A vision for a more resilient Iowa

The Iowa Watershed Approach

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The IWA Resilience Team timeline is staggered

The IWA Flood Resilience Team will engage stakeholders in nine watersheds for 3 to 5 years:

- **Year 1:** Clear Creek, Upper Iowa, Middle Cedar
- **Year 2:** English River, Upper Wapsipinicon
- **Year 3:** Ongoing Assessment
- **Year 4:** North Raccoon, East Nishnabotna, West Nishnabotna
- **Year 5:** Dubuque
Social Resources is a Resilience “Gap” Across Watersheds

Social Resources are *community* characteristics that facilitate collective action. The ability to trust, build partnerships, form social networks, and pursue collective learning are examples.
A dynamic Flood Resilience Action Plan can make hazard mitigation and watershed planning more valuable.
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North English Case Study?
Flood Resilience Goals and Current Products

The IWA Flood Resilience Team Seeks to:
- Measure, visualize, and communicate flood resilience resources
- Enhance flood resilience content in formal watershed plans
- Improve social resources for flood resilience

Our Current Products Include:
- Interactive Flood Damage Estimations

Our Products Under Development:
- Interactive Social Vulnerability & Flood Risk Platform
  - Flood vulnerability indices at the intersections of flood risk
  - Estimation & visualization of financial and displacement burdens
- City-scale Flood Resilience Action Plans
Interactive Flood Damage Estimations

Flood Damage Estimate:
- Affected Buildings: 3401
- Structure Damage: $121,844,836
- Content Damage: $386,844,623
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Social Vulnerability Indicators for Flood Recovery in Cedar Rapids, Iowa

- % Black
- % Language barrier
- % Renters
- % Unemployed
- % Poverty
- % Children
- % Elderly
- % Hispanic
- % Low Education
- % Female head of household
- % Disabled
- % No vehicle access
Interactive Social Vulnerability & Flood Risk Platform
Interactive Social Vulnerability & Flood Risk Platform
Interactive Social Vulnerability & Flood Risk Platform
Flood Vulnerability Indices at the Intersections of Flood Risk

<table>
<thead>
<tr>
<th>Category</th>
<th>Index</th>
</tr>
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<tbody>
<tr>
<td>Disabled</td>
<td>167</td>
</tr>
<tr>
<td>Poor</td>
<td>159</td>
</tr>
<tr>
<td>Renters</td>
<td>146</td>
</tr>
</tbody>
</table>
Now, imagine “adding up” all of the socially vulnerable and high flood risk individuals at a HUC 12 scale as a tool to evaluate the relative impact, on people, when considering the benefit of various flood mitigations.

- Disabled: 167
- Poor: 159
- Renters: 146
Enhance Formal Watershed Plans – An Example We Like

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Social Vulnerability Considerations
1 Introduction

This watershed management plan provides recommendations to protect and enhance the flood resiliency of communities in the 300-acre Wood-Pawcatuck watershed and improve river and stream ecosystems, including water quality and habitat. This introductory section describes: 1) the flooding and water quality issues in the Wood-Pawcatuck watershed, 2) the purpose and benefits of developing a comprehensive watershed-based plan and a multi-benefit, ecosystem-based approach to flood resiliency, and 3) the overall organization of this document.

1.1 The Wood-Pawcatuck Watershed

The Pawcatuck River and its major tributary, the Wood River, are located in southwestern Rhode Island and portions of southeastern Connecticut (Figure 1-1). The lower Pawcatuck River forms the border between Rhode Island and Connecticut and flows into the eastern end of Long Island Sound at Little Narragansett Bay. The area of land that drains to the Pawcatuck and Wood Rivers – commonly referred to as the "Wood-Pawcatuck watershed" – is approximately 300 square miles and includes numerous tributaries (Queen, Usquepaug, Chickasheen, Chipuekt, Ashaway, Beaver, Shunock, and Green Falls Rivers) and portions of 14 communities. The Wood-Pawcatuck is the most rural and least developed major watershed in Rhode Island, with a majority of the development focused in the southern part of the watershed in Westerly, Rhode Island and Stonington, Connecticut as well as small towns and villages along the Pawcatuck and its tributaries.

1.2 Flooding in the Wood-Pawcatuck

Riverine flooding and drainage-related flooding in developed areas are relatively common in the Wood-Pawcatuck watershed. The watershed communities have suffered extensive flooding and flood-related damages, with the most extreme flooding on record having occurred in the March and April floods of 2010 (Figure 1-2). The incredible amount of precipitation (over 16 inches) that fell in February and March 2010, along with saturated soils, high water tables, lack of leaf cover and limited pervious surfaces all contributed to the worst flooding ever experienced along the Pawcatuck River and many other areas of Rhode Island (RIEMA, 2011).

