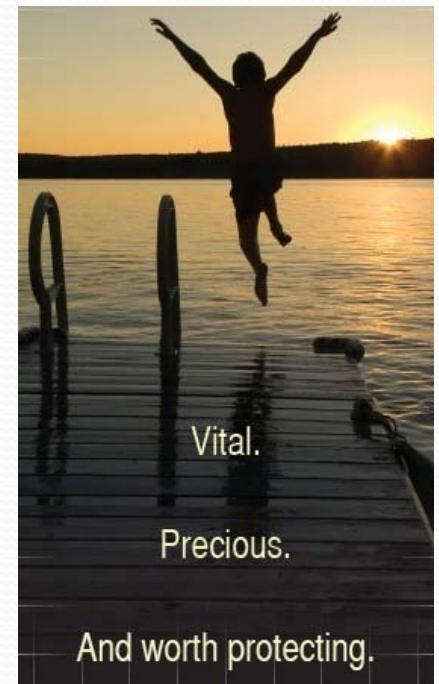


Planning Far into the Future: the Minnesota Water Sustainability Framework

Deborah Swackhamer
University of Minnesota

What is the Framework?

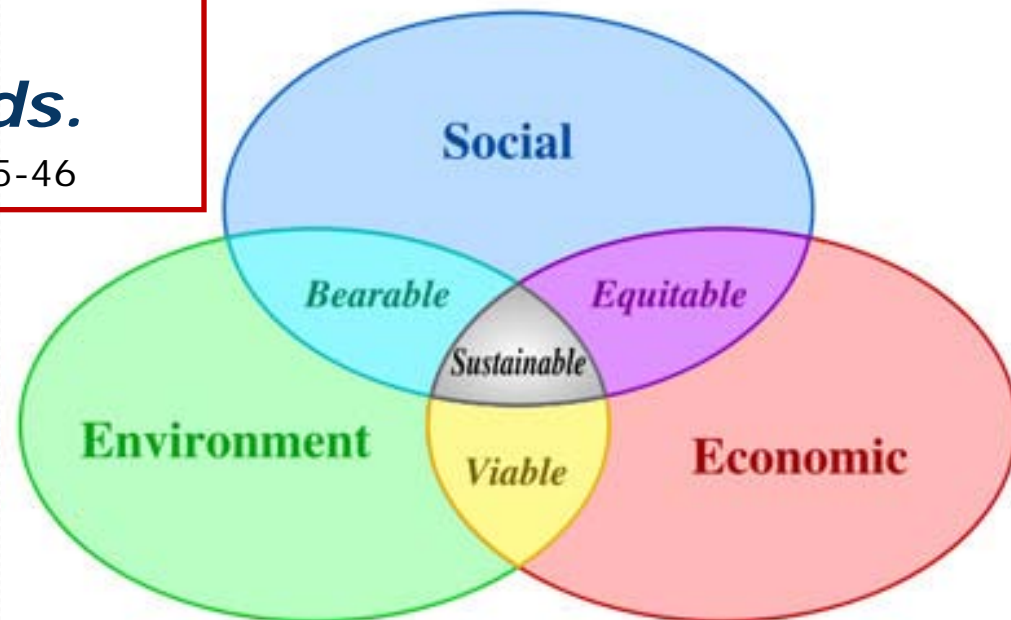
- A 25-year plan to protect, conserve, and enhance the quantity and quality of the state's groundwater and surface water
- An approach to manage the state's water resources that is
 - Sustainable
 - Comprehensive
 - Integrated



Sustainability

Sustainable water use does not harm ecosystems, degrade water quality, or compromise the ability of future generations to meet their own needs.

2009 Minn. Laws. Ch. 172, Art. 2 § 30 at 45-46



Clean Water Fund: Goals

Clean Water

Enough Water

Healthy Ecosystems

Hydrologic Integrity

Infrastructure

Mandate – to address needs related to:

- Drinking water
- Stormwater
- Agricultural use
- Industrial use
- Surface and groundwater interactions
- Infrastructure
- Interface of water resources with climate change, land use, development, demographics

