“Climate change” or “a changing climate”: A survey of approaches to account for climate change in MN watershed studies

Andrea Plevan | TMDL Writer and Trainer

June 8, 2021
Climate change in Minnesota

- Warmer and wetter
- More extreme rainfall events
- Cold weather warming
Wetter overall and more heavy rains

Annual Precipitation & Heavy Rain, Twin Cities

Annual Precipitation (inches)

1-inch precipitation days per year

6/8/2021
More snow and more thaws
Lake ice duration

![Ice duration graph and photo]

Photo: Laurie Shaull
Our strategic plan
Sixteen strategic goals for our agency | 2018-2022

Act on opportunities to increase resilience of communities and the environment to climate change impacts.

- MN Climate Change Subcabinet
- MPCA Climate Adaptation Team
• Pollution control and watershed management
• Multiple benefits
• Altered hydrology
• Management strategies
Watershed approach

- Watershed modeling
- Section 319 Small Watersheds Focus Program

Diagram:
- 10 Year Cycle
  - Ongoing Local Implementation
  - Comprehensive Watershed Management Plan
  - Monitoring and Assessment
  - Restoration and Protection Strategy Development
  - Water Resource Characterization & Problem Investigation

Connecting state programs with local leadership

TMDLs WRAPS
Climate change and the watershed approach

1. Climate change happens
2. A changing climate
3. Addressed through strategies but not discussed
Climate change: Duluth urban streams

Photo: Sharon Mollerus
Climate change: Duluth urban streams

Maximum July water temperatures

![Graph showing changes in maximum July water temperatures over time, comparing historical and mid-century conditions. The graphs display the number of streams affected at different temperature levels, with stress and lethal temperature thresholds for brook trout marked.]
Climate change: Minnesota River basin

- Sediment Reduction Strategy
- Minnesota River TSS TMDLs
Climate change: Minnesota River basin
Climate change: Minnesota River basin

- Climate change alters
  - Precipitation patterns
  - Hydrology
- Multiple benefits

<table>
<thead>
<tr>
<th>Sediment Origin</th>
<th>Upland</th>
<th>Near-Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upland</td>
<td>Crop residue management</td>
<td>Sediment traps</td>
</tr>
<tr>
<td></td>
<td>Buffers</td>
<td>Reservoirs</td>
</tr>
<tr>
<td></td>
<td>Water and sediment control basins</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waterways</td>
<td></td>
</tr>
<tr>
<td>Near-Channel</td>
<td>Water storage</td>
<td>Infrastructure repair and protection</td>
</tr>
<tr>
<td></td>
<td>Water and sediment control basins</td>
<td>Armoring</td>
</tr>
<tr>
<td></td>
<td>Cover crops and perennial vegetation</td>
<td>Diversions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stream restoration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two-stage ditch</td>
</tr>
</tbody>
</table>
Skunk Creek Nine Key Element Plan

• “...three rainfall events in the past three years that have exceeded the 200-year storm event...”

• “Increased volumes and rates of runoff and stream-flow that have altered the channel stability and evolution of Elim Creek.”
### Skunk Creek Nine Key Element Plan

<table>
<thead>
<tr>
<th>Critical area</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failing red clay dams</td>
<td>Dam removal</td>
</tr>
<tr>
<td>Improperly sized culverts</td>
<td>Culvert replacement</td>
</tr>
<tr>
<td>Near-channel erosion</td>
<td>Stream channel restoration and riparian management</td>
</tr>
</tbody>
</table>
Sediment source: stream bank erosion and altered hydrology

- Near-channel practices
- Soil health practices
- Agricultural BMPs
• Long-term stream flow and water quality monitoring
  • **Cooperative Stream Gaging** (DNR/MPCA/USGS)
  • **Watershed Pollutant Load Monitoring**
• **Sentinel Lakes Program** (DNR)
• **Long-term biological monitoring of rivers and streams**
• Local organizations
• Climate Adaptation Dashboard
• MN Climate Trends (DNR)
• MN Climate Explorer (DNR)
• Watershed modeling
• Most agree that climate is changing. Less agreement on cause.

• We are talking about climate change (or a changing climate).

• We recommend watershed management strategies to mitigate and adapt to climate change.

• We are treating existing problems. We don’t know the scope of future problems.
Thank you!

Andrea Plevan
andrea.plevan@state.mn.us
651-757-2672