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Winnipeg, MB

Water Innovation Centre

Adaptation as Resilience Building: A Policy Study of Climate Change Vulnerability and Adaptation on the Canadian Prairies

Henry David (Hank) Venema, *PhD, PEng (Ont.) Director*

Water Innovation Centre

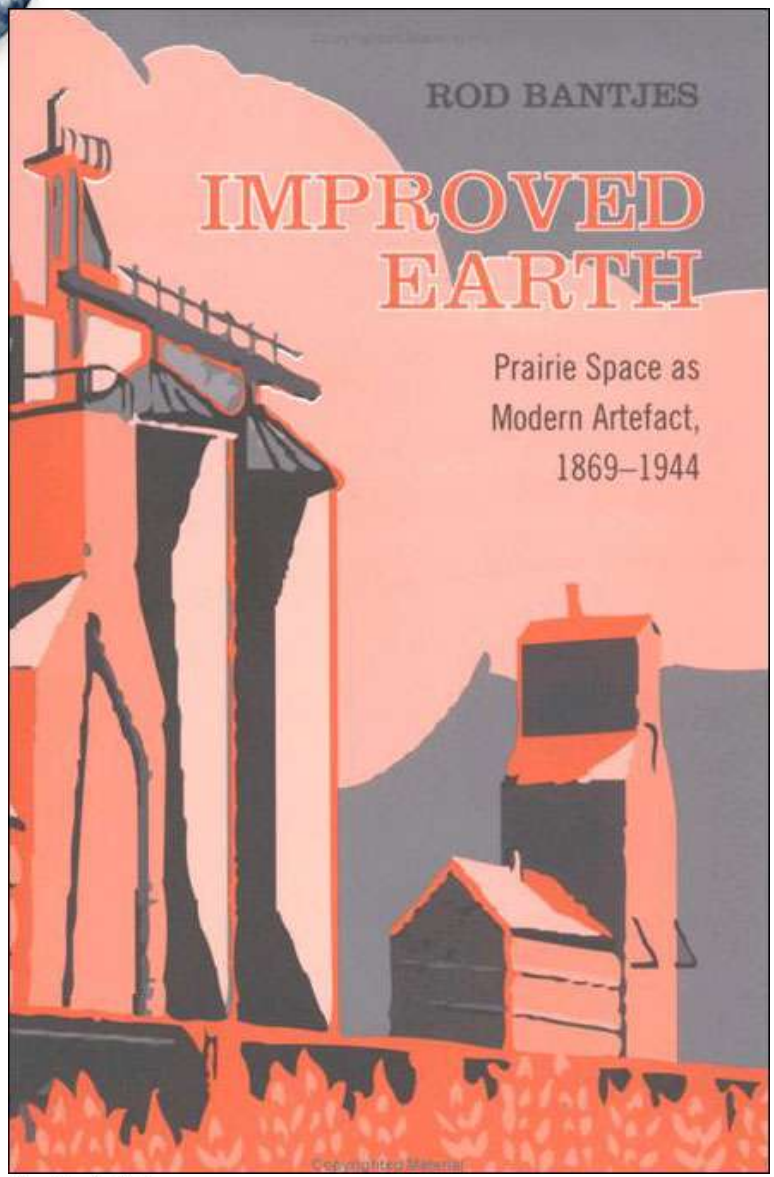
Sustainable Natural Resources Management

International Institute for Sustainable Development

Winnipeg, Canada

iisd International Institute for Sustainable Development / Institut international du développement durable

