Flood Management in Iran
Country Report

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Contents:

1. Floods in Iran
2. Recent History of Flood Management
3. Current Situation of Flood Management
   - Pilot Projects
   - Challenges
4. Future Plans
1. Floods in Iran

Introduction

<table>
<thead>
<tr>
<th>Area</th>
<th>1.6 million Km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>75 million</td>
</tr>
<tr>
<td>Climate</td>
<td>Arid and Semi Arid</td>
</tr>
<tr>
<td>Average Annual Precipitation</td>
<td>240 mm</td>
</tr>
<tr>
<td>No of Major River Basins</td>
<td>6 Basins</td>
</tr>
</tbody>
</table>
Nature of Floods in Iran

Types of Floods

- Flash Floods
- Long-lasting Floods
- Mountainous Rivers Floods
- Seasonal River Floods
- Tidal Rivers Floods
- Urban Floods

<table>
<thead>
<tr>
<th>No</th>
<th>Flood location</th>
<th>Flood type</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shiraz</td>
<td>Urban</td>
<td>2004</td>
</tr>
<tr>
<td>2</td>
<td>Goldaghan</td>
<td>Flash</td>
<td>2005</td>
</tr>
<tr>
<td>3</td>
<td>Karun 4 dam</td>
<td>Flash</td>
<td>2006</td>
</tr>
<tr>
<td>4</td>
<td>Chahbahar, Guno</td>
<td>Tidal</td>
<td>2007</td>
</tr>
<tr>
<td>5</td>
<td>Breaking of Jakigor bridge</td>
<td>Tidal</td>
<td>2007</td>
</tr>
<tr>
<td>6</td>
<td>Kheirabad Dam</td>
<td>Tidal</td>
<td>2007</td>
</tr>
<tr>
<td>8</td>
<td>Qum</td>
<td>Urban</td>
<td>2009</td>
</tr>
</tbody>
</table>
Masouleh Flood
- Jul.30th, 1998
- More than 50 Human losses
- More than 1 million U.S. $ Damages
- Effective factor: River channel encroachment

Golestan Flood-2001
- Aug.10th, 2001
- More than 200 Human losses
- More than 60 millions U.S. $ Damages
- Effective factor: Lacking of public education

Tajrish Flood
- Jul.26th, 1987
- About 400 Human losses
- More than 75 million U.S. $ Damages
- Effective factor: River channel encroachment

Qum Flood
- March.31th, 2009
- 4 Human losses
- More than 30 million U.S.$ Damages
- Effective factor: River channel encroachment, using river bed as public parking area
Major Causes of Floods in Iran

- **Natural**
  - Intense rainfall
  - Inadequate vegetation and soil cover
  - Steep mountain terrain

- **Man-made**
  - Land use changes
  - Flood plain encroachment
  - Deforestation
  - Extensive gravel mining
  - Improper design of infrastructure
  - Improper urban drainage network

Frequency of Flood Occurrence in Different Provinces (1951-2007)
2. Recent History of Flood Management

**Legislation and Responsible Organizations**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1989</td>
<td>only a limited group, related to the Ministry of Interior, was responsible to allocate compensational payments to flood victims and reconstruction of flood damages</td>
</tr>
<tr>
<td>1991</td>
<td>the law of &quot;National Committee on Natural Disaster Reduction&quot; and &quot;Flood Prevention Committee&quot; was approved by parliament</td>
</tr>
<tr>
<td>1995</td>
<td>&quot;River Engineering and Flood Control Bureau &quot; was established at the national level in the Ministry of Energy</td>
</tr>
<tr>
<td>1998</td>
<td>relevant provincial offices were established all over the country</td>
</tr>
<tr>
<td>2003</td>
<td>The law of &quot;Disaster Management&quot; was passed</td>
</tr>
<tr>
<td>2009</td>
<td>&quot;Disaster Management Organization&quot; was established</td>
</tr>
</tbody>
</table>
Flood Control Measures

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1992</td>
<td>Flood control measures was limited to the construction of flood protection walls. Limited funds were allocated only for casualties and reconstruction of damaged structures.</td>
</tr>
<tr>
<td>1995</td>
<td>Later, guidelines and manuals provided standards for river engineering projects, and different structures (Dikes, Groins, …) along with dredging were applied for river channel improvement, protection and control of erosion or sedimentation.</td>
</tr>
<tr>
<td>2000</td>
<td>Non-structural measures such as Flood Warning Systems, and floodplain delineation and flood zoning maps, were introduced in order to cover the shortcomings and disadvantages of structural measures.</td>
</tr>
</tbody>
</table>

3. Current Situation of Flood Management
National Disaster Management Organization (NDMO) is responsible for control and management of all natural disasters and crises in the country.

All other related organizations work with NDMO under 14 working groups, including Working group of Flood, Marine Hazards, Electricity, Water and Waste water.

NDMO supervises, coordinates and finances all committees.

Secretary of Flood prevention working group is at the Ministry of Energy.

Provincial subcommittees of Flood, Marine Hazards, Electricity, Water and Waste water manage and control floods in their criteria and under supervision of NDMO and Ministry of Interiors.
Organizational Structure

- National Disaster Management Organization
- 14 Committees
  - Committee of Flood, Marin Hazards, Electricity, Water and waste water
  - Ministry of Energy
  - Committee of Earthquake, Land Sliding, Constructions And Urban Development
  - Ministry of Roads and Urban Development
  - Committee of rescue and public education
  - Red Crescent Society
  - Sub committee of Flood Prevention
  - Sub committee of Marin Hazards
  - Sub committee of Electricity
  - Sub committee of Water and waste water

Legislation

- Water Distribution Legislation (1983), article 45, act 2, declares that river bed and floodplains of all the rivers (permanent or seasonal), and wetlands belong to the public and should be managed by Ministry of Energy.

