Trees/Forest – Asset and Liabilities to Your Municipality

Toso Bozic P.Ag

CEO ATTS Group Inc.

https://attsgroup.ca/

https://yardwhispers.ca/

ATTS GROUP

We provide insights for people and businesses to make informed decisions

Our Consulting Services

- **Tree/Forestry Services** - through our sister company Yard Whispers
  - Municipal Urban/Rural forestry planning
  - Arborist services
  - Agroforestry/Woodlot services
- **Environmental Services**
  - Renewable biomass energy projects
  - Waste to Energy project
- **Business Services**
  - Human Resources
  - Government, corporate, and stakeholder relations
  - Grant application services
  - Business plan development
  - GIS Asset Management

ATTS Group

Our Tree/Forestry Services

Arborist Services

- Forensic Tree Expert for insurance and legal services
- IPM Services -Tree pests ID, assessment, surveillance and monitoring
- Tree Risk and Hazard Assessments (TRAQ Certified)
- Tree appraisal and value assessment

Municipal (towns, summer villages, counties) Tree Management Services

- Conduct tree/forest inventory
- Development of Tree/Forest management plan
- Development of tree bylaws, policy and regulations

Natural forest management

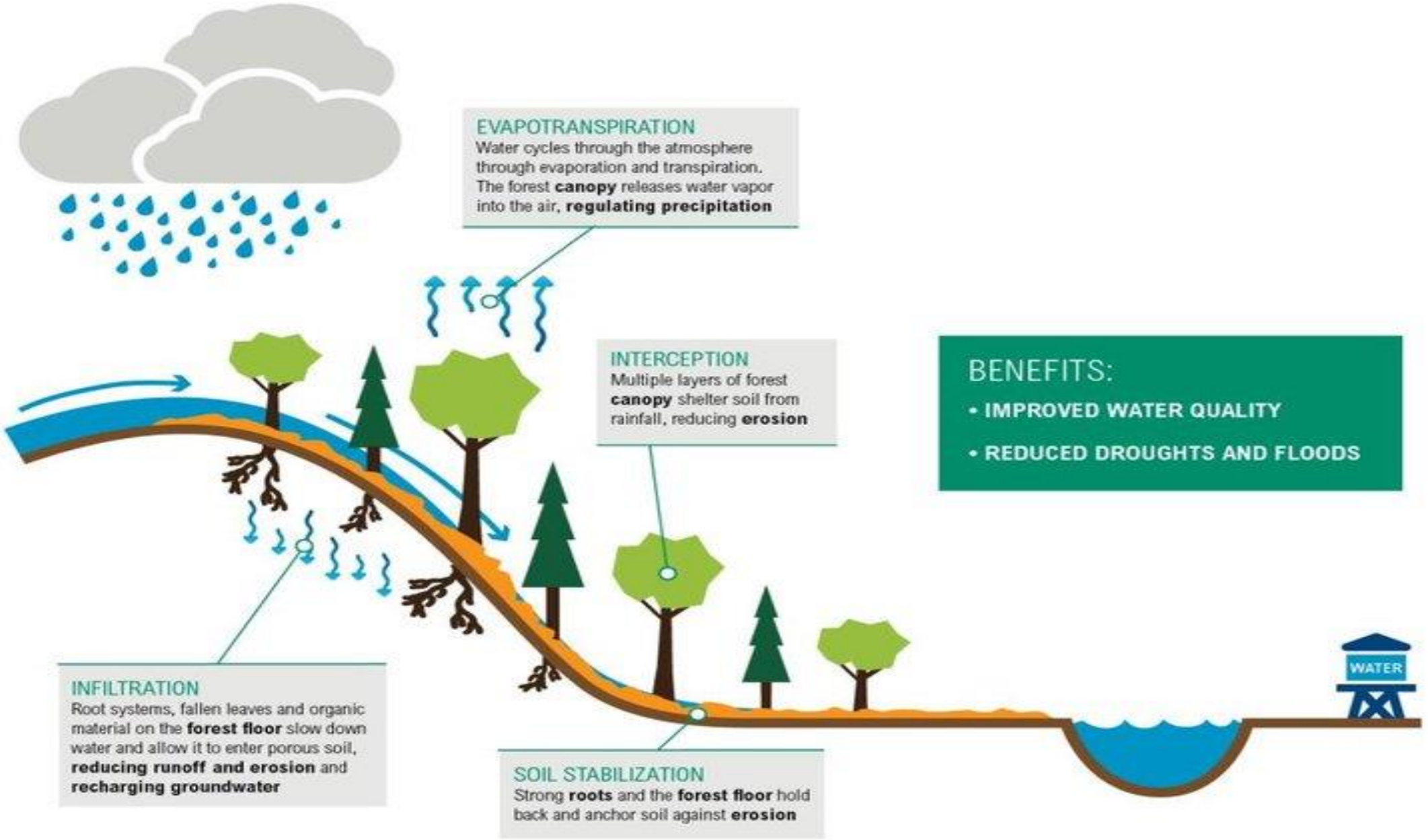
- Woodlot management plans- harvesting and reforestation
- Tree/forest design, planting and species selection for reforestation and reclamation projects
- Tree planning and designs for acreage owners

Agroforestry Services

- Shelterbelts and windbreaks designs
- Development of riparian and natural tree/forest revegetation plans
- Biodiversity, wildlife and pollinators tree designs and planting

Water and trees

- Purify drinking water - “Trees are like natural sponges, and they act like kidneys”
- Absorb pesticides, fertilizers, heavy metals and other pollutants
- Recharge ground water
- Reduce excessive erosion
- Biodiversity “hotspots”
- 2/3 of Canada’s Species at Risk rely on riparian areas
- Corridors for wildlife
- Reduces flood effects
- Reduce the cost of drinking water

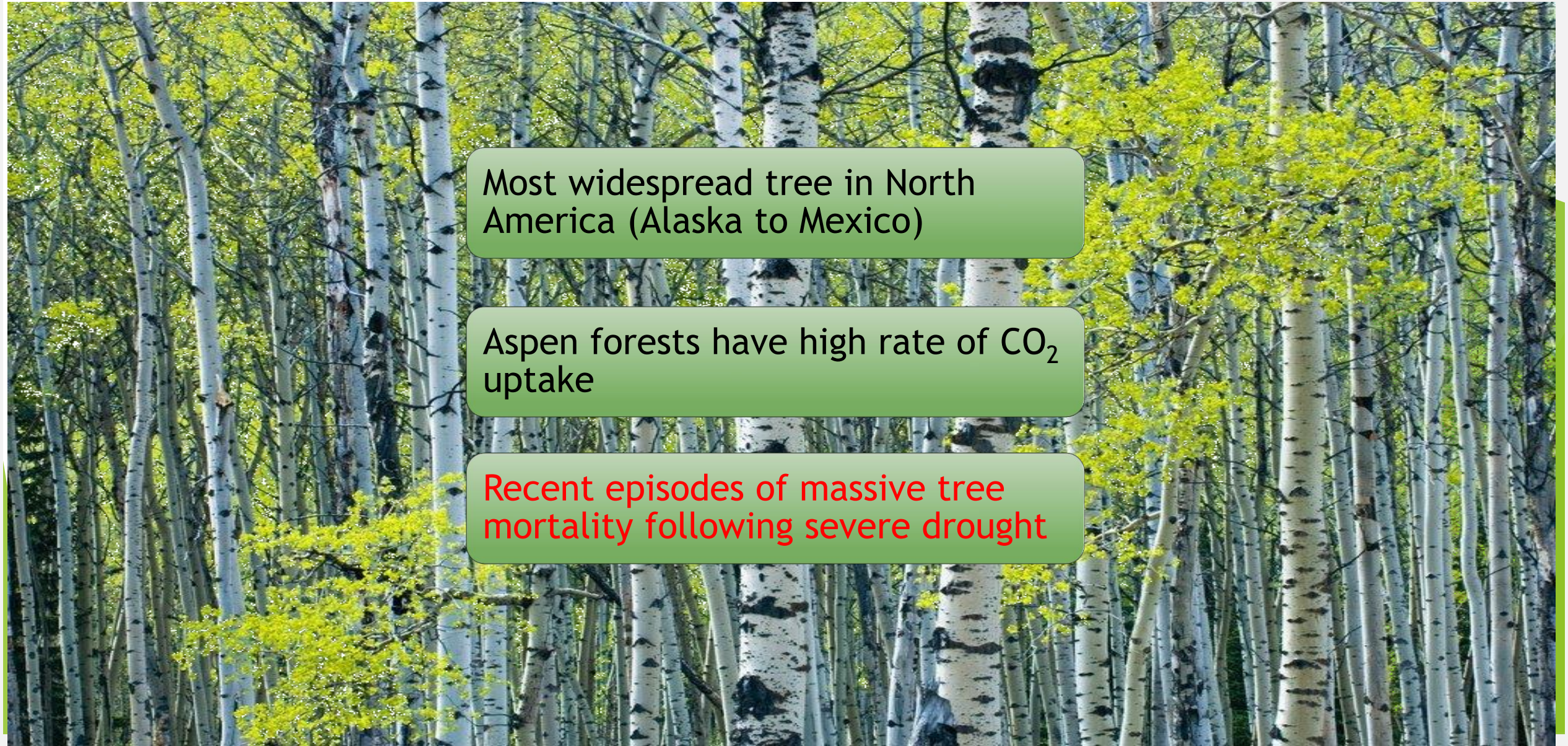


Source: Role of forests in the water cycle. http://www.wri.org/blog/2016/08/watershedslost-22-their-forests-14-years-heres-how-it-affects-your-water-supply (modified)

Key Drivers that Impact your Watershed

- Climate
- Fire
- Flood
- Agriculture
- Liabilities arise from 4 above
- Trees are asset and solution

Trembling Aspen (Populus tremuloides)



Most widespread tree in North America (Alaska to Mexico)