The “Modern” Prairies



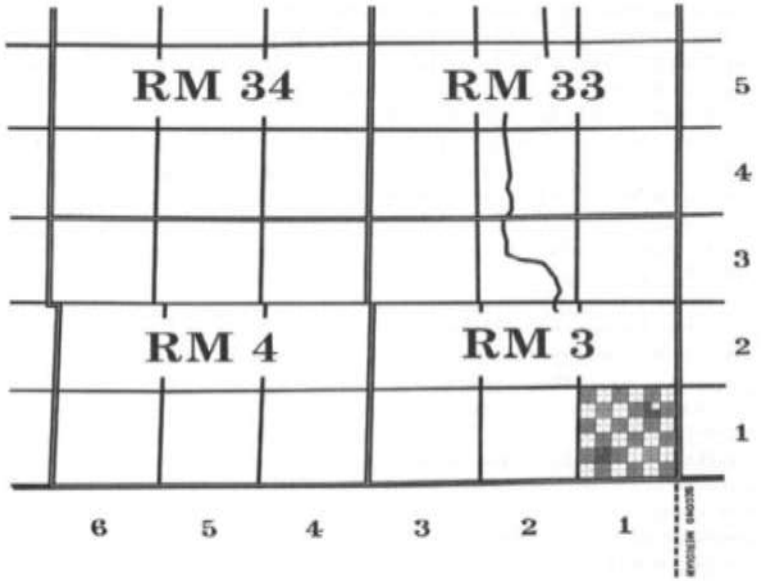
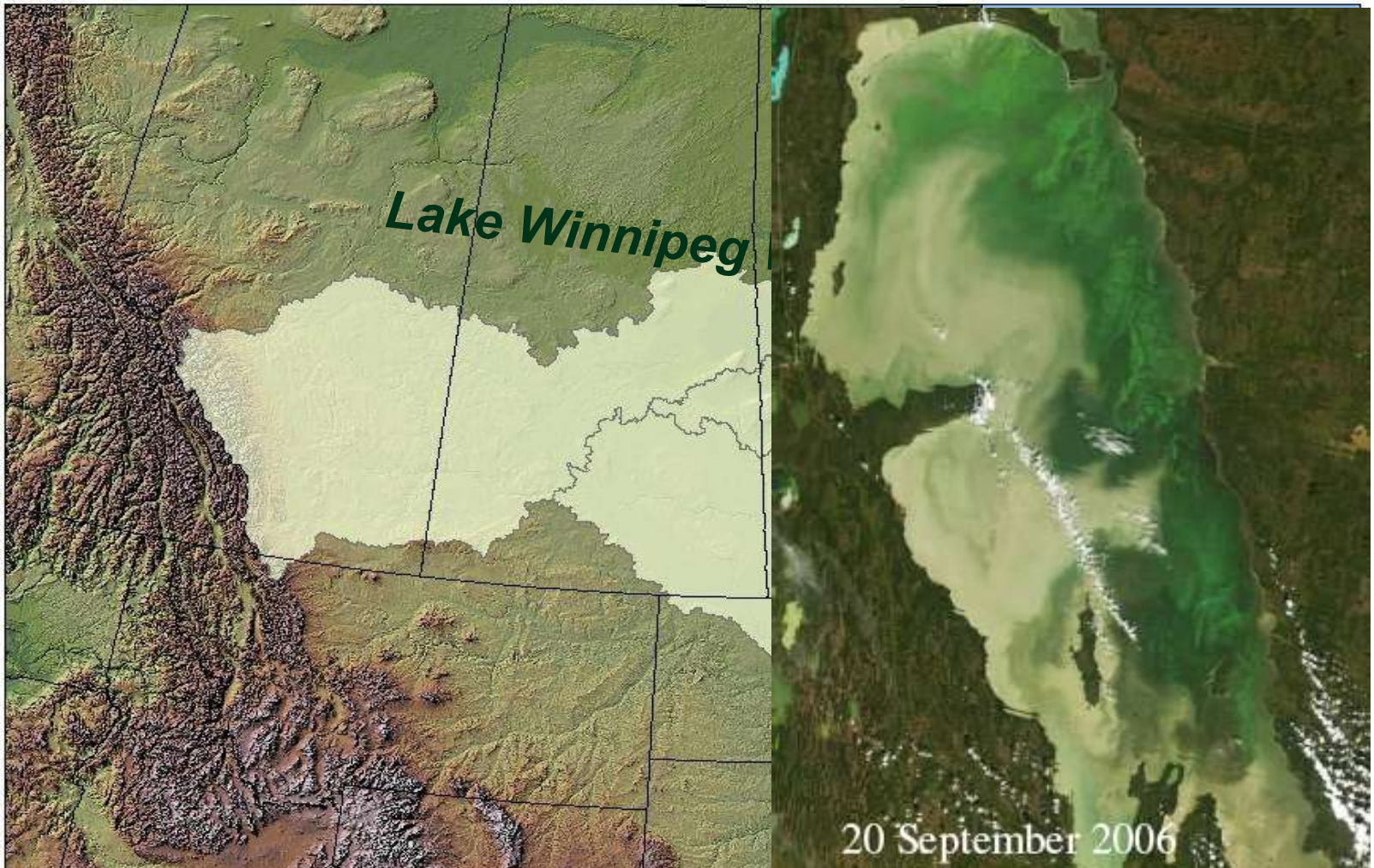


