SUSTAINABLE DISASTER RISK MITIGATION THROUGH RETROFITTING and MASS AWARENESS

PROJECT IN ECO MEMBER COUNTRIES

Mehmet Emin Akdogan, PE, SE, PhD, C.
Human Settlements Officer
Technical Adviser
UN-Habitat Disaster Mitigation Office
Tehran, I.R.Iran

3rd Global Platform for Disaster Risk Reduction

May 8-13, 2011,
Geneva, Switzerland

OUTLINE

- About UN-HABITAT Disaster Mitigation Office
- About ECO Secretariat
- Hazard profile of the region
- Project description and objective
- Project Components and Details
- Methodology
- Final Remarks and Outcomes

ABOUT UN-HABITAT TEHRAN DISASTER MITIGATION OFFICE

UN-HABITAT DISASTER MITIGATION OFFICE

- **The United Nations Human Settlements Programme (UN-HABITAT) Disaster Mitigation Office was established in April 2007 with an Agreement between the Islamic Republic of Iran and UN-HABITAT focusing on:**
  - Rehabilitation of urban settlements in the Region, particularly Iran and improvement of the preparedness measurements for potential disasters and earthquakes
  - Capacity-Building support in the area of earthquake resistant housing,
  - Link to disaster mitigation with sustainable relief and reconstruction
  - Dissemination of earthquake resistant technologies within the region and supporting measures for better enforcement of building codes and urban development.

UN-HABITAT DISASTER MITIGATION OFFICE

MANDATE & MISSION

The primary responsibilities of the office pursuant to the mandate of the UN-HABITAT related to the sustainable human settlements development are:

- Strengthen the co-operation of the Islamic Republic of the Iran and other United Nations Member States with the UN-HABITAT and other UN agencies, programmes and funds in the field of Earthquake resistant construction

- Promote participation of the experts, scientists and urban managers in UN-HABITAT activities and more specifically in the field of earthquake resistant construction.

- Increase the possibilities for the interested Member States to provide development recourses and contribute towards capacity enhancement in earthquake resistant construction through technical and financial means.

- And to promote UN-HABITAT mandated activities in the Islamic Republic of Iran.

ACTIVITIES&COMPONENTS

In the framework of the objectives, Office has initiated a 5 year period work plan by defining the working scheme into 4 main Components:

Component A: Seismic Risk Mitigation for Public Facilities and Housing
Component B: Dissemination of knowledge for Sustainable Urban Development
Component C: Enforcement of Building Codes
Component D: Project Management and Model Cities

ABOUT ECO SECRETERIAT

THE ECO SECRETERIAT

- Economic Cooperation Organization (ECO) is an intergovernmental regional organization established in 1985 by Iran, Pakistan and Turkey for the purpose of promoting economic, technical and cultural cooperation among the Member States.

- ECO is the successor organization of Regional Cooperation for Development (RCD) which remained in existence since 1964 up to 1979.

- In 1992, the Organization was expanded to include seven new members : Islamic Republic of Afghanistan, Republic of Azerbaijan, Republic of Kazakhstan, Kyrgyz Republic, Republic of Tajikistan, Turkmenistan and Republic of Uzbekistan.

THE ECO SECRETERIAT

MANDATE & MISSION

The primary objective of ECO secretariat is:

- Sustainable economic development of Member States;
- Development of transport & communications infrastructure linking the Member States with each other and with the outside world;
- Economic liberalization and privatization;
- Effective utilization of the agricultural and industrial potentials of ECO region;
- Progressive removal of trade barriers and promotion of intra- regional trade; Greater role of ECO region in the growth of world trade; Gradual integration of the economies of the Member States with the world economy;
- Regional cooperation for drug abuse control, ecological and environmental protection and strengthening of historical and cultural ties among the peoples of the ECO region;
- Mutually beneficial cooperation with regional and international organizations.