Aspen forests have high rate of CO_2 uptake

Recent episodes of massive tree mortality following severe drought

Severe dieback

Batoche, SK - one of the three CIPHA stands has experienced 100% mortality

2003

2008

2012

What you see on the ground

Wood borers

Cankers

Drought

Defoliators

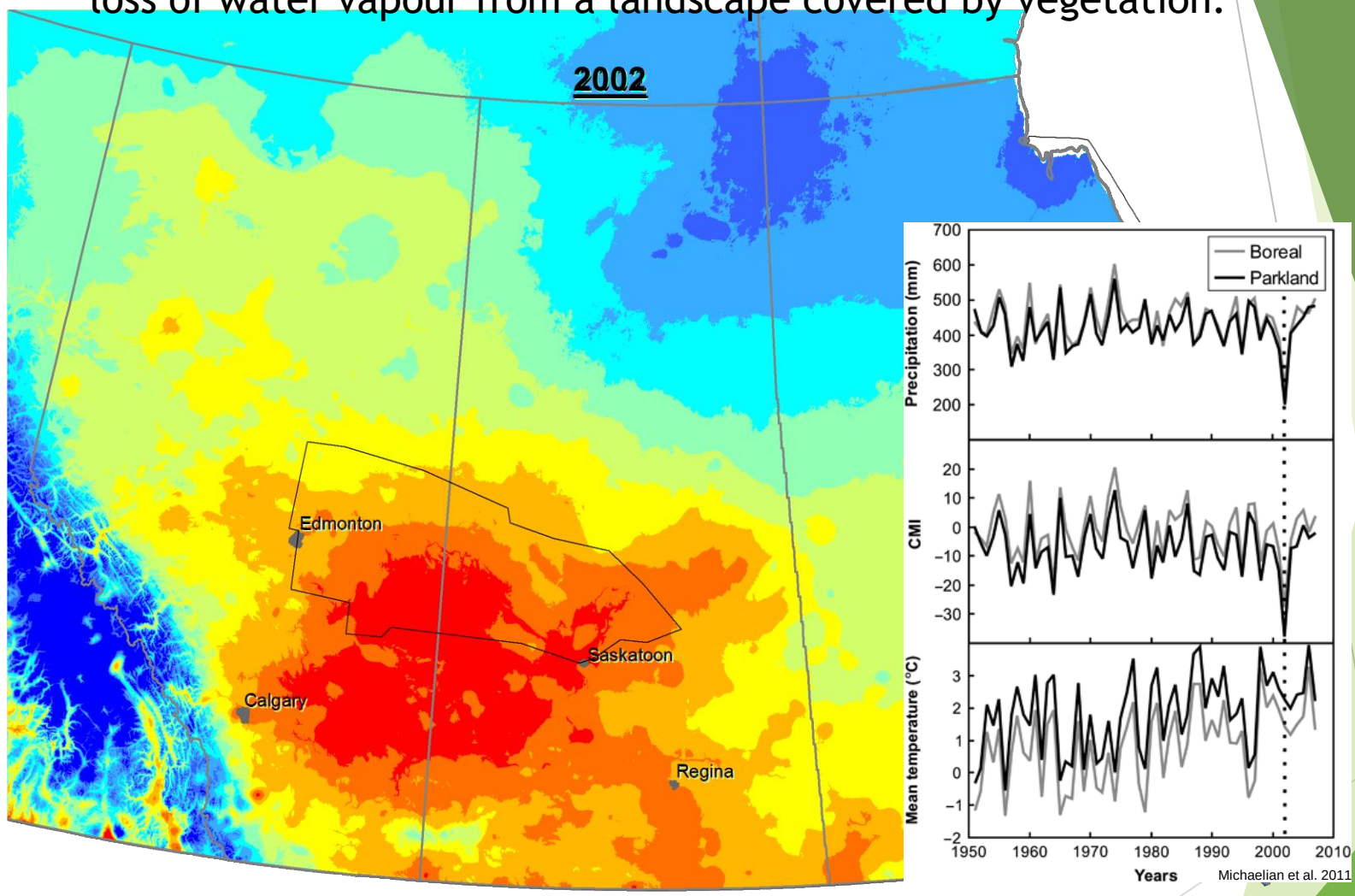
Stressed trees

Root rot

Mortality

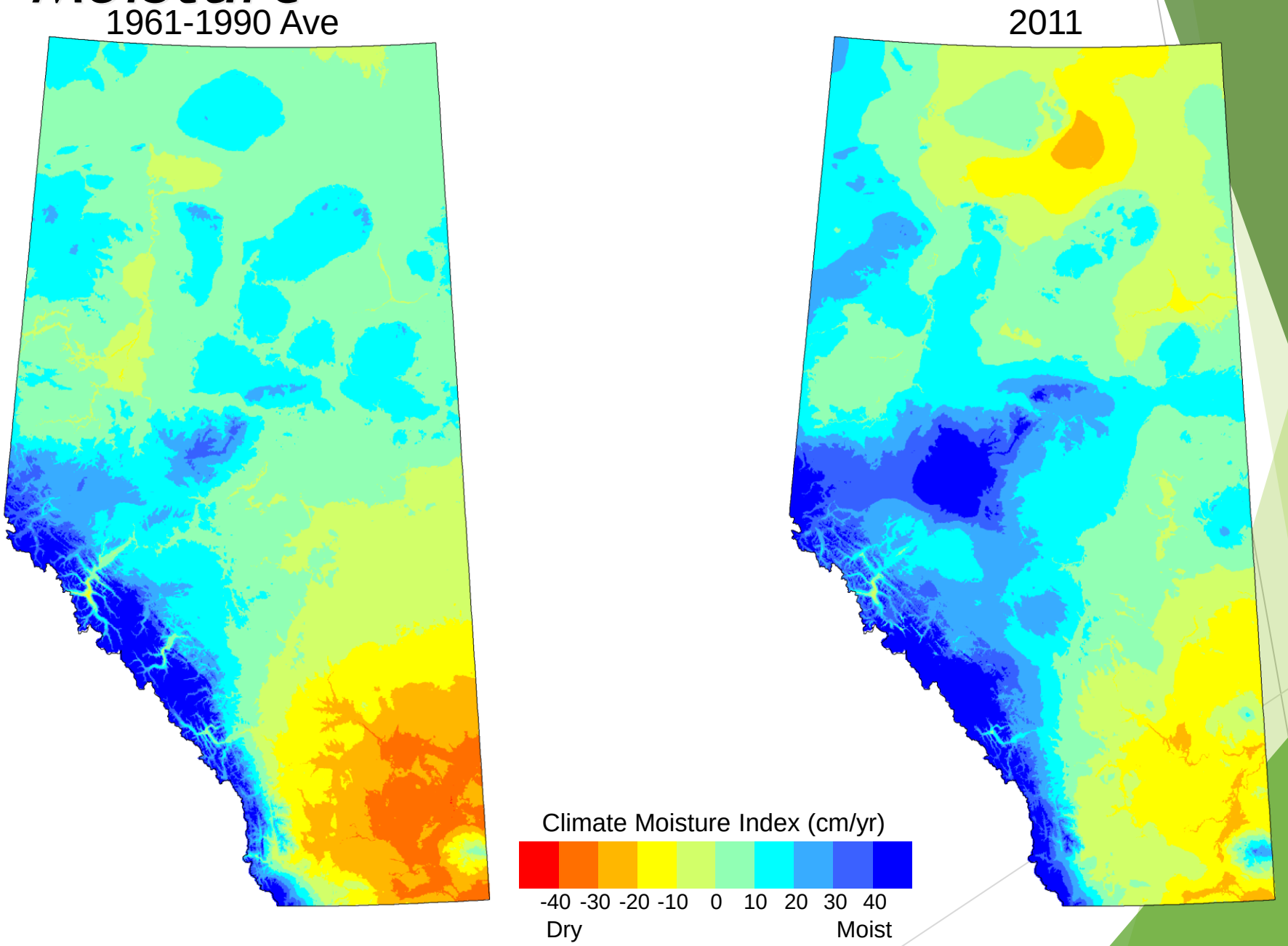
CMI

The Climate Moisture Index (CMI) was calculated as the difference between annual precipitation and potential evapotranspiration (PET) – the potential loss of water vapour from a landscape covered by vegetation.



Michaelian et al. 2011

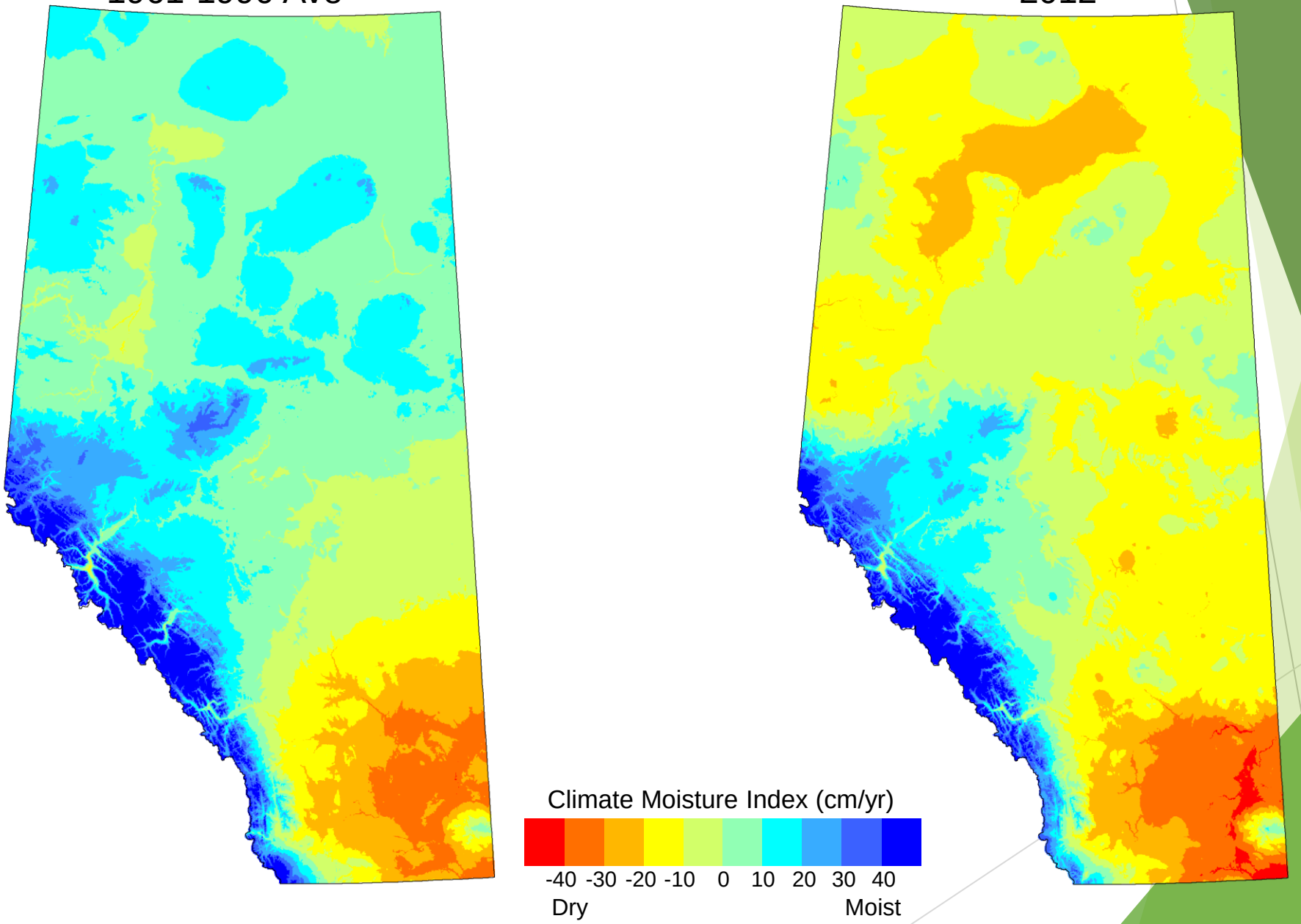
Moisture


1961-1990 Ave
2011
Climate Moisture Index (cm/yr)
-40 -30 -20 -10 0 10 20 30 40
Dry
Moist

