Floods of 2008
Urban Systems
Wayne Petersen, Urban Conservationist, IDALS

What lessons did we learn?
(or should have learned)

- 100 year storms and 100 year floodplains are not a good standard for the future
- Past weather patterns are not good models for the future (“Stationarity” is dead)
- We must consider the “hydrologic footprint” of our actions
- We must find ways to increase the landscapes capacity to hold water and shed less runoff
- We should stay out of the flood plains (?)

What do we know already?
Dr. Gene Takle and Dr. Elywnn Taylor - ISU

- Getting 10% more rain than we used to
- More rain earlier in the year – more runoff.
- Getting more days when it rains
- Getting more days with big rains
- In 2007 – 8 days with more than 4” of rain
- In 2008 – probably more than that

Dr. Jerry Miller - ISU

- Degradation of soil quality (loss of OM)
- Bulk density increased (compaction / less pore space)
- Less infiltration – more runoff
- SQ degradation correlates to LDA (urban) or tillage (ag)
- Need to improve soil quality in both urban and ag sectors – the easiest, cheapest, fastest way to help landscapes hold more water and reduce the volume of runoff.

“Stationarity”

“In a recent article in Science magazine, hydrologists and engineers commented that a central tenet of civil engineering called “stationarity” – the notion that water systems can be designed and managed for a relatively stable range of conditions – is no longer true.” Betsy Otto, American Rivers

“The Water Cycle
What can we apply now?

The New Paradigm: Storm Water Management for WQ / WQ
Water Quality Volume (WQv)
Runoff from 1.25" of rain or less
Infiltration-based storm water management practices

- Permeable pavement
- Soil quality restoration
- Bio-retention

Permeable transportation surfaces (60%-70% of imperviousness)

- Porous Asphalt
- Pervious Concrete
- Grass pave systems
- Gravel pave systems
- Permeable Paver Blocks
Permeable Pavers
Bio-retention

(Infiltration Cells)

Profile

Sandy Organic Soil

Gravel

Moderately Pervious Soils

2" Mulch

Existing Ground

Perforated Drain Pipe
Green Streets
Retrofitting the Built World
What additional research is needed?

- What is the actual contribution of urban runoff to peak flows?
- How effective are infiltration based BMP’s addressing WQ/WQ…how much could we reduce peaks?
- How much can we downsize traditional infrastructure with LID?
- We need tools to assess urban WS’s and model impacts future growth with LID or without LID.

Wayne Petersen
Urban Conservationist
IA Dept of Ag and Land Stewardship
515-281-5388 (o)
319-430-7480 (c)
wayne.petersen@iowaagriculture.gov
Iowa City’s Flood of 2008

Regenia D. Bailey, Mayor
Jeff Davidson, Director
Department of Planning & Community Development

Coralville Dam and Spillway

The Iowa River

The Iowa River
June 3, 2008
Dubuque Street is reduced to two lanes of traffic

Vulnerable Areas:
- Parkview Terrace/Taft Speedway/Idyllwild
- University of Iowa
- South business area
- Baculis/Thatcher manufactured housing parks

Iowa City Flood of 2008
Sandbagging begins in Idyllwild Subdivision

June 5, 2008
Dubuque Street is closed
June 10, 2008
Water flows over the spillway at Coralville Reservoir

June 10, 2008
Park Road Bridge is closed

June 12, 2008
Sandbagging ceases; mandatory evacuations begin

June 13, 2008
Hwy. 6 between Gilbert Street and Riverside Drive closed
33,000 vehicles per day
June 15, 2008
Flood Crest: 42,500 cfs
### 2008 Flood Flows

<table>
<thead>
<tr>
<th>Date</th>
<th>@ Hydraulics Lab (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal June 3500 cfs</td>
</tr>
<tr>
<td>June 6</td>
<td>13400</td>
</tr>
<tr>
<td>June 9</td>
<td>19100</td>
</tr>
<tr>
<td>June 10</td>
<td>21400 <strong>Water over Spillway</strong></td>
</tr>
<tr>
<td>June 11</td>
<td>22100</td>
</tr>
<tr>
<td>June 13</td>
<td>34100</td>
</tr>
<tr>
<td>June 14</td>
<td>39700</td>
</tr>
<tr>
<td>June 15</td>
<td>42500 <strong>Crest</strong></td>
</tr>
<tr>
<td>June 23</td>
<td>21000 <strong>No Water over Spillway</strong></td>
</tr>
<tr>
<td>July 7</td>
<td>12000</td>
</tr>
<tr>
<td>December 8</td>
<td>1800</td>
</tr>
</tbody>
</table>
By the Numbers

- 100 year flood event: 29,000 cfs
- 500 year flood event: 45,000 cfs
- Peak flow in Iowa City: 42,500 cfs on June 15th
- Days above flood stage: 32

By the Numbers

- Homes inundated: 250
- Businesses impacted: 100
- University of Iowa:
  - 20 buildings flooded
  - $230 million in damage
  - 1000 unit residence hall evacuated

By the Numbers

- Acres flood in Iowa City: 1,600
- Total number of calls handled by the Call Center: 8,656
- Sandbags Acquired: 1,593,000
- Sandbags Distributed: 1,393,000

Recovery
Water recedes; cleanup begins

Parkview Evangelical Church

Water Treatment Plant well field (plant not impacted; relocated after ‘93)
City Park: 12,000 tons of sand

Flood Recovery Call Center

Flood Recovery Center
Residential
- State - $686,197
- CDBG - $1.2 million

Business
- State - $1,479,632
- CDBG - $739,000

Jumpstart Iowa

Programs
- Down payment Assistance
- Mortgage Assistance
- Housing Rehabilitation
- Business Assistance

Mitigation

HMGP Buyout
Future Projects - options
- Elevating Roads and Bridges
- Hesco Barriers
- Levee/Demountable Walls
Floodplain Management Standards

- Iowa City has adopted the State standard: Elevate structures 1’ above the 1% per year occurrence event
- Federal standard is to elevate to the 1% per year occurrence event
1. Key Question:
What lessons can we learn from the flood?
• Floodplains will become inundated
• Recent history is not adequate when assessing risk
• Floodplain management that deals only with 1% occurrence event (100 yr. flood) is not enough

2. Key Question:
What do we already know that we can put to practice to reduce the impact of future floods?
• Buyout 100 year floodplain/floodway structures
• Flood proofing (flood doors; alarms)
• Elevate mechanical systems, electrical and plumbing systems and habitable areas above the 100 year floodplain

1. Key Question:
What lessons can we learn from the flood?
• “100 year” floods can reoccur in 17 years
• The watershed is changing
• The reservoir will not protect us

2. Key Question:
What do we already know that we can put to practice to reduce the impact of future floods?
• Design ground floors of buildings for inundation (Boat House; Ned Ashton House)
• Elevate additions to buildings in floodplain
3. Key Question: What more do we need to learn?

- What is magnitude of ’93 and ’08 events?
- What is going on in the watershed – increased runoff rates
- What are the hydrologic effects upstream and downstream of flood mitigation strategies?

3. Key Question: What more do we need to learn?

- Can the management of the reservoir be improved?
- How can we protect what is left?

Dubuque Street / Park Road Bridge Elevation

North Wastewater Plant relocation