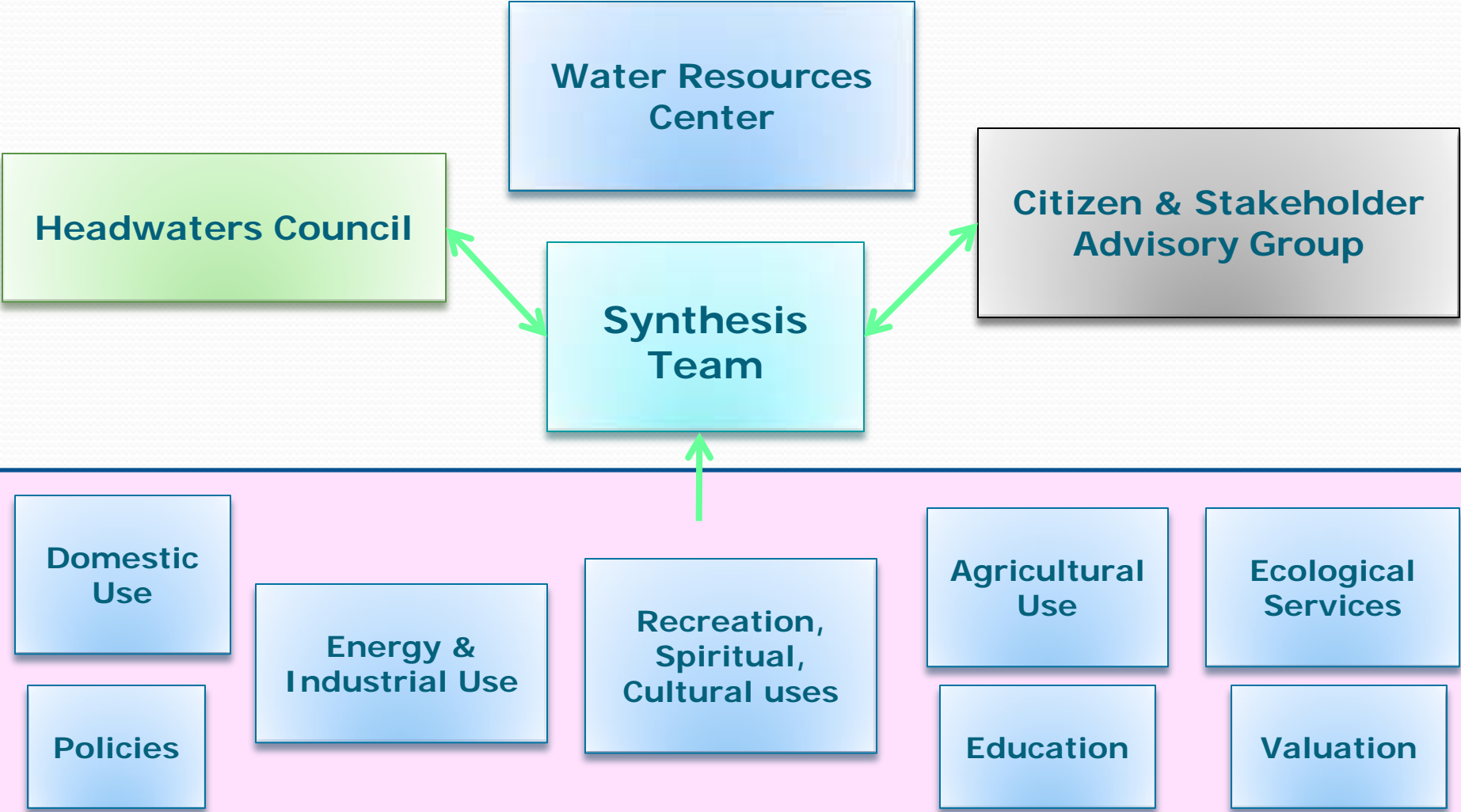
Identify BMPs for WWTP, DW source protection, pollution prevention, conservation, and water valuation

A Collaborative Approach

UNIVERSITY OF MINNESOTA

- DNR
- MDA
- MDH
- MPCA
- EQB
- BWSR
- WDs
- WMOs
- SWCDs
- NGOs
- Counties & Cities

Approach



Team Members

- Academic: 34
- State Agency: 46
- Federal Agency: 10
- City/Cty/LGU: 16
- WD/WMO/SWCD: 8
- NGO: 15
- Private sector: 20
- Agriculture: 14
- Tribal: 4
- Citizen: 7

Foundational Materials

White Papers:

- Water Use in Minnesota
- Water Supply in Minnesota
- Water Quality in Minnesota

Presentations on:

Climate Change, Demographics, Land Use

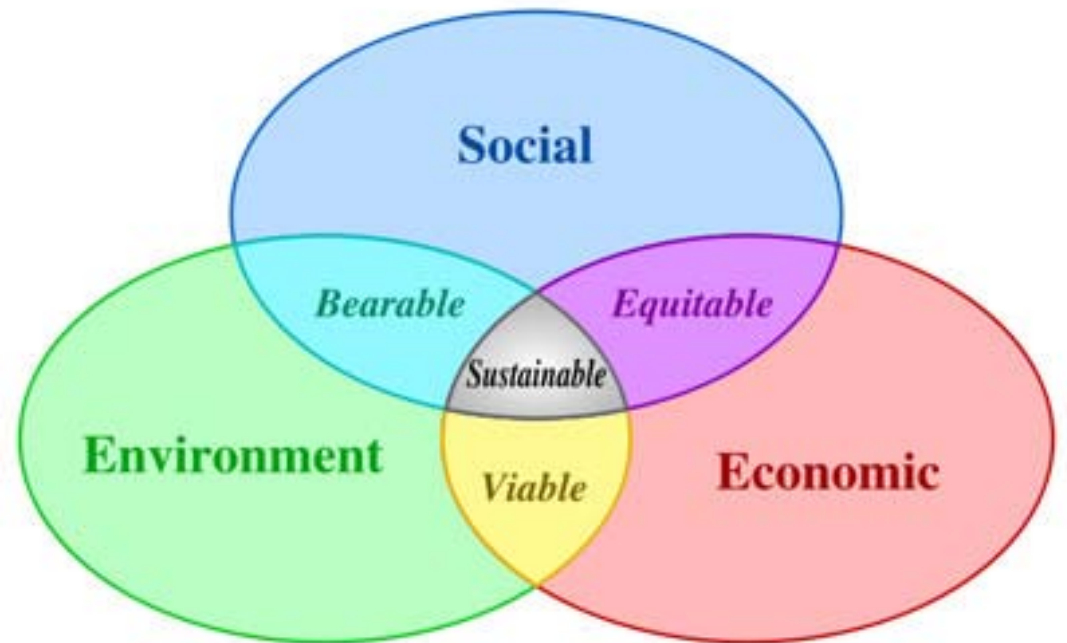
Technical Team White Papers

- Policy
- Education
- Valuation
- Agriculture
- Ecosystem Services
- Domestic
- Energy/Manufacturing
- Rec/Cultural/Spiritual