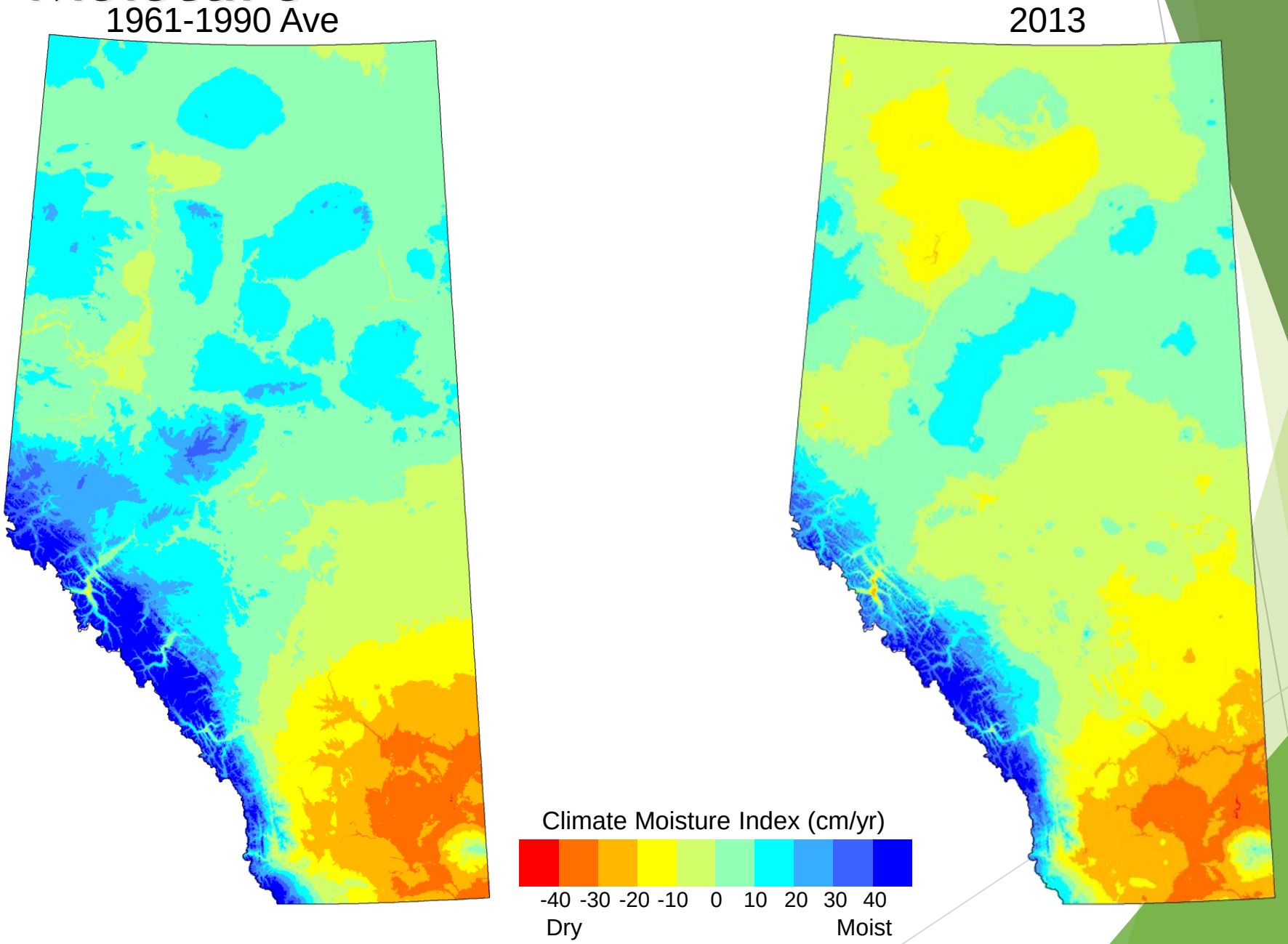
Moisture

1961-1990 Ave

2012



Moisture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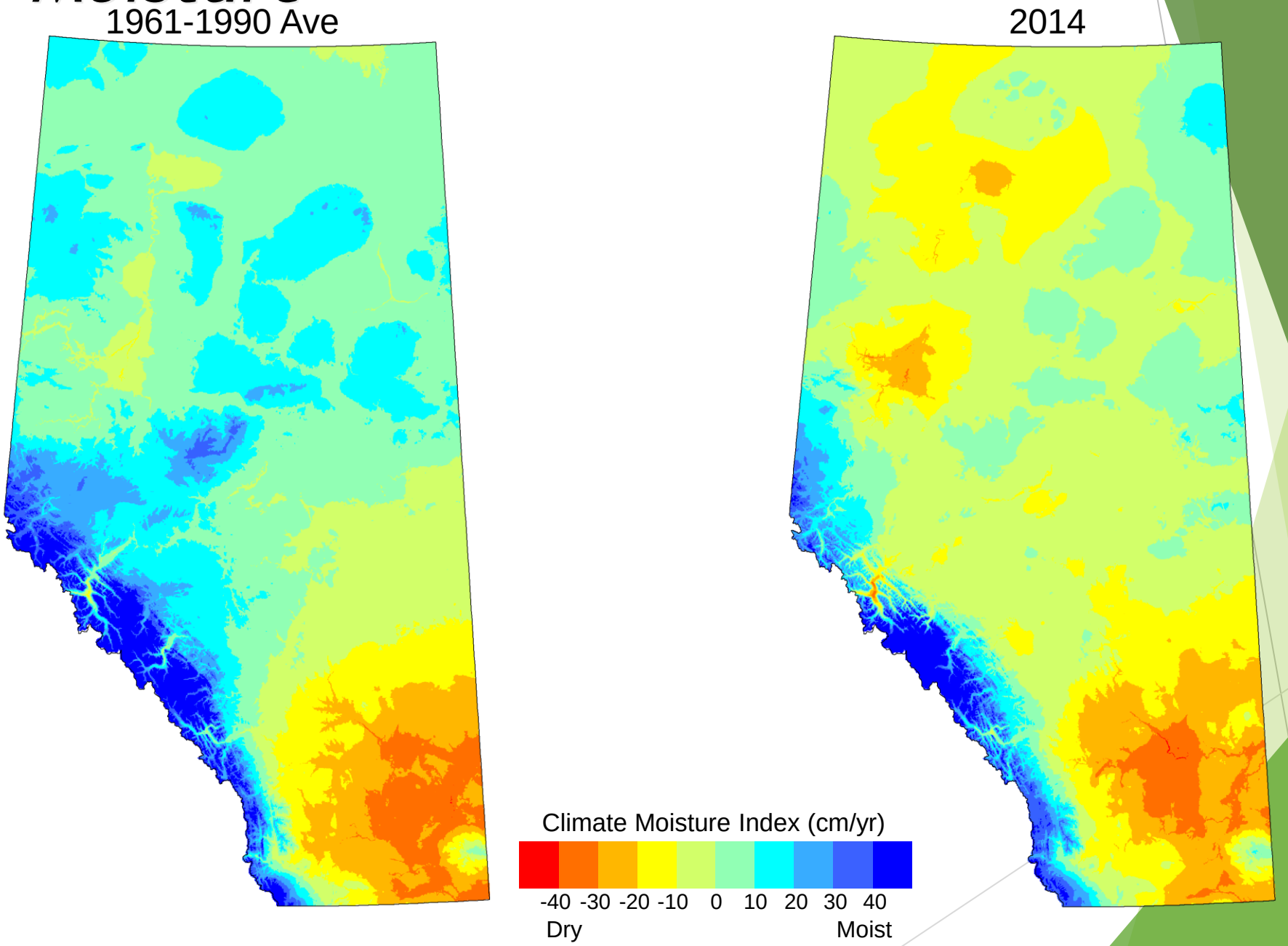
Dry
Moist

Moisture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2014
Climate Moisture Index (cm/yr)
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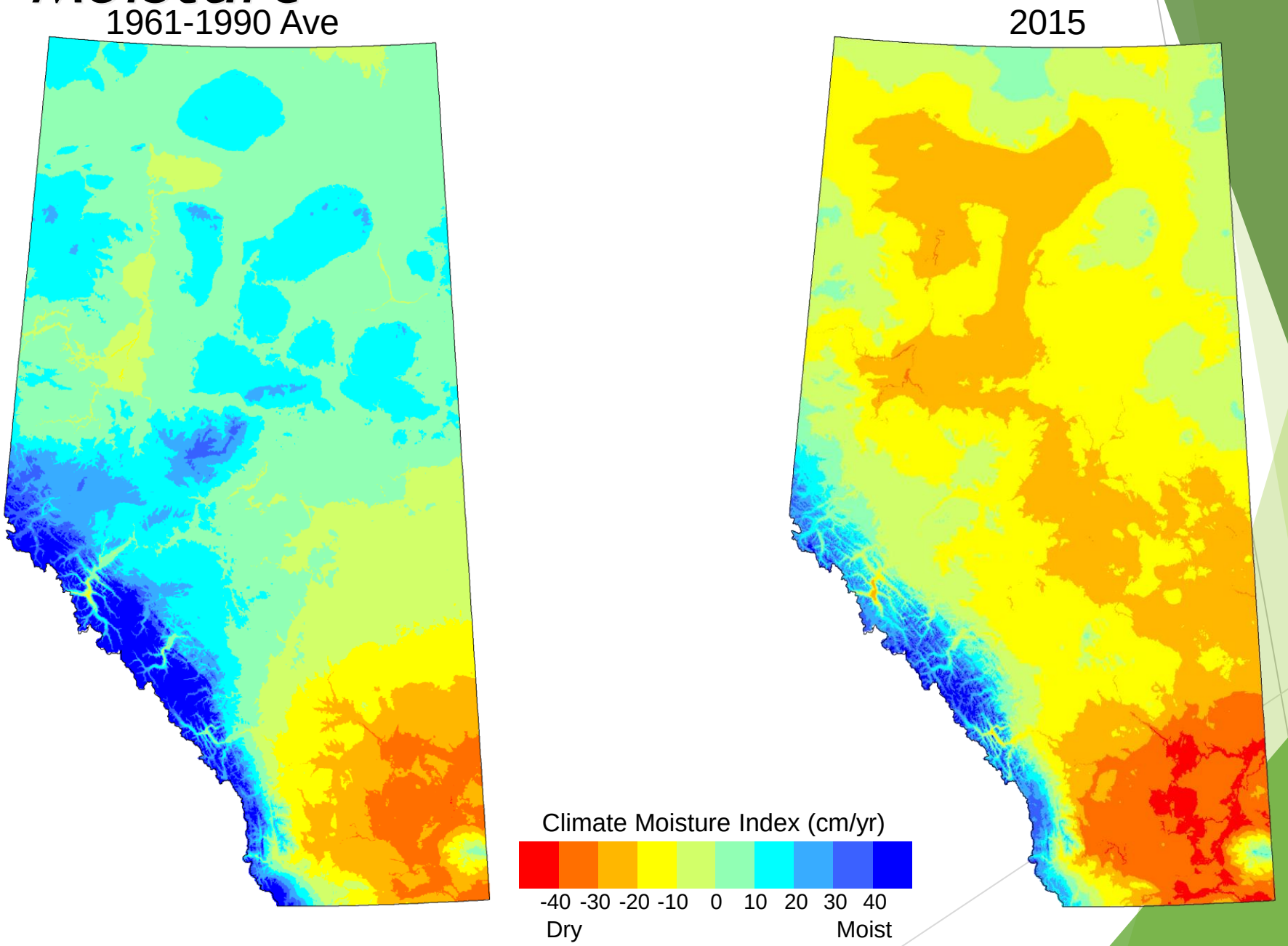
Dry
Moist

Moisture


1961-1990 Ave
2015
Climate Moisture Index (cm/yr)
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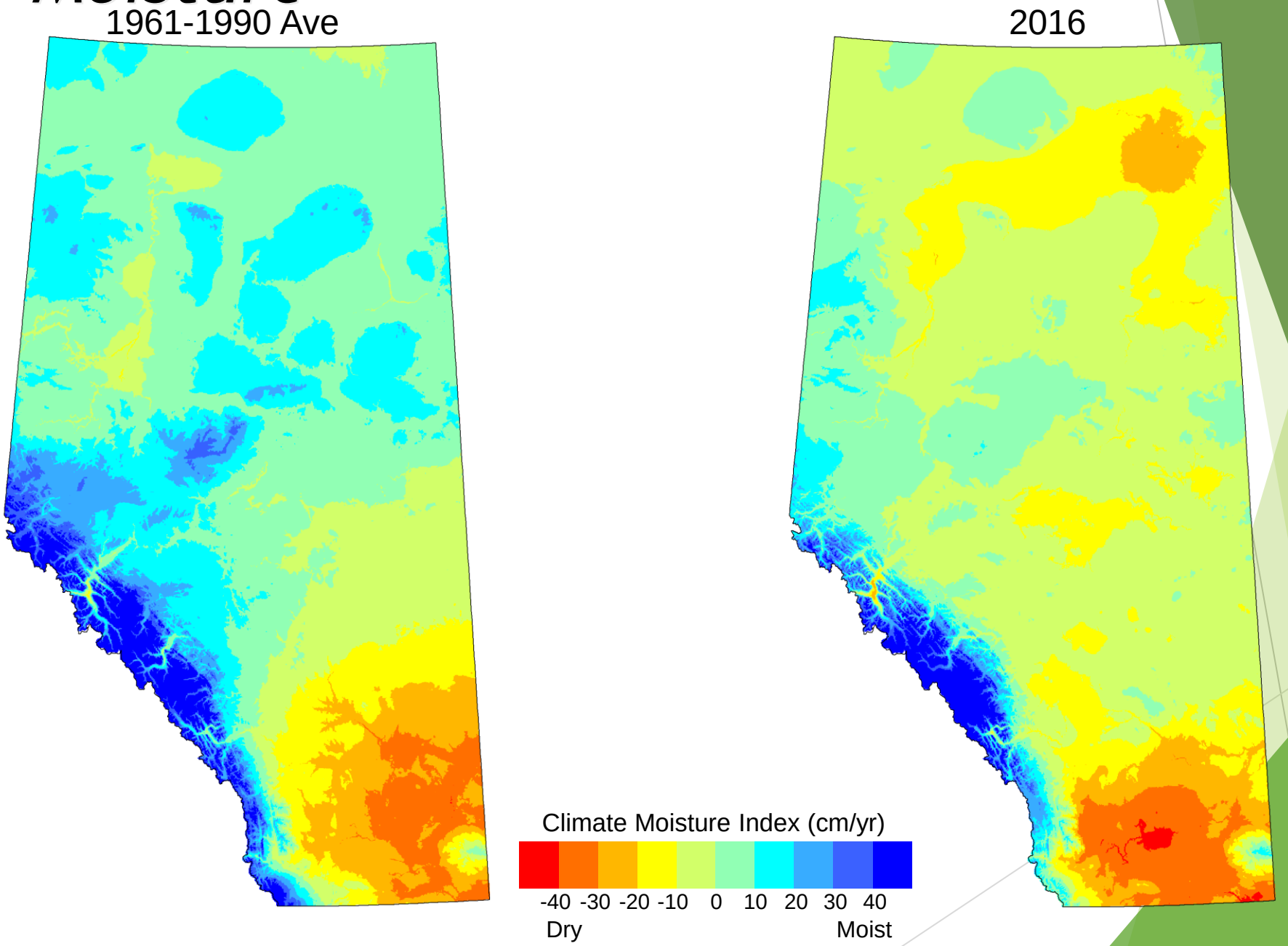
Dry
Moist

Moisture


1961-1990 Ave
2016
Climate Moisture Index (cm/yr)
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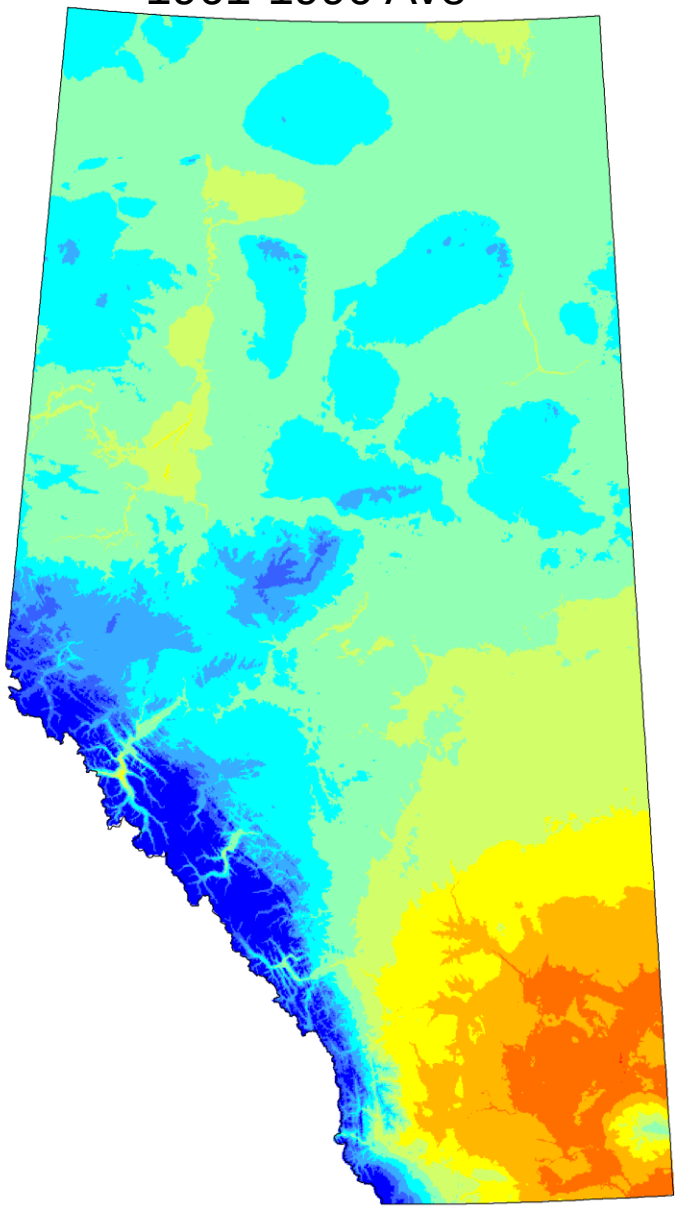
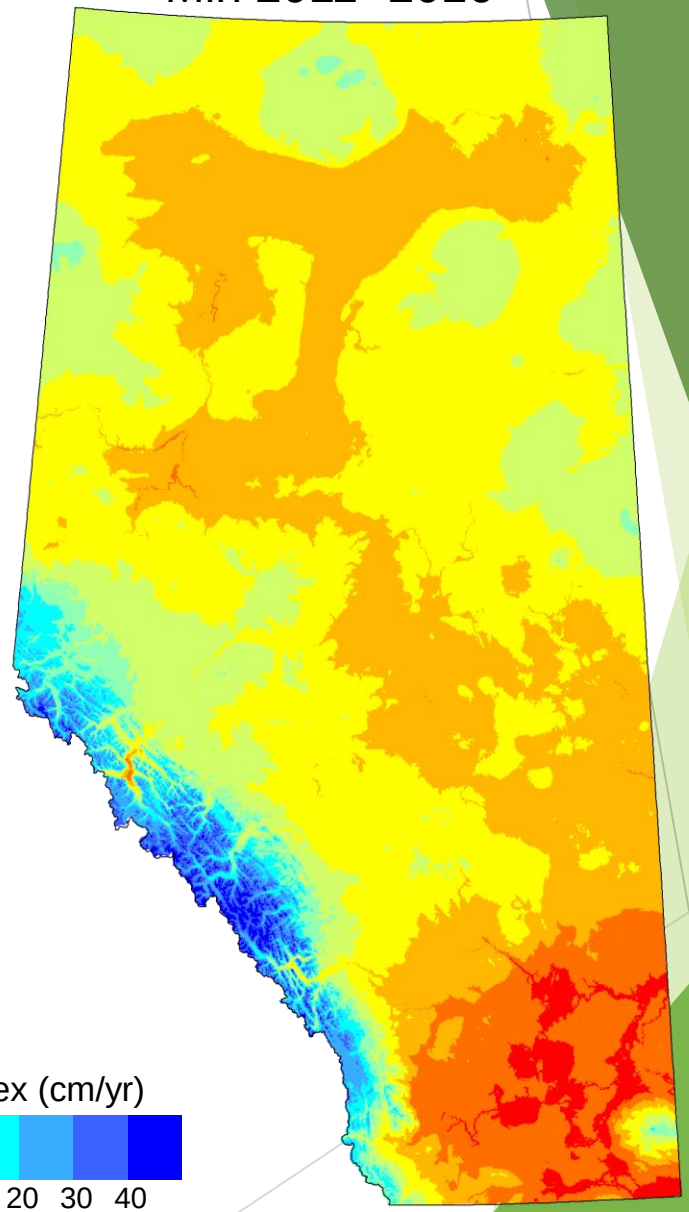
Dry
Moist

