

Marmara Earthquake Emergency Reconstruction Project (MEER)

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TURKEY is prone to mainly three types of natural disasters.

➤ Earthquakes;

- 70% of the population living in seismically active areas.
- 66% of the country is located on active fault zones.
- 75% of damaged buildings and %64 of total disaster losses in the last century are due to earthquakes.

➤ Floods;

- Mostly in coastal plains and exacerbated by deforestation, erosion and ignorant development.
- 15% of total disaster losses are due to floods.

➤ Landslides;

- 25% of country area is exposed to landslide hazard.
- 11% of total population is located in landslide areas.
- 16 % of total disaster losses are due to landslides.











Earthquake Toll in Turkey

- Average annual direct economic costs exceeded 1 billion US\$ in the last decade.
- Average annual number of earthquakes equal or greater than a magnitude of 5.5 on the Richter scale: 0.76 (6th in the world)
- Number of people killed per year due to earthquakes: 950 (3rd in the world)
- Average number of people killed per million inhabitants: 15.58 (4th in the world)
- Average physical exposure per year: 2 745 757 people (8th in the world)
- Killed per million exposed – relative vulnerability: 346 people (4th in the world)









KARAYAKA
KIRAATHANE

Uludağ

In the last decade Turkey faced heavy natural disasters

- **Erzincan Earthquake, 1992**
- **Flood in Black Sea Region, 1998**
- **Adana-Ceyhan Earthquake, 1998**
- **Marmara Earthquake, 1999**

After every disaster, a loan agreement was made with World Bank.

1999 Marmara Earthquake, 7.4 Richter

- 18000 lives lost
- 113.000 housing units and business premises were completely destroyed, 264.000 damaged to varying degrees
- Up to 600.000 people were forced to leave their homes.
- 10-15 billion US\$ direct cost

Lessons learned from Marmara Earthquake

Communication

- Communication failed
- Telephone lines were out of order in first 48 hours
- Mobiles did not function

First Aid & Rescue

- Lack of organization and coordination in search & rescue activities
 - Caotic situation
- Bureaucracy inhibiting efficiency and effectiveness
 - Insufficient logistical support
- Voluntary efforts were not trained and organised

Losses / Problems

- Public buildings and infrastructure seriously damaged
 - Sub-standard buildings and infrastructure
 - Hazard ignorant development
 - Lack of code enforcement
 - Improper inspection during construction
 - Corrupted permitting and licensing

Serious Resource Gap

- 10-15 billion \$ as direct cost
- %5-7 of Turkey's GNP

Name of the Project	Name of the Funding Agency	Date	Total Amount (million US\$)	Disbursement (as of June 2006) (million US\$)	Remaining Budget (million US\$)
Erzincan Rehabilitation and Reconstruction Project ERRP (Completed)	WB	27.07.1992 31.12.1999	285	218	-
Turkey Emergency Flood and Earthquake Recovery Project TEFER (Completed)	WB	11.09.1998 30.09.2003	369	249	-
Marmara Earthquake Emergency Reconstruction Project MEER (Executing)	WB	23.11.1999	481 (*) (*) 145 contingent capital facility	260,5	220,8 (*) (*) 145 contingent capital facility
Turkey Earthquake Rehabilitation and Reconstruction Assistance Project TERRA (Executing)	EIB	09.02.2000	450 \$	349	101
Marmara Earthquake Rehabilitation Programme MERP (Executing)	EC	16.05.2000	25,6	22,5	3,1

Larger proportion of project funds has been spent on mitigation in each subsequent project:

- 1992 Erzincan earthquake - The Rehabilitation and Reconstruction Project : 10% of the total funding allocated for preparedness and disaster mitigation.
- 1998 Adana earthquake - The Emergency Flood and Earthquake Recovery Project: preparedness and mitigation component is a quarter of total funding
- 1999 Marmara earthquakes - Marmara Earthquake Reconstruction Project: two thirds of the total funding allocated for preparedness and disaster mitigation

Component A: Disaster Response System and Risk Mitigation

Sub-component A1: National Emergency Management System

- **TEMAD: Turkey Emergency Management General Directorate**
- **Coordination of all four phases of disaster management**
- **35 million US\$ budget**