All background papers and presentations available at
wrc.umn.edu

Framework

- Framed 90 specific needs
- Collected under 10 “Big” Issues
- Contained in 3 categories of sustainability



Issues/needs

Environmental

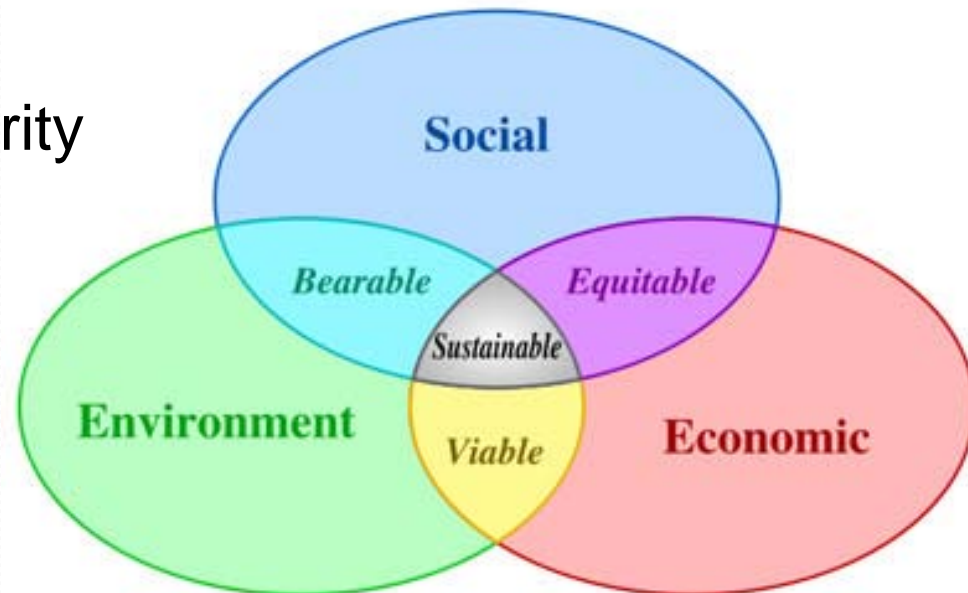
- Sustainable water supply
- Cultural eutrophication & conventional impairments
- Contaminants of emerging concern
- Land-water connection
- Ecological & hydrologic integrity
- Water-energy “nexus”