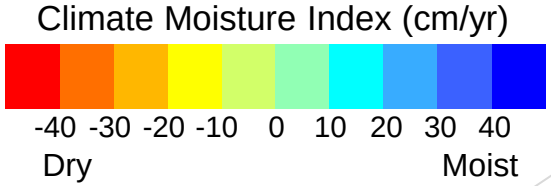
Moisture

1961-1990 Ave



Min 2011- 2016






What is effect of tree mortality on watershed during this period?

CANADA

Tomahawk wildfire west of Parkland County causing flare-ups, resident concern

By Morgan Black · Global News
Posted July 3, 2021 6:00 pm

Water bombers over Tanya Dirk's property on July 1 in Tomahawk. Courtesy: Tanya Dirk

CANADA

Alberta crews continue to battle out-of-control wildfire in Yellowhead County

By Slav Kornik · Global News
Posted June 23, 2021 12:07 pm · Updated June 24, 2021 6:39 pm

Yellowhead County residents who were forced to evacuate their homes on Tuesday due to a wildfire near Evansburg were allowed to return Wednesday night, but were told to be ready to leave again if need be. Sarah Komadine spent the day in the community west of Edmonton, where crews continued to battle the out-of-control forest fire – Jun 23, 2021

Calgary

Wildfires in southern Alberta contained after village evacuated

1 person transported to hospital in critical condition as a result of fire, RCMP says

Joel Dryden · CBC News · Posted: Mar 28, 2021 3:26 PM MT | Last Updated: March 28

This image, taken by Kyle Brittain of The Weather Network, shows smoke billowing in southern Alberta. A massive grass fire has forced the evacuation of the village of Carmangay. (Kyle Brittain/The Weather Network)

The Current

2 months after Lytton, B.C., was destroyed by fire, its future is still unclear

As rebuilding plans begin before some residents have even been allowed back, many feel stuck in limbo

CBC Radio · Posted: Sep 13, 2021 3:22 PM ET | Last Updated: September 13

EDMONTON | News

Ten years later: Five things to know about the Slave Lake wildfire

Colette Derworiz
The Canadian Press Staff
Contact

Published Sunday, May 9, 2021 11:57AM MDT

Crews work to shut off gas and water in a burned-out neighbourhood in Slave Lake, Alta., on Wednesday, May 15, 2011. Almost all of Slave Lake's 7,000 residents fled Sunday in the face of a forest fire that eventually destroyed about a third of the town. (The Canadian Press/Ian Jackson)

SHARE:

MOST-WATCHED

2 Oilers develop heart condition after COVID-19

EDMONTON | News

Dry conditions prompt over 40 fire bans or advisories in Alberta

Adam Lachacz CTVNewsEdmonton.ca Digital Producer
@adam_lachacz | Contact

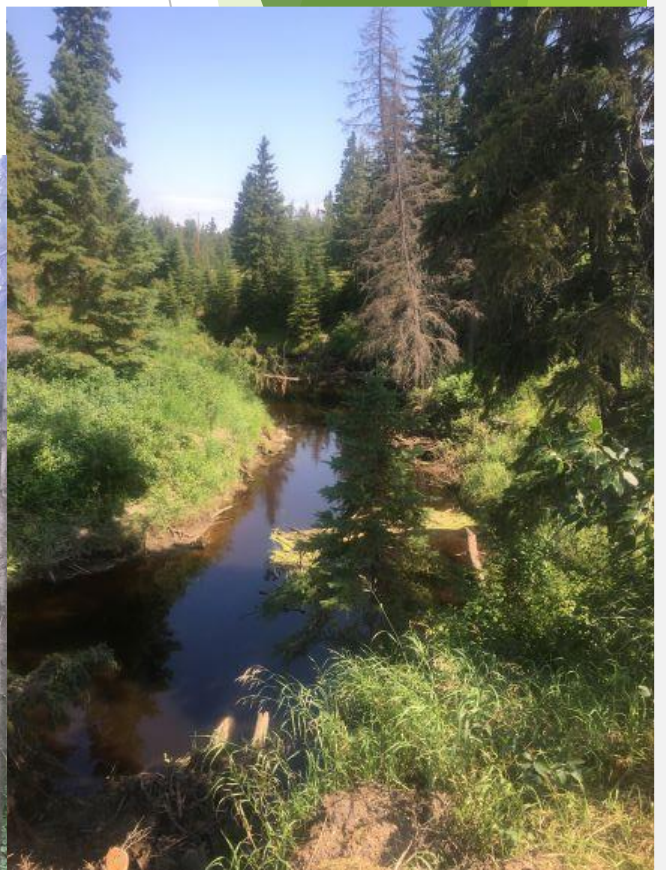
Published Thursday, April 15, 2021 3:10PM MDT

As of April 15, 2021 there are 46 fire use warnings, restrictions, or bans in Alberta (Supplied/Alberta Fire Bans).

MOST-WATCHED

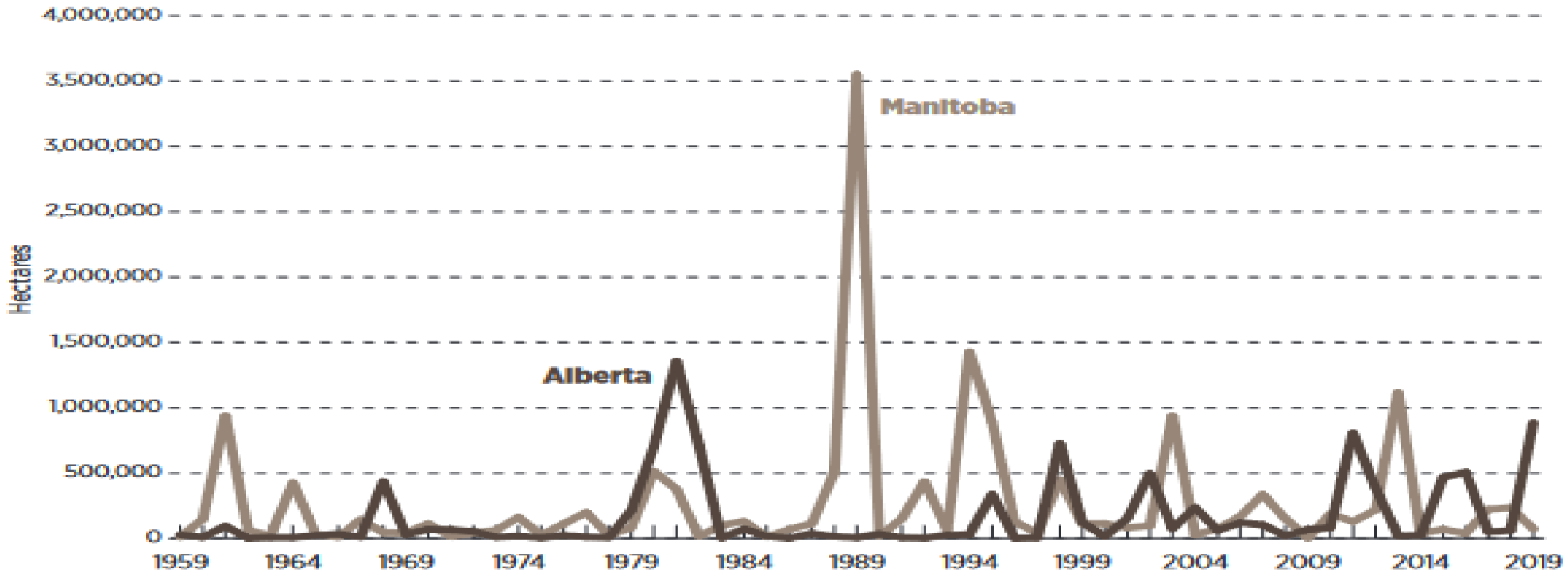
Fire Hazard within acreage development, towns, hamlets, environmental and natural reserves as well as private forest

- Many small towns, hamlets and acreages are built in natural forest settings
- Natural forest is part of riparian area or natural areas around town
- Since 2011 Slave Lake Forest fires many small towns in Alberta apply for Fire Smart Program and Grants
- Thousands of acres of privately own forest



Forest Fire History

Figure 3: Total area burned (hectares), Alberta and Manitoba, 1959–2019

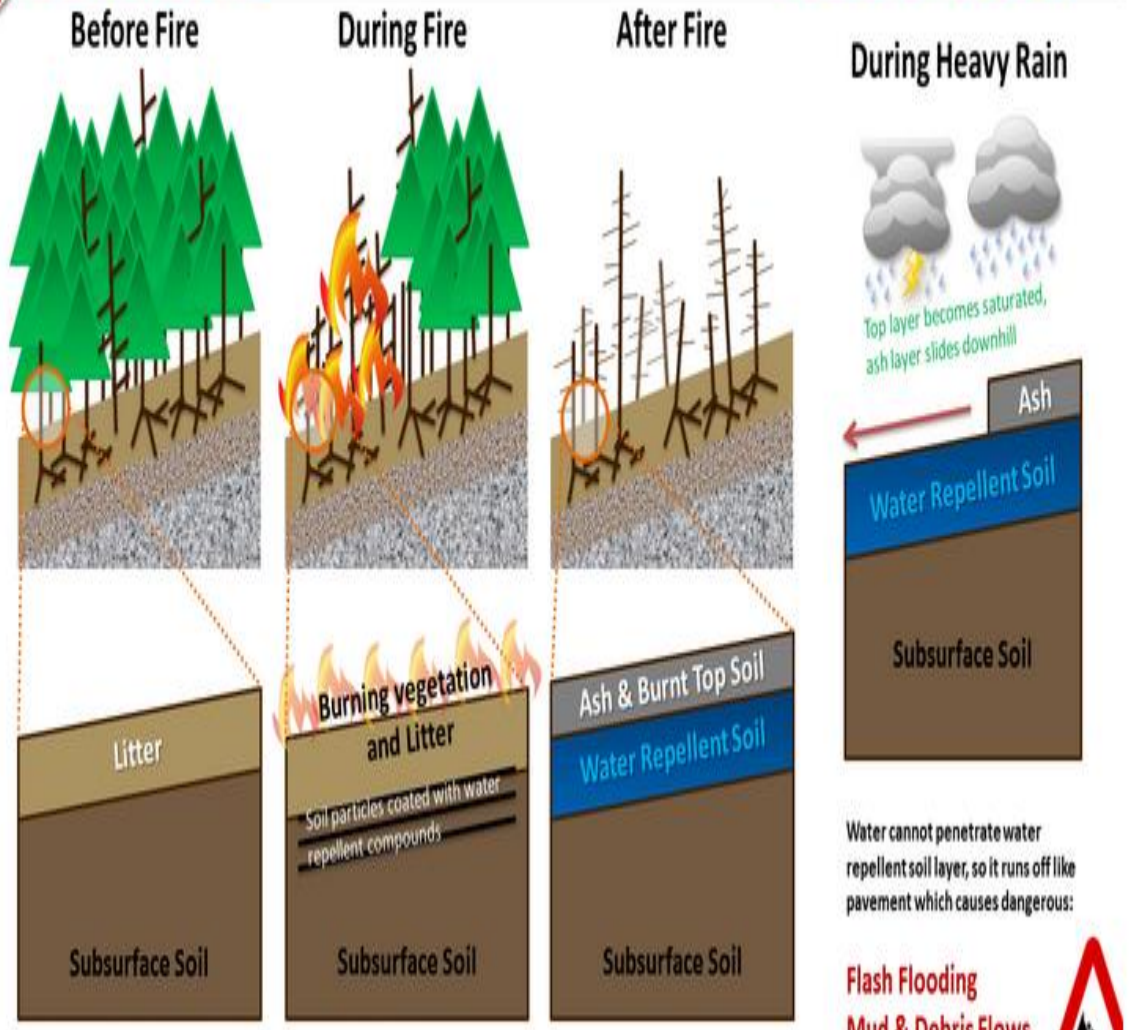


Source: Natural Resources Canada, 2020: Canadian National Fire Database (CNFDB).