Figure 4.2 Rural municipalities: The standard rural municipality in Saskatchewan was nine townships, although there was some variation (see, e.g., figure 2.1). The horizontal axis in this figure is the 49th parallel, the vertical axis is the second meridian. Sections are indicated in township 1 range 1 west of the second meridian. Rural municipalities endured throughout the twentieth century, although with little of the tangible institutional presence that many had envisioned for local government on the prairies. (*Source*: Abstracted from Census Map, Census of Canada, 1946)

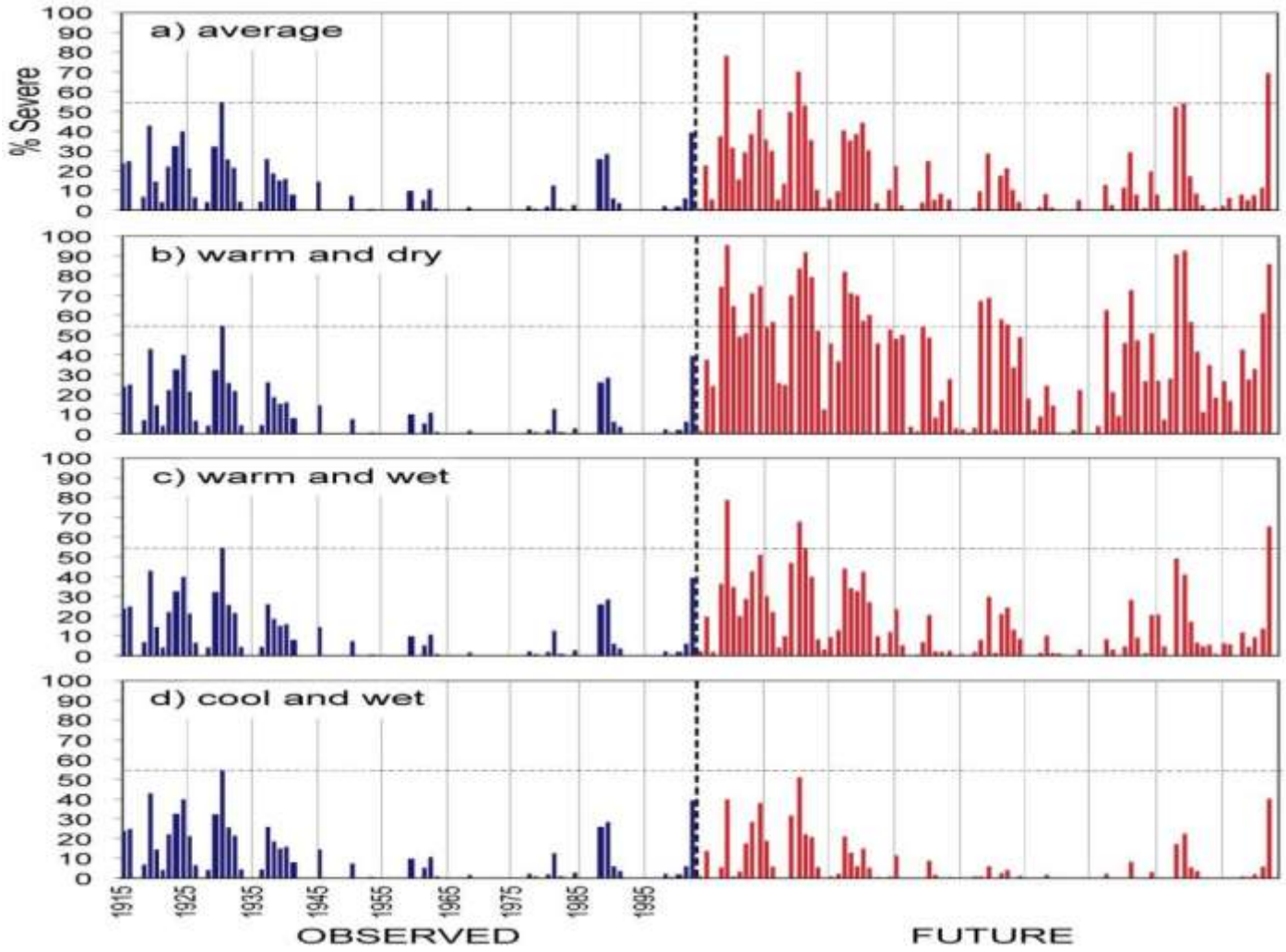
Effects of the Dominion Land Survey

- Rebellions in Manitoba (1869-1870) and Saskatchewan (1885)