Economic

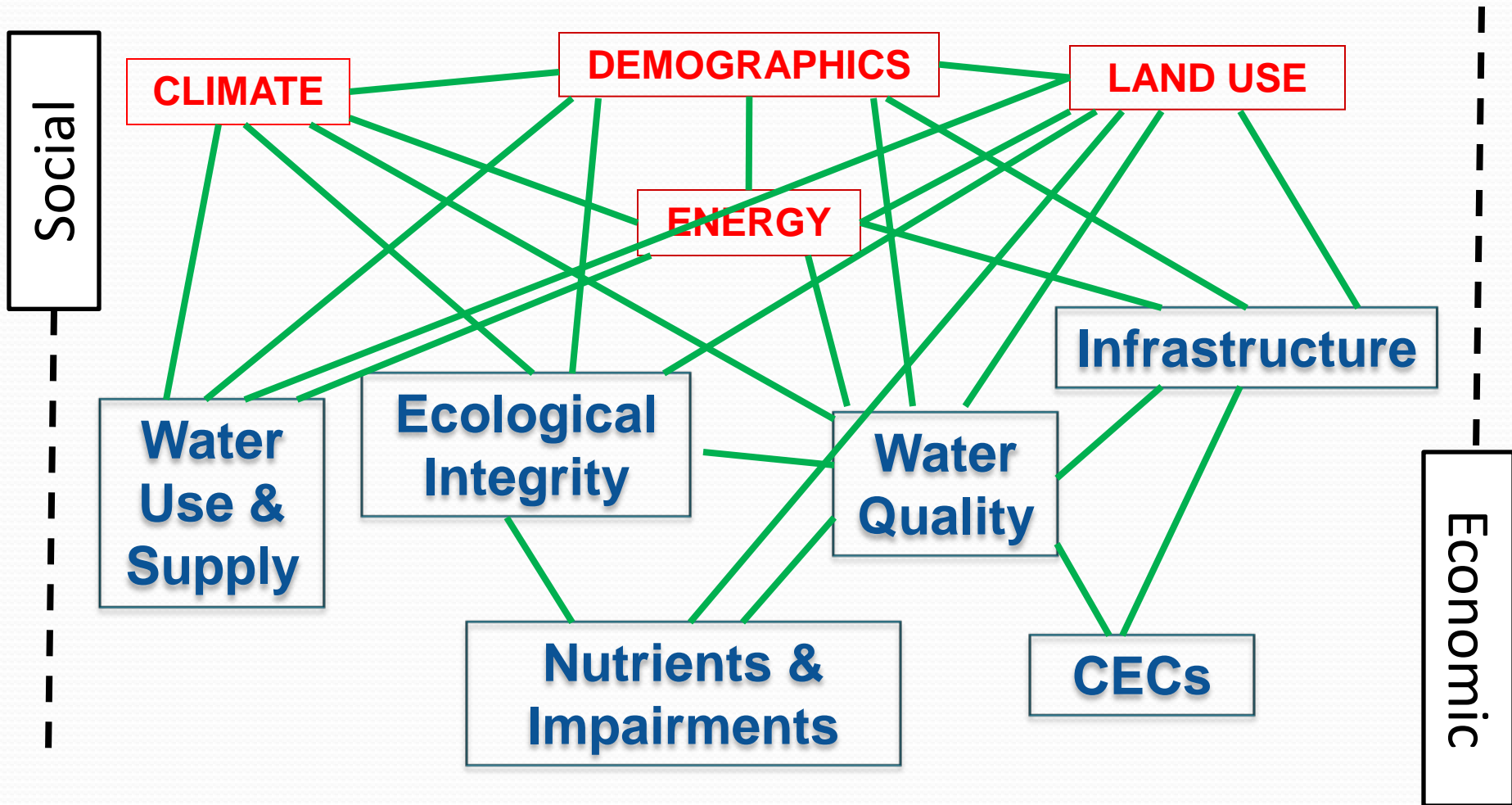
- Water pricing
- Infrastructure needs

Social

- Citizen engagement & education
- Governance & institutions



Issue Relationships and Drivers



For each Issue:

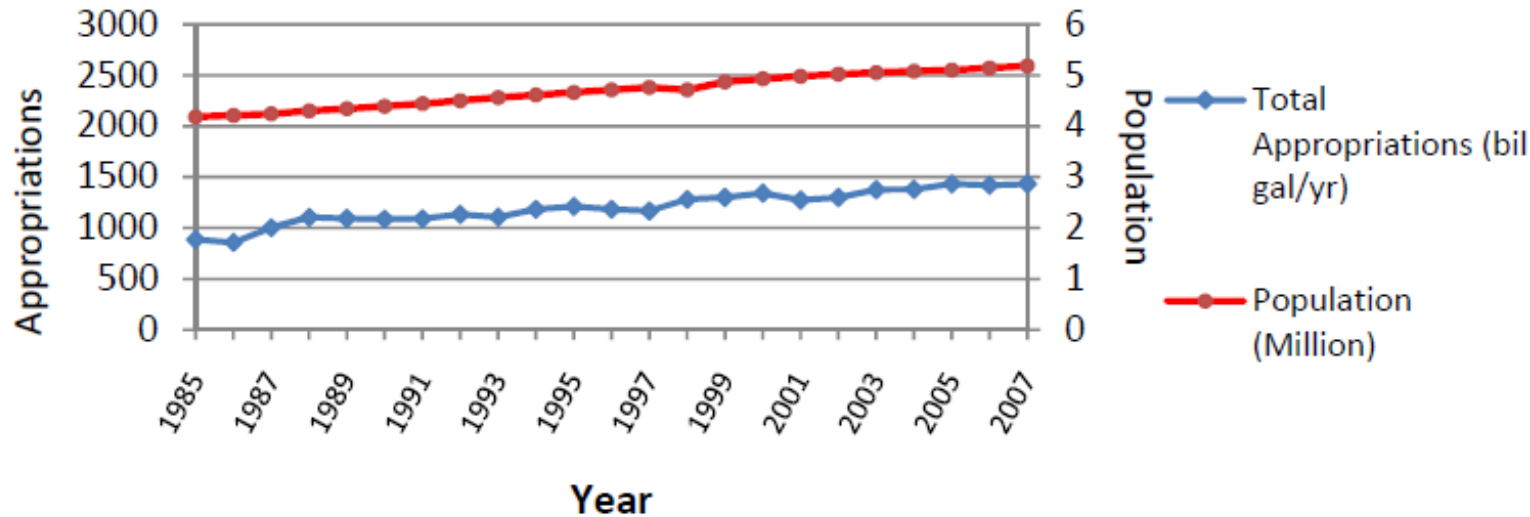
- Problem statement
- Desired future Minnesota condition
 - Outcomes & Strategies (“what”)
 - Actionable tasks (“how”)
 - Benchmarks for measuring progress
- Implementation schedule

Issue: Sustainable Water Supply

Problem:

- Population growth means more water demand

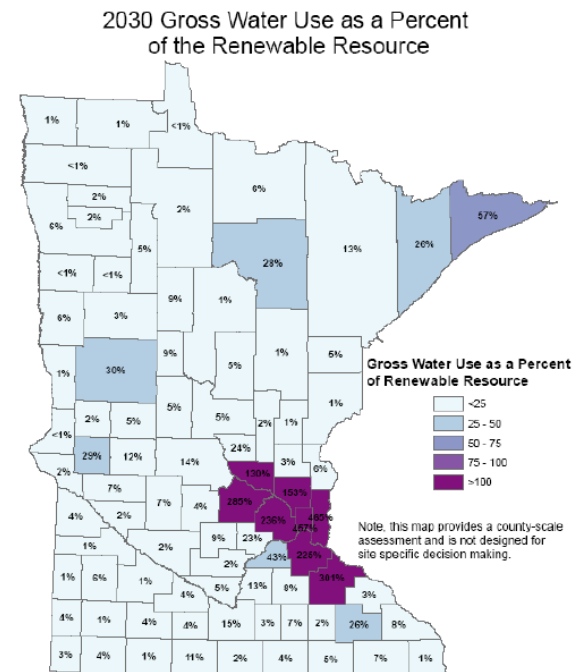
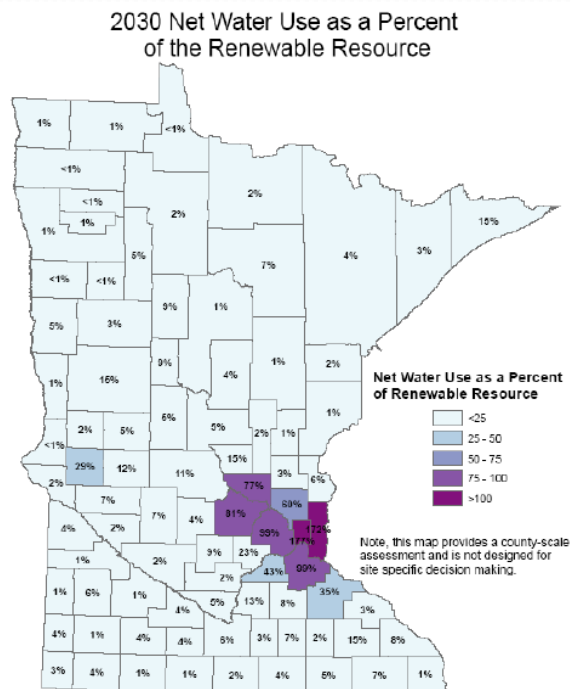
Trends in MN Population and Water Appropriations, 1985-2007



Issue: Sustainable Water Supply

Problem:

- Studies indicate we may be using more groundwater than is being replaced in Metro



Issue: Sustainable Water Supply

Desired Minnesota Future:

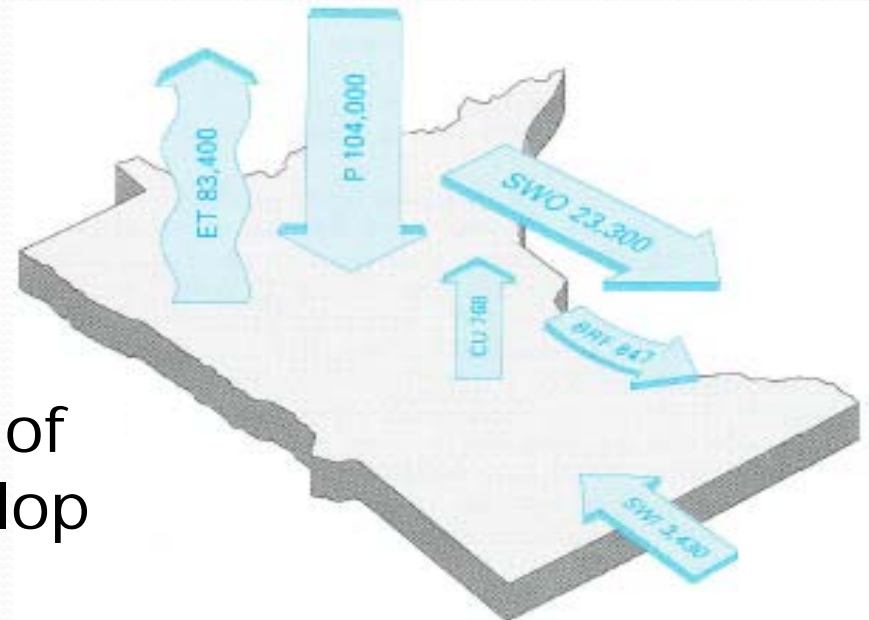
- *Enough water of sufficient quality that is protected for use by all future generations*

Issue: Sustainable Water Supply

Strategy 1:

Full knowledge of water balance

- **Task:** determine flows, storage, recharge rates of major aquifers and develop model of water balance
- **Task:** complete, and update as needed, county geologic atlases



From USGS Circular 1139

Benchmarks: rate of data collection; atlases complete

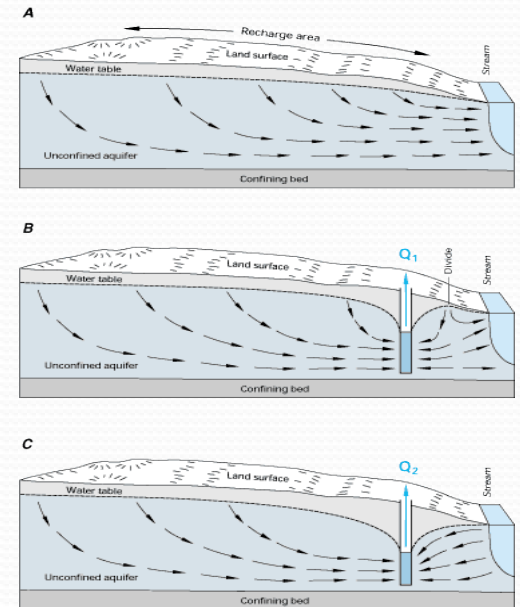
Issue: Sustainable Water Supply

Strategy 2:

Water appropriation process that accounts for surface/groundwater interactions and ecological needs

