Implementation Guide

Natural Infrastructure for Drought Mitigation and Water Supply

August 2026

IISD

Natural Infrastructure for Water Solutions

Associated

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Unless otherwise noted, photos and illustrations are courtesy Associated Engineering.

Table of Contents

Purpose

Natural infrastructure works–and it can do more than many people realize.

This guide is designed to demonstrate the value of natural infrastructure, moving it from a promising concept to a practical part of everyday decision making. Focusing on drought and water supply, it demonstrates how wetlands, riparian areas, grasslands, trees, and other natural systems can be used to store water, sustain soil moisture, and secure water supplies, either on their own or combined with engineered systems. These approaches can strengthen drought and water shortage resilience while also reducing flood risk, improving water quality, and supporting reliable water supply across the Canadian Prairies.

Developed by the International Institute for Sustainable Development, the guide draws on research, Prairie-based examples, and practical implementation advice. It is intended to support the broader adoption and scaling of natural infrastructure across Alberta, Saskatchewan, and Manitoba.

This publication is part of the Prairie Natural Infrastructure Guide Series, which also examines flood risk reduction, as well as water quality. Together, the series highlights how natural systems can deliver multiple, interconnected benefits.

Who These Guides Are For

These guides are written for a broad audience working to increase the use of natural infrastructure across the Prairies. The groups below will find them particularly helpful and each plays an important role in implementing the actions needed to scale up natural infrastructure (see Section 3).

Government and Infrastructure Owners

Watershed and Conservation Organizations

Indigenous Nations and Knowledge Holders

Practitioners and Contractors

Education, Training, and Knowledge Organizations

Private Sector and Investment Partners

Indigenous Acknowledgement

The region of focus for IISD's Natural Infrastructure for Water Solutions (NIWS) initiative spans over 200 traditional territories and homelands across the provinces we call Alberta, Saskatchewan, and Manitoba–including the Indigenous territories of the Nêhiyaw-Askiy (Plains Cree), Woodland Cree, Iyarhe Nakoda (Stoney Nakoda), Anishininiimowin (Oji-Cree), Niitsítapi (Blackfoot), Tsuut'ina, Očhéthi Šakówiŋ, Nakoda Oyadeb (Nakota), Lakota, Dakota, Anishinaabe (Ojibwe), Anisininew (Ojibwe Cree), and Salteaux, alongside Métis Nations, including the Otipemisiwak Métis, Métis Nation–Saskatchewan, and Red River Métis.

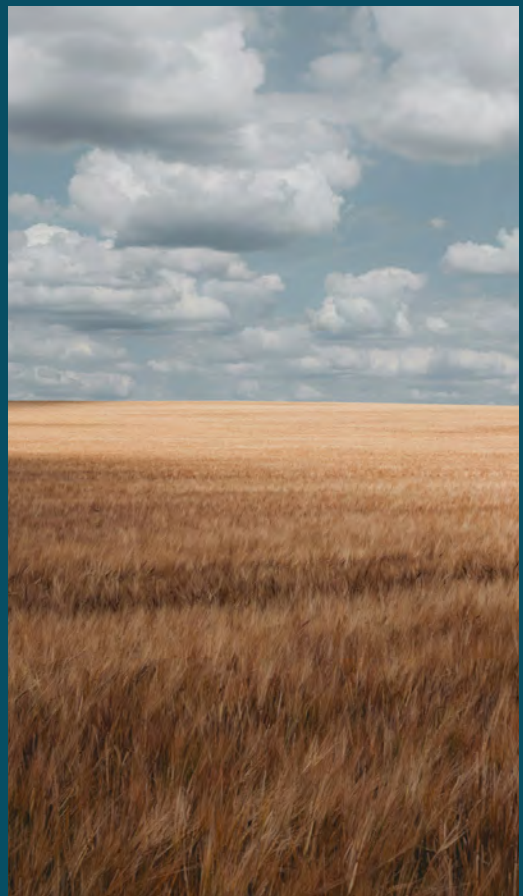


Photo by Jez Timms on Unsplash

Examples of Natural Infrastructure Solutions

WETLANDS

Areas where land is covered by water, either permanently or seasonally. Wetlands support diverse plants and wildlife and help store and improve water quality. Can also include constructed wetlands which are human-made systems designed to mimic natural wetlands.

Photo credit: IISD

CONSTRUCTED WATER RETENTION

Includes built features like small dams and basins to capture, store, and slowly release rainfall and snowmelt, helping to reduce flooding, increase water availability during dry periods, improve water quality, support wildlife habitat, and enhance climate resilience.

RE-GRADED DITCHES

Reshaped drainage channels with gentle slopes to hold and slow runoff water. They increase water retention, reduce erosion, filter pollutants, and support water infiltration.

BIORETENTION, BIOSWALE, RAIN GARDEN

Reshaped drainage channels and basins with gentle slopes to capture and slow runoff. They increase water retention, reduce erosion, filter pollutants, and support water infiltration.

NATURALIZED RESERVOIR AND AQUIFER STORAGE

Creating or enhancing storage in large water bodies by modifying rivers and streams, recharging aquifers and improving long-term water access. Techniques include reconnecting oxbows, river training, and opportunistic filling of ponds.

AGROFORESTRY & SHELTERBELTS

Trees and shrubs planted alongside crops or in rows. In addition to protecting from the wind, this practice also improves soil health, reduces erosion, conserves moisture, and provides habitat for wildlife.

NATIVE GRASSLANDS

Areas with native grasses and wildflowers that helps absorb and store water, reduce runoff and erosion, improve soil health, support biodiversity, and increase resilience to floods and droughts.

PRAIRIE POTHOLE WETLANDS

Shallow, seasonal water basins unique to the Prairie region that are vital for wildlife habitat and water storage.

Photo credit: Ducks Unlimited Canada

GREEN ROOFS

Rooftops designed to be covered with plants and soil. They help manage stormwater, reduce heat, and provide habitat.

Photo credit: Living Lands Landscape and Design

SOIL CELLS

Underground structures that provide large volumes of uncompacted soil and can be connected to the stormwater system in urban areas. They support healthy tree growth and help manage stormwater below paved surfaces.

STORAGE PONDS

Human-made basins designed to collect and hold water for later use. They help manage runoff, store irrigation water, and reduce flooding on agricultural or developed land.

Photo credit: iStock

Natural infrastructure is also described using related terms such as “nature-based solutions,” “green infrastructure,” “ecosystem-based approaches,” “low-impact development,” “sustainable design,” and “natural assets.” While these terms have slightly different meanings depending on the context, they all emphasize working with nature to deliver infrastructure and community benefits.

Prairie Drought and Water Shortage Context

Drought is a recurring part of the Prairie climate, but water shortages are far more common than official drought declarations—and waiting for one can delay action. Seasonal and annual water shortages arise for many reasons, including dry years, rising demand, and engineered systems that underperform.

Healthy landscapes buffer shortages by storing water in streams, rivers, wetlands, soils, and groundwater. Wetland drainage and landscape changes reduce this ability, while climate change makes shortages more frequent and severe. Natural infrastructure restores water storage, infiltration, and groundwater recharge to support a reliable water supply.

What Is Natural Infrastructure?

In this guide, natural infrastructure refers to ecosystems, whether natural, restored, or constructed, that provide environmental, social, and infrastructure-related benefits. Many types of natural infrastructure are suitable for use on the Prairies (see pages 11 to 13), including natural systems such as wetlands, forests, and rain gardens.

Natural infrastructure differs from conventional grey infrastructure. Grey infrastructure refers to engineered systems that rely on human-made materials, such as concrete, steel, and asphalt. In many cases, the two approaches work effectively together. Integrating natural and grey infrastructure can improve resilience, reduce long-term costs, and deliver multiple co-benefits.

Why the Prairies Are Ideal for Natural Infrastructure

Considered the breadbasket of Canada, the Prairies are a key agricultural region, with large acreage devoted to growing crops and raising livestock. At the same time, the region’s population is growing, with expanding towns and cities and increasing demands on infrastructure. This increases pressure on land and water systems. Natural infrastructure can help balance these demands.