- Hard-wired a modernist agricultural model based on the durability and high quality of export grains; ie Crow Rate.
- Early Prairie Reformers
  - *warned against loss of community formation, and*
  - *ecological consequences of monocultures - urging diversification; inappropriate tillage practices*
  - *Dismay that farmers spent their time organizing to improve market conditions rather than diversifying their production base*
  - *Co-operative movement was a politically acceptable moderation of more radical reformist movements.*

Non-point Nutrient Loading
Most Eutrophic Large Lake in the World



Projected Drought Scenarios (Bonsal, 2006)



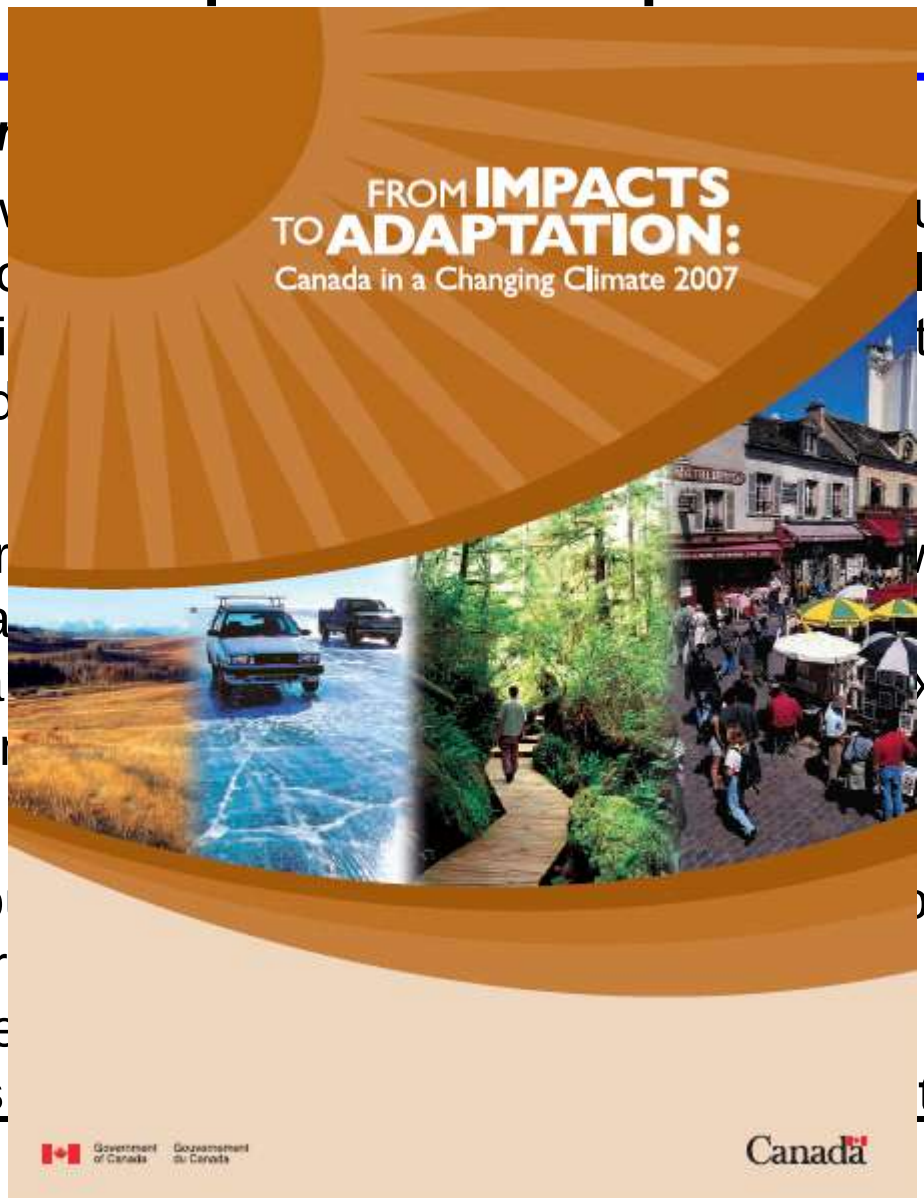
NRCan, 2007 Impacts and Adaptation Report

