors of the people's life.

The Ministry of Public Works and Housing

Dedicate all available resources for the rescue operations and all related actions and responsibility for all engineering works and construction in the governmental sector.

The Ministry of Transport

Collect a database of the owners of heavy duty equipment and other tools (Bulldozers, Excavators, trucks, loaders, cranes etc.), as well as monitoring and forecasting the weather conditions through the meteorological department.

The Youth Sector (Ministry of Education, Ministry of Youth and sports)

All human resources, assets and capabilities will be devoted to support in the emergency rescue and evacuation in addition to assisting in maintaining the security.

The Ministry of Agriculture

Work on the protection of the agricultural land to mitigate the effect of possible desertification, drought, frost and locusts by establishing special strategies and plans

Other GOs, related to risk reduction: The Ministry of Telecommunications and Information Technology, the Media, the Water Authority and Enviromental Quality Authority.

Non-Governmental Organizations (NGOs), Universities and Private Sector

The Palestinian Red Crescent Society (PRCS)

The Palestinian Red Crescent Society has paid special attention to the issue of disasters since it was established in 1968; PRCS is considered one of the most important organizations in this area. Its activities cover all of the Palestinian territory. It has played a very effective and major role during the second Intifada. This concern developed gradually until it became a major part of the work of the society and complementary to its social and health targets. PRCS has 22 branches covering all governorates and distributed in the West Bank and Gaza.

The Earth Sciences and Seismic Engineering Center (ESSEC)

The Earth Sciences and Seismic Engineering Center at An-Najah National University is the only specialist center in the oPt in the fields of Natural Risk Assessment, Disaster Management and Earthquake Engineering. Since it's establishment in September 1996, ESSEC

oriented it's activities (awareness, training, teaching studies and research) to cover all sectors of people like citizens, professionals and decision makers.

The National Agency for Disaster Risk Mitigation (NADRM)

The National Agency for Disaster Risk Mitigation was founded July 31st 2006. It has been responsible for the formation of a national framework that gathers all of the NGOs working in the field of disaster management and emergency support, in addition to planning and conducting Capacity Building and Quality Assurance Programs for the concerned organizations.

Other NGOs, related to risk reduction: The Palestinian Engineer's Association, The Palestinian Contractor's Union, Health Care (HR), Union of Health Care Committees, Union of Health work committees/ Gaza Strip, Friends of the patient charity/ Gaza Strip, Research Centre land, Union Committees of Agriculture Relief, Hydrological Group, Environmental Friends Association/ Gaza Strip and the Applied Research Institute – Jerusalem (ARIJ).

Concerning the universities, they teach subjects related to geology, environment and water. In Gaza the Islamic University has the Center of Environment Studies while Al-Azhar University has the Center for Water Studies. In the West Bank, An-Najah University has the Water Environmental Studies Institute while Bir Zeit University has a center for water studies as well. The role of these centers is more connected to a specialised sector of disaster management which is limiting the effects of water drought and environmental impact rather than disaster management in general.

Other governmental and nongovernmental organizations related to risk reduction in oPt, in addition to the above mentioned organizations (GOs and NGOs), are presented in special tables, the table contains addresses and contact persons for each organization. Also, the comprehansive file of the study contains national resources (materials and equipment) availabile for emergency response.

6. Monitoring and Evaluation

Evaluation is "an assessment, as systematic and objective as possible, of an on-going or completed project or policy, its design, implementation and results". Evaluations are analytical exercises, focusing on project outputs and especially outcomes or impact. Good evaluation is essential for effective project and programme management.

In addition to that, the monitoring and evaluation process ensures the following benefits:

- Evaluation is the main key by which agencies seek to learn lessons from their work and incorporate them into policy and practice.
- Organizational learning (through evaluation) is a prerequisite for knowledge transfer between agencies.
- Evaluation is often the only consolidated source showing how a project or programme progressed.
- Evaluations are a means of retaining and building institutional memory.
- Evaluations question and test basic assumptions and create a space for lesson learning.
- Learning from experience is particularly valuable at times of policy uncertainty.