The Prairies feature a diverse range of landscapes, including grasslands, forests, river valleys, and wetlands. One of its most distinctive features is the globally significant Prairie Pothole Region, which is defined by thousands of small, shallow wetlands formed by glacial activity. Unlike larger, permanent wetlands, prairie potholes are highly dynamic, filling and drying out with changing conditions. This allows them to store water during wet periods and slowly release it over time, making them especially effective for natural flood storage and groundwater recharge.

Photo credit: Freshwater Conservation Canada

Photo credit: Alisha Goldstein, EPA

What Is a Watershed?

A watershed includes the land that drains water to the same river, lake, wetland, or groundwater system. Rain and snowmelt move across the landscape through streams, wetlands, soils, and groundwater–connecting everything upstream and downstream.

Watersheds connect:

- Water
- People and communities
- Ecosystems and infrastructure

Why Watersheds Matter

Many natural infrastructure projects occur on agricultural and rural lands, while many flood and water quality benefits are realized downstream in towns and cities. This means successful watershed management depends on shared responsibility, partnerships, and coordinated investment across the landscape.

How Do Watersheds and Natural Infrastructure Work Together?

Natural infrastructure works throughout the watershed from wetlands and riparian areas to farms, parks, and urban green spaces. Different solutions perform different functions, but together they help slow runoff, increase infiltration, recharge groundwater, reduce erosion, and improve water quality.

Watershed-scale planning helps identify where different natural infrastructure solutions will provide the greatest combined benefit over the long term.

Watershed Resilience Requires Collaboration

Because watersheds cross property lines and jurisdictional boundaries, addressing flood risk and other water challenges requires coordinated action among Indigenous communities, landowners, agricultural producers, municipalities, watershed organizations, governments, conservation groups, and residents.

Natural infrastructure is most effective when planned and implemented at the watershed scale. By working together, partners can identify opportunities that provide the greatest collective benefit, align investments, and strengthen long-term resilience across the landscape.

Lasting results come not from a single project, but from many complementary actions implemented over time. Section 3 highlights the priority actions that different organizations and sectors can take to help accelerate the adoption of natural infrastructure across the Canadian Prairies.

Understanding Natural Infrastructure

Natural infrastructure uses ecosystems and natural processes to provide services that support communities and the environment.

Unlike conventional grey infrastructure that often focuses on a single function, natural infrastructure can deliver multiple benefits simultaneously, including:

- improve water quality
- enhance drought resilience and groundwater recharge
- provide habitat and biodiversity benefits
- increase climate adaptation and community resilience.

A Continuum of Solutions

Natural infrastructure can be implemented using various approaches depending on landscape conditions, community expansion, local economy, and watershed objectives.

The most effective and cost-efficient approach is to maintain existing natural systems first. Alongside protecting and maintaining existing natural assets, efforts can also include restoring degraded systems, enhancing working landscapes, and integrating natural infrastructure into built environments.

These four approaches form a continuum of solutions, with the appropriate approach reflecting the unique characteristics and priorities of each region and watershed. Successful watershed strategies often combine all four approaches.

Natural Infrastructure Continuum Across Landscapes

Indigenous Knowledges and Relationships with the Land and Its Water

Indigenous Knowledges

Indigenous Knowledges are grounded in long-standing relationships with land and water. These knowledges recognize that humans are part of nature and have responsibilities to care for ecosystems on behalf of future generations.

For many Indigenous Peoples, land is not viewed simply as a resource or commodity, but as a living relationship that supports culture, identity, health, and community well-being. Water, plants, animals, and ecosystems are deeply interconnected.

Colonialism and development disrupted many of these relationships by displacing Indigenous Peoples from their lands and limiting opportunities to practice stewardship and governance. Despite these impacts, Indigenous communities across the Prairies and Canada continue to lead and support important work related to land stewardship, restoration, monitoring, and climate resilience.

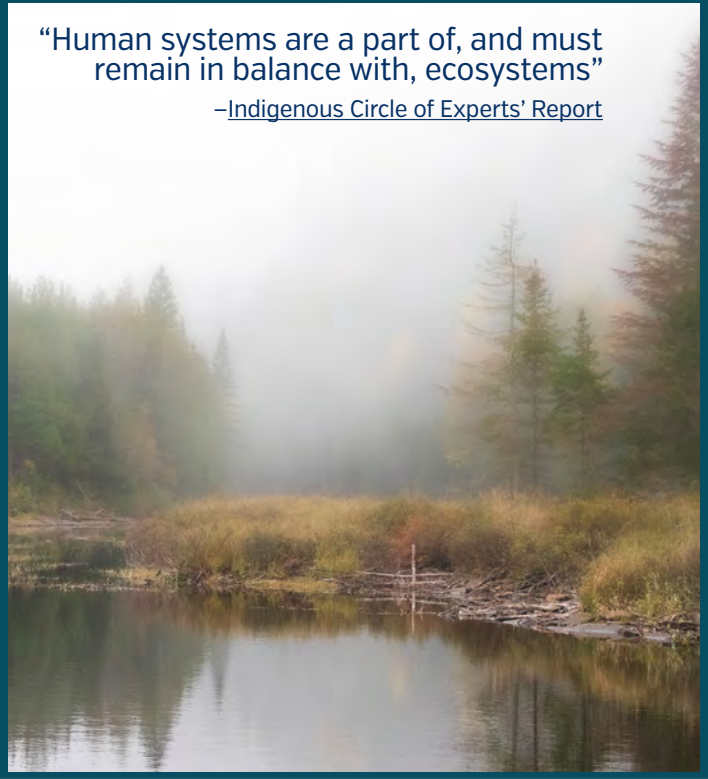
Recognizing and respecting Indigenous ways of knowing can strengthen natural infrastructure planning by supporting more holistic, long-term, and place-based approaches to caring for land and water.

Pimachiowin Aki Land Guardians and Protected Area (Manitoba–Ontario)

Pimachiowin Aki–"the land that gives life"–protects more than 29,000 km² of boreal forest and peatland on the Manitoba–Ontario border. Led by four Anishinaabe First Nations (Bloodvein River, Little Grand Rapids, Pauingassi, and Poplar River), it became Canada's first mixed cultural-and-natural UNESCO World Heritage Site in 2018 and is the largest protected stretch of boreal shield forest in North America. Its vast peatlands act as natural reservoirs, storing water and releasing it slowly to sustain rivers through dry periods. Land Guardians monitor peatland moisture and water conditions, blending Indigenous knowledges with scientific methods to keep these watersheds resilient.

"Human systems are a part of, and must remain in balance with, ecosystems"

–Indigenous Circle of Experts' Report



Different Ways of Valuing Nature

Natural infrastructure can provide environmental, cultural, social, and economic value. Many of these connected benefits are not fully captured through traditional financial decision-making lenses.

ENVIRONMENTAL VALUE

Supporting biodiversity, healthy ecosystems, water storage, and cleaner air and water.

CULTURAL VALUE

Protecting relationships to land, Traditional Knowledge, cultural practices, and sense of place.

SOCIAL VALUE

Supporting recreation, mental health, education, community connections, and safer communities.

