Facing the Flood:
Challenges and Opportunities for Urban Flooding and Public Health

Add image

Outline

Establish the relationship between public health and flooding
Define the current impact of flooding on public health
Look to the future for solutions

Global River Flood Risk

Many people are still missing; Afghanistan families devastated by flash floods
The area was later connected to the power grid and a hospital and clinic were built, but nothing was done to stop potential flooding. Flash floods have been known to take place in Afghanistan for many years.

3/2/2022
Flood recovery = roughly 20% of the cost of feeding the US for one year

World Resource Institute, 2020 and US Census, 2018

2030 (77%)

2050 (185%)
Reported waterborne illnesses linked to pathogens or involving gastrointestinal illnesses of unknown etiology, 1991–2000

Is a flood a flood?

Extreme Events – Public Health

- Drowning/Injury
  - 7% of all worldwide injury-related deaths
- Access to Clean Water
- Landslides
- Other Infrastructure Risk
  - Electrical shock
  - Mold
  - Gas line damage
- Waterborne Illness
Nuisance

- Drowning
- Exposure
- Waterborne Illness
- Other Infrastructure Risk
  - Transportation access
  - Mold

What about the future?

[Map showing observed changes in very heavy precipitation]
What are we doing about it?

Complex Urban Environments

What is Green Stormwater Infrastructure (GSI)?
What is the fate of the sediment?

Ampomah et al. (in prep)

Function Dynamics

Rashid et al. (in prep)
Deposition in the Urban Backwater

But….big challenges remain
Tacoma, Washington

Photo illustration by Megan Kitagawa/WHYY/Tacoma

~ 20% of those in extreme poverty are at risk of flood
Urban Flooding - Freetown, Sierra Leone

- Rapid urbanization
- Monsoonal flooding
- High sediment generation
- Unstable slopes

Freetown, Sierra Leone

Water Security Freetown, Sierra Leone
Guma Reservoir Sedimentation Estimates

Reservoir Capacity: 23 Million m³

<table>
<thead>
<tr>
<th>Volume of Water Sedimented (m³)</th>
<th>Water Volume (m³)</th>
<th>Sediment Volume (m³)</th>
<th>Stores by Reservoir Capacity</th>
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</thead>
<tbody>
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<td>0</td>
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<td>209,281</td>
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<td>120</td>
<td>722,531</td>
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</table>

*Includes a 0.2 compression factor

*Estimated costs range from $2.5/㎥ to $25.0/㎥ (Kawashima, 2007)

Urban Flooding - HEC-RAS Flooding Analysis

Flood extents of the Alligator River for varying flow events

<table>
<thead>
<tr>
<th>Flow (m³/s)</th>
<th>Total Area (km²)</th>
<th>Number of People Affected</th>
<th>Number of People Affected</th>
<th>Estimated Damage (10⁶)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>267,038</td>
<td>1,552</td>
<td>1,552</td>
<td>30,496</td>
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<td>30,496</td>
</tr>
</tbody>
</table>

*Flows in bold correspond to peak flood of 1500 m³/s

*Results at greatest event probability 1/year

1. Use your voice!
2. Use your actions!

3. Innovate!

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