Consequences of forest fires

- Run off and erosion will increase sediments in water bodies
- Run-off during the first year after a wildfire can increase by as much as 30%
- Due to loss of tree canopy during intense rainfall and/or snowmelt (increasing water quantity) it increases potential for flooding and mudslides- e.g. BC flood
- 60 % of participation is intercepted by forest canopy instead of instant run offs
- No vegetation creates higher snow accumulation resulting in higher peak flows as the snow melts
- No vegetation the greater volume of snowmelt in specific areas.
- Higher cost to water treatment plant due to higher sediments

Wildfire Burn Scars are a Flood Risk



Water cannot penetrate water repellent soil layer, so it runs off like pavement which causes dangerous:

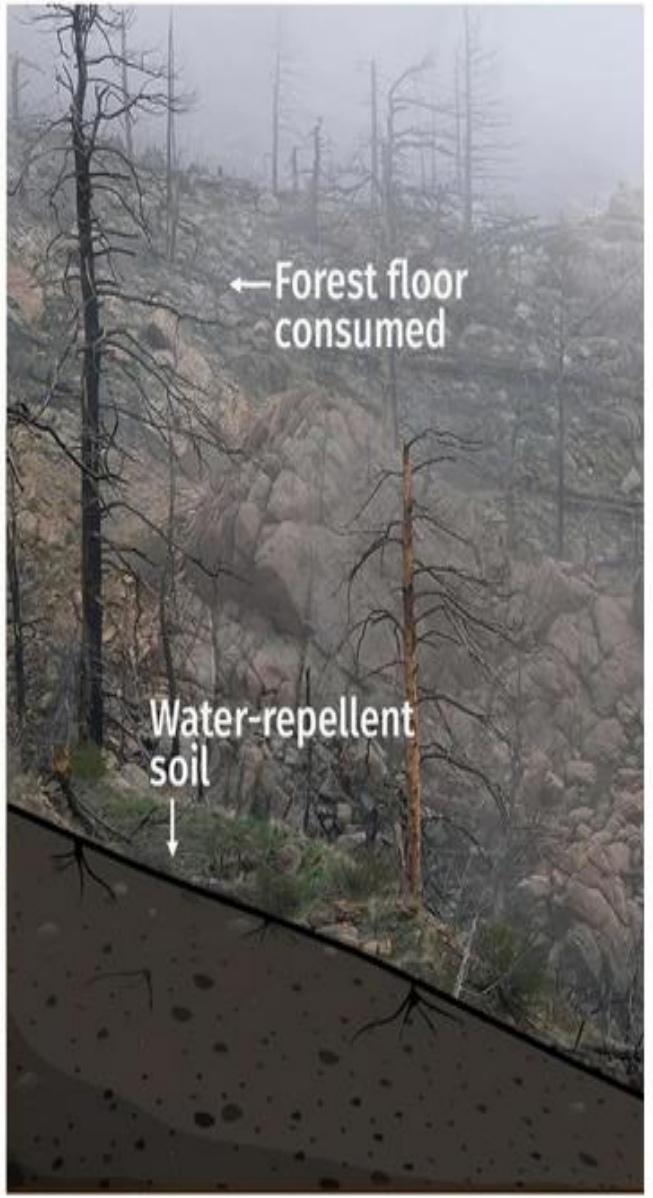
Flash Flooding
Mud & Debris Flows
Mudslides

Litter: organic material such as needles, leaves, grass, brush, bark.

Water Repellent Soils: formed when organic material such as trees, scrubs, plants and litter burn at high intensity, water repellent compounds are vaporized, and condense on cooler soil layers below, which prevents soil from absorbing water.

Before the fire

After the fire



CBC NEWS

ENVIRONMENT

IN PHOTOS: Flood warning issued for area just north of Peace River

By Phil Heidenreich · Global News
Posted May 18, 2017 2:04 pm · Updated May 18, 2017 8:25 pm

A flood warning was issued for the Whitemud River near the northern Alberta hamlet of Dixonville on Thursday afternoon.
COURTESY: Mishell Krysztan

sing river affects Highway 2 and infrastructure in rthern Alberta community, triggers flood warning

By Phil Heidenreich · Global News
Posted June 13, 2018 2:49 pm · Updated June 14, 2018 7:68 am

photo taken on June 13, 2018 of flooding at the intersection of Highway 2 and Highway 33 east of Driftpile, Alta.

15 compelling images of High River in the 2013 flood

By Lisa Geddes · Global News
Posted June 16, 2014 3:04 pm · Updated June 16, 2014 3:09 pm

1 / 15

NEWS

Peace River and Manning get flood repair funds

SHARE ON:

Erica Fisher, staff Thursday, Apr. 2nd, 2015

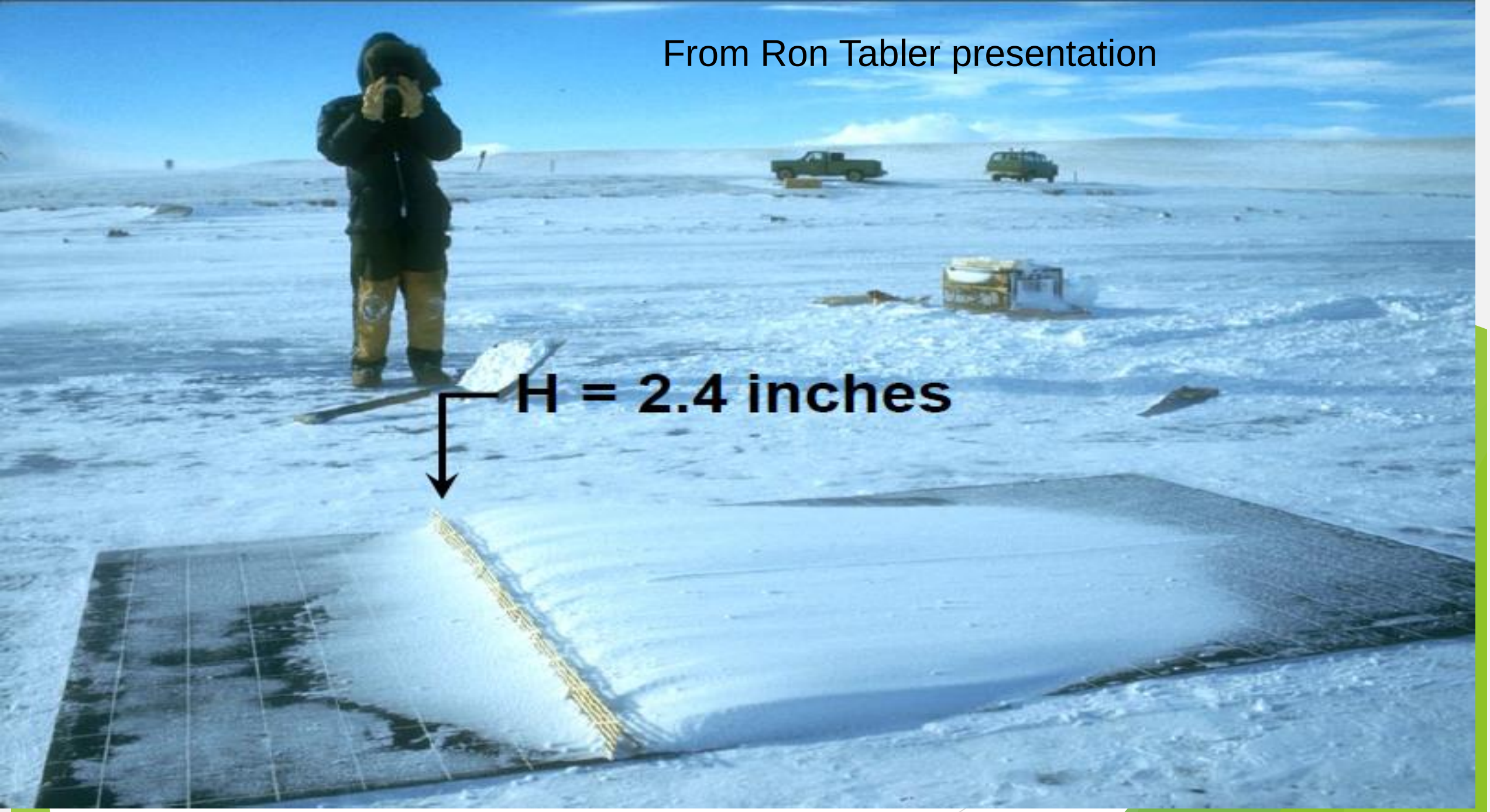
Pat's Creek and Highway 744 after the 2013 flooding, Government of Alberta

Two Peace Region communities are getting provincial grants to reduce their risk of damage from future floods.

Land conversion from Trees to Fields

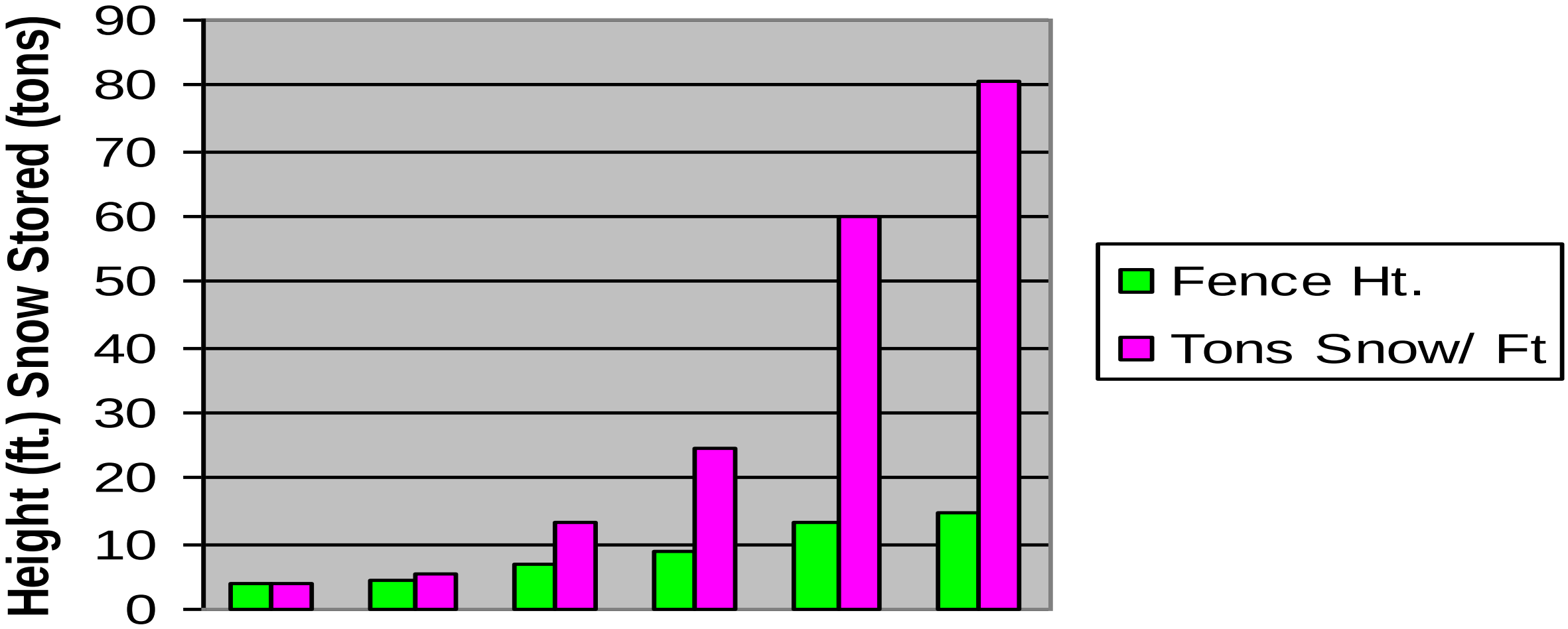
- Increases wind speed on the land
- Increases water run off and erosion
- Increases crop damages
- Increase snow accumulations in ditches
- Decreases biodiversity
- Change weather patterns