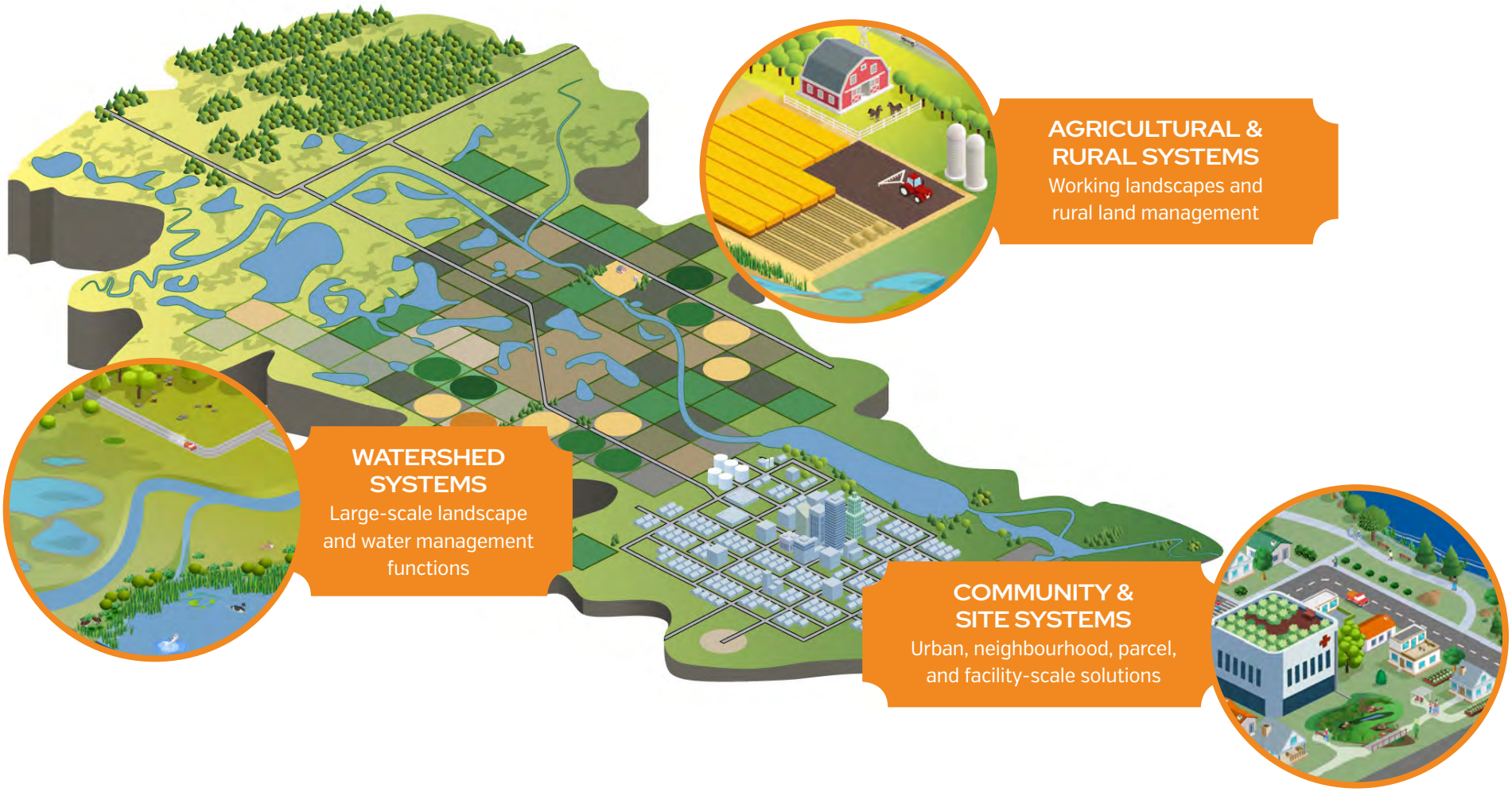
ECONOMIC VALUE

Reducing infrastructure costs, lowering flood damages, improving drought resilience, and supporting long-term sustainability.

Recognizing multiple ways of valuing nature can support more balanced and informed decision making.

Natural Infrastructure Solutions at Different Scales

Natural infrastructure can be applied across different parts of the landscape, from integrated approaches across a watershed to agricultural lands and urban areas. Different solutions are suited to different contexts, but together they help slow, store, recharge, and filter water while supporting broader environmental and community benefits.



Key Water Functions Supported by Natural Infrastructure

SLOW WATER
Reduce flood peaks and erosion

STORE WATER
Increase flood storage and drought resilience

RECHARGE WATER
Increase infiltration and support groundwater and base flows

FILTER WATER
Improve water quality and ecosystem health

2

Drought Resilience Roles of Natural and Grey Infrastructure

Natural infrastructure stores water on the landscape and recharges the groundwater that sustains supply through dry periods.

Grey infrastructure manages the residual storage and supply needs that remain.

The most resilient water supply systems use both.

GREY INFRASTRUCTURE

Provides targeted storage and supply where risks remain even with the use of natural infrastructure. Grey infrastructure is particularly useful in developed areas and around critical water supplies.

Grey infrastructure can help to
- Store and deliver water during dry periods
- Protect critical water supplies
- Manage water treatment and distribution
- Meet peak water demands

Examples: Reservoirs, treatment and distribution systems, irrigation canals, groundwater wells

Use natural infrastructure where appropriate, or combine it with grey infrastructure where needed for even more resilient systems.

Drought Resilience Starts Across the Watershed

Drought resilience is built by keeping water on the landscape. Natural infrastructure helps slow, store, and infiltrate water throughout the watershed, holding moisture in soils and wetlands and recharging groundwater before dry periods arrive.

As land is developed and wetlands are drained, the landscape loses its natural ability to capture, store, and slowly release water. As a result, runoff moves quickly through the watershed, reducing water availability. The most resilient strategies integrate a hybrid approach with both natural and grey infrastructure across a connected watershed system.

Watershed-Scale System

- Greatest opportunity for natural water storage and retention
- Solutions are planned and/or coordinated at a watershed-scale
- Wetlands, riparian areas, grasslands, and floodplains store water on the landscape

Agricultural & Rural Systems

- On-site opportunities to slow runoff, increase infiltration, and retain water on the landscape
- Solutions are planned and/or coordinated at a more site-specific or localized level
- Water management can often be integrated with agricultural production

Community & Site Systems

- Development and infrastructure constraints limit available space for natural infrastructure
- Solutions are planned and/or coordinated at a more site-specific or localized level
- Rain gardens, bioswales, soil cells, and constructed wetlands help retain water close to where rain falls

Use natural infrastructure where appropriate or combine it with grey infrastructure where needed for even more resilient systems.

Watershed-Scale Systems

Coordinated watershed-scale conservation and restoration

Maintain natural systems
Native grasslands, riparian areas, and wetlands, including prairie potholes

Restore wetlands
Temporary and permanent wetland basins, including prairie potholes

Restore rivers and streams
Floodplain reconnection and channel naturalization with bends and meanders

Restore riparian areas and riverbanks
Live staking, naturalized plantings, bioengineering, and riverbed enhancements

Restore groundwater recharge
Infiltration areas and soil health improvements

Restore and protect water retention
Beaver dams and beaver dam analogues

PRIMARY BENEFITS — Drought and Water Supply, Water Quality, Flood Mitigation — SECONDARY BENEFITS

Natural Infrastructure Solutions for Watershed Systems

Watershed systems provide the greatest opportunity to improve water supply by slowing, storing, and naturally conveying water across the landscape. Protecting and restoring these large-scale natural systems strengthens water supply and groundwater recharge while also supporting water quality, biodiversity, and flood management.

Natural Infrastructure Examples

WETLANDS AND NATURAL AREA PROTECTION

RIPARIAN RESTORATION

PRAIRIE POTHOLE WETLANDS

Photo credit: Ducks Unlimited Canada

NATIVE GRASSLANDS

Agriculture and Rural Systems

Working landscapes and rural land management

Build natural water retention features
Small dams and constructed wetlands

Restore and protect wetlands
Temporary and permanent wetland basins, including prairie potholes

Enhance sustainable drainage systems
Regraded ditches, back-flooded dams, filter fields, and naturalized channels

Restore marginal farmlands
Perennial vegetation, riparian restoration, and buffer zones

Establish and protect trees
Shelterbelts, windbreaks, and silvopasture

Restore riparian areas
Live staking, naturalized plantings, bioengineering, and riverbed enhancements

PRIMARY BENEFITS — SECONDARY BENEFITS

- Drought and Water Supply
- Water Quality
- Flood Mitigation

Natural Infrastructure Solutions for Agricultural and Rural Systems

Agricultural and rural landscapes cover much of the Canadian Prairies, creating one of the greatest opportunities to improve water supply and drought resilience. Solutions in agricultural and rural systems focus more on individual projects rather than the large-scale planning and coordination seen at a watershed scale. Many natural infrastructure practices can be integrated into working landscapes while supporting agricultural productivity, water management, and long-term soil health.