PROJECT DESCRIPTION:

- **The Objective:**
- **Mutual agreement for cooperation between UN-HABITAT and ECO secretariat…**
- **Development of seismic risk mitigation projects toward disaster preparedness and enhancement of response capacity, post-disaster recovery and disaster risk reduction associated with natural hazards in ECO member Countries…**
- **Republic of Turkey, Islamic Republic of Pakistan, Islamic Republic of Afghanistan, Republic of Azerbaijan, Republic of Kazakhstan, Kyrgyz Republic, Republic of Tajikistan, Turkmenistan and Republic of Uzbekistan.**

United Nations
Human Settlements Program
Disaster Mitigation Office

C/2011/04
Distr.: Limited
7 April 2011

Original: English

REPORT for "SEISMIC RISK MITIGATION and DISASTER PREPAREDNESS PROJECTS" in ECO MEMBER COUNTRIES

Developed by:

UN-HABITAT DISASTER MITIGATION OFFICE
UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME
TEHRAN, I.R.IRAN

April 7th, 2011

Summary

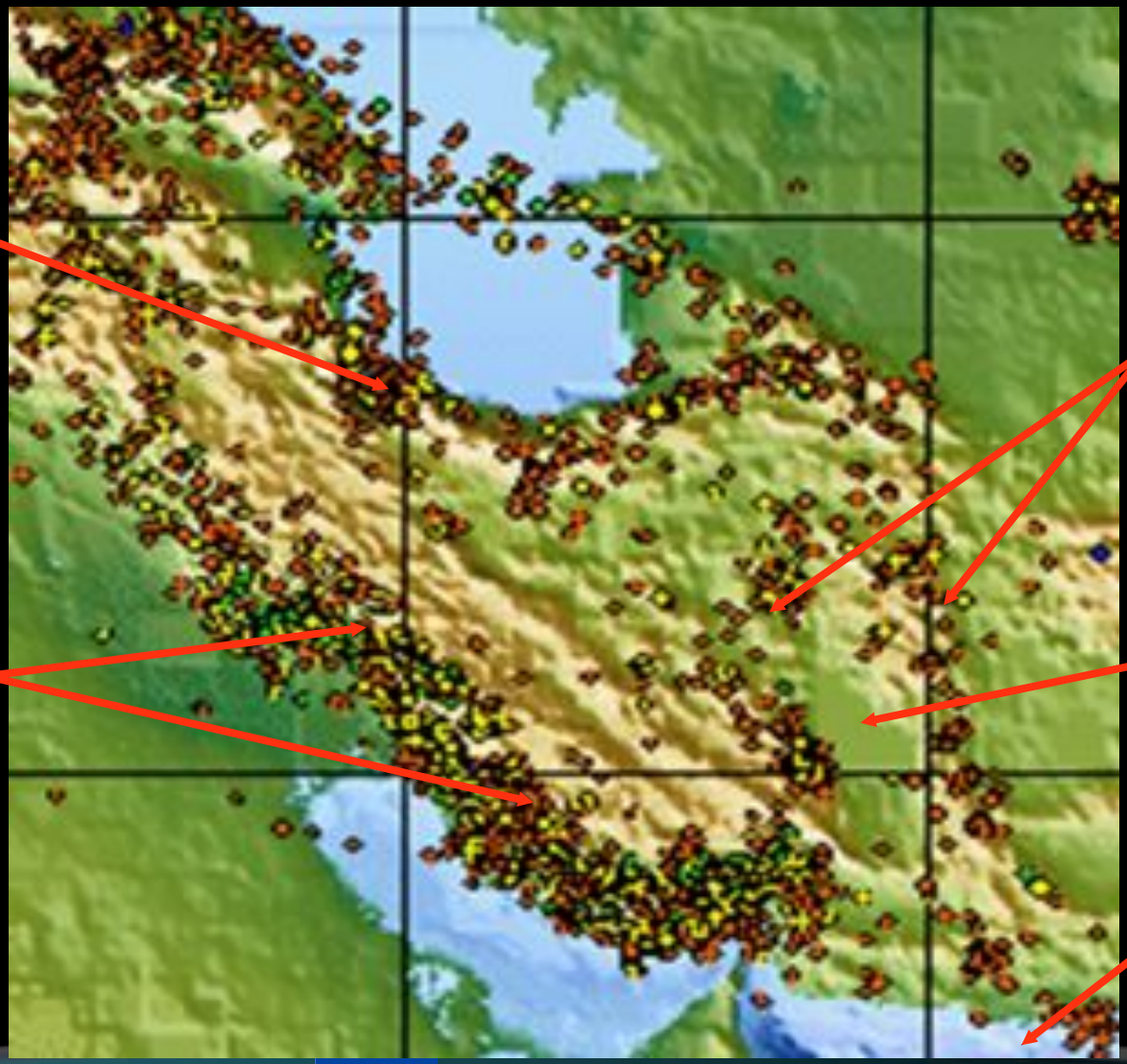
The present report has been prepared to establish the foundations of a mutual agreement between UN-HABITAT Disaster Mitigation Office and ECO secretariat in Islamic Republic of Iran for development of seismic risk mitigation projects within the framework of international cooperation toward disaster preparedness and enhancement of response capacity, post-disaster recovery and disaster risk reduction associated with natural hazards in ECO Member Countries.