Major activities

- Establishment of TEMAD as the Implementing Agency
- Recognized as the central coordinating agency for response
- “International Emergency Management Symposium” on 11-14 November 2002, participants from six different countries and major international organizations such as UN, JICA, NATO and World Bank
- “Earthquake Summit” on 29 September – 1 October 2004 together with Ministry of Public Works and Settlement, seven different commissions
 - Institutional Capacity Building
 - Legal Issues
 - Disaster Information System
 - Assessment of Existing Buildings and Building Inspection
 - Construction Materials
 - Source of Funding and Insurance
 - Training/Education
- Design permanent crises management facility of the central government,
- Design continuous communication and information management system
- Furnishing and equipping the facility
- Temporary crises management center for TEMAD was also equipped.

Sub-component A2: Disaster Insurance Scheme

- **GDI: General Directorate of Insurance**
- **145 million US\$ contingent capital facility**
- **219 million US\$ total budget**
- **Turkish Catastrophic Insurance Pool is established**
- **All studies done for the establishment**
- **Public information campaigns**
- **Trainings and workshops for TCIP**
- **The first years' and this years' reinsurance premiums**
- **Contingent capital facility which lowered the reinsurance rates in the international market.**

Sub-component A3: Land-use planning and building code enforcement

Sub-component A3.1: Legislative Studies and Training

- **The implementing agencies, three general directorates of Ministry of Public Works and Settlement**

- **General Directorate of Technical Research and Implementation,**
- **General Directorate of Disaster Affairs**
- **General Directorate of Construction Affairs.**

- **6,7 million US\$ budget**

The major activities and outputs under this component are as follows:

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- **Two workshops on drafts for Development Law and Urban Regeneration Law by the General Directorate of**
- **Three important mitigation studies,**
- **The Redefinition of Planning and Development Standards in Disaster Prone Areas, Publication of the Results as a Manual**
- **The Integration of Ground Scientific Data to Planning and Preparation and Publication of End Results as a Manual**
- **Preparation and Presentation of Training Program on Construction and Retrofitting for Civil Engineers according to the new Turkish Earthquake Resistant Design Code and its Pilot Implementation**
- **Strengthening and Upgrading of the Software for the Building Inspection System, and System design and upgrading of software and hardware by General Directorate of Construction Affairs.**

The major activities and outputs under this component are as follows-cont.:

- **Provincial Laboratories for the testing of construction material, a central laboratory will be constructed in Ankara**
- **General Directorate of Disaster Affairs organized**
- **Two workshops for Code for Soil Improvement and the draft version of recently issued Code for Retrofitting by General Directorate of Disaster Affairs**
- **Technical assistance for upgrading seismic hazard mapping principles**
- **Procurement of Software and Customization of the Software, and Data Entry Including Training Services for the National Disaster Data Archives and Disaster Information Systems by the General Directorate of Disaster Affairs**

Sub-component A3.2: Pilot Municipalities in Marmara Region

- Six pilot municipalities in Marmara Region, namely; Municipalities of Bakırköy, Tekirdağ, Gemlik, Bandırma, Eskişehir and Körfez.
- 4,4, million US\$ budget
- Microzonation and Hazard Vulnerability Studies for Disaster Mitigation in Pilot Municipalities
- technical assistance
- training and equipment needs assessment
- equipment and hardware
- mitigation guidelines specific to each municipality.
- follow up by the Ministry of Public Works and Settlement
- a study to issue the outcomes as a manual and a regulation

Sub-component A3.3: Pilot Municipalities in İstanbul

- 13-14 million people, 20% of Turkey's population, live in İstanbul. More than 40% of Turkish GNP is generated in the region.
- Comparable seismic risk degree with San Francisco, Los Angeles and Tokyo cities
 - Probability of occurrence of a large earthquake in next 30 years is greater than %50.
 - Probability of occurrence of a large earthquake in next 10 years is greater than %20.
- Impacts after a probable 7.5 Richter scale earthquake in İstanbul;
 - Approximately 70.000 dead people, 120.000 injured-heavily injured people, 400.000 lightly injured people
 - direct economic loss ~30 billion US \$

New and pro-active approach for Istanbul

- Increase in quality of life
- Preparedness and awareness for disasters
- Sustainability
- Aesthetic
- Conservation of cultural and historical heritage
- Attractiveness