- The law of "Disaster Management" was passed in 2003 and "Disaster Management Organization" was established in 2009.
Measures

1. Structural Measures

1.1. Dam construction projects

- Golestan Storage Dam (Golestan Province- 2001 & 2002 Floods)

- Karoon Storage Dams (Khozestan Province- 2004 & 2005 Flood)

- ...........

- ...........

Measures (continued)

1. Structural Measures

1.2. Flood control and river training projects (more than 200 projects)
Flood Control and River Training Projects

<table>
<thead>
<tr>
<th>River Training Works</th>
<th>year</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
<td>206</td>
</tr>
<tr>
<td>Programmed (Km)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Implemented (Km)</td>
<td>33</td>
<td>72</td>
</tr>
<tr>
<td>Percentage</td>
<td>110</td>
<td>240</td>
</tr>
</tbody>
</table>

2. Non-Structural Measures

2.1. Determination of Legal extent of River Bed and Floodplains
2. Non-Structural Measures

2.2. Publication of flood zoning maps

100 year flood zone
(Gorganrood River- Golestan Province)

Non-Structural Measures (examples)

Prioritization of rivers for determination of legal extent of river bed, and flood zones
Performance of Determination of Legal Extent of River Bed and Flood Zones

2. Non-Structural Measures

2.3. Coordination with Dams Operation and Management Department

2.4. Providing “National Standard of Preparing Flood Action Plans” (in progress)

2.5. Initiation of Integrated Flood Management (pilot project)
Measures (continued)

2. Non-Structural Measures

2.6. Development of Hydro-Environmental Mathematical Analysis Tool (HEMAT) Model for simulating steady and unsteady flow, sediment & water quality

2.7. Study and implementation of different types of Flood Forecasting and Warning Systems:

- Meteorological Forecasting

- Hydrologic and Hydraulic Models
Meteorological Forecasting

National Meteorological Organization provides weather forecasts for the next 3 days, using MM5 and WRF Models, and meteorological radars.

Meteorological Forecasting

National Meteorological Organization provides warning messages of intense rain and flooding probability in the website and sends to responsible national and related provincial managers via fax or SMS.
Monitoring Stations of Flood Prediction and Warning Systems

Pol-e-Chehr Station
(Kermanshah Province)

Jelogir Station
(Lorestan province)

Measures (continued)

3. Education and Capacity Building

3.1. Holding training courses, workshops and technical exhibitions
3. Education and Capacity Building

3.2. Establishment of M.Sc. and PhD courses on River Engineering in universities

3.3. Establishment of M.Sc. crisis management courses

3.4. Establishment of River Engineering Consultancies (with government approval)

3.5. Contractor construction companies with specialty in flood control works

3.6. Employment of graduated PhD experts in flood management organizations

3.7. Participation in river engineering and flood control training courses of other countries

3.8. Publication of Standard manuals for designing, operation and maintenance

3.9. Publication of books, magazines, and CDs

3.10. Production of documentaries

3.11. Establishment of technical websites about rivers and floods in Iran: (www.iranrivers.ir / www.iranfloods.ir)
Measure (continued)

4. Financial

4.1. Providing and allocating special funds for flood control and river engineering projects

4.2. Special funds to provide flood zoning maps

4.3. Proposing financial corporation with World Bank for the project “Moving Towards a National Integrated Flood Management Strategy” for the value of 200 M US$ loan for 12 years period
5. Public Awareness

5.1. Preparation of training videos and documentaries to broadcast from national TV
5.2. Broadcasting training programs from national and provincial radio stations
5.3. Publication of books and magazines
Public Awareness (examples)

Flood Doesn’t Warn. Take Flood Risk Seriously

Flood Warning Signs

Publications

TV Programs

Public Awareness (examples)

Brochures with General Information for Passengers
Public Awareness (examples)

Flood risk map

Maneuver

Coordination of Authorities

1. agreement between Ministry of Energy, Municipality of Tehran, and Tehran city council
2. agreement between Ministry of Energy, National Disaster Management Organization, and National Organization of Municipalities
Coordination of Provincial Authorities

3. Coordination of Tabriz Municipality and Provincial Water Resources Management authority – River Training Project: Mehraneh Rood River, passing safely through Tabriz City

Implementation of Some Specific Pilot Projects

1. Flood Warning Systems:
   1.1. Golabdareh River (Tehran Province)
   1.2. Gorganrood River (Golestan Province)
   1.3. Karkheh River (Khozestan Province)
   1.4. Karoon River (Khozestan Province)

2. Integrated Flood Management:
   2.1. Kan River Basin (Tehran Province)
Challenges

- Diversity of flood issues
  - Geographical
  - Institutional
  - Functional
- Diversity of flood management aspects
  - Technical
  - Financial
  - Legal
  - Environmental
  - Social
- Human resources development (capacity building)
- Coordination between different organizations

4. Future Plans
**Future Plans**

- Completion of Previous Plans and Programs
- Development and Implementation of Integrated Flood Management
- Implementation of “National Flood Risk Reduction Plan”
- Preparation of Flood Action Plan for Flood prone Basins
- Integrated Management of Rivers, considering river restoration and sustaining their balance in sustainable development of the country
- Development of Flood Warning Systems
- Development of non-structural measures
- Capacity Building

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**Thank you**

for your patience

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