This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without UN-HABITAT authorization.

1 | Page

Earthquake Hazard of the Region

Iran is Also Obviously an Earthquake Country



RECENTLY…

The 2000 year old Citadel in Bam (Iran), the worlds largest mud fortress before the earthquake in 2003.

Photo: Wikipedia

Bam after earthquake December 26, 2003

Photo: Marty Bahamonde/FEMA

2003 Bam EQ

DEVELOPMENT OBJECTIVE & INDICATORS:

Key indicators:

1. List of existing public facilities (school, hospital, administrative buildings),

2. Initial vulnerability studies and prioritization list of essential public facilities,

3. Disaster Management system and Disaster Reduction Policies

DEVELOPMENT OBJECTIVE & INDICATORS:

3. Construction types, building codes, rehabilitation processes and hazard profile of individual countries,

4. Assessment and retrofitting designs for three most resemble school, hospital and administrative buildings in each country using cost effective methods,

DEVELOPMENT OBJECTIVE & INDICATORS:

6. Cost benefit analysis and probable budget need for rehabilitation and multi-hazard risk mitigation in the countries

7. Skills and technical capacities of the relevant emergency response units;

8. Enforcement of building codes and mass awareness campaigns

IMPLEMENTATION

Institutional and implementation arrangements

- ✓ Project implementation will be placed under the responsibility of the UN-Habitat and ECO Secretary General Based in Tehran.
- ✓ A small Coordination Unit (CU) will be established under this Office, headed by two experts from UN-Habitat and ECO secretariat
- ✓ Each relevant agency from the member countries (such as Provincial Directorates of Health, Education, Public Works, etc.) will nominate a senior staff to be a liaison between the CU and their mother agency.
- ✓ The CU will be responsible for project coordination, financial management, monitoring, and evaluation and reporting.
- ✓ A Project Steering Committee will be established to oversee project implementation and provide strategic guidance.

PROJECT COMPONENTS AND DETAILS

The objective is defined in three components:

Component A: List of Public Facilities and Prioritization List

Component B: Feasibility Studies and Retrofitting Designs

Component C: Support for enhancement of Response Capacity and Disaster Management Systems and training through mass awareness campaigns in the region

PROJECT COMPONENTS AND DETAILS

Component A: List of Public Facilities and Prioritization List

- ✓ List of existing public facilities from relevant ministries (schools, hospitals, administrative buildings, social service buildings, dormitories...etc) for the most vulnerable cities

- ✓ Initial vulnerability assessment studies for the list of the buildings and prioritization list

PROJECT COMPONENTS AND DETAILS

Criteria for Prioritization

- Accessibility during disasters
- Technical Features of Building
  - ✓ Construction Year
  - ✓ Type of the building
  - ✓ Number of story
- Distance to Epicenter
- Distance to Fault Line
- Importance in Disaster Management Plan (Strategical Location
- Number of People getting served
- Working Hours
- Population Served

PROJECT COMPONENTS AND DETAILS

Component B: Feasibility Studies and Retrofitting Designs

✓Determination of construction types, building codes, rehabilitation processes and hazard profile of countries and define ad's, con's by developing a detail report including possible rehabilitation and retrofitting methods and post disaster damage repair alternatives,

✓Conducting feasibility studies and preparing retrofitting designs using the most cost effective method for the three of the most resemble essential buildings (1 school, 1 hospital and 1 administrative buildings) in each country

✓Preparing cost benefit analysis and probable budget for rehabilitation and multi-hazard risk mitigation of the selected vulnerable buildings in the Prioritization List and estimate the possible return period.

SELECTION OF BUILDINGS

The types of public facilities :

Medical Facilities

- Hospitals (One Hospital from each member countries, a total of 10 buildings)

Educational Facilities

- Schools (One School from each member countries, a total of 10 buildings)

Administrative Facilities

- Facilities essential for the administrative functioning of communities at risk after disaster, including communication and coordination centers (One Admin building from each member countries, a total of 10 buildings)

PROJECT COMPONENTS AND DETAILS

Feasibility Studies and Assessment Process

1. Determine seismic deficiencies
2. Establish rehabilitation objective
3. Obtain as-built information
4. Select rehabilitation method
5. Identify rehabilitation schemes
6. Design the rehabilitation / verify design