Prairies (NRCan

- "Increases in v…us climate risk" manifest as "lo…levels, retreating glaciers, and i…ts….greater frequency of c…

- Changes in pr…warmer growing seasons will a… and demands by ecosystems a…xtreme drought and flood ever…

- Increased dro…f organic soils and soil cover… these conditions, runoff become… intense flash floods. – **This… t management.**



Canadian Climate-Agricultural Policy Reccomendations

Research Approach and Support

Responses from industry and policy representatives suggest results from climate scenario/model approaches are limited. There is merit in adopting a research perspective that meets the following criteria: is rooted in what is "known" and accommodates diversity; incorporates producer based experience and knowledge; encourages integration; and builds on existing capacity. These features form the basis for a research perspective known as the vulnerability approach.

Recommendation: Employ the vulnerability approach for climate change adaptation research.

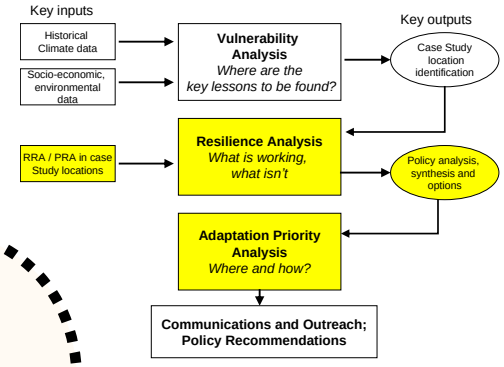
- ***Enhance knowledge of producer' experiences with climate and weather risks and how these affect adaptation choices.***
- ***Incorporate knowledge of farm production practices and management so that linkages to existing (and future) programs and policies can be identified and acted on.***
- ***Ensure that climate scenarios and related models include agro-climatic conditions identified as relevant by the agri-food sector.***
- ***Encourage climate change related research projects to incorporate whole farm perspectives.***

***

Theoretical Framework

Resilience Analysis

[Berkes et al,2003]



