Climate Change & The Facilities Management Organization

Risks & Responsibilities

Donald Guckert, P.E., APPA Fellow
Associate Vice President & Director of Facilities Management
The University of Iowa
April 22, 2008

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- New president launches sustainability initiative including the creation of the Office of Sustainability
The Office of Sustainability

• Facilities Management was tasked with creating the Office of Sustainability
• Charged with all matters related to sustainability
• Chartered as a no-growth organization
• Identified three key positions
But 40 days later and
before the first person could be hired…
Flood of 2008
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1. Hurricane Katrina, LA
2. Earthquake, Northridge, CA
3. Hurricane Katrina, MS
4. Hurricane Ike, TX
5. Floods & Tornadoes, IA
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- UI’s estimated impact close to $1 billion
Why Did It Happen?
Why Did It Happen?
The Perfect Storm
Why Did It Happen?
The Perfect Storm
The Final Storm
The Perfect Storm
The Coralville Reservoir
The Coralville Reservoir

Coralville Lake Reservoir

Record High: 717.02
Spillway Crest: 712
Normal Conservation Pool: 683
Overflowing of the dam and the flooding of the Iowa River was dramatically impactful, but only part of the story...
A Tale of Two Cities & Two Rivers
A Tale of Two Cities & Two Rivers

Unlike previous floods, this one was affecting surrounding communities and thus impacting the University's efforts.
Lesson Learned #1

Broaden the context for emergency planning
Lesson Learned #1

Natural disasters affect communities and greater regions, not just campuses.

Tornados   Derechos   Hurricanes
Earthquakes   Fires   Pandemic Flu
Outside The Planning Parameters
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How Prepared Were We?
Flood of '93
What is a 100-year Flood
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- Permitting generally requires buildings to be built one foot above the determined 100-year flood elevation
- Coralville Dam (1958) lowered the 100-year elevation
- Virtually all statistical flood elevations are outdated
According to the Iowa Flood Center:

- 500 year = 80 year, 100 year = 25 year, 10 year = 2 year
- Changes are related, over time, to the built environment and climate changes
- A 120-year plot of peak flooding has been steadily climbing over time
- Last ten years a noticeable increase in rain severity for April, May, June, September and October and a decrease for July and August

The Water is Rising with Time
Out-scaled Previous Disasters

The 500-year Flood of 2008 was of a magnitude not seen with any of the several 100-year floods experienced in the University of Iowa’s 165 year history.
Lesson Learned #2

Plan for your next disaster, not your last one
The 2006 UI Flood Emergency Response Plan:

- Developed in response to our 1993 flood
- Put in place a structure for responding to a disaster
- Was too narrow in scope and vision
- But served us well throughout the event even when it grew beyond the planning parameters
<table>
<thead>
<tr>
<th>Sandbag Dikes</th>
<th>First Priority</th>
<th>Second Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (ft)</td>
<td>21 24 18 12 24 16 10</td>
<td>21 24 18 12 24 16 10</td>
</tr>
<tr>
<td>Base Width (in)</td>
<td>63 72 64 54 36 42 30</td>
<td>63 72 64 54 36 42 30</td>
</tr>
<tr>
<td>Length (ft)</td>
<td>325 370 120 100 150 325 320</td>
<td>325 370 120 100 150 325 320</td>
</tr>
<tr>
<td>Sandbags</td>
<td>8,000 7,500 1,200 1,400 3,300 1,200 1,900</td>
<td>8,000 7,500 1,200 1,400 3,300 1,200 1,900</td>
</tr>
<tr>
<td>Tons of Sand</td>
<td>155 215 45 126 80 120 65</td>
<td>155 215 45 126 80 120 65</td>
</tr>
</tbody>
</table>

Suggested resources to build the sandbag dikes in less than 24 hours:
- Red-Mix Concrete
- People filling sandbags
- People loading sandbags into pipes
- People filling and helping sandbags
- People helping sandbags

Construction Summary:
- DIKE A: 1 2 1 1 1 1 1
- DIKE B: 2 2 2 2 2 2 2
- DIKE C: 1 2 1 1 1 1 1
- DIKE D: 2 2 2 2 2 2 2
- DIKE E: 1 2 1 1 1 1 1
- DIKE F: 2 2 2 2 2 2 2
- DIKE G: 1 2 1 1 1 1 1

Note: The diagram includes various landmarks such as Hanover Auditorium, Voxman Music Building, and the Iowa River. The legend includes symbols for flood boundaries and sites to sandbag.
Mission Accomplished?

The Flood Emergency Response Plan was a resounding success in protecting the University against another 1993 type 100-year flood.
Mission Accomplished?
Mission Accomplished?
Ever Increasing Threats
Lesson Learned #3

Mother nature always wins
The Final Storm
The Final Storm
Lesson Learned #4

Be prepared
NIMS

National Incident Management System
NIMS

Consistent nationwide approach to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of the cause, size, or complexity.

A component of NIMS is the Incident Command System (ICS).
Incident Command System

- Organizes field-level operations
- Manages resources during incidents
- Applicable to small, large and complex incidents
- Defines an organization structure and key roles
ICS Key Roles

- Incident Commander
- Planning Section Chief
- Operations Section Chief
- Financial Section Chief
- Safety Officer
- Liaison Officer
- Information Officer
Lesson Learned #5

Contribute to the Solution
2020 Vision for Sustainability
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1. Achieve Net-negative Energy Growth
2. Green Our Energy Portfolio up to 40%
3. Reduce the Carbon Impact of Transportation by 10%
4. Decrease Our Production of Waste by 60%
5. Increase Student Opportunities to Learn and Practice Principles of Sustainability
6. Support and Grow Interdisciplinary Research in Sustainability-focused and Related Areas
7. Develop Partnerships to Advance Collaborative Initiatives, both Academic and Operational
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Net Negative Energy Growth

The 2007 Energy Conservation Plan Provided Strategy for:

- Sustainable Design & Total Cost of Ownership Framework
- Commissioning & Recommissioning
- Energy Conservation Projects
- Energy Conservation Funding
- Reinvestment of Savings and Utilities Rebates
- Creation of the Energy Control Center
- Organizational Capacity
- Outreach & Education
Net Negative Energy Growth
Renewable Energy

- Reduce our Carbon Footprint
- Manage Costs and Avoid Future Price Increases
- Stay ahead of Coal Market Developments
- Diversify our Fuel Portfolio
Renewable Energy
Biomass Fuel Portfolio

Industrial byproducts:
  Current: oat hulls
  Future: cardboard recycling sludge, scrap from furniture making

Wood chips:
  Current: pallet remanufacture
  Future: opportunity wood, short rotation woody crops

Energy grasses:
  Current: Miscanthus
  Future: prairie and switchgrass
Oat Hulls

• UI has been burning oat hulls for energy since 2003
• Sourced from Quaker Oats in Cedar Rapids, IA
• Expected to contribute 10%
Wood Chips

- Co-Fired with coal in solid fuel boilers
- Expected to contribute 10%
- Increasing supply projected
Miscanthus

- Creating an energy crop
- Targeted as 10% energy source
- Partnership with Iowa State University
- Garnering increasing farmer interest
- *Planting 350 acres in 2015*
- *2500 total acres over next three years*
Risk & Responsibilities
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- Mother Nature always wins
- Be prepared
- Contribute to the solution
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