PROJECT COMPONENTS AND DETAILS

Vulnerability Assessment…

1.Data Collection and Investigations

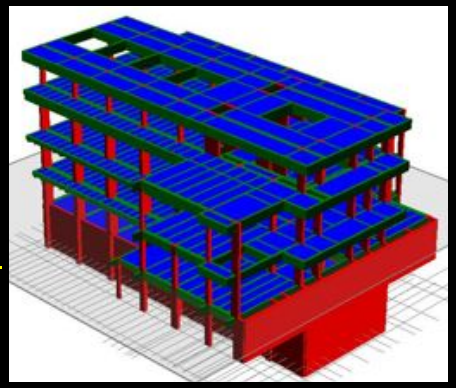
- Collection and Review of All Existing Documents and Data
- In-situ and Laboratory Material Testing
- Geotechnical Investigatons

2.Survey (Construction) Project

- Geometrical and Architectural Surveys
- Structural Survey

3.Seismic Performance Assessment

- Site Specific Hazard Assessment
- Seismic Performance Assessment of Structures



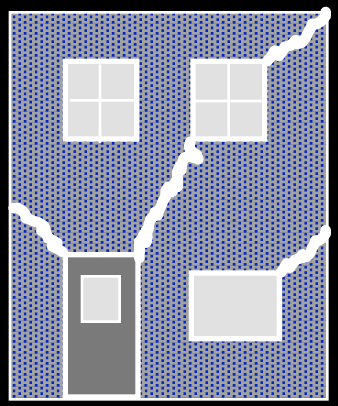
4.Seismic Retrofit, Strengthening and Renovation Projects

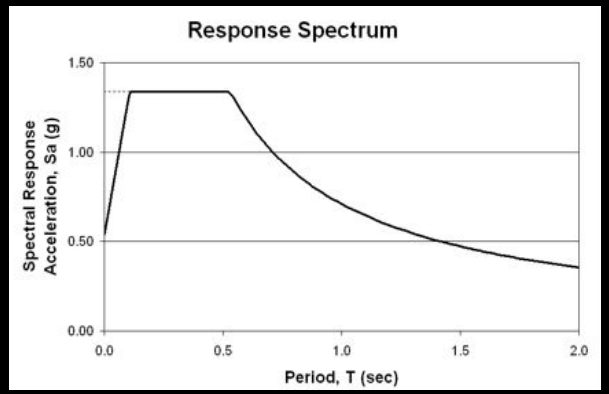
- Preliminary Retrofit and Renovation Project s
- Detailed (Final) Retrofit and Renovation Project s

Rehabilitation Objective

Rehabilitation Objective = Performance Level + Earthquake Hazard Level

(Graphics Courtesy of ATC)





Rehabilitation Objective

Strengthening by using Conventional Methods..

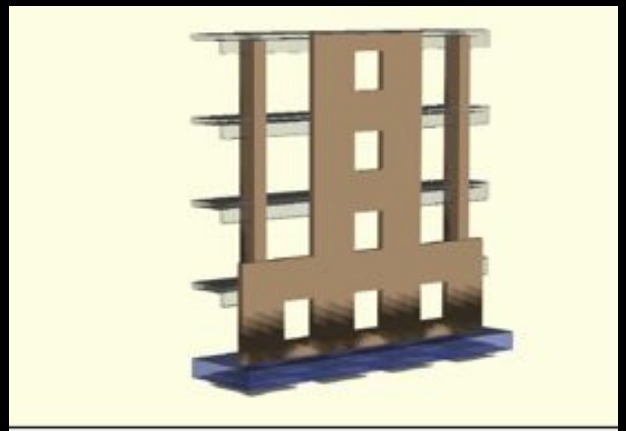


Figure 3.14 – Perforated Perimeter Shearwall with Broad Base (two-column case)

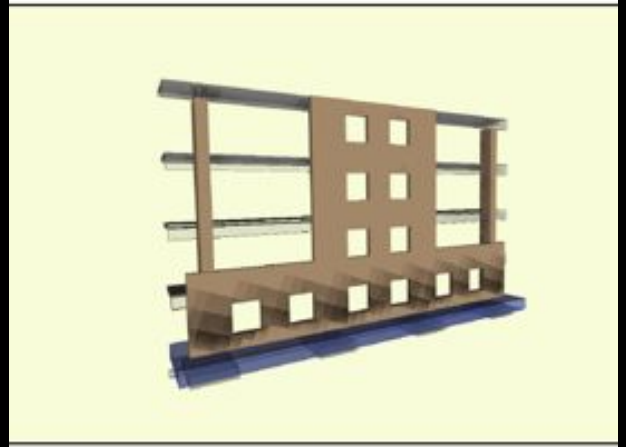


Figure 3.15 – Perforated Perimeter Shearwall with Broad Base(three-column case)