Change/Stress/Shock

Innovation, learning

Social-ecological system

Capacity to adapt to change

This is what we (think we can) measure

Memory, institutions

These are the policy dynamics we're trying to understand and influence

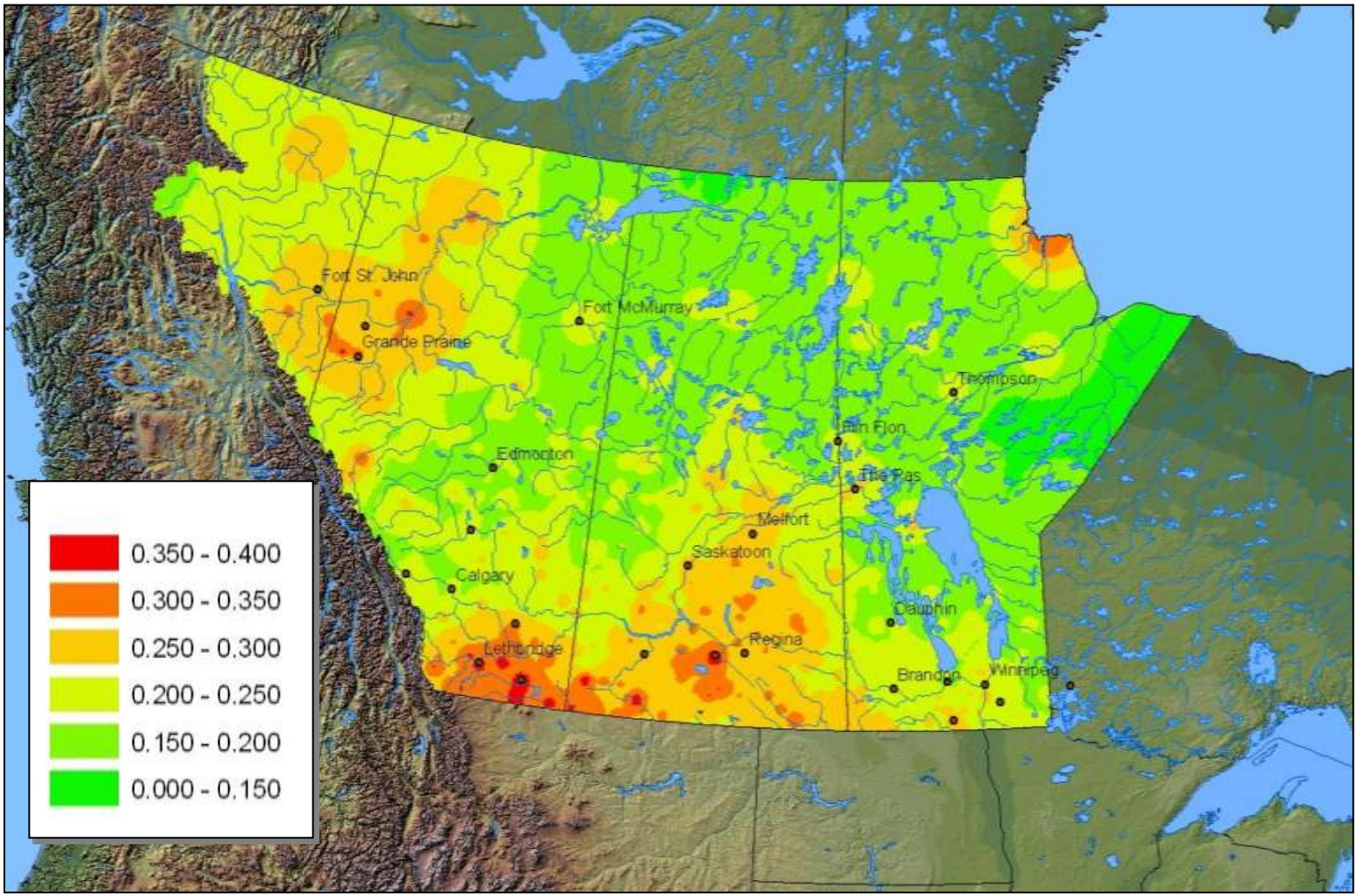
Sustainability "Resilience"