The monitoring and evaluation systems in disaster risk management in oPt (West Bank and Gaza Strip) are very limited and not integrated into mitigation activities, emergency response and recovery aspects. Experiences and practices in oPt in emergency responses to various disasters (ex. man-made disasters) should be evaluated and shared with other countries in the region. Sharing experiences could improve the coordination and collaboration not only between the countries but also between the related Palestinian organizations. Additionally, establishing a unified catalogue for monitoring and evaluation should have the priority.

7. Discussion and Concluding Remarks

National policies and legislations are focused towards rescue and relief activities. There is a need to shift this to disaster preparedness and prevention and incorporating disaster management into the development plans of the country, considering the disaster as national priority towards the implementation of "*Hyogo Framework for Action"*.

However, it is observed that there is a lack of coordinated efforts among various departments, coordination between centers and local administrative bodies and clear definition of the roles and responsibilities towards disaster mitigation and management. But, decentralization cannot be considered as a single rule for disaster management and preparedness as there is a need for a centralized database which should be accessible to all organizations that are involved in planning and formulating disaster management and mitigation activities within the country and the region. In most of the organizations related to risk reduction, the data related to the bio-physical and socio economic are either not available or are in discrete, not easy to use formats. These data should be added and in cases not available, should be generated and organized in a usable format (ideally in GIS) which would be a crucial tool for hazard prevention strategy planning.

Gaps were identified based on risk assessment and review of the existing legislation, institutional framework and capacity of the oPt. Recommendations were provided to address these gaps, which can be found at the end of this paper. In the oPt many cities have been damaged by disasters in the past and the cities have then made reconstruction plans and carried out this urban reconstruction. By analyzing these cases it is possible that we have the many elements which are needed to form the basic planning of disaster prevention in the oPt and in the wider region.

Non Governmental Organizations (NGOs): International Federation of the Red Cross and Red Crescent Societies are active in the oPt and in some cases play a leading role in disaster preparedness and response. These organizations are well coordinated with the concerned governmental departments. There is one academic and research center

within the country, particularly working in the field of seismology, earthquake engineering and DRR. The training and awareness need to be tailored to accommodate trans-boundary issues and cooperation in case of emergency. Awareness should also reach the general public and the efforts of organizations to impart training and awareness in schools should be encouraged. The use of media for disseminating awareness programmes should be broadened and encouraged so that the message will reach a larger audience.

Since communication to the public is critical in reducing the impact of disasters on the community there is a need to develop risk communications programs as an integral part of all plans, across sectors and from the national to municipal levels. The proposed risk communications programs could incorporate risk awareness, community education about risks and precautionary measures, warning systems and public communication for critical situations.

Initiatives on regional cooperation are very limited, donors and humanitarian organizations working in oPt can play a crucial role in developing regional cooperation. The United Nations Development Programme's (UNDP) activities are expanded in almost all of the country with close cooperation and coordination with the national government. In addition to bilateral and multi lateral links some of the academic institutions and research centers have intense cooperation with scientific institutions in US, EU and Japan. This often mobilizes resources to undertake studies and generate useful information for disaster management.

One of the main gaps identified during this study is availability of reliable sub-national level data that is crucial for any vulnerability assessment. A centralized database on variables required for vulnerability and risk assessment, risk modeling and preparing management plans at country and regional level needs to be generated. Some organizations already have some data available in GIS format, which needs to be integrated into a common database. Data design should be developed and stored in a versatile format for easy retrieval, analysis and update. The data will help identification of vulnerable zones, formulate land use

planning strategies and develop regional plans for disaster mitigation and preparedness.

Earthquakes, floods, landslides, droughts and desertification are the main natural hazards in the oPt. Also, the frequency and vulnerability due to technological related hazards are increasing in the oPt. Based on interviews, workshops, analysis of data obtained from distributed questionnaires, local and international statistical reports and scientific research studies, the study finds out comprehensive conclusions about the following main topics:

- *Regional cooperation and International initiatives*
- *Training and awareness*
- *Institutional structure and capacity*
- *National policy, legislation and strategies*
- *Disaster profile and risk assessment*

The conclusions are:

- Disaster risk reduction system, as it is outlined in the Hyogo Framework for Action is not yet regulated.
- Lacking awareness of the natural hazard, human vulnerability and related economic and social risks;
- Settlement in risk areas (e.g. along active faults, in low-level coastal area, near steep slopes or cliffs, in flood plains, on unstable grounds etc.).
- Unknown or ignored natural site conditions, such as soil liquefaction potential, sub-soil amplification characteristics attenuation laws of seismic waves, landslides, etc;
- The vulnerability of the Palestinian buildings and infrastructures to earthquakes is very high.