Figure 3.16 – Perforated Perimeter Shearwall with Abutment

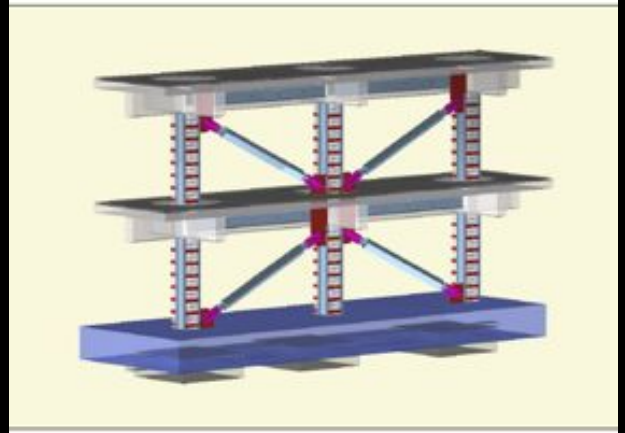
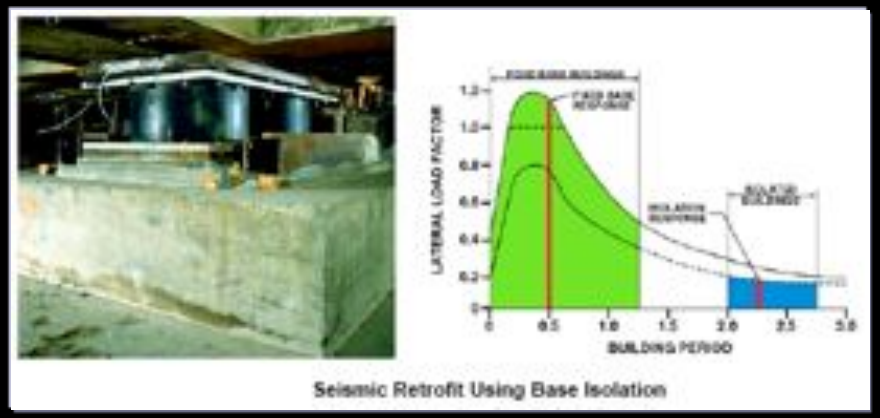
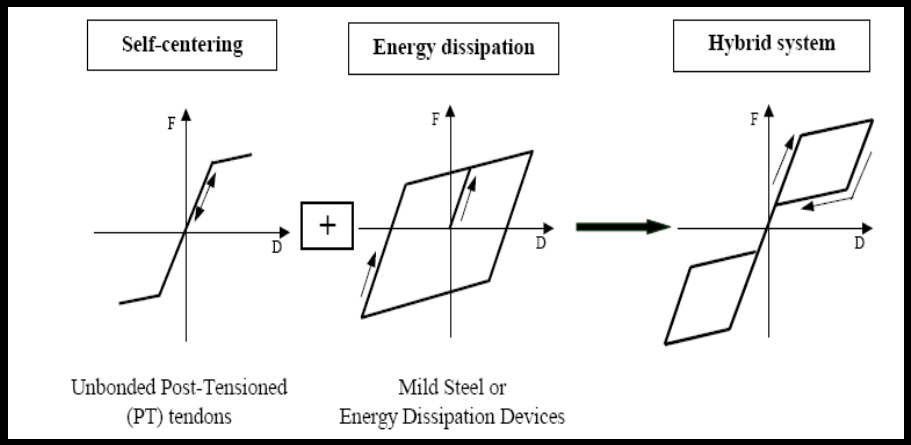


Figure 3.17 – Buckling Restrained Brace with Steel Batten Jacketed Column

Rehabilitation Objective

Strengthening by using Innovative Methods..