From Ron Tabler presentation



Source : Craig Stange, Forester for Natural Resources Conservation Service in ND

Snow Storage by Fence Height

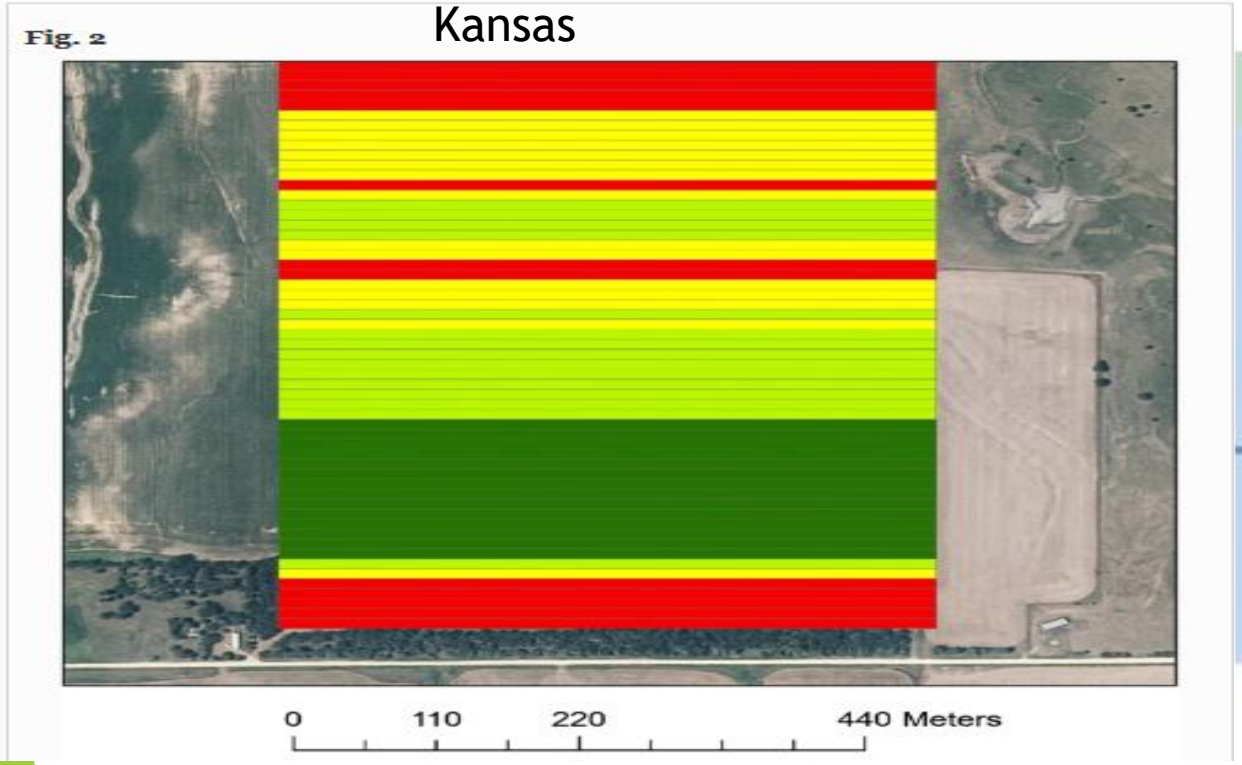


Source : Craig Stange, Forester for Natural Resources Conservation Service in ND

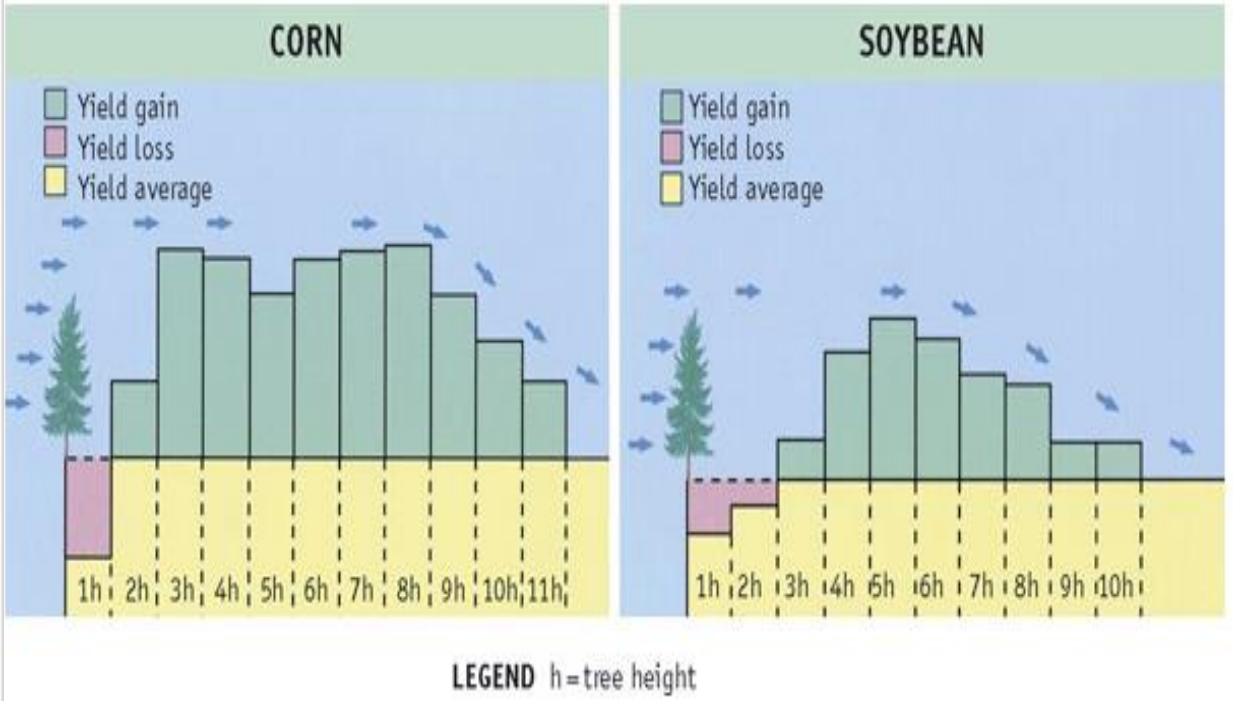
Windbreak trees and Crop Yield

- Studies shows the increase in crop yields up to 10 -20 % depending on crop.
- Large study in USA concluded: "Soybeans presented the most positive response to windbreak effect showing a yield increase 46% of the time, with a 16% average yield increase; followed by wheat with a 30% of the time, with a 10% average yield increase"

Kansas



Ontario



Source:https://link.springer.com/article/10.1007/s10457-018-0270-2 (L) andhttp://www.omafra.gov.on.ca/english/crops/hort/news/hortmatt/2016/07hrt16a4.htm (R)

Lethbridge County declared a local state of emergency today due to overland flooding as snow accumulations begin to rapidly melt. The Municipal District of Taber made a similar declaration over the weekend for the same reason. | Twitter/Mark Valgardson photo

Lamont county flooding

Consequences of clearing Trees

- Road damage/washouts
- Culvert and bridge damage due to ice jamming
- Increase in windspeed
- May lead to local climate changes
- What is the cost of fixing this infrastructure?? – Millions of ratepayer's dollars

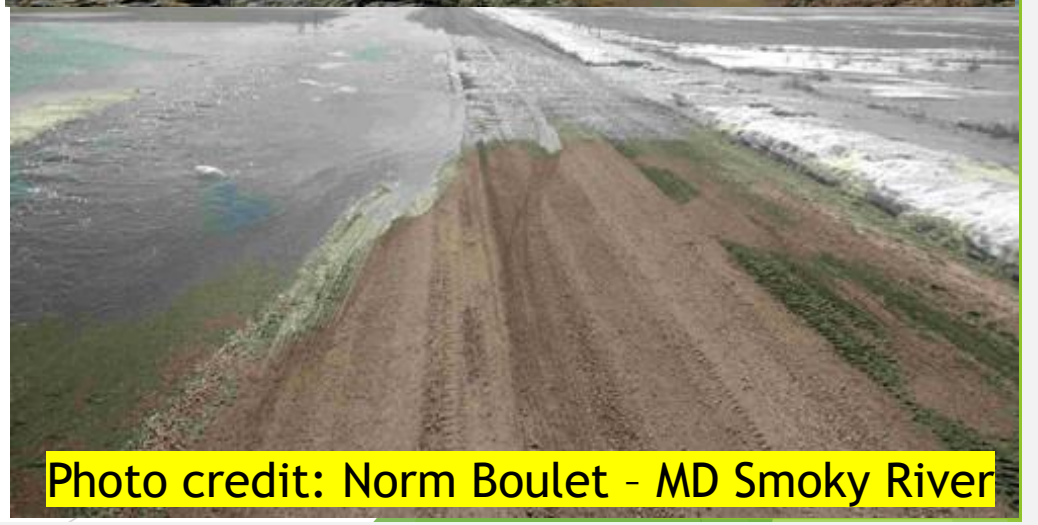


Photo credit: Norm Boulet – MD Smoky River

Cost – who will pay ???

- Federation of Canadian Municipalities (FCM) and Insurance Bureau of Canada (IBC) report the estimated cost:
- "According to the report's findings, avoiding the worst impacts of climate change at the municipal level **will cost an estimated $5.3 billion per year** shared amongst all three orders of government"
- " In the fall of 2020 a report by Alberta auditor general Doug Wylie found disaster costs increased by over 2,500 per cent from 2010 to 2016, hitting $9 billion. The province incurred an estimated $2.3 billion from 2010 to 2016 and the federal government reimbursed the province for around $1.4 billion of the $2.3 billion in disaster expenses incurred."
- " Additionally, funding for each affected property will be capped at one-time funding of $500,000. If a property is damaged in another emergency, then the owner is out of luck"


PONOKA NEWS

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Single Game Tickets Available Now!

A wild fire rips through the forest 16 kilometres south of Fort McMurray, Alta., on highway 63 on May 7, 2016. (File photo/THE CANADIAN PRESS/Jonathan Hayward)

Rural municipalities worried about cost of disaster relief


CANADA

Alberta Puts Municipalities, Metis Settlements On The Hook For 10% Of Disaster Relief Costs

By Jeremy Appel, Local Journalism Initiative Reporter Alberta Native News

Tue., March 16, 2021 | 2 min. read

Tree/Forest in your municipality

- Natural and Environmental Reserves
- Campgrounds
- Playgrounds
- Hamlets and towns
- Private forest - Woodlots
- Crown land
- Industrial forest

Private forested land in Peace Region

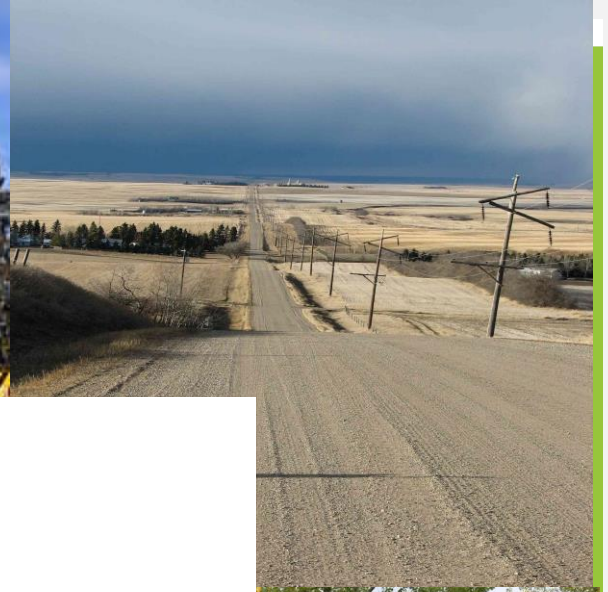
Peace River Region Private Forested Land (2013)

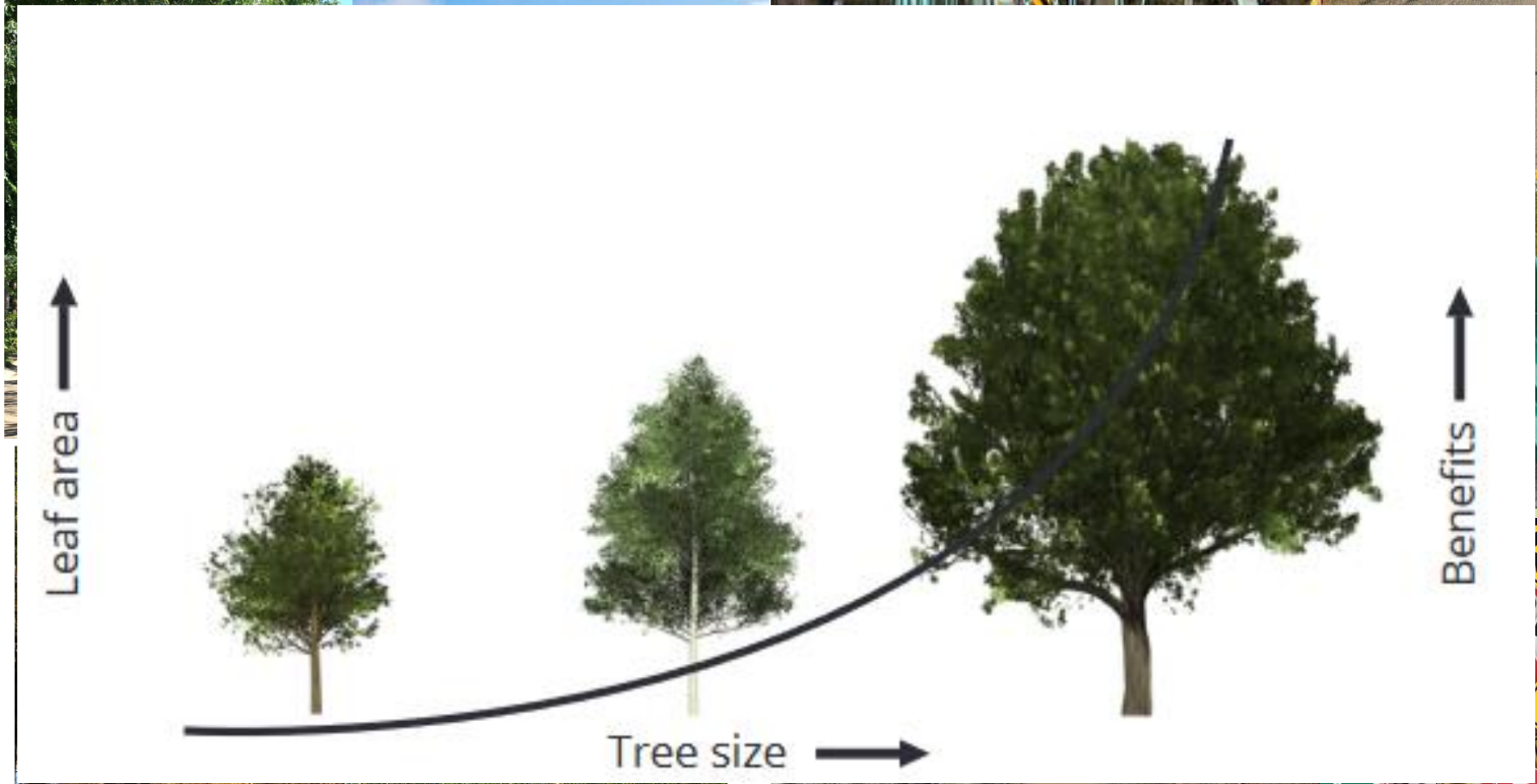
Municipality	Coniferious (ha)	Decidious (ha)	Mixedwood (ha)	Total (Ha)
Mackenzie	21526	89306	1763	112,595
Grande Prairie	4632	92936	435	98,003
Fairview	710	12478	58	13,246
Lesser Slave Riv	39830	57140	3684	100,654
Big Lakes	50985	91704	1750	144,439
Northern Lights	20346	97326	14966	132,638
Clear Hills	13961	46322	7893	68,176
Northern Sunrise	45675	66247	490	112,412
Birch Hills	931	26923	89	27,943
Vermilion River	534	15498	203	16,235
Saddle Hills	11358	75139	6871	93,368
Smoky River	1614	23131	0	24,745
Spirit River	313	6191	48	6,552
Greenview	172028	247769	3498	423,295
Total Hectares	384,443	948,110	41,748	1,374,301
Total Acres	949,979	2,342,830	103,161	3,395,970

