Integrated Water Management: Implementing Nebraska’s Water Policies for Integrated Surface Water / Groundwater Management

State of Nebraska, USA

Expert Consultation on Consumption Based Water Management
Beijing China, October 2019

Jennifer J. Schellpeper
Water Planning Division Manager
Overview

- Resource Conditions
- Governance of Water
  - History
  - Legislative Toolbox Highlights
    - Clearly Defined Boundaries
    - Nested Tiers of Governance
    - Planning Process
    - Science Foundation
    - Stakeholder Engagement
    - Implementation and Monitoring
  - Conclusions
Location: Nebraska, United States
Providing the sound science and support for managing Nebraska’s most precious resource
Nebraska River Basins and Natural Resource District Management Boundaries
Resource Conditions - Rainfall
Average Annual Precipitation in Nebraska (2000-2009)

- 10 to 34 inches of rainfall
- Uncertainty in annual availability
Resource Conditions - Rainfall

- 14 to 36 inches of rainfall
- Uncertainty in annual availability
Resource Conditions - Streamflow

Average Annual Precipitation
86,000,000 Acre feet

Average Annual Streamflow
Total Flow In = 1,000,000 Acre-feet
Total Flowing Out = 7,100,000 Acre-feet
Resource Conditions - Groundwater
Resource Conditions - Irrigation Development
Governance of Water - History

- **1850s**: First record of irrigation ditches
- **1867 to 1889**: Riparian Doctrine
- **1867 to 1933**: Essentially no groundwater law, except on artesian wells (1897)
- **1895**: State Administrative Control & State Board of Irrigation
- **1889**: Prior appropriation system adopted
- **1889 to 1933**: Prior appropriation part of NE Constitution
- **1895**: Landowner has correlative rights to groundwater
- **1920**: The NE State Water Plan initiated
- **1920s**: Prior appropriation part of NE Constitution
- **1930s**: The NE Legislature reexamines water policy
- **1933**: Landowner has correlative rights to groundwater
- **1940s**: Beginning of significant groundwater development
- **1940s**: Landowner has correlative rights to groundwater
- **1950s**: The NE State Water Plan initiated
- **1960s**: Prior appropriation part of NE Constitution
- **1967**: The NE State Water Plan initiated
- **1970s**: Prior appropriation part of NE Constitution
- **1972**: Natural Resources Districts created
- **1978**: NE Legislature reexamines water policy
- **1981**: LB 326: State Water Planning and Review Process
- **2004**: LB 962: Integrated management of hydrologically connected water
Governance of Water – History

NE Water Policy Task Force

- Created in 2002 by the Nebraska Legislature
  - Consensus-based decision-making process
  - Evaluate law governing integrated water management
  - Inter- and intra-state lawsuits

- Developed LB962 (2004)
  - Recognized hydrologic connection of surface and groundwater
  - Established joint planning process (IMPs)
  - Goal to sustain a balance between water use and water supply
  - Use best available science
Governance of Water – History
Additional Tools

2007
LB 701:
• IMP Funding
• Forecasting Requirements

2009
LB 54:
• Transparency
• Economic development

2010
LB 1098:
• Water Sustainability Fund

2004
LB 962:
• State + Local NRD planning process
• Protect Existing Users
• Monitoring

2010
LB 862:
• Occupation taxing authority
Governance of Water – Current Setting

Integrated Water Management

**Surface Water**
- Regulated by NeDNR
- Prior appropriations
- First in time is first in right

**Groundwater**
- Regulated by NRDs
- Correlative rights
- Share and share alike
## Governance of Water – Legislative Toolbox

<table>
<thead>
<tr>
<th>Elinor Ostrom’s Principles for Managing a Commons</th>
<th>Nebraska Water Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear boundaries</td>
<td>Defined Acres, Defined Allocations, Defined Resource Areas, Defined Authorities</td>
</tr>
<tr>
<td>Rules match local needs and conditions</td>
<td>Local Natural Resources Districts</td>
</tr>
<tr>
<td></td>
<td>Stakeholder Participation</td>
</tr>
<tr>
<td>Affected user participate in rule making</td>
<td>Stakeholders Participation</td>
</tr>
<tr>
<td>Local rules respected by outside authorities</td>
<td>Local Natural Resources Districts</td>
</tr>
<tr>
<td>Member system to monitor</td>
<td>Monitoring (Local, State, Federal)</td>
</tr>
<tr>
<td>Graduated sanctions for violators</td>
<td>Phase I, II, and III areas</td>
</tr>
<tr>
<td>Accessible dispute resolution</td>
<td>Dispute resolution process optional</td>
</tr>
<tr>
<td>Nested tiers of governing responsibility</td>
<td>Nested tiers (NRD, State, Federal)</td>
</tr>
<tr>
<td>Effective communication &amp; trust</td>
<td>Trust and communication (Leadership)</td>
</tr>
</tbody>
</table>
Statute 46-715(2)(b): IMP must contain a map clearly delineating the geographic area subject to the integrated management plan.
Toolbox – Clear Boundaries
Authorized Users

- Certification of Use
  - Surface Water Permits

<table>
<thead>
<tr>
<th>Basin</th>
<th>SW Irrigation Permits</th>
<th>Irrigated Acres</th>
<th>Other Permits</th>
<th>Other Use Majority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Republican FA</td>
<td>429</td>
<td>107,900</td>
<td>215</td>
<td>storage</td>
</tr>
<tr>
<td>Upper Niobrara FA</td>
<td>454</td>
<td>58,500</td>
<td>176</td>
<td>storage</td>
</tr>
<tr>
<td>Upper Platte OA</td>
<td>464</td>
<td>434,000</td>
<td>185</td>
<td>storage</td>
</tr>
</tbody>
</table>

