GLOBAL BLUEPRINTS FOR CHANGE

First Edition--Prepared in conjunction with the International Workshop on Disaster Reduction convened on August 19-22, 2001

The Global Blueprints for Change contain guidance for working together to improve the capability to identify indicators of physical, social, enterprise, and environmental vulnerabilities throughout the world and to select and implement realistic solutions to reduce them towards acceptable levels.

Theme A: LIVING WITH NATURAL AND TECHNOLOGICAL HAZARDS
Topic A.1: Improving Community Sustainability

"A Note on Improving Community Sustainability in the Middle East"

This Contribution was created by Avi Shapira
Geophysical Institute of Israel

A NOTE ON IMPROVING COMMUNITY SUSTAINABILITY IN THE MIDDLE EAST

Avi Shapira[1]

Introduction

The Seismology Division of the Geophysical Institute of Israel (GII) is assigned by the Earth-Sciences Research Administration of the Ministry for National Infrastructures of Israel, to conduct seismological studies and surveys aiming at reducing the earthquake risk in Israel. In that capacity, the Seismology Div. of GII is operating the seismic monitoring systems of Israel, provides earthquake hazard assessments to the private and the public sectors and is involved in wide spectrum of disaster reduction projects. A number of projects have already been initiated by different organizations within the government of Israel. Following the Global Blueprints for Change we would like to report as follows:

Israel has a very long documented history of earthquake catastrophes. However, strong and destructive earthquakes are not frequent. The community, at large, does not have a comprehensive idea of the seismic hazard and the earthquake threat. The first mandatory a-seismic building code was introduced in 1971. It has been modified in 1995 and awaits another modification in 2000/2001.

Following the concept that "Earthquakes do not kill people – houses do! " the major emphasis for improving community sustainability are:

(1) Enforcement of the building regulation and the Israeli Standard 413. A government committee has been established to propose the concepts and techniques for enforcing IS 413.
(2) Professionals in and outside the government ministries are in the process of formulating requirements for evaluating geological hazards and incorporating these evaluations in the national and municipal planning.
(3) As part of the licensing process, the Israel Ministry for the Environment has instructed a number of planners to provide a full evaluation of the earthquake impact on planned projects. The Seismology Div. of GII will analyze and check the evaluation reports when submitted. These will serve as a pilot for formulating nation-wide requirements from the industrial sector.
(4) The Geological Survey of Israel has issued a map that shows the areas where earthquake hazards are potentially enhanced due to soil amplification effects. The Seismology Div. has launched a project to empirically determine site response functions at sites of potential amplification. The investigation will be based on seismological studies (determination of horizontal to vertical spectral ratios of ambient noise and of seismic events), geophysical surveys (mapping of the subsurface using refraction and reflection surveys) and geotechnical data (mainly from boreholes).

---

[1] Director of the Seismology Division, Geophysical Institute of Israel

(5) The Geological Survey of Israel, in collaboration with GII, will provide maps of active faults and maps of areas having the potential for land slides and soil liquefaction.

Enhancing public awareness

The Seismology Division of GII is the prime organization in Israel to enhance public awareness. As a routine, earthquake information is updated daily and is provided to the public over the internet (www.gii.co.il). The scientists of the Seismology Div are providing professional and popular lectures on Seismology and the Earthquake hazard in Israel. Special seminars and workshops on earthquake hazard and earthquake mitigation were organized and are planned for the future, for the following audience:

(1) The civil engineering community at large.
(2) Military units that might be involved in rescue operations.
(3) Teachers.
(4) Emergency response organizations.

Spokesmen of the Ministry of Education and the Office of the Prime Minister are in the process of designing the content and means of communication with the public prior and during a destructive earthquake.