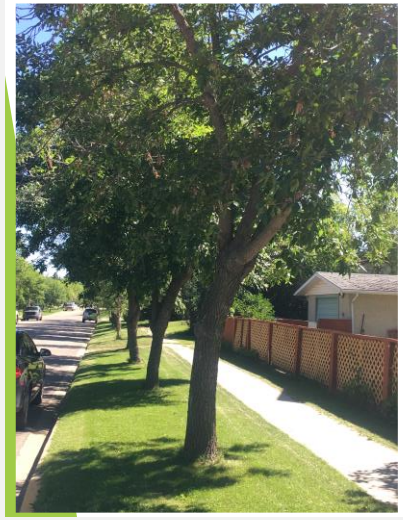
Values of trees/forest as assets

- reducing summer heat (cooling effects)
- protecting from cold winter winds (heating effects)
- increasing crop yields and protects livestock
- increasing property values up to 20 %
- improving well-being through stress reduction and increased comfort
- aiding with storm water management- reduce water erosion
- reducing noise and dust effects
- providing a home to many wildlife species
- sequester carbon
- Recharge dugouts and underground water
- $$$ values through sales of timber

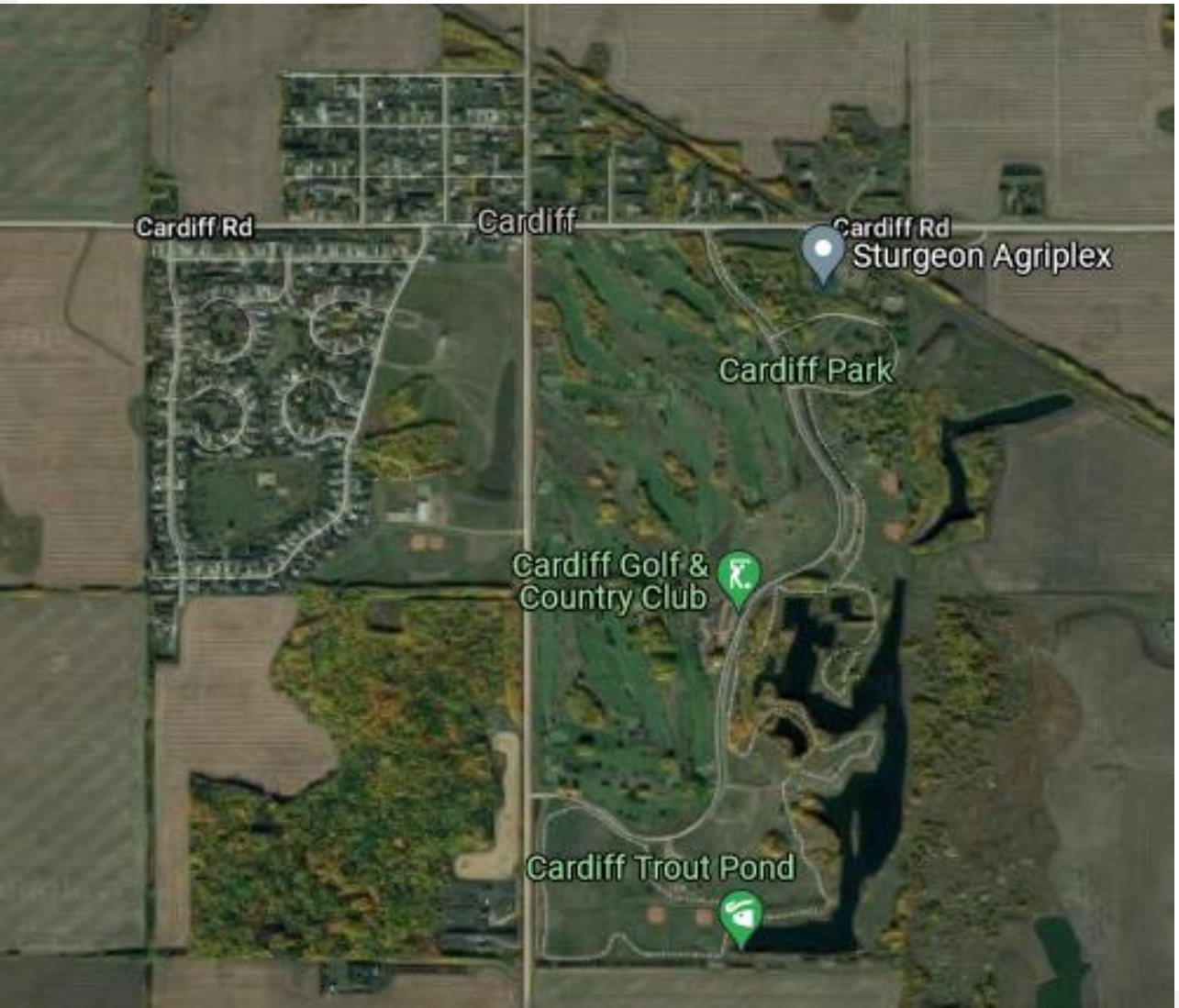
Green vs Gray infrastructure

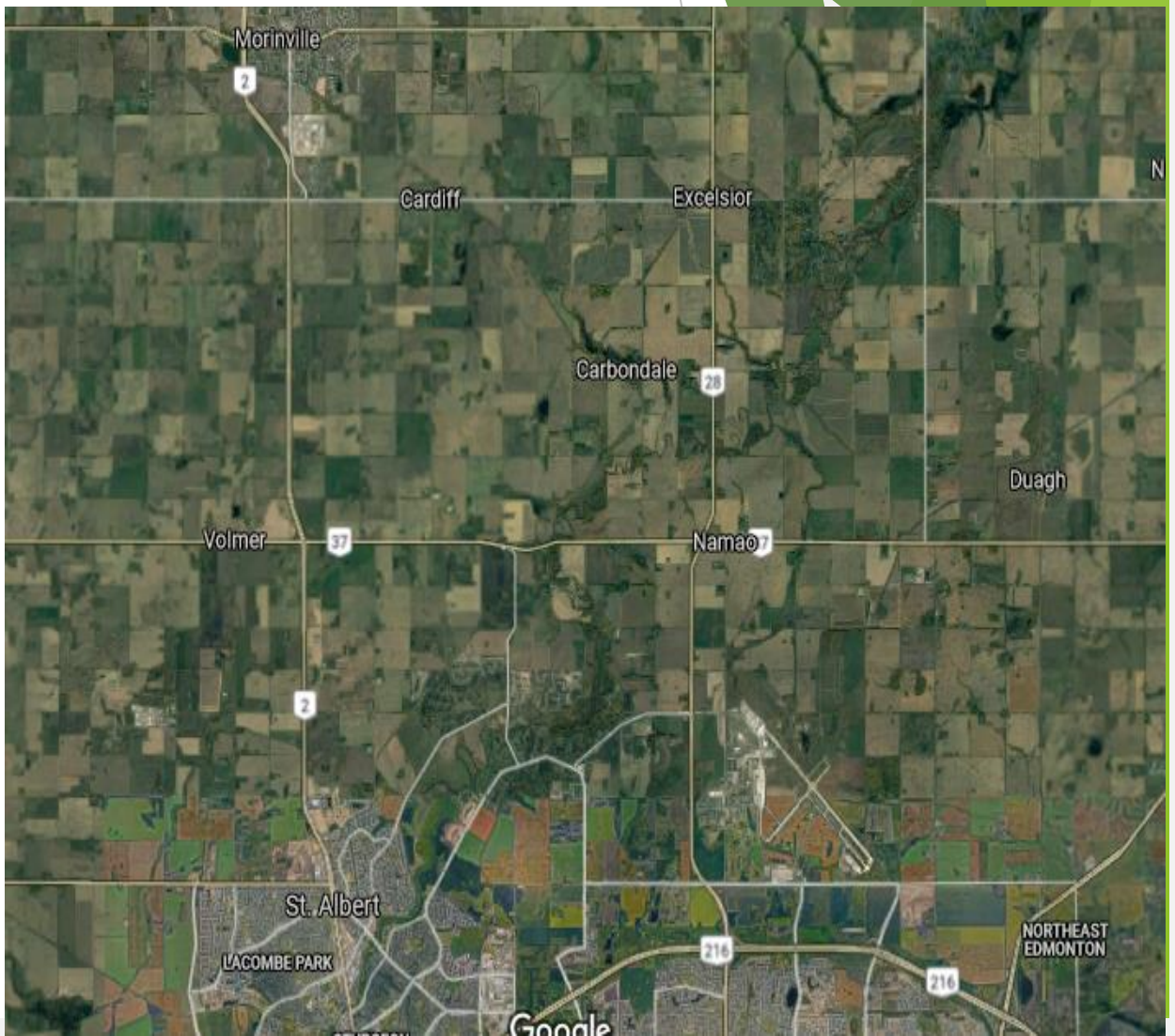






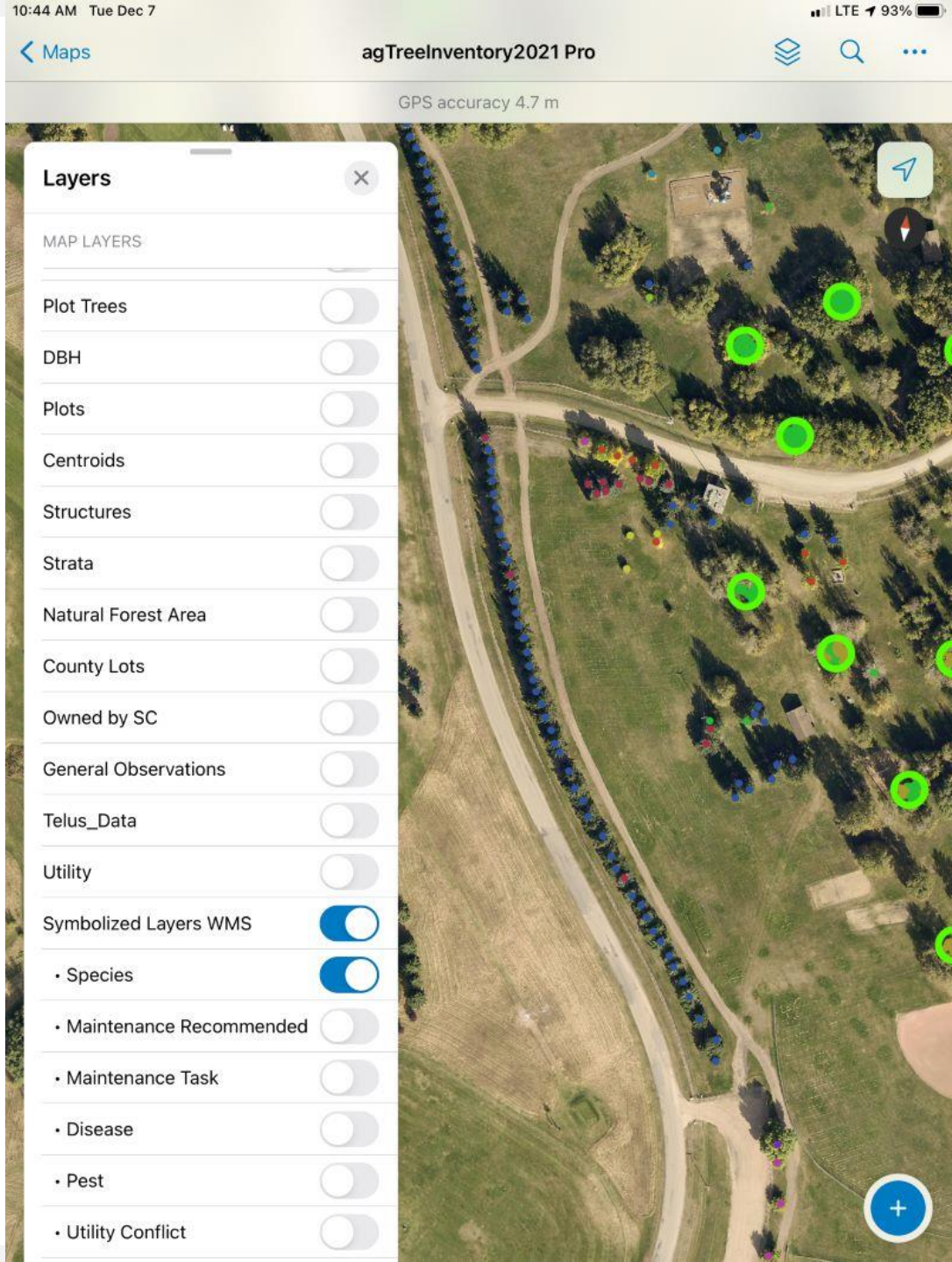
Sturgeon County – Cardiff Park Inventory

