The occurrence of floods is the most frequent among all natural disasters globally

- In 2010 alone, **178 million people** were affected by floods. The total losses in exceptional years such as 1998 and 2010 exceeded **$40 billion**.
Rapid and unplanned urbanization puts more people and assets in harm’s way

- **Urbanization** is the defining feature of the world’s demographic growth.

Who is at risk?
- Small and medium size towns and cities – by 2030, majority of population will live in towns and cities with population of less than 1 million
- Urban poor
- Socially disadvantaged communities


Integrating Urban Flood Risk Management

- **Forward-looking** approach, which aims to avoid the mistakes of the past.
- **Risk-based**, recognizing residual risk and uncertainty need to part of investments.
- A strategy based on implementing “the right balance” of structural and non-structural measures.
- As part of urban and land use planning, which is participatory, works across sectors and jurisdictions.

http://www.gfdrr.org/urbanfloods
### Getting the balance right

<table>
<thead>
<tr>
<th>Keep the water away from the people</th>
<th>Keeping the people away from the water</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hard engineered</strong></td>
<td><strong>Increased preparedness</strong></td>
</tr>
<tr>
<td>• Flood conveyance</td>
<td>• Awareness campaigns</td>
</tr>
<tr>
<td>• Flood storage</td>
<td>• Urban management</td>
</tr>
<tr>
<td>• Urban drainage systems</td>
<td>• Land use planning</td>
</tr>
<tr>
<td>• Ground water management</td>
<td>• Resettlement</td>
</tr>
<tr>
<td>• Flood resilient building design</td>
<td>• Early warning systems and evacuation</td>
</tr>
<tr>
<td>• Flood defenses</td>
<td>• Critical infrastructure</td>
</tr>
<tr>
<td><strong>Eco-system management</strong></td>
<td><strong>Speeding up recovery</strong></td>
</tr>
<tr>
<td>• Utilizing wetlands</td>
<td>• Building back safer</td>
</tr>
<tr>
<td>• Creating environmental buffers</td>
<td>• Risk insurance</td>
</tr>
</tbody>
</table>

### Examples: Integrated Flood Risk management approach as part of World Bank projects

**Vietnam**
- Local Resilience Plans for Can Tho
- Integrated Flood Management in Ho Chi Minh City

**Mekong Basin**
- Hydromet and Early Warning Systems (GFDRR, WMO)

**Philippines**
- Metro Manila Flood Management Master Plan (AusAID, JICA, GFDRR)

**Indonesia**
- Risk in a Box (GFDRR Labs, AusAID/AIFDR)
- Jakarta Urgent Flood Mitigation Project

**Pacific**
- Kiribati Adaptation Program - Phase III Project (KAP III)
- Pacific Catastrophe Risk Assessment and Financing Initiative (SOPAC, WB, ADB, GFDRR and JICA)
Example: Indonesia – creating tools for understanding risk


2007 floods
- Inundated 36% of Jakarta
- Affected over 2.6 million people;
- Losses US$ 900 million
- Over 70 people died
- Disease affected over 200,000 people

- GFDRR (Labs), AusAID (AIFDR), national DM agency (BNPB) – developed a prototype decision support tool “Risk in a Box.”

Demonstrating relative impact of an infrastructure investment

<table>
<thead>
<tr>
<th>Flood Height</th>
<th>Population (,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 10 cm</td>
<td>1,900</td>
</tr>
<tr>
<td>&gt; 50 cm</td>
<td>1,320</td>
</tr>
<tr>
<td>&gt; 1 m</td>
<td>790</td>
</tr>
</tbody>
</table>

-33% affected

With Dredging
Example: Indonesia – creating tools for understanding risk

- Full agency ownership from the beginning of the process.
- This prototype was used in the 2011/2012 Jakarta contingency emergency planning.
- Demand for further development including software advancement, testing, and user training.
- Continuous dialogue with other institutions.

- Dialogue on risk-based urban flood risk management, in line with WB Open Data for Resilience Initiative (OpenDRI)
- Facilitated discussion on flood risk mitigation, including the signing of a Urban Flood Mitigation Project ($139.64 million), additional (US$49.71 million) from central and provincial govts
- Leveraging and complimenting efforts of partners
- Spurred cross-country interest in risk-based approach

Example: Pacific – creating robust risk information for CCA and DRM

- Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI), led by SOPAC, WB, ADB, supported by GFDRR and JICA. It provides 15 Pacific Islands with disaster risk assessment information & tools to help them better understand, model, and assess their exposure to natural disasters.

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Exposure/Vulnerability</th>
<th>Risk</th>
</tr>
</thead>
</table>

Pacific Catastrophe Risk Assessment and Risk Financing in association with SPC/SOPAC and the ADB
Sharing Risk Information

- Ownership of regional agency
- Exposure, hazard and risk maps are shared across region for clients, WB, and other organization
- In line with WB OpenDRI
- Facilitates dialogue on hydromet services
- Enhances integration of CCA and DRM agendas
- The data forms basis for projects in core DRM areas: disaster risk financing; flood mitigation investments, urban land & infrastructure planning; rapid post-disaster damage and loss estimation

Challenges and the way forward

- **INSTRUMENTS**: What instruments do we need to support our clients to mainstream integrated flood risk management? (Data, metrics, analytical work etc.)
- **INVESTMENTS**: What concrete actions can we take to implement on ground the right balance between structural and non-structural measures?
- **INCENTIVES**: Institutionally why is this not happening, even for events that we know that are bound to take place? (Small, regular flood events)
Questions

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Disaster Risk Management
East Asia and the Pacific
The World Bank