Natural Infrastructure Examples

WETLAND RESTORATION

AGROFORESTRY & SHELTERBELTS

RIPARIAN BUFFER

REGRADED DITCHES

FILTER FIELDS

BACK-FLOODED DAMS

Photo credit: East Interlake Watershed District

Community and Site Systems

Urban, neighbourhood, parcel, and facility-scale solutions

Enhance stormwater management
Rain gardens, constructed wetlands, bioswales, and soil cells

Consider land use development to enhance flood protection
Naturalized stormwater ponds and tree canopy

Build bioswales
Vegetated conveyance channels

Build bioretention cells and rain gardens
Vegetated conveyance channels

Restore riparian areas
Live staking, naturalized plantings, bioengineering, and riverbed enhancements

Enhance urban tree canopy
Maintain healthy tree canopy, expand canopy cover, and soil cells

PRIMARY BENEFITS
Drought and Water Supply
Water Quality
Flood Mitigation
SECONDARY BENEFITS

Natural Infrastructure Solutions for Community and Site Systems

Community and site-scale natural infrastructure natural infrastructure captures runoff close to where rain falls. Although space is often limited in developed areas, integrating natural infrastructure into streets, parks, neighbourhoods, and redevelopment projects can hold moisture in soils and vegetation, recharge groundwater, and complement conventional water supply systems by reducing demand on treated water through the driest months.

Natural Infrastructure Examples

CONSTRUCTED WETLANDS

GREEN ROOFS

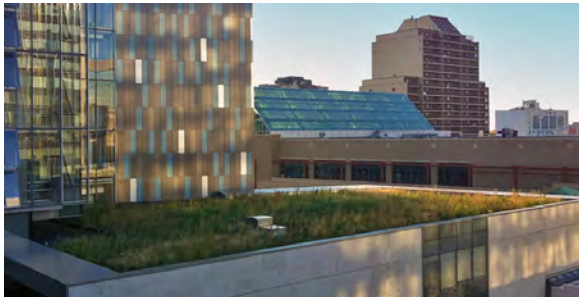


Photo credit: Mark Bauche

BIORETENTION, RAIN GARDENS

Photo credit: Mat Langford

BIOSWALE

Photo credit: IISD

SHORELINE RE-NATURALIZATION

SOIL CELL

Common Metrics

PERCENT CHANGE (%)
Shows how much a solution increased or decreased a measurable outcome such as peak flow, runoff or erosion.

RETURN ON INVESTMENT (ROI)
Compares economic benefits to dollars invested.

SOCIAL RETURN ON INVESTMENT (SROI)
Captures broader social, environmental and economic value.

COST-BENEFIT RATIO
Compares total benefits to total costs. Values greater than 1 indicate benefits exceed costs.

ECOSYSTEM SERVICE VALUE (ESV)
Estimates the value of services provided by natural systems, such as flood mitigation, water quality improvement, and wildlife habitat.

How Natural Infrastructure Effectiveness Is Measured

The following pages summarize Prairie-based evidence showing how natural infrastructure can improve water supply and drought resilience, along with additional benefits.

Evidence in this guide focuses on three questions:

DROUGHT AND WATER SUPPLY PERFORMANCE
Measures how effectively natural infrastructure:

- Stores water
- Recharges groundwater
- Retains soil moisture
- Sustains base flows

ECONOMIC PERFORMANCE
Measures whether natural infrastructure can:

- Reduce drought damages and losses
- Lower infrastructure costs
- Reduce long-term maintenance needs

CO-BENEFITS
Measures additional benefits such as:

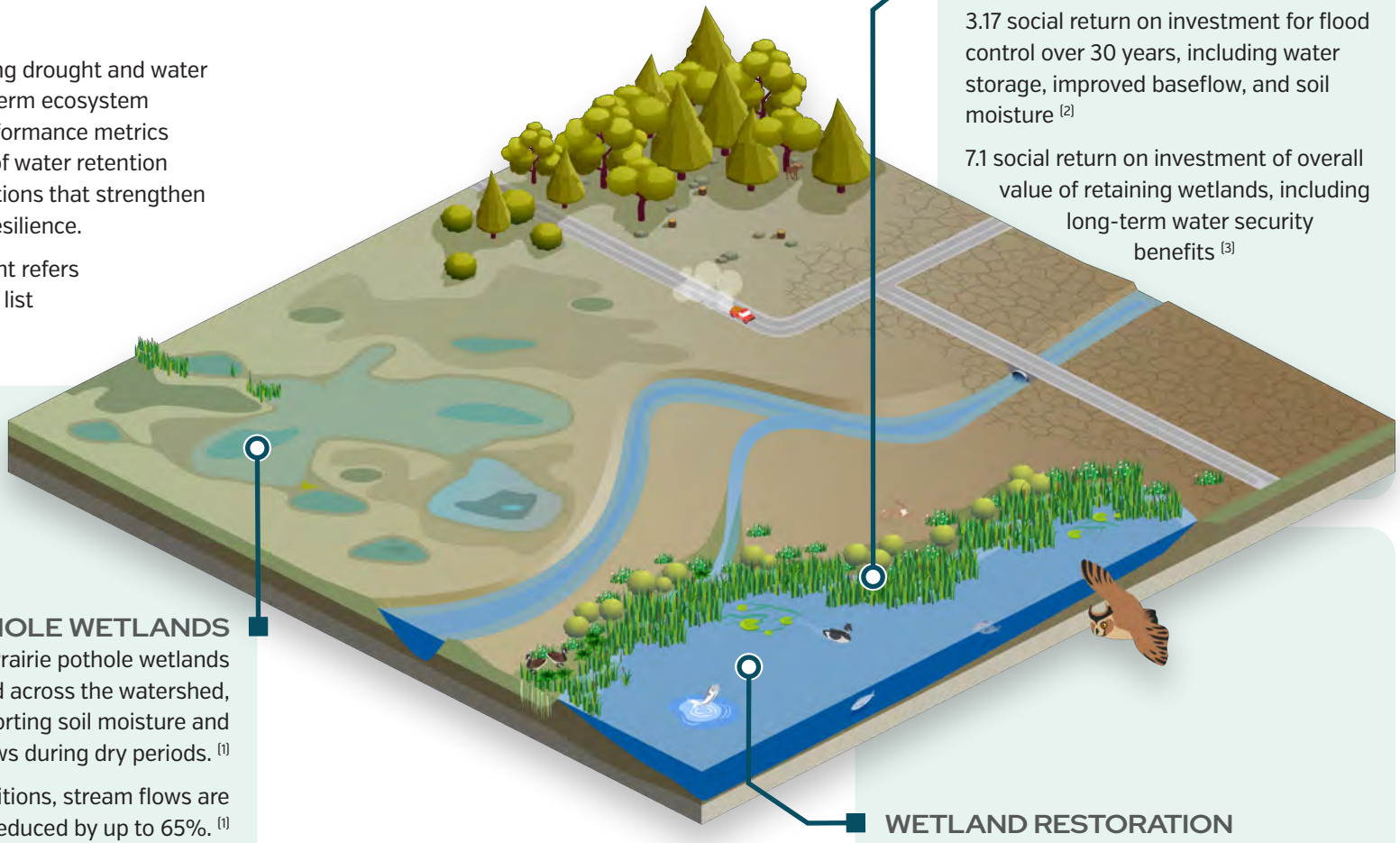
- Flood management
- Water quality improvement
- Habitat and biodiversity
- Recreation and community well-being

Important Note:
Results are intended to support relative comparison and understanding. Actual performance will vary depending on local conditions, design, scale, and watershed context.

Watershed-Scale Evidence

Prairie examples demonstrating drought and water shortage resilience and long-term ecosystem benefits. Flood and runoff performance metrics are shown here as indicators of water retention and delayed release–key functions that strengthen drought and water shortage resilience.

Note: Number after each insight refers to the citation in the reference list at the end of this document.



WETLAND PROTECTION

3.17 social return on investment for flood control over 30 years, including water storage, improved baseflow, and soil moisture [2]

7.1 social return on investment of overall value of retaining wetlands, including long-term water security benefits [3]

PRAIRIE POTHOLE WETLANDS

In drought conditions, Prairie pothole wetlands allow water to be retained across the watershed, slowing drainage and supporting soil moisture and baseflows during dry periods. [1]

In flood conditions, stream flows are reduced by up to 65%. [1]

STORAGE WETLAND CONSTRUCTION

Carryover water storage increases drought resilience, with every dollar invested returning CAD 1.70 in avoided costs and water supply benefits [6]

BACK-FLOODED DAMS

3.7 cost-benefit ratio for ecosystem service value, which supports low-flow augmentation [7,8]

CONSTRUCTED WATER RETENTION

72% reduction in peak flows in spring and 48% in summer, on average [9]

Disclaimer: Values on pages 11–13 are for relative comparison since local context will affect the specific values. Dollars presented are based on the study's references and have not been converted.