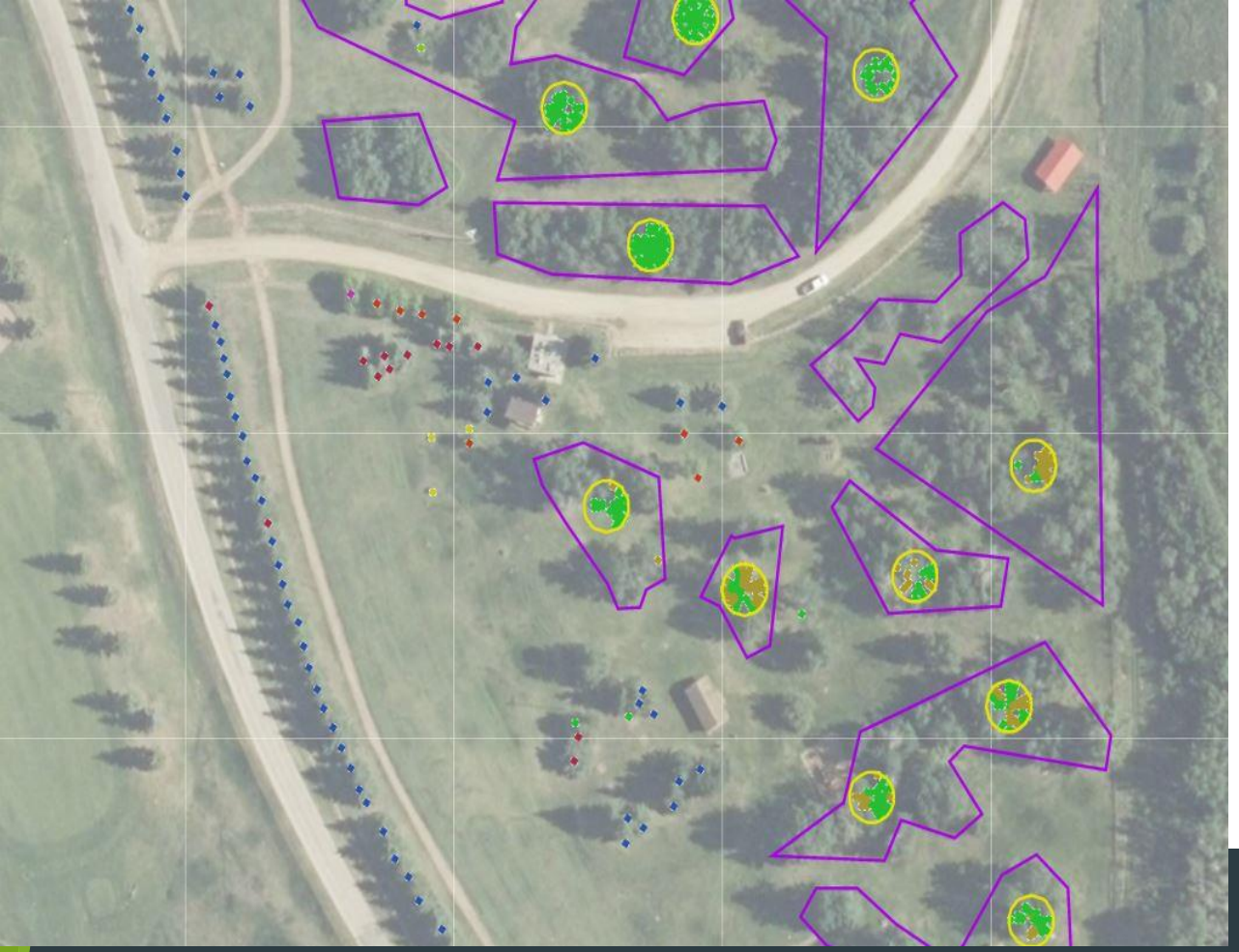




Data Collected

- Tree and Shrub species ID
- DBH and Height, age, etc
- Land use, ground cover types, tree and shrub cover %,
- Conditions, dieback, crown health, vigor
- Fire hazard – fuel load assessment
- Damages (crown, trunk, roots)
- Cause of damages – human, wildlife, equipment, etc
- Maintenance tasks – pruning, mulching, staking, etc
- Utility conflicts and distance to buildings
- Major insect and diseases

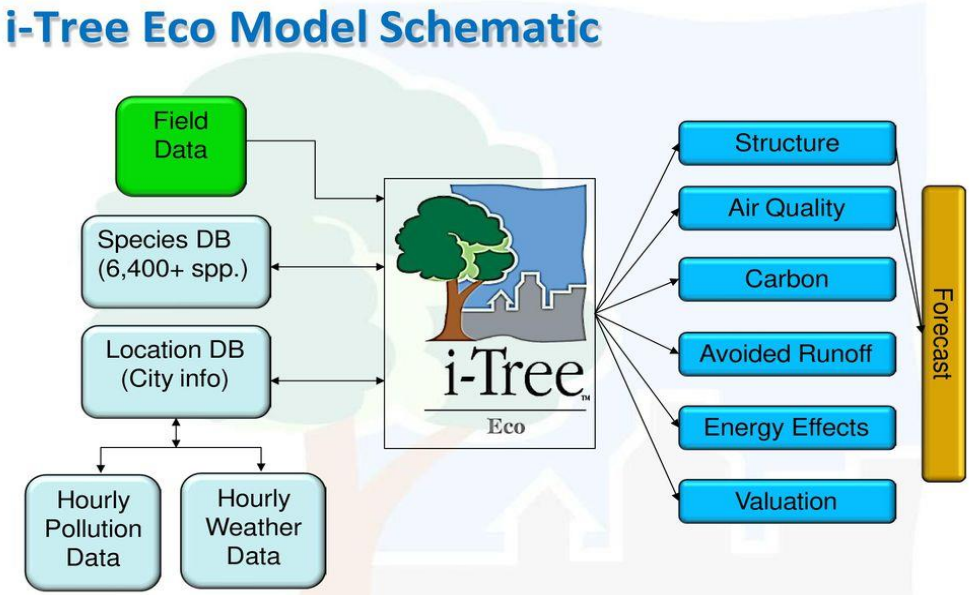


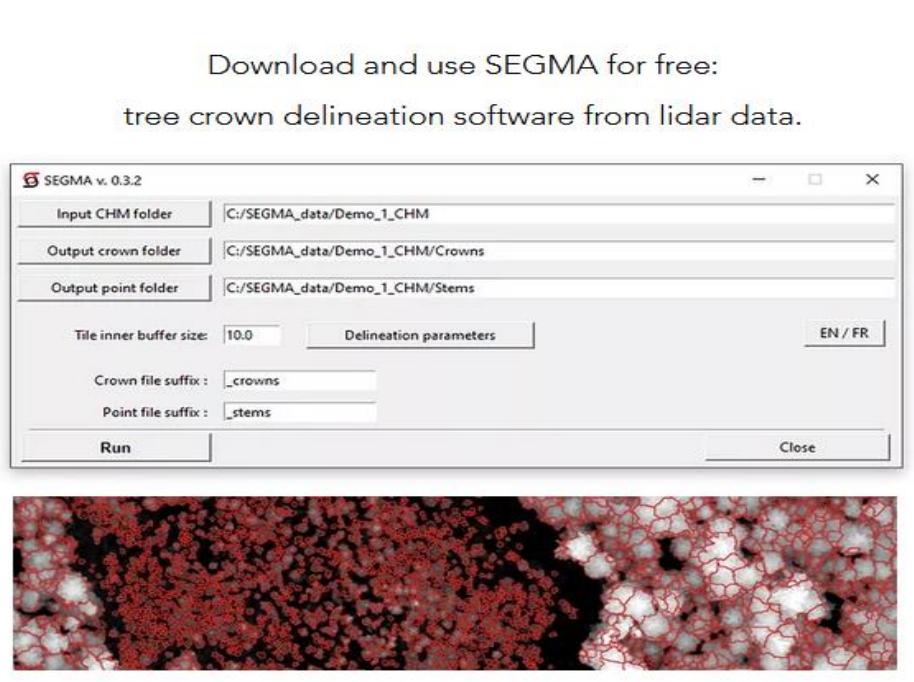


Individual and plot tree inventory

Inventory and Data collection

- We use I-Tree Eco v6
- We added several other features to I-Tree Eco
- We use ESRI – Collector
- We use 2019-2020 airphotos
- We use Lidar 2017 data coverage
- We use SEGMA software to select individual trees
- Written reports are generated by I-Tree Eco and myself
- Municipalities are owners of all data – GIS or reports





Results of Tree Inventory – Sturgeon County /Cardiff Park

The Summary of both individual and sample plot inventory are:

Description	Individual tree	Sample plot tree	Total
Number of trees	1,096	455,500	456,596
Most common species	White spruce, hybrid poplar and blue spruce	Trembling aspen, balsam poplar and white spruce	
Percentage of trees less than 6" (15.2 cm) diameter	48.1 %	83.1%	
Pollution Removal	88.08 kilograms/year ($912/year)	3.681 metric tons/year ($46,400/year)	3,769.08 metric tons/year ($47,312/year)
Carbon storage	218 metric tons ($6,540)	13,350 metric tons ($400,000)	13,568 metric tons ($ 406,540)
Carbon Sequestration	4.3 metric tons ($128/year)	713.9 metric tons ($21,400/year)	7,143, 2 metric tones ($21,528/year)
Oxygen Production:	11.36 metric tons/year	1,561 metric tons/year	1,572.36 metric tons/year
Avoided Runoff	280.2 cubic meters/year ($651/year)	14,690 cubic meters/year ($34,100 /year)	14,970 cubic meters/year ($34,751 /year)
Structural values	**$651,000**	**$60.5 millions**	**$ 61.15 millions**

Thorsby Riparian Area

- Number of trees: 4,194
- Tree Cover: 71.7 %
- Most common species of trees: Quaking aspen, White spruce, Balsam poplar
- Percentage of trees less than 6" (15.2 cm) diameter: 43.8%
- Carbon Storage: 355.1 metric tons ($5,330)
- Carbon Sequestration: 9.485 metric tons ($142/year)
- Oxygen Production: 16.42 metric tons/year
- Avoided Runoff: 929.5 cubic meters/year ($2,160 year)
- Structural values: $2.45 million

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Hamlet of Grande Cache – Greenview County

- Number of trees: 829
- Tree Cover: 0.5 %
- Most common species of trees: Blue spruce, Lodgepole pine, White spruce
- Percentage of trees less than 6" (15.2 cm) diameter: 42.2%
- Pollution Removal: 97.51 kilograms/year ($119/year)
- Carbon Storage: 76.94 metric tons ($2,310)
- Carbon Sequestration: 2.38 metric tons ($71.4/year)
- Oxygen Production: 6.348 metric tons/year
- Avoided Runoff: 196.1 cubic meters/year ($456/year)
- Structural values: $557,000

Why should you conduct tree inventory?

- Through performing many functions trees are - Asset
- It helps you to identify your liabilities
- It helps your emergency services to identify where potential hazards are (fire, flood, powerline outrage, etc)
- It helps planners and public works departments to protect your gray infrastructure and avoid costly repair projects
- It helps you to evaluate environmental performance – biodiversity, water protection, wildlife habitat, carbon sequestration,
- It helps you to develop necessary tree bylaws and policies
- It helps to perform due diligent work where to develop environmental projects – riparian planting, or overall tree planting
- In long term it saves money while trees increase values

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- "By bringing "green infrastructure" into the asset management system, a defensible approach to identifying investment requirements is introduced – thereby "leveling the playing field" with grey infrastructure……. Trees are the miracle municipal asset indeed. Count them in "

Liabilities

- Forest Fires – more frequent, more powerful
- Tree removal create following liabilities
  - Floods – more frequent and more powerful
  - **Destruction of rural road infrastructure -roads, culverts, bridges**
  - Loss of habitat, biodiversity,
  - Reduce crop production,
  - Soil losses and degradation
  - Increase intensity of prairie fires
- **WHO PAYS for losses??**
- **WHO is Liable??**

Trees bylaws, policies, regulations and standards

- Many municipalities have trees/forest mentioned in MDP and LUB
- Without proper tree bylaws or policies – in most legal cases courts will found you guilty
- Aim/purpose of them is protect and preserve your asset/trees while regulating tree removal, planting, and conservation.
- Aim/purpose is to protect public infrastructure (eg roads, bridges, buildings, etc)
- Avoids costly litigations when things go wrong
- Avoids costly litigations among different land users
- Reduces spread of invasive tree pests

Summary

- Climate, fire, flood and deforestation are highly related and greatly impacting forest and watershed
- Loss of forest due to fire and flood is relatively temporarily as young forest will grow back (unless forest is converted into agriculture)
- Loss of forest to agriculture is the long term and most impactful to watershed
- Climate change and loss of forest may change local weather patterns
- **Due to loss of forest that capture snow and rain the cost to local infrastructure (roads, bridges, towns) is measured in millions of dollars**
- Who pays for losses and liabilities ? Insurance industry will increase pressure on governments as well as on business
- **Lack of local tree policies may trigger many legal litigations**
- **Trees are long term asset and should be treated same way as other assets**

Thank you

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