Paradigm Shift in TURKEY;

In the past

- Fate
- Reactive
- Recovery
- Wait and see
- Ex-post
- Crisis management
- Ad-hoc efforts
- Development at risk

New Strategic Approach

- Choice
- Proactive
- Mitigation
- Anticipate and prevent
- Ex-ante
- Risk management
- Comprehensive approach
- Sustainable development

Sub-component A3.3: Pilot Municipalities in Istanbul

- Project Implementation Unit, Governor's Office, Metropolitan Municipality
- 5,7 million US\$ budget from MEER, 1 million US\$ Japanese grant by Worldbank
- All preparation activities widely discussed with Treasury and SPO

Strategic Disaster Management in Urban Areas

Emergency Management

Communication Systems

Disaster Mng. Information Sys.

Emergency Response Capacity

Infrastructure/ Lifelines

- Airports, harbors
- Train stations
- Highways, bridges
- Railways, metro
- Natural gas
- Electricity
- Water
- Sewage
- Communication
- Others

Superstructure / Buildings

Public Buildings

Residential/ Commercial Buildings

Industrial Estates / Factories

Cultural Heritage/ Historical Monum.

Inventory

Multi-hazard risk assessment

Prioritization

Coordination with historians, architects, international colleagues

Pilot implementation

Legal Issues

Disaster Framework Law

Disaster Insurance

Development Law

Retrofitting Regulation

Condominium Law

Transferrable Property Rights

Building Inspection Law

Training

Primary Schools

Public awareness

Neighbourhoods

Govern. Agencies

Decision makers

NGO's

Strategic Disaster Management in Urban Areas

Emergency Management

Infrastructure /Lifelines

Superstructure / Buildings

Cultural Heritage/ Historical Monum.

Legal Issues

Training

Public Buildings

- Hospitals
- Schools / universities
- Student Dormitories
- Fire-brigades
- Police
- Other public administrative buildings

Residential / Commercial Buildings

Microzonation

Multi-hazard risk assessment

Land use plans/ new city vision

Rehab. of existing building stock

Urban-regeneration

Preparation of designs

Technical and financial feasibility

Reconstruction

Retrofitting

Industrial Estates / Factories

- Industrial Estates
- Small industries
- Big industrial installations
- Refineries
- LPG stations
- Petro-chemical complexes
- Gas stations

Activities;

- Major studies done for the design and preparation of ISMEP Project;
 - Feasibility study for disaster information management system
 - Feasibility study for upgrading emergency response
 - Feasibility study for emergency communication system
 - Feasibility study for retrofitting of high priority public assets
 - Feasibility study for retrofitting of selected residential buildings
 - Consulting Service for code enforcement study
 - Social assessment and demands assessment in pilot areas
 - Environmental assessment in pilot areas

Alternatives considered during preparation of ISMEP

- i. implement geographically-expanded risk mitigation and emergency preparedness activities covering not only Istanbul but also other provinces throughout Turkey**
- ii. continue to focus on the support to the national level institutions responsible for risk mitigation and emergency preparedness**
- iii. implement a seismic strengthening program aimed not only at public assets and lifelines, but also on the private residential buildings.**

... and reasons for rejection

- i. **implement geographically-expanded risk mitigation and emergency preparedness activities covering not only Istanbul but also other provinces throughout Turkey**
 - **degree of institutional capacity and disaster mitigation needs vary across different provinces**
 - **a uniquely-tailored program focusing on one area would have the highest impact at the local level**
 - **provincial government's ownership and commitment,**
 - **high potential risk and vulnerability,**
 - **vital importance to the country and the region**
 - **key lessons may be learned and replicated in other provinces**

... and reasons for rejection

ii. **continue to focus on the support to the national level institutions responsible for risk mitigation and emergency preparedness**

- **lessons learned from the MEER project**
- **MEER project provides tremendous assistance for strengthening the central level emergency management functions**
- **ISMEP project will support activities at the local level**
- **remarkable initiative of local authorities to better prepare for emergencies since the Marmara earthquake.**
- **mechanisms defined to ensure compatibility and consistency with the national programs**
- **TEMAD and user groups will be part of the project Steering Committee**

... and reasons for rejection

iii. **implement a seismic strengthening program aimed not only at public assets and lifelines, but also on the private residential buildings.**