WETLAND RESTORATION

Up to 55% decrease in peak streamflow, which buffers low flows [4]

Up to 23% decrease in peak discharge to support drought resilience [5]

Up to 3.6 cost-benefit ratio showing the strong case for water security [6,7]

CAD 17,000 /ha annual ecosystem service value of flood reduction and contaminant removal, which supports drought co-benefits [6]

Water storage at comparable cost to dry dam, but further co-benefits [3]

Agricultural and Rural Evidence

Working landscapes can hold water and moisture on site to buffer dry periods and contribute to a healthier ecosystem. Flood and runoff performance metrics are shown here as indicators of water retention and delayed release–key functions that strengthen drought and water shortage resilience.

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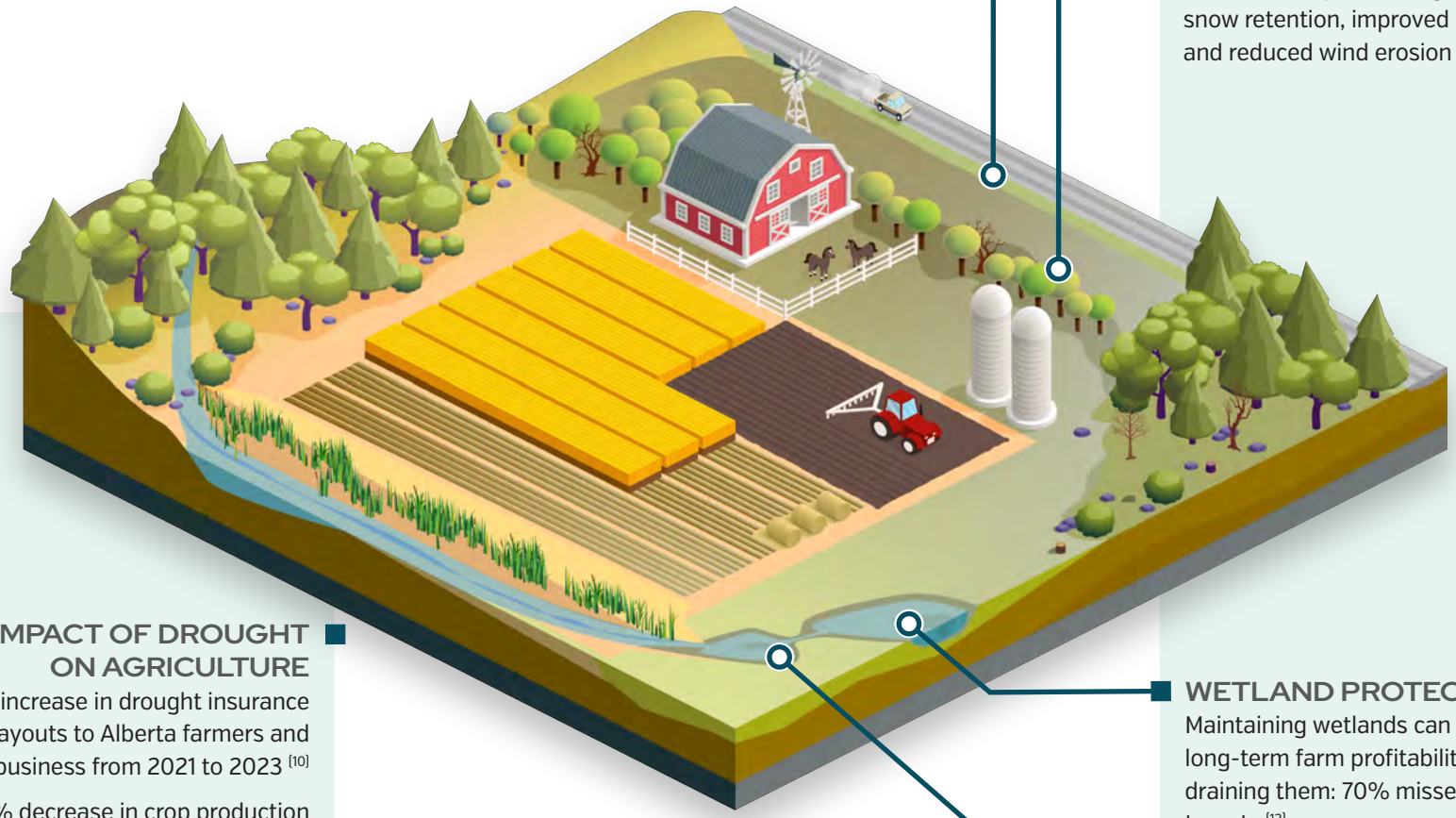


RE-GRADED DITCHES

1.9 cost-benefit ratio for ESV, including improved water retention [7,8]

AGROFORESTRY & SHELTERBELTS

Largest yield gains occur in the driest regions and driest years [13]

Increased crop and forage yields through snow retention, improved microclimate, and reduced wind erosion [13]

IMPACT OF DROUGHT ON AGRICULTURE

3x increase in drought insurance payouts to Alberta farmers and agribusiness from 2021 to 2023 [10]

47% decrease in crop production in Saskatchewan due to drought, contracting the economy by -0.3% [10]

2.2 million+ livestock were affected by extreme dry conditions in Saskatchewan in 2010 [11]

WETLAND PROTECTION

Maintaining wetlands can improve long-term farm profitability rather than draining them: 70% missed profitability targets [12]

FILTER FIELDS & PONDS

1.3 cost-benefit ratio for ESV, including increased water storage and soil moisture for dry periods [7,8]

See page 14 for a case study!

Community and Site Evidence

Urban natural infrastructure can store water, lower infrastructure costs, and improve community resilience. Flood and runoff performance metrics are shown here as indicators of water retention and delayed release–key functions that strengthen drought and water shortage resilience.

Note: Number after each insight refers to the citation in the reference list at the end of this document.

See page 14 for a case study!

COST OF DROUGHT AND ROLE OF NATURAL INFRASTRUCTURE

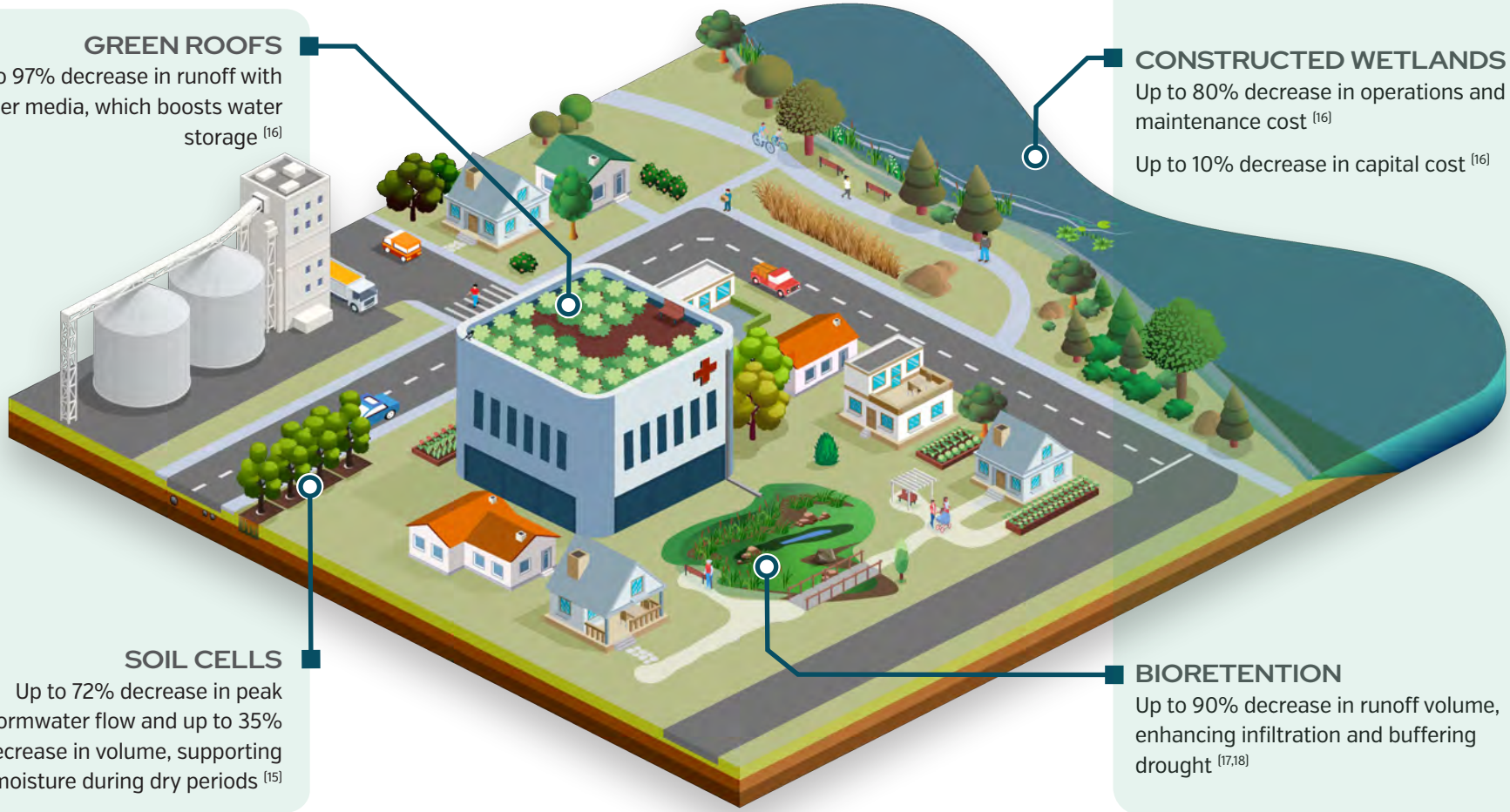
2001–2002 drought caused a CAD 5.8 billion economic loss nationally [11]