Flood Resilience

The term "resilience" or "resilience" has many definitions. In general, it is the ability to become strong, healthy, or successful again after something bad happens – the ability to spring back into action. In the context of flooding, resiliency refers to a community’s ability to plan for, respond to, and recover from floods. It includes measures taken to reduce the vulnerability of communities to damages from flooding and to support long-term recovery after an extreme flood (EPA, 2014).
Additional Attributes We Like

Clear objectives that name resilience and flooding prominently

**Project Objectives**

The objectives of this project are to:

1. Assess the vulnerability of the watershed to the growing risks from flooding and riverine erosion,
2. Develop a comprehensive, watershed-based management plan that will identify prioritized actions to protect and enhance the resiliency of the watershed communities to future flooding and improve river and stream ecosystems, including water quality and habitat.

“Cross-connectivity” with local hazard mitigation plans

1. *Incorporate priority stream crossings identified in this study into local hazard mitigation plans.*

Communities with FEMA-approved hazard mitigation plans are eligible to apply for Hazard Mitigation Grant Program funding from FEMA for measures identified in their plans. Stream crossing upgrade priorities need to be included in these plans before floods occur. Vulnerable stream crossings identified in this watershed management plan and the accompanying *Dams, Bridges and Culverts Assessment Technical Memorandum* in Appendix G, particularly crossings identified as high- and medium-priority, should be included in the hazard mitigation plans of the watershed communities.
City-scale Flood Resilience Action Plans
"Lower-income people are among the least able to recover, yet they are often central to the economy and culture of a community."

- ISET INTERNATIONAL

Shocks Expose Stresses
Boulder's social and economic stresses are sometimes harder to see, but can be exposed and exacerbated during a crisis or disaster. The city's vibrant economy and high quality of life often mask latent stresses that strain the community and make it less resilient overall. Natural disasters like floods and fires disproportionately impact low-income residents who already struggle to thrive in a city that is becoming more unaffordable. A Boulderite living on a fixed income, for example, whose home is damaged in a disaster has limited options to find affordably-priced alternatives because the city has a constrained supply of housing.

Stresses can also present a threat to our economic future. Successful, thriving cities need young people to fuel their economic pipeline. However, in Boulder, individuals between the ages of 25 to 44 is a cohort that has declined by 15 percent since 2000. Similarly, increasing real estate prices have also affected the commercial sector. High office rents and limited commercial space hamper the opportunity of growth-stage firms seeking to expand from start-up status, and many of these companies choose to expand in places like Denver and Longmont where there may be more available space.

![Pie chart showing 10% of Boulder families with children under the poverty level.](image)
The Resiliency and Improvement Plan is the culmination of over 1 1/2 years of research, public planning, and related outreach efforts in both urban and rural areas to reach the goals stated in the voluntary Iowa Nutrient Reduction Strategy.

In recent decades, communities and property owners in the watershed have been impacted by an increasing number of severe storms, and the costs of those storms have also been on the rise. Each event has caused millions of dollars in damage to homes, farms, and infrastructure. The storms have also contributed to the loss of topsoil and nutrients downstream, impacting water quality and habitat locally, and as far away as the Mississippi River and the Gulf of Mexico.

In 2015, a comprehensive watershed assessment and improvement planning project was completed. The project included an assessment of the watershed's strengths and weaknesses. The second phase included development of a Resiliency and Improvement Plan. This plan includes both planning and implementation efforts. The Executive Summary is the short version of key findings and recommendations.

The Plan

**The Main Goal:** Engage stakeholders and promote water quality improvements in a cooperative manner that encourages voluntary action and collaboration. Click each link to read the whole section.
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Initial efforts on conservation project planning and hydrologic modeling have focused on the Headwaters North English and Gritter Creek
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Agricultural Conservation Planning Framework (ACPF)

Analyze landscape and runoff conditions and suggest potential sites for conservation practices

Legend
- Grassed Waterways
- Contour Buffer Strips
- WASCOBs
- Watershed Boundary
- Stream Reach

Runoff Risk Assessment:
Prioritize fields where multiple erosion control practices are most needed

Close to stream?

<table>
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Grassed Waterways

180 km Existing length
(568 acres grassed area)

163 km ACPF length
(472 acres grassed area)
Grassed Waterways

Headwaters

Grassed waterways are already widely implemented in the Headwaters and Gritter Creek.
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Water and Sediment Control Basins (WASCOBs)

648 Existing WASCOB (drains 12.2% of area)

826 ACPF WASCOBs (drains 16.5% of area)
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Water and Sediment Control Basins (WASCOBs)

252 Existing WASCOBs (drains 8.1% of area)

255 ACPF WASCOBs (drains 17.4% of area)
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Water and Sediment Control Basins (WASCOBs)

WASCOBs are already widely implemented in the
Headwaters and Gritter Creek
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Existing Ponds and ACPF Wetlands

89 Existing Ponds
(drains 7.3% of area)

39 ACPF Wetlands
(drains 20.8% of area)
Existing Ponds and ACPF Wetlands

60 Existing Ponds (drains 6.9% of area)

7 ACPF Wetlands (drains 8.9% of area)
Few large ponds/wetland exist in these watersheds. ACPF recommends potential areas for pond/wetland practices for flood control and nutrient reduction.
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https://iwqis.iowawis.org/app/
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