- **Cost effective Analysis…**

PROJECT COMPONENTS AND DETAILS

Cost benefit analysis

- ✓ The cost benefit threshold for eligibility for project financing will be determined through the feasibility studies being carried out,
- ✓ approximately 30 to 40% of replacement cost,
- ✓ Depend on function, age and sector operational requirements
- ✓ **The retrofitting designs will only be conducted for the buildings that are**
  - ✓ Technically feasible,
  - ✓ Socially acceptable
  - ✓ Financially affordable

PROJECT COMPONENTS AND DETAILS

Component C: Support for enhancement of Response Capacity and Disaster Management Systems

- ✓ Review the existing Disaster Management System of the country and provide/propose possible international model for the enhancement of response capacity for an expected disaster, particularly
- ✓ Define skills and technical capacities of the relevant emergency response units;
- ✓ Define possible improvement plans in compliance with building codes.
- ✓ Prepare Training campaigns and disseminate technical expertise for mass awareness

The basic tenets of Disaster Risk Management are:

- Understand/Quantify the Existing Hazard and Risk

  Seismological Observations
  Earthquake Hazard
  Earthquake Risk

- Do not Increase the Existing Risk
- Decrease the Existing Risk
- Transfer the Risk
- Improve Emergency Management.

The basic tenets of Disaster Risk Management are:

- Understand/Quantify the Existing Hazard and Risk
- Do not Increase the Existing Risk

  New Buildings
  Building Codes

- Decrease the Existing Risk
- Transfer the Risk
- Improve Emergency Management.

The basic tenets of Disaster Risk Management are:

- Understand/Quantify the Existing Hazard and Risk
- Do not Increase the Existing Risk (i.e. build properly);
- Decrease the Existing Risk

  Earthquake Retrofit of Structures
  Earthquake Retrofit of Cultural Property
  Earthquake Early Warning System
  Earthquake Rapid Response System
  Structural Health Monitoring
- Transfer the Risk
- Improve Emergency Management.

The basic tenets of Disaster Risk Management are:

- Understand/Quantify the Existing Hazard and Risk
- Do not Increase the Existing Risk (i.e. build properly);
- Decrease the Existing Risk

  - Retrofit of Structures
  - Retrofit of Cultural Property
  - Disaster Early Warning Systems
  - Earthquake Rapid Response System
  - Structural Health Monitoring

- Transfer the Risk
- Improve Emergency Management.

The basic tenets of Disaster Risk Management are:

- Understand/Quantify the Existing Hazard and Risk
- Do not Increase the Existing Risk
- Decrease the Existing Risk
- Transfer the Risk

  Compulsory Earthquake Insurance
  Increase insurance penetration
  Reduce government catastrophe risk exposures

- Improve Emergency Management.

The basic tenets of Disaster Risk Management are:

- Understand/Quantify the Existing Hazard and Risk
- Do not Increase the Existing Risk
- Decrease the Existing Risk
- Transfer the Risk
- Improve Emergency Management.

Core system implementation
Integrated risk management
Public awareness and education
Community-level approaches

MASS AWARENESS CAMPAIGNS&TRAINING MATERIALS…

Activities to develop training programs and materials for different target groups and materials for public awareness campaign will be under two components:

Part A: Community Disaster Awareness: Training programs and materials under several headings will be developed under this part. Implementation strategies for every training module and information campaign to increase the level of public awareness will also be developed.

Part B: Building Code Enforcement: Training programs and materials will be developed for three different target groups (decision makers, technical staff and community) regarding the importance of proper land use planning and construction.

RESULTS...

Monitoring and evaluation of outcomes/results

✓Evaluation of the results through monitoring will be seriously considered, for drawing lessons for future applications.

✓All the results, analysis and data gathered through implementation of the project will monitored periodically, analyzed and further recorded detail for possible establishment of a "Centre of Excellence" so that all the member countries can benefit from the outcomes, best practices and lessons learnt.

✓In the case of the seismic risk reduction and enhancement of emergency preparedness the key activities and practices conducted in Iran, Turkey and Pakistan will further be compared and evaluated therefore, these valuable information can be to some extent used by other member countries.

RESULTS...
Outcomes:

- A key report for the institutions enabling decisions regarding investments in retro-fitting and rehabilitation of essential assets.
- Technical guidelines on possible local construction methods and post disaster damage rehabilitation
- Possible Training and Mass awareness campaigns
- Serve as basis for the contribution of international donors in providing loans for possible seismic risk mitigation projects in these countries
- Assess the potential for demonstrating innovative technologies to reduce disruption and maximize economies.

THANKS FOR YOUR ATTENTION

CONTACT DETAILS

Mehmet Emin Akdogan, PE, SE, PhD, C.
UN-Habitat Disaster Mitigation Office, Tehran, I.R.Iran
Mehmet.akdogan@unhabitat.org, akdoganm@gmail.com
Tel: +98 939 090 4167