5x increase in drought insurance payments in Canada between 2018 and 2022 [10]

CAD 5.3 billion CAD in annual value provided by wetlands under Ducks Unlimited Canada's management, including water supply, wastewater treatment, and water purification [14]

GREEN ROOFS

Up to 97% decrease in runoff with deeper media, which boosts water storage [16]



CONSTRUCTED WETLANDS

Up to 80% decrease in operations and maintenance cost [16]

Up to 10% decrease in capital cost [16]

SOIL CELLS

Up to 72% decrease in peak stormwater flow and up to 35% decrease in volume, supporting soil moisture during dry periods [15]

BIORETENTION

Up to 90% decrease in runoff volume, enhancing infiltration and buffering drought [17,18]

PRAIRIE CASE STUDIES

Communities across the Canadian Prairies are already using natural infrastructure to strengthen drought resilience, improve watershed function, and lower long-term costs.

Drought-Resilient Bioretention System

OKOTOKS, AB

This project near Meadow Ridge School demonstrates how a bioretention system can improve water quality while creating a sustainable source of irrigation water. Rather than sending runoff directly to storm drains, the system retains and treats water onsite for beneficial reuse. During the spring and summer of 2020, retained runoff was used to irrigate four nearby vegetation beds at a rate of approximately 1 cm per day from June through July. By replacing treated drinking water with captured stormwater, the project reduced potable water demand while supporting healthy vegetation that further filters runoff and improves site water management. The project highlights how natural infrastructure can transform stormwater from a waste product into a valuable resource, enhancing water efficiency and resilience to future water stress. Communities can move bioretention beyond one-off pilots by embedding standard designs into servicing and subdivision standards and adding retrofits to planned road and park upgrades.

Photo Credit: ALIDP

Federal Shelterbelt Nursery

INDIAN HEAD, SK

For over a century, the federal shelterbelt nursery at Indian Head distributed free tree and shrub seedlings to Prairie farms, making a substantial contribution to Canadian agroforestry. Established in 1901 and scaled up dramatically in response to the 1930s Dust Bowl (more than 2,000 km of shelterbelts were planted), the program distributed nearly 600 million seedlings between 1901 and 2001. The trees trap snow, reduce wind speed and evapotranspiration, and hold soil in place, adding moisture to fields and buffering the dry years that recur across the region. A peer-reviewed assessment valued the external benefits of just two decades of seedlings (1981–2001) at more than CAD 140 million, including CAD 73 million in carbon sequestration and CAD 5 million in avoided soil erosion. The program's success underscores the importance of support for shelterbelts and the benefits they provide for Prairie farms.

PRAIRIE CASE STUDY

Service Value of Natural Assets

CITY OF SASKATOON, SK

UP TO CAD **48.2** million per year

In ecosystem services provided by natural infrastructure in Saskatoon, including:

- HABITAT
- CARBON SEQUESTRATION & STORAGE
- FLOOD REGULATION
- RECREATION & TOURISM
- POLLINATION
- WATER QUALITY IMPROVEMENT

Interested in learning more about the benefits of natural infrastructure?

Visit the NIWS website for more resources: https://www.iisd.org/niws

Natural infrastructure investments are often pursued to strengthen drought resilience, but their greatest value comes from delivering benefits for people, nature, and climate at the same time.

Natural Infrastructure Delivers Benefits for People, Nature, and Climate

While this guide focuses on water quality, natural infrastructure investments often deliver multiple benefits at the same time–creating value for communities, ecosystems, and long-term climate resilience.

Drought Resilience and Water Supply

Reducing water shortages, soil moisture loss, and downstream drought impacts.

NATURE FOR PEOPLE

- Recreation and well-being
- Urban cooling and shade
- Community spaces and livability
- Property and amenity value

NATURE FOR NATURE

- Habitat and biodiversity
- Ecosystem health
- Peak flow control
- Pollinator and wildlife support