- **no commitment or support from central government**
- **no subsidy in any form**
- **no interest from private banks**
- **low willingness of households to pay for retrofitting or urban transformation**
- **low level of information available to the communities**
- **withdrawn by the Metropolitan Municipality of Istanbul so that discussions about its feasibility and the financial model would not delay the processing of the retrofitting activities for public buildings.**

As a result below components were dropped:

- **Retrofitting of residential buildings**
 - Municipality of Bakırköy
- **Urban Transformation**
 - Municipality of Zeytinburnu

Sub-component A4: Cadastre Renovation and Land Management

- General Directorate of Land Registry and Cadastre
- 24 million US\$ budget

The major activities and outputs under this component are as follows:

- **Densification works of TUTGA (Turkish National Fundamental GPS Network) were done in the cities Kocaeli, Sakarya and Yalova.**
- **In all, 39 C1 (first category), 320 C2 (second category) triangulation and 586 elevation points were produced based on 14 TUTGA points in 9351 km².**
- **Since the previous service buildings heavily damaged by earthquake, five brand new Local Offices were constructed in Yalova, Kocaeli, Sakarya, Kandira and Hendek.**
- **1:1000 scaled digital photogrammetric maps covered 58.734 ha were procured**
- **Orthorectified satellite imageries covered the establishment cadastre and renovation works area in Sakarya - Hendek region were procured.**
- **Cadastre and Land Registry Renovation of 103.877 parcels in 93 villages were completed.**
- **Establishment cadastre of 90.650 parcels in 101 villages were completed.**
- **Procurement of Electronic Takeometers (25 in total)**
- **Procurement of GPS devices (27 in total) with environmental equipments and educational courses.**
- **Supply and Installation of IT Equipment for Headquarter and Local Offices is going on and will be completed by the end of this year.**

Component B: Trauma Program

- Ministry of Health
- 9,9 million US\$ budget

The major activities and outputs under this component are as follows:

- **The Development of a National Mental Health Strategy**
- **Training, training materials and office equipment for central and provincial mental health departments in 81 provinces**
- **activities related with emergency health care services added after midterm review**
- **strengthening of command and control centers and emergency health care services in 11 provinces in Marmara Region**
- **Training of Health Personnel working in Command Control Center and Emergency Health Services**

Component C: Permanent Housing and Health Facilities

- Prime Ministry Project Implementation Unit
- 163 million US\$ budget

Urban Housing in Marmara Region

Province	District/Neighborhood	Housing Units	Schools	Health Facilities
Düzce	Düzce	622	1	1
	Gölyaka	274	1	1
	Cumayeri	108	-	-
	Kaynaşlı	466	-	-
Kocaeli	İzmit (Center)	2820	2	1
	Gölcük	3568	1	1
	Körfez	980	1	1
	Gebze	558	1	1
	Yeniköy	1120	-	-
	Karamürsel	556	-	-
Sakarya	Adapazarı (Center)	2572	2	1
	Camili 2	1000	1	-
Total		14644	10	7

23 health facilities/public housing (MoH) - 5 regional offices (GDLRC)

Rural Housing

- 797 rural houses in 137 villages in Yalova and Kocaeli
- through technical and material support for reconstruction

Shopping centers

- 144 shops in 2 shopping centers at Kocaeli-Yeniköy
- 60 shops in 1 shopping center at Kocaeli-Karamürsel
- 1 shopping center at Düzce-Kaynaşlı
- 5862 shops in 82 shopping centers at Düzce, Bolu and Yalova

Health Facilities

- 4 hospitals at İzmit, Adapazarı, Bolu and Düzce and 1 clinic

Lessons from MEER

- Institution building takes longer than any project life span
- Compliance with building codes is a long-term agenda
- Social considerations are extremely important for the reconstruction program (social infrastructure and amenities; diversified designs, etc.)

Some Lessons from MEER cont.

- Readiness or commitment might be overestimated due to the pressure of the crisis (e.g., trauma program)
- Financial risk transfer (limited demand, penetration and enforcement)
- Reconstruction project implementation is smoother if financing is off-budget

Most Important Outcomes of MEER

- TEMAD
- TCIP
- MERLIS
- ISMEP

Thank you for your attention