- Absence of codes, rules and regulations which emphasize the safety requirements in the buildings.
- Absence of land use policy (planning).
- Neglect of human safety, interests and long- term needs for sustainable developments.
- Absence of effective mechanisms for control of application and enforcement of regulations.
- Weaknesses of national programs and public policies on preparedness, mitigation, and emergency response.
- Weak institutional capacity in disaster management and rescue operations.
- Lack of awareness by citizens and weak capacity of professionals, engineers, and decision makers.
- Lack of capacity and training in disaster risk management and policy implementation at government level.
- Lack of coordination between central and the local level authorities in disaster management activities.
- Legal frameworks for disaster risk reduction are very limited. The disaster risk reduction agenda is driven by response activities, whereas prevention or mitigation is missing.
- National and municipal disaster management and emergency response plans do not actually exist.
- National and local capacities for disaster risk reduction are generally very weak at all levels.
- The role of the private sector in disaster reduction is also not adequate
- Lack of appropriate support for the civil defense in terms of resources, training and other needs, which resulted in lack of

specialized and well trained human recourses in rescue operations.

- Absence of a clear and comprehensive national plan for disaster management and national office for disaster risk management.
- Lack of adequate coordination among different governmental and non governmental organizations and the private sector as well. This will result in the reduction of the emergency support operations.
- Absence of well equipped operations central rooms on the national levels covering different governorates.
- The unique Palestinian case: no geographic connection between the Gaza Strip and West Bank and the complications caused by the occupation will delay disaster management, plus the nonexistence of a Palestinian armed forces able to greatly help in the crisis management and rescue operations.
- Few national bodies are key players in disaster risk management, but all of them are facing considerable capacity gaps. Also, public responsibilities in disaster risk management are not allocated to one specific relevant authority, but they are shared among different bodies.
- The fact that the area of Palestine is small makes almost all areas vulnerable to disasters but to different levels. This will make disaster support and management more complicated especially in earthquake disasters.
- The location of the oPt between "Israel" and Jordan in addition to its very small area, make it very vulnerable to different types of disasters. The emergency support from these countries will be very limited since they will also be affected by the disaster.

8. Recommendations

The overall recommendations provided in this paper have been deduced based on the reviewed questionaires, available historical data on hazards and their impact, capacity and vulnerability assessment the lack

of readiness of the Palestinian people and institutions, the absence of effective management for disasters and emergency response as well as following up the requirements plus declarations and recommendations of the international organizations related to DRR, such as the Hyogo Framework for Action 2005-2015. The study finds out comprehensive recommendations about the following main topics:

- *National Policies, legislation and enforcement*
- *Disaster risk management database and risk modeling*
- *The National Disaster Management Plan*
- *Non Governmental Organizations*
- *Political Consensus*
- *Approach towards disaster risk management*
- *Regional cooperation*
- *Links from the Center to Local Government*
- *Links between Policy and Operations*

In order to benefit from the strengths of Palestinian society and to minimize the consequences of the above mentioned gaps, there is an urgent need to adopt the following recommendations taking into consideration the national priorities:

- Encourage all governmental and non-governmental institutions to adopt the Hugo Framework for the Decay 2005 – 2015 and encourage the international organizations to consider this in future development projects.
- Improve the the civil defense capacity to cope with the international developments in different disasters. Establish training centers to have trainers in different areas. Encourage Palestinian and International organizations to support the civil defense.
- Estabilish national platform for DRR.
- Apply the regulations of the public safety on the buildings and different structures.