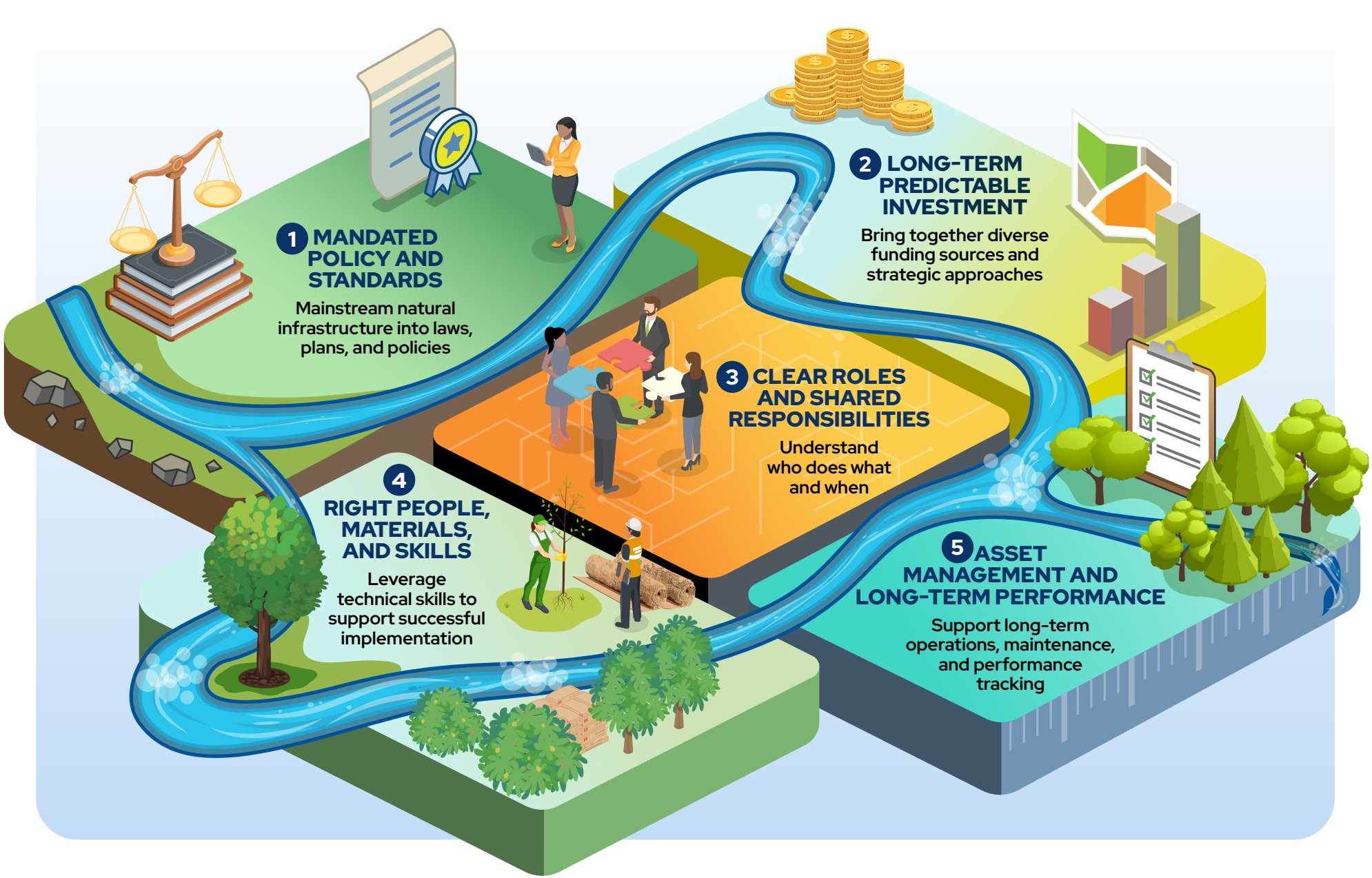
NATURE FOR CLIMATE

- Carbon storage
- Water Quality
- Groundwater recharge
- Adaptation to changing climate conditions

Natural infrastructure investments can be pursued to reduce drought and water shortage risk, but their greatest value comes from delivering benefits for people, nature, and climate at the same time.

Five Action Areas to Scale Natural Infrastructure

Scaling natural infrastructure requires action across five interconnected areas. Progress can begin anywhere, but long-term success depends on advancing all five together. The following pages describe each action area, recommend a priority action to pursue to support implementation, and share case studies for inspiration.



1. Mandated Policy and Standards

Outcome: Natural infrastructure is no longer optional –it is a standard part of planning, development, and infrastructure delivery.

KEY AUDIENCES

Indigenous and local governments, municipal associations, conservation organizations and land trusts.

Governments | Watershed Partners | Collaborative Networks

WHY THIS MATTERS

Natural infrastructure becomes standard practice when expectations are clear, mandatory, and consistently applied.

Without policy certainty, implementation depends on individual champions rather than established practice.

PRIORITY ACTION

Embed natural infrastructure requirements into policies, standards, and approval processes so they become standard practice.

- Adopt existing, credible natural infrastructure standards and tools rather than creating new ones.
- Integrate natural infrastructure requirements into official plans, land-use bylaws, development and subdivision standards, and permitting processes.
- Make compliance with natural infrastructure requirements a condition of approval.
- Apply requirements consistently across projects and proponents.

ADDITIONAL OPPORTUNITIES

Strengthen provincial policies supporting wetland protection and restoration to improve water retention and groundwater recharge.

Require public reporting of natural infrastructure performance and value into financial and asset management frameworks.

Key Resources: CSA W218:23 Natural Asset Inventories; Standards Council of Canada Nature-Based Solutions initiatives; emerging CSA standards supporting natural asset management and natural infrastructure implementation.

Wetland Restoration | Lac La Biche, AB

PRAIRIE EXAMPLE

Setting Water Retention Standards in Policy

Saskatchewan's Water Security Agency has embedded natural water storage into provincial policy through its Agricultural Water Stewardship Policy–a made-in-Saskatchewan approach to agricultural water management. Rather than treating wetlands only as obstacles to drainage, the policy sets a baseline wetland-retention goal of 40% (rising to 60% where needed to protect important water sources), applied regionally to reflect the province's varied landscapes. The policy is backed by monitoring and a CAD 1-million, multi-year research initiative with producers and research partners to keep it evidence-based. It shows how clear regional retention standards can make natural water storage a routine part of land-and-water decisions.

2. Long-Term, Predictable Investment

Outcome: Natural infrastructure is routinely planned, protected, built, and maintained because funding is stable, accessible, and aligned with long term performance.

KEY AUDIENCES

Governments & infrastructure owners, private sector & investment partners, conservation organizations and land trusts, and municipal associations.

- Governments and Asset Owners
- Private Sector and Investors
- Watershed and Conservation Partners

WHY THIS MATTERS

Short-term funding cannot support long-term infrastructure performance. Natural infrastructure requires sustained investment for protection, implementation, monitoring, and maintenance.

PRIORITY ACTION

Establish long-term investment approaches that fund natural infrastructure as an essential component of drought resilience and water supply.

- Inventory existing natural infrastructure assets and identify the water supply and other services they provide.
- Identify priorities for protection, restoration, enhancement, and new implementation across the watershed.
- Estimate lifecycle funding needs, including planning, construction, operations, maintenance, and monitoring.
- Align funding approaches along with the drought resilience and broader services that natural infrastructure delivers.
- Establish stable, long-term funding mechanisms by embedding natural infrastructure into policies and asset management systems.

ADDITIONAL OPPORTUNITIES

- Collaborate with the private sector (e.g., insurers, developers) to explore alternative investment sources.
- Advocate for dedicated funding programs for natural infrastructure implementation across watershed, agriculture, community and site scales.
- communicate drought resilience and water supply benefits, such as long-term availability and groundwater recharge.

Wetland I Strathcona County, AB

PRAIRIE EXAMPLE

Ducks Unlimited Wetland Restoration Lease Program

Ducks Unlimited Canada's Wetland Restoration Lease Program helps landowners restore previously drained wetlands while keeping the land in agricultural production. Through 10-year agreements, landowners receive financial compensation to restore natural water levels, while retaining ownership and the ability to grow hay or graze the restored areas. Restored wetlands function as natural infrastructure, helping to recharge groundwater, hold water on the land, and release water into the land during drought conditions. By combining financial incentives, technical expertise, and long-term stewardship, the program demonstrates how partnerships with landowners can restore watershed functions, improve water quality, and strengthen climate resilience across the Prairies.

3. Clear Roles and Shared Responsibility

Outcome: Natural infrastructure is planned and delivered in a way that can be upscaled through coordinated action at the local government and watershed levels.

KEY AUDIENCES

Indigenous and local governments, municipal associations, conservation organizations and land trusts.

Governments | **Watershed Partners** | **Collaborative Networks**

WHY THIS MATTERS

Watersheds cross jurisdictional boundaries, but governance often does not. Clarifying roles and strengthening partnerships helps avoid fragmented investments and missed opportunities.

PRIORITY ACTION

Strengthen local leadership and watershed-scale collaboration to coordinate water quality efforts through natural infrastructure.

- Establish a formal mandate describing how departments and partner organizations, including developers, will work together.
- Secure dedicated resources to support ongoing watershed coordination activities, in addition to project implementation costs.
- Clearly define and communicate roles and responsibilities among organizations, interested parties, and community members involved in natural infrastructure implementation.

ADDITIONAL OPPORTUNITIES

- Develop shared watershed priorities with upstream and downstream partners to maximize water quality benefits.
- Create opportunities to collaborate with the private sector, landowners, and communities.

Town of Herbert Drought Response Planning Workshop, SK

Photo Credit: Saskatchewan Association of Watersheds

PRAIRIE EXAMPLE

Drought Response Planning: Clarifying roles for drought resilience

The Saskatchewan Association of Watersheds is helping communities strengthen drought resilience through its Hydrologic Drought Response Planning program. Working with communities, the Association develops community-specific drought response plans that identify drought indicators, response actions, leadership roles, and operational responsibilities before water shortages occur. By clearly defining who is responsible for monitoring conditions, making decisions, communicating with residents, and implementing response measures, the program helps communities move from reactive crisis management to coordinated action. The plans create a shared understanding of responsibilities among municipal staff, watershed organizations, and provincial agencies, ensuring that the right people are prepared to act during drought.

4. Right People, Materials, and Skills

Outcome: Natural infrastructure will be protected, restored, designed, built, and maintained successfully because the right local knowledge, expertise, materials, and systems are in place.

KEY AUDIENCES

Practitioners, contractors, Indigenous Knowledge Holders & First Nations, professional associations, educational institutions, watershed organizations, supply chain partners.

Practitioners and Contractors

Education and Training Partners

Indigenous Knowledge Holders & Land Stewards

WHY THIS MATTERS

Natural infrastructure depends on living systems that require specialized knowledge and resources.