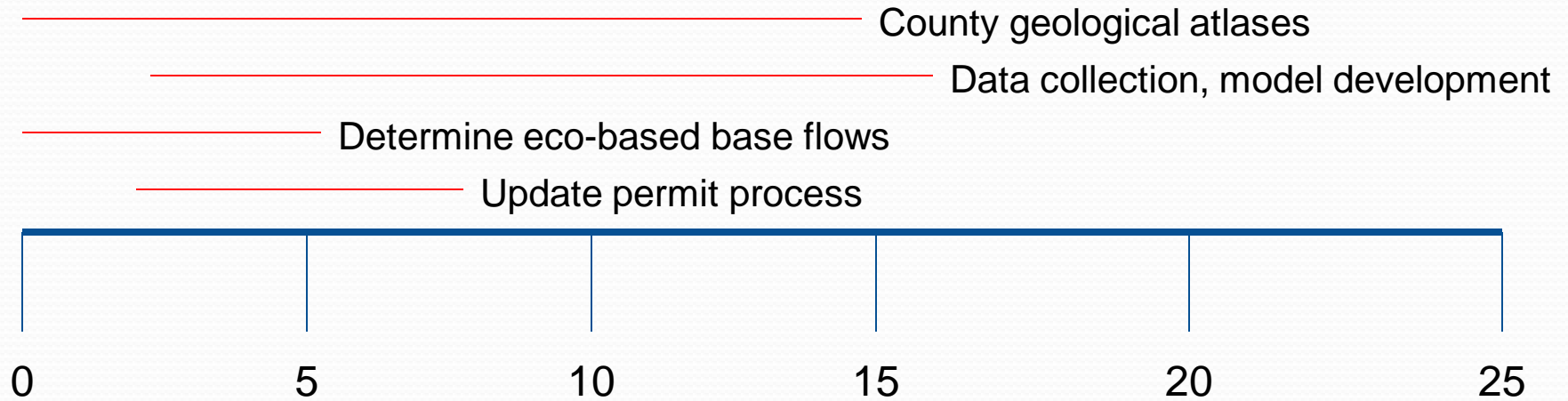
- **Task:** Base permits on minimum base flow that is protective of ecological needs for given hydrologic regime

Benchmarks: development of minimum base flows; monitoring of ecosystem health indicators to assess their effectiveness



From USGS Circular 1139

Issue: Sustainable Water Supply



Implementation Schedule

Issue: Cultural Eutrophication & other Conventional Impairments

Strategy 1:

- Develop statewide nutrient enrichment management plan that is:
 - implemented at watershed level
 - adaptive
 - addresses all aspects of excess nutrients from all sources
 - includes solids and pesticides

Issue: Cultural Eutrophication & other Conventional Impairments

Tasks:

- Make implementation of approved TMDLs mandatory for all sectors, including non-regulated, non-point sources
- Require compliance timelines, effectiveness monitoring, and consequences for failure to comply
- Include allocations and implementation of load reductions in every watershed nutrient enrichment management plan

Issue: Cultural Eutrophication & other Conventional Impairments

Tasks, cont:

- Encourage green infrastructure for stormwater using incentives, tax credits, grants
- Strengthen shoreland rules to specifically protect water quality and address sustainability
- Improve regulation and management of SSTS
- Inventory and improve testing of private wells

Issue: Cultural Eutrophication & other Conventional Impairments

Benchmarks:

- Declining trends in nutrients, solids, pesticides
- Improved compliance rates of TMDL implementation plans
- Improved compliance rates for SSTs performance
- Declining number of private wells with excess nitrates or pesticides

Issue: Cultural Eutrophication & other Conventional Impairments

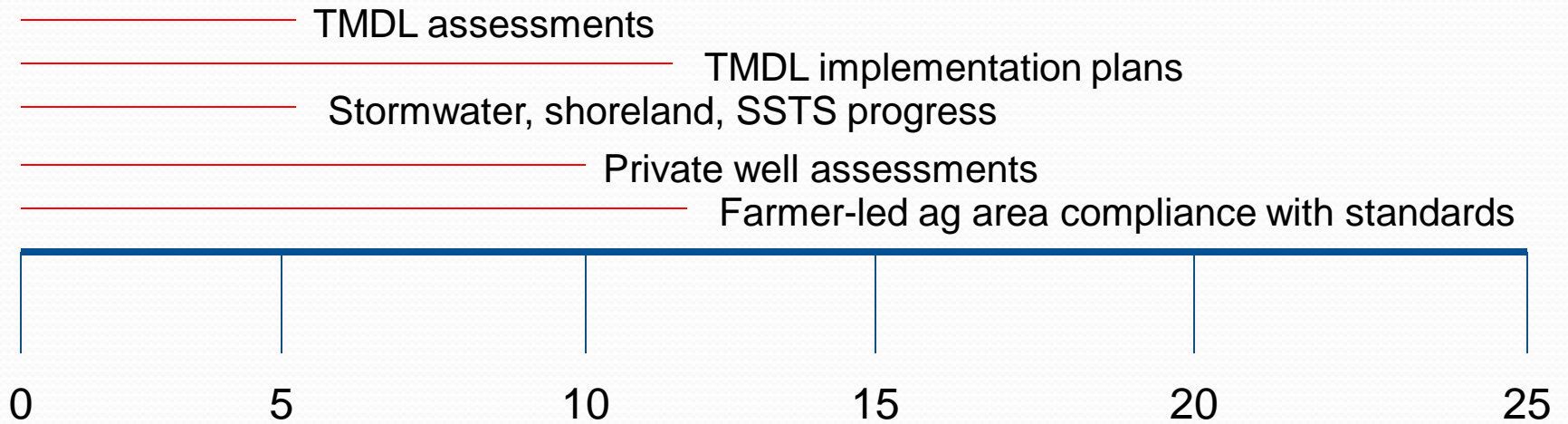
Strategy 2:

Accelerate improvements in water quality and provide equity in solutions to cultural eutrophication

- **Task:** Establish farmer-led, performance-based approach to meeting water quality standards in agricultural areas

Benchmarks: adoption rates of BMPs; reduction in loadings; and increase in compliance of allocations

Issue: Cultural Eutrophication & other Conventional Impairments



Implementation Schedule: Strategies 1 & 2

Issue: Contaminants of Emerging Concern

Problem: scores of potentially harmful, trace level contaminants are in surface and groundwater; most are not yet regulated

Desired MN Future: a society that has reduced risk from toxic contaminants and microbes

Issue: Contaminants of Emerging Concern

Strategy 1:

Move upstream of hundreds of potentially harmful, trace level contaminants entering from different sources

- **Task:** Promote green chemistry and manufacturing

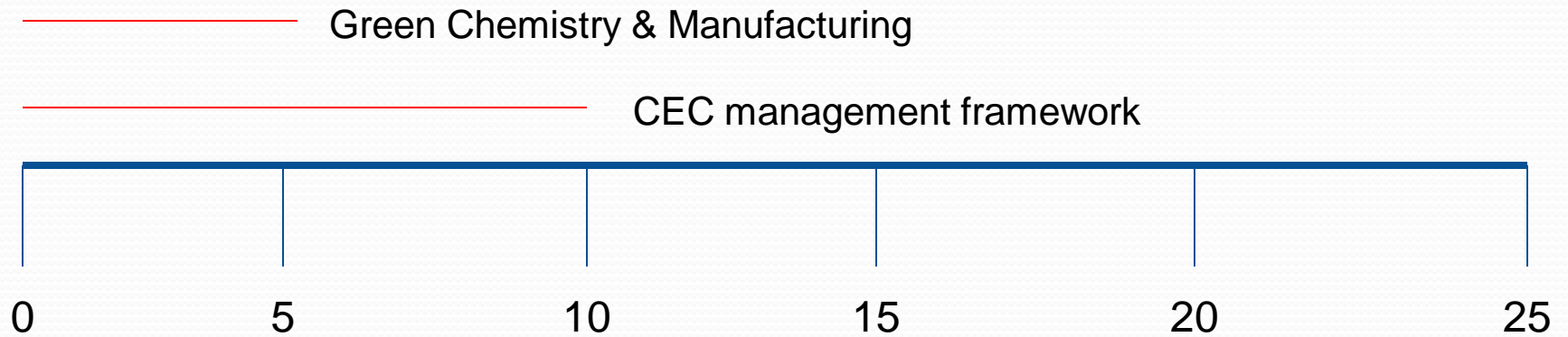
Strategy 2:

Manage the CECs already in water

- **Task:** Multi-pollutant approach

Benchmarks: fewer CECs; reduced concentrations

Issue: Contaminants of Emerging Concern



Implementation Schedule: Strategies 1 & 2

Issue: Land-water connection

Problem: How we use land affects water

Desired MN Future: water resources are managed and protected for all land uses



Issue: Land-water connection

Strategy 1:

Integrate water and land sustainability planning

- **Task:** Review water impacts in land use permitting processes

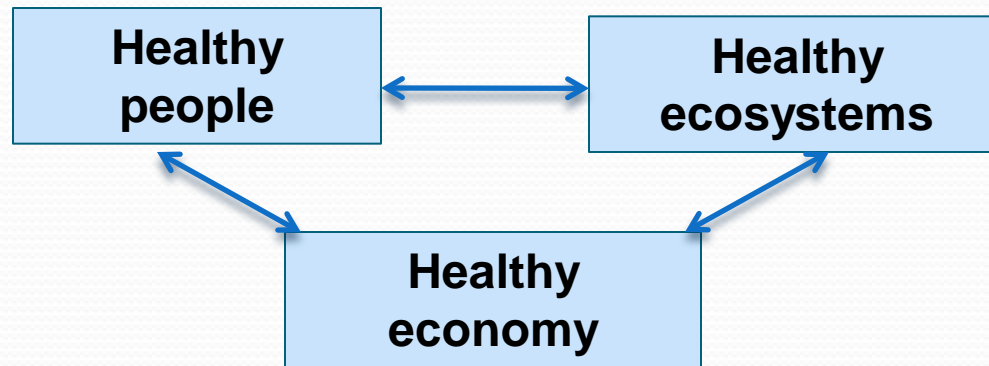
Strategy 2:

Increase compliance capacity for current regulations

- **Task:** Fund enforcement and education

Benchmarks: reduced land use impacts on water;
increased compliance at local level

Issue: Ecological and Hydrologic Integrity



Strategy 1:

Protect critical aquatic ecosystems

- **Task:** Protect priority habitat
- **Task:** Manage and prevent aquatic invasive species
- **Task:** Research and implement climate adaptation strategies

Issue: Ecological and Hydrologic Integrity

Strategy 2:

Account for ecological benefits in environmental reviews

- **Task:** Amend environmental review rules

Strategy 3:

More water is kept on the land where it falls

- **Task:** Require drainage areas to control local hydrograph
- **Task:** support further development of Watershed Assessment Tool for flood management

Issue: Water-Energy “Nexus”

Problem: It takes energy to clean water;
it takes water to make energy

Desired MN Future: energy and water policy
are aligned



Issue: Water-Energy “Nexus”

Strategy 1:

Quantify all water - energy relationships and evaluate energy policy for water sustainability

- **Task:** Use full-cost accounting to quantify water – energy relationships
- **Task:** Revise Minnesota energy policy for water sustainability

Benchmark: energy demand does not decrease water availability and water demand does not increase energy production

Issue: Water pricing

Strategy 1:

Incorporate the economic value of ecosystem services provided by water in decisions and assessments

- **Task:** Determine economic value of diminished ecological benefits and incorporate into new pricing structures
- **Task:** Use funds to further protect source water

Benchmark: indicators of ecosystem services increase in quality

Issue: Public Water Infrastructure

Strategy 1:

Long-term strategy for funding new, expanded, and updated infrastructure and its maintenance

- **Task:** Understand options for funding
- **Task:** Implement strategies for funding

Issue: Public Water Infrastructure

Strategy 2:

Incorporate new technologies and adaptive management into public water infrastructure

- **Task:** Train utility managers in effective management to respond to future challenges in a complex, unpredictable future

Benchmark: contaminant reductions in wastewater and drinking water

Issue: Citizen Engagement & Education

Strategy 1:

Citizens hold a water ethic and act on it

- **Task:** Educate children through K-12 education and water literacy campaign
- **Task:** Engage the public, communities and businesses in water conservation and stewardship through multiple efforts and with stable funding

Benchmark: greater adoption of conservation, greater public engagement in local water activities

Issue: Organization & Institutions

Strategy 1:

Align water, land use, energy policies to ensure water sustainability

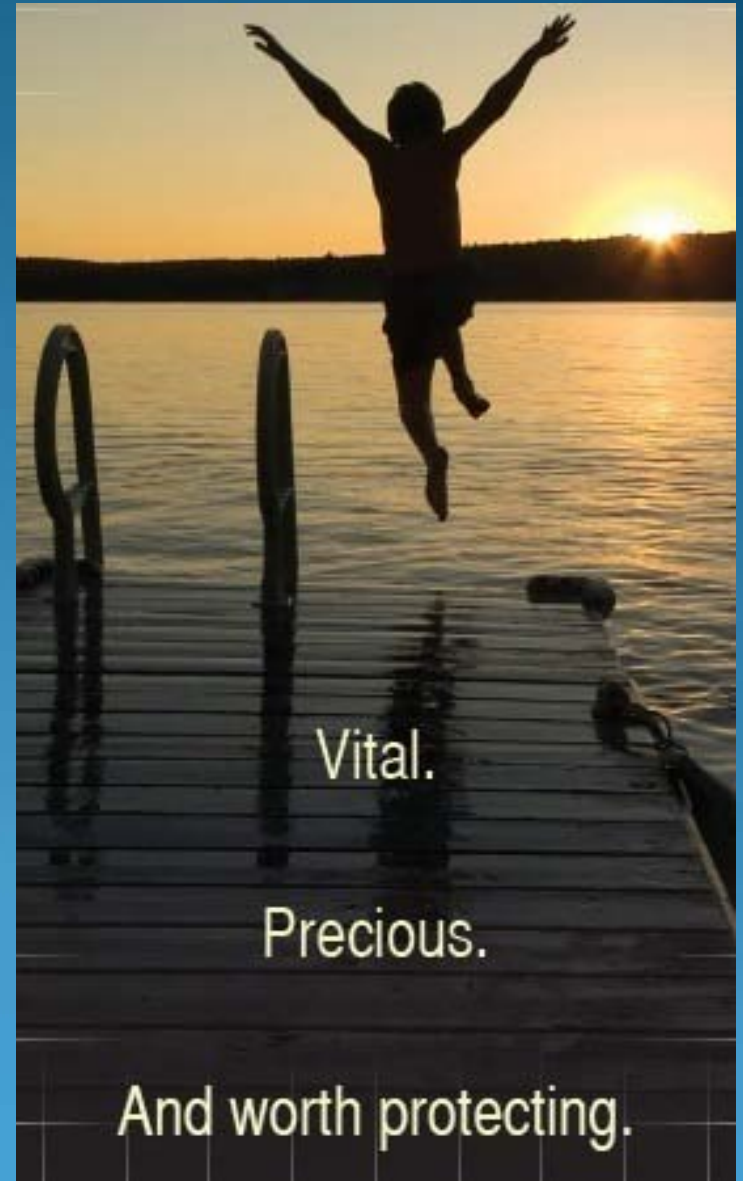
- **Task:** Review water laws and statutes and revise as needed to incorporate sustainability as a guiding principle
- **Task:** align land, energy, and transportation policies with water sustainability
- **Task:** Re-establish Legislative Water Commission

Summary: Top 5

- Protect and Restore Water Quantity and Quality
 - Revise permitting, model water balance
 - Strengthen TMDLs – implementation and equity
 - Address future contaminants
- Address Interconnected Nature of Water
 - Integrate water and land use planning
 - Align water, energy, land, transportation policies for sustainability

Minnesota Water Sustainability Framework

wrc.umn.edu/watersustainabilityframework/



Vital.

Precious.

And worth protecting.