Improving Emergency Management

Very unfortunately, the State of Israel has too many experiences in managing emergency situations. Nevertheless, it is fully realized that managing the consequences of a disastrous earthquake is different fro other emergency situations that we had in the past. An inter-ministerial steering committee is currently studying different strategies for developing a disaster management scheme for Israel. Meanwhile, Israeli Emergency organizations include in their activities drills, seminars and training of their professionals and field operators.
(2) It is well recognized that emergency management can be made more effective and efficient by introducing computerized systems for the preparation of damage scenarios. The Seismology Div. of GII is leading a task group to develop and prepare such a system for Israel. It has been realized that we would like to have two kinds of system:

System A- A computer program will be developed to provide a rapid yet general prediction of the consequences of a high magnitude earthquake across the country. It has been realized that due to the small dimensions of the country, a strong earthquake may disrupt the power supply systems and the communication lines and thus extending the time for acquiring information from the affected areas. It is planned that immediately after the occurrence of a strong earthquake, based on seismic information (location, magnitude and mechanism), a GIS based system will give us a picture of the expected distributions of casualties, fatalities, damage to property and other losses across the country. These almost real-time predictions will expedite the initiation of organized rescue operations at the most critical hours after the earthquake.

System B- A computer program will be developed to provide a detailed earthquake damage scenario. This scenarios generator will be used to design exercises and drills and to highlighting preparedness actions that are required in order to mitigate the effect of a high magnitude earthquake. Such a system does require a high level of detailed information. Consequently, its development will be extended over a number of years.

The development of these systems will involve experts from the Technion (The National Center for Building Research and the Faculty for Civil Engineering), the Survey of Israel, the Geological Survey of Israel, the Israel Police, the Home-Front Command of the IDF and several government ministries (e.g., Health, Communication, Protection of the Environment, Defense and National Infrastructures). However, we have started to investigate the possibility of relying on some of the existing developments such as the HAZUS system that was developed by FEMA, USA and the EXTREMUM system that was developed by the Ministry for Disaster Management of Russia.

THEME B: BUILDING TO WITHSTAND NATURAL AND TECHNOLOGICAL DISASTERS.

Improving Hazard Characterization Models and Maps

Project A : Earthquake Hazard Assessments for Building Codes in the Middle East. In 2000 the National Resources Authority (NRA) of Jordan, En Najah University of the Palestinian National Authority (PNA) and the Geophysical Institute of Israel (GII) have launched a comprehensive project to re-assess the earthquake hazard in their region. This effort is aimed at supporting the implementation and/or updating of national building codes. This project is financed by the US-AID (MERC Program) for a period of 3 years.

The principal investigators and leading collaborators are: Dr. A. Shapira of GII, Dr. J. Dabbeek of PNA, Eng. A-Q Abdalla of NRA and Dr. W. Hays of ASCE. The issues to be addressed are:

(1) Production of a unified earthquake catalog including the unification of magnitude determinations.
(2) Compilation of geological, geophysical and seismological data for the definition of the seismogenic zones and their seismicity characterization.
(3) Typification of buildings and their generalized dynamic characteristics.
(4) Site response investigations.
(5) Enhancement of seismic monitoring with emphasis on strong motion data.
(6) Implementation of stochastic methods for estimating ground motion parameters.
(7) Mapping of earthquake hazard parameters (PGA, Spectral Accelerations)

Project B: Implementation of Stochastic Methods for Estimating Ground Motions. In regions of low and moderate seismicity where strong motion data are rare, it might be advised to base estimations of earthquake ground motions on modeling. Realizing that almost nothing in seismology is deterministic, it is important to develop

procedures that take into account the uncertainty associated with almost every seismological parameter. The Seismology Division of the Geophysical Institute of Israel (GII) has adopted the principles of the stochastic method of Boore (1983) and others for synthesizing ground motions. Shapira and van Eck (1993) have integrated that method into a wider scheme where Monte Carlo simulations are used for simulating the seismicity and for choosing seismic parameters.
The first generation of earthquake hazard assessments that are based on stochastic estimations has been practiced in the last years by the GII.

It is planned that that approach will be improved through collaboration with the US Geological Survey (Dr. David Boore) and the USAID's MERC project. This will include:

(1) Regional characterization of relationships between seismological parameters.
(2) Reduction of the uncertainties associated with determining values of various seismic parameters.
(3) Calibrating the computational process against local and regional observations.
(4) Develop a computer code to provide reliable assessments of the earthquake hazard in terms of uniform-hazard, site-specific, spectral-accelerations.