Building workforce capacity and supply chains enables projects to be delivered successfully at scale.

PRIORITY ACTION

Build the workforce capacity, technical knowledge, and supply chains needed to successfully deliver natural infrastructure for drought resilience and long-term water availability.

- Develop and deliver role-specific training for practitioners, contractors, and operators on funding opportunities, design practices, maintenance requirements, and compliance obligations.
- Enable the supply chain by coordinating procurement, supporting bulk purchasing opportunities, and aligning implementation schedules with growing seasons.
- Understand local site conditions (e.g., soil type, moisture) to make sure the appropriate natural infrastructure solutions are selected.

ADDITIONAL OPPORTUNITIES

- Encourage peer-to-peer learning across jurisdictions to share experiences and lessons learned.
- Partner with post-secondary institutions and local Indigenous Nations to develop experiential learning opportunities.
- Learn from Indigenous Knowledge Holders about local drought and water supply concerns, water movement, and land stewardship in areas of interest.
- Work with local nurseries and greenhouses to source plant species suited to local hydrology and conditions.

Seedling

Photo by Jael Rodriguez on Unsplash

CANADIAN EXAMPLE

Indigenous Nursery Dedicated to Native Plant Production

Nupqu Resource Limited Partnership has established one of Canada's largest Indigenous-owned native plant nurseries on Aq'am First Nation lands near Cranbrook, B.C. The facility can grow up to 700,000 native seedlings annually, supplying plants for land restoration. Using locally collected seed, the nursery produces native grasses, shrubs, and trees adapted to local conditions. These plants support natural infrastructure by stabilizing soils, reducing erosion, improving water infiltration, and restoring watershed functions that help protect water quality. The project demonstrates how Indigenous leadership, specialized expertise, and locally sourced plant materials can be mobilized to restore degraded landscapes at scale while strengthening long-term environmental stewardship and community resilience.

5. Asset Management and Long-Term Performance

Outcome: Natural infrastructure will be managed (protected, maintained) as an integral part of asset management systems.

KEY AUDIENCES

Includes Indigenous, local, provincial, and federal governments, utilities and infrastructure owners, watershed groups managing natural assets.

- Governments
- Infrastructure Owners and Utilities
- Watershed Groups

WHY THIS MATTERS

Infrastructure delivers value only when it is actively managed.

Treating natural infrastructure as an asset helps secure long-term funding, maintenance, and public confidence.

PRIORITY ACTION

Manage natural infrastructure as essential infrastructure through asset management systems and ongoing stewardship.

- Include natural infrastructure in asset inventories.
- Report on condition, service level, and value through state of infrastructure or asset management reporting structures.
- Incorporate natural infrastructure into life-cycle and capital decisions.
- Establish ongoing maintenance and monitoring requirements to sustain performance, including drought resilience and water supply functions where appropriate.

ADDITIONAL OPPORTUNITIES

- Assign ownership and clarify responsibilities for inspections, maintenance, and issue reporting, especially after prolonged dry periods or low soil moisture.
- Establish dedicated operations and maintenance budgets for water storage features, including sediment removal to preserve storage capacity, vegetation management, and berm and outlet repair.
- Monitor performance and support adaptive management through clear service-level metrics.
- Plan for vegetation establishment periods and recognize that natural infrastructure performance increases over time.

Key Resources: https:/naturalassetsinitiative.ca and CSA W218:23 Standard

Municipal Park | Winnipeg, MB

Photo by Jesse on Unsplash

CANADIAN EXAMPLE

Ontario's Asset Management Regulation: Embedding Natural Infrastructure

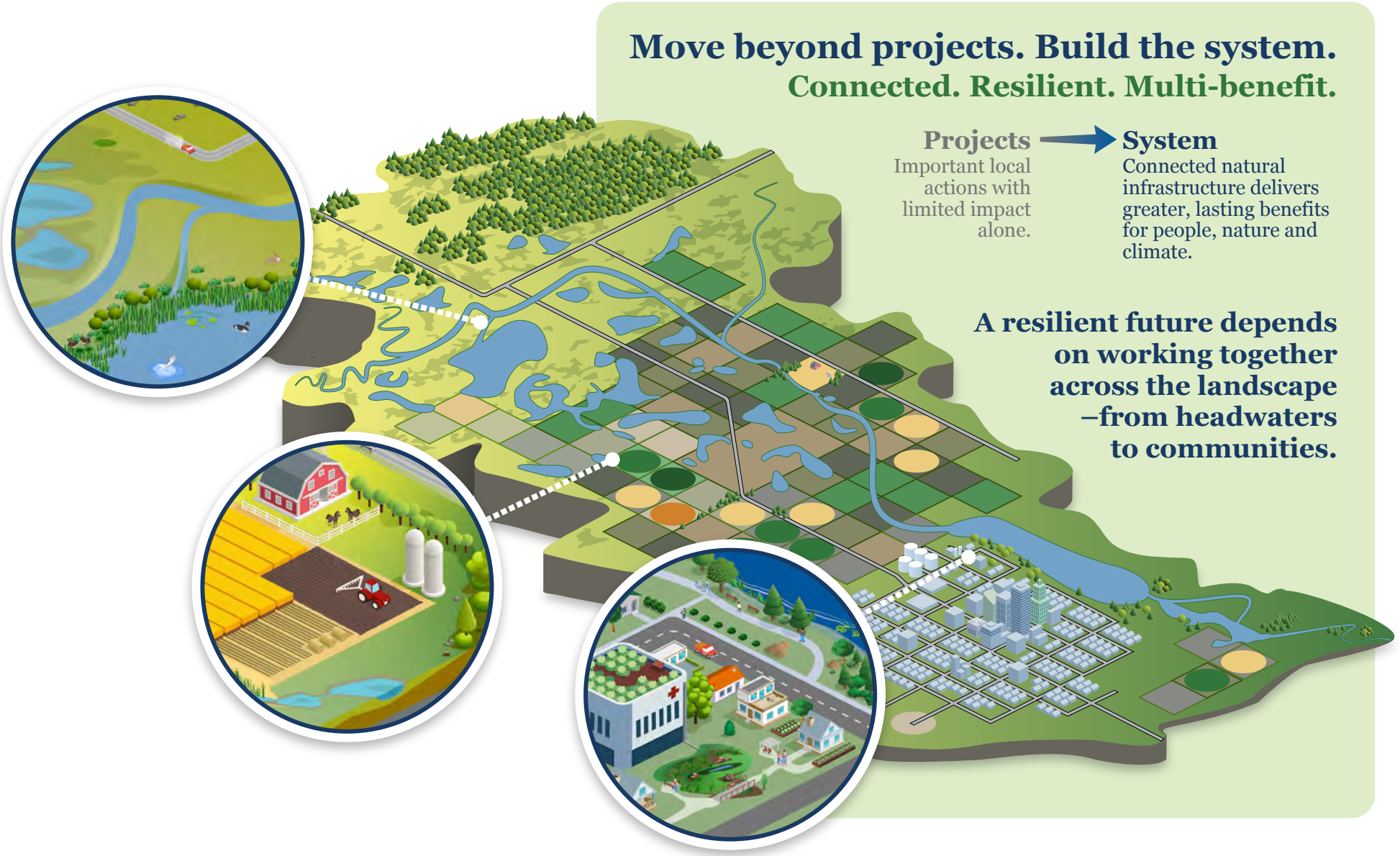
Ontario's O. Reg. 588/17 requires municipalities to consider green infrastructure assets, including wetlands, natural channels, urban forests, and stormwater systems, within asset management planning. By recognizing natural assets as infrastructure, municipalities can account for the long-term services they provide, such as water filtration, flood mitigation, and groundwater recharge. By embedding natural assets within formal asset management processes, Ontario is helping municipalities improve infrastructure performance, reduce risk, and protect the natural systems that underpin community resilience.

PRAIRIE PROGRESS

While many Prairie communities are progressing toward formal asset management integration, the City of Selkirk, MB has explored how natural areas contribute to municipal services, promoting the inclusion of these assets within long-range infrastructure planning and decision making.

Scaling Natural Infrastructure: From projects to a resilient system

Integrate nature in how we plan, fund, deliver, and manage infrastructure at the scale our communities and watersheds need.



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