- Encourage concerned institutions like civil defense and Red Crescent to increase the training courses for the local community including schools, local authorities and others. Also encourage the non-governmental organizations for assistance.
- Increase the public awareness for the safety measures within the Palestinian community.
- Develop special programmes to enhance the capacities of those working in the media on how to perform before, during and after earthquakes and disasters in general.
- Conduct regular exercises at all levels.
- Apply the building codes requirements and include the seismic requirements (in design and practices) and find a mechanism to enforce its application. Prepare and adopt a time frame in cooperation with concerned institutions.
- Find legislations and mechanisms to oblige concerned local authorities to adopt the engineering supervision on the construction of buildings and retrofitting the existing buildings.
- Encourage the governmental and non-governmental organizations to benefit from the experience of specialized centers like ESSEC in DRR.
- Create contact and communication centers on both local and national levels. These will act as a focal point for which coordination between all areas can be more efficient.
- Establish clear Structure for disaster management and an operation central room which will include all concerned governmental and non-governmental organizations.
- Prepare a national database with the disaster management operations room. Also a database for each governorate or city should be prepared and updated annually.

- Mapping of landslide prone areas and land use regulation legislation plus develop legislation to control the land use policy in a way that maintains the sustainable development, environment stability and reduces the risks of earthquakes and other natural disasters.
- Encourage establishing non-governmental centers and societies in the field of emergency support. Launch foundation of committees for support and voluntary work in all governorates and in corporation with the civil defense centers and societies.
- Prepare and/or develop roles and responsibilities in disaster response at all levels "national, governorates and municipal levels".
- Consider efficient and logical distribution of hospitals, health centers and all centers related to disasters, so as to cover as much as possible of the areas and to avoid any isolation for any areas.
- Include courses on seismic design of structures and buildings as part of the plans for the engineering faculties in the oPt as compulsory courses. In addition to that, include courses related to public safety and disaster management as elective or compulsory for all faculties in Palestinian universities.
- Continuous follow up to the international developments in dealing with the disasters. Also establish a network to benefit from others who have experienced natural disasters.

To ensure national disaster reduction and risk management programs in oPt, the following preparedness activities should be implemented through:

- Creating coordination systems for operational emergency centers.
- Developing the Civil Defense capabilities and enhancing the institutional capabilities.
- Establishing crisis communication to and from the public and decision-makers.

- Official arrangements (through the Ministry of Foreign Affairs, Civil Defense and the Palestinian Red Crescent) for seeking international assistance.
- Conducting regular exercises for all levels.
- Developing public awareness programmes.
- Preparing and/or developing roles and responsibilities in disaster response at all levels "national, governorates and municipal levels".
- Developing disease surveillance systems.

To reduce vulnerabilities and losses of life, properties and infrastructure, the institutional capacities for/with risk reduction, disaster management, and emergency support should be enhanced through:

- Establishing clear mechanisms for monitoring.
- Evaluating disaster preparedness and response activities to be able to promote the development of a disaster reduction.
- Monitoring and evaluation to ensure feedback to management systems.
- Holding national workshop and training courses to discuss critical issues in terms of earthquakes/ natural disasters vulnerability reductions.

In addition to the above mentioned required measures, the health sectors and the rescue operation institutions should be given priority, this includes: developing a mental health plan to manage the psychosocial aspects of disaster and decontamination of patient on-site and at hospitals involving large and small groups of people.

Based on the first priority of Hyogo Framework of action a pro-active measure for disaster risk reduction should be integrated into the country development plan. It is vital to code and enforce legislative standards and requirements, especially the seismic building code and land use planning.

Taking into consideration the common and shared natural hazards, increasing vulnerability across political boundaries and demographic structure of an ageing population, it is important to develop a framework for regional or sub regional cooperation. An organization having capacity and resources should coordinate (or cooperate with) all related organizations working in DRR such as ministries, NGOs, private organizations and international donor agencies. The organizations should promote partnership of countries in the region, share hazards and trans boundaries issues, in addition to that, it should be equipped with well-trained staff and adequate resources and supported by appropriate legislations and authority for decision making and implementation.

NGOs should be well integrated within the disaster risk management framework in order to improve NGO/government cooperation and establish a comprehensive, integrated pattern of response. Best practices of NGO activities should be showcased and identified as a key part of the process.

There is an urgent need to establish national disaster preparedness plans which incorporate linkages to international systems of disaster response, and have clearly defined and agreed roles and responsibilities for the national independent disaster response organizations. Disaster management plans should be proactive, giving emphasis to preparedness and mitigation.

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