- Certified Groundwater Acres

<table>
<thead>
<tr>
<th>Basin</th>
<th>Total Irrigation Wells</th>
<th>Irrigated Acres</th>
<th>Other Wells</th>
<th>Other Use Majority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Republican FA</td>
<td>9,800</td>
<td>1,021,500</td>
<td>5,500</td>
<td>Domestic, monitoring, livestock</td>
</tr>
<tr>
<td>Upper Niobrara FA</td>
<td>1,500</td>
<td>179,400</td>
<td>6,800</td>
<td>Injection, monitoring, recovery, livestock</td>
</tr>
<tr>
<td>Upper Platte OA</td>
<td>11,500</td>
<td>1,068,300</td>
<td>13,000</td>
<td>Domestic, monitoring, livestock</td>
</tr>
</tbody>
</table>
Toolbox – Nested Governing Tiers

Interstate Agreements

Statute 46-715(4)(b): IMPs must keep the State in compliance with Interstate Agreements, Compacts, Decrees
Toolbox – Nested Governing Tiers
Interstate Agreement – Platte River

Comparison
USF&WS "Target Flows", Nebraska "Instream Flows",
Average and Median Flows/
Platte River at Grand Island

Cubic feet per Second

Dates

01/01 01/31 03/01 03/31 04/30 05/30 06/29 07/29 08/28 09/27 10/27 11/26 12/26

0 1,000 2,000 3,000 4,000 5,000 6,000

Wet Year USFWS "Target Flows"
Average Year USFWS "Target Flows"
Dry Year USFWS "Target Flows"
Nebraska Instream Flows
Average Flow 1975-2002
Median Flow 1975-2002

NEBRASKA
Good Life. Great Water.
DEPT. OF NATURAL RESOURCES
Toolbox – Nested Governing Tiers
Basin-wide Plans
Toolbox – Nested Governing Tiers
State and Local Natural Resources Districts

NRD IMP Status as of September 2019

- Required, Adopted
- Voluntary, In Development
- Voluntary, Adopted
Toolbox – Planning Process & Monitoring

**IMPLEMENTATION**
- Water Management Projects
- Strategic Planning Actions

**PLANNING AND PUBLIC PARTICIPATION**
- Goals and Objectives for Water Planning
- Stakeholder Involvement
- Water Availability and Water Shortages
- Water Supplies and Water Uses

**SCIENCE**
- Hydrologic Models, Data, and Analyses
Toolbox – Science Foundation

- Statutes: 46-713(1)(d), 46-715(3)(a), 46-755(5)(a)
  - shall rely on the best scientific data, information, and methodologies readily available
  - Utilize accepted methodologies based on best available information, data, and science
  - shall utilize the best generally-accepted methodologies and available information, data, and science
Toolbox – Science Foundation
Model Design

Groundwater Model

- Baseflow
- Canal Diversion
- Canal Loss
- Canal Spill

Surface Water Operations Model

- Irrigation Demand
  - Runoff

Watershed/Crop Water Models

- Recharge
  - Pumping
  - Runoff

Available Irrigation Water
Toolbox – Science Foundation
Current Model Areas

- Upper Niobrara-White Model
- Central Nebraska Model (CENEB)
- Western Water Use Model (WWUM)
- Lower Platte & Missouri Tributaries Assessment
- Republican River Compact Administration Model
- Blue Basin Model
- COHYST 2010
Stakeholders help formulate, evaluate and recommend goals, objectives, and action items, including local controls (regulations).
Toolbox – Stakeholder Engagement
Education and Outreach
Toolbox – Stakeholder Engagement
Education and Outreach

Long-Term Average Total Demand by Sector

September – May

June – August

Basin Water Supply (Acre Feet)
Statute 46-715(2)(e): a plan to gather and evaluate data, information, and methodologies [to implement, increase understanding] and test the validity of the conclusions and information [of the plan]
Toolbox – Implementation & Monitoring

Regulation and Compliance

- Annual Meetings
- Annual Reports
- Regulations
  - Allocations
  - Acre Reductions
- Projects
  - Conjunctive Management
  - Water Leasing
  - Storage Facilities
  - Augmentation Pumping
- Compliance
  - Remote Sensing
  - Meters
  - Neighbors
  - Field Investigations
Toolbox – Implementation & Monitoring
Regulation and Compliance
Annual Meetings
Annual Reports

2018 Platte Basin-Wide IMP Report

Annual Report of the Department of Natural Resources
To Meet the Requirements of the North Platte–South Platte, Twin Platte, Central Platte, and Niobrara/Natural Resources District Platte Basin Integrated Management Plan for the 2018 Basin-Wide Meeting

Nebraska Department of Natural Resources
July 31, 2018
Toolbox – Implementation & Monitoring
Regulation and Compliance

Regulations
Allocations
Acre Reductions

NRD GROUNDWATER QUANTITY REGULATIONS ACROSS NEBRASKA
(October 2017)
Toolbox – Implementation & Monitoring
Regulation and Compliance
Projects

Conjunctive Management
Water Leasing
Storage Facilities
Augmentation Pumping
Toolbox – Implementation & Monitoring
Regulation and Compliance

Compliance

Remote Sensing
Meters
Neighbors
Field Investigations
Concluding Thoughts

- Challenge: acceptance of science and regulatory system by local producers

- Legislative Toolbox
  - Boundaries
  - Local Management
  - Nested Tiers
  - Dispute Resolution
  - Funding
  - Monitoring
  - Stakeholder Participation

- Trust and Communication – be impeccable with your word

Article in the May 2019 AWRA Water Resources IMPACT magazine
THANK YOU

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