iisd

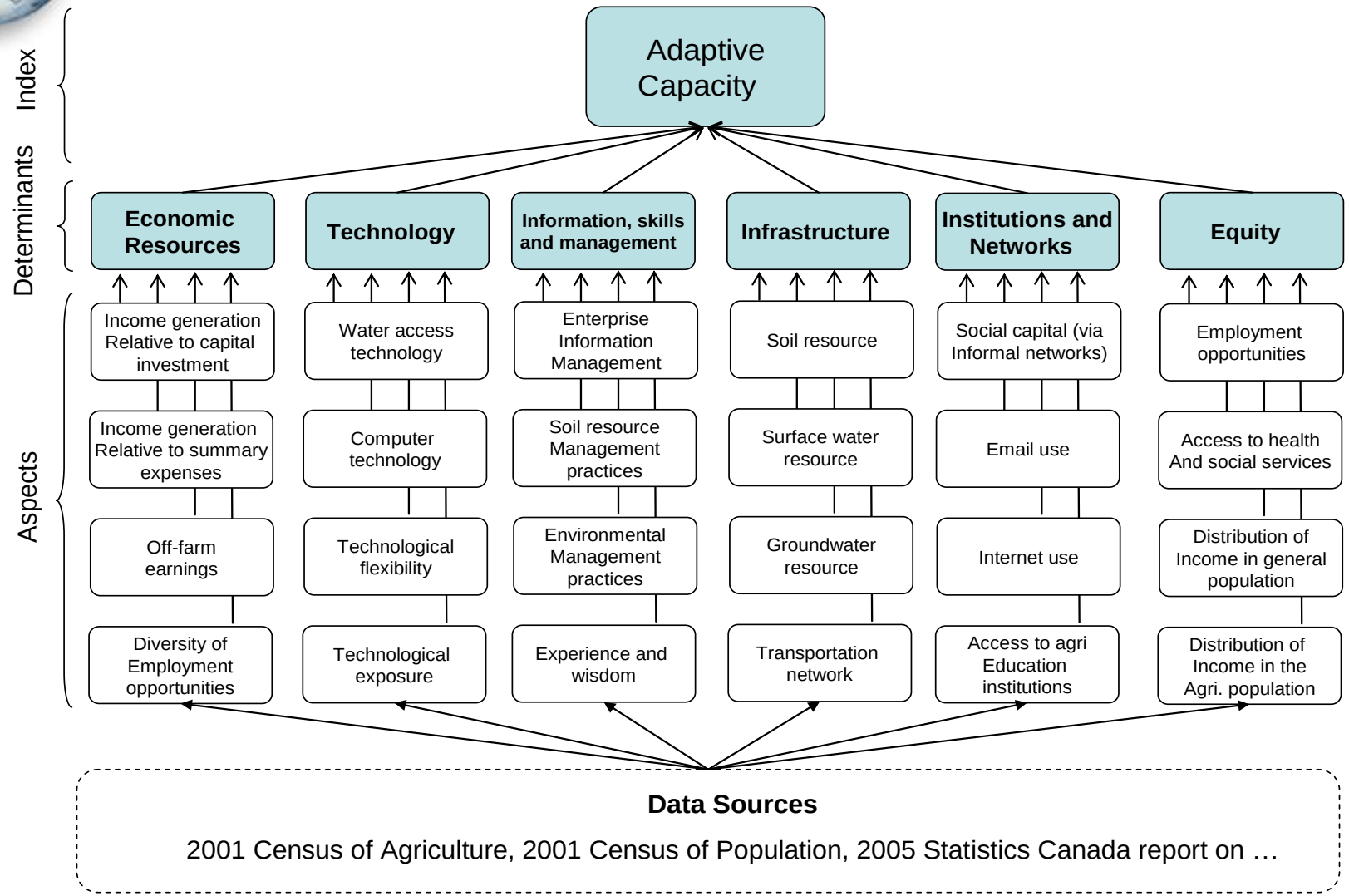
Climate Exposure Mapped

(a surrogate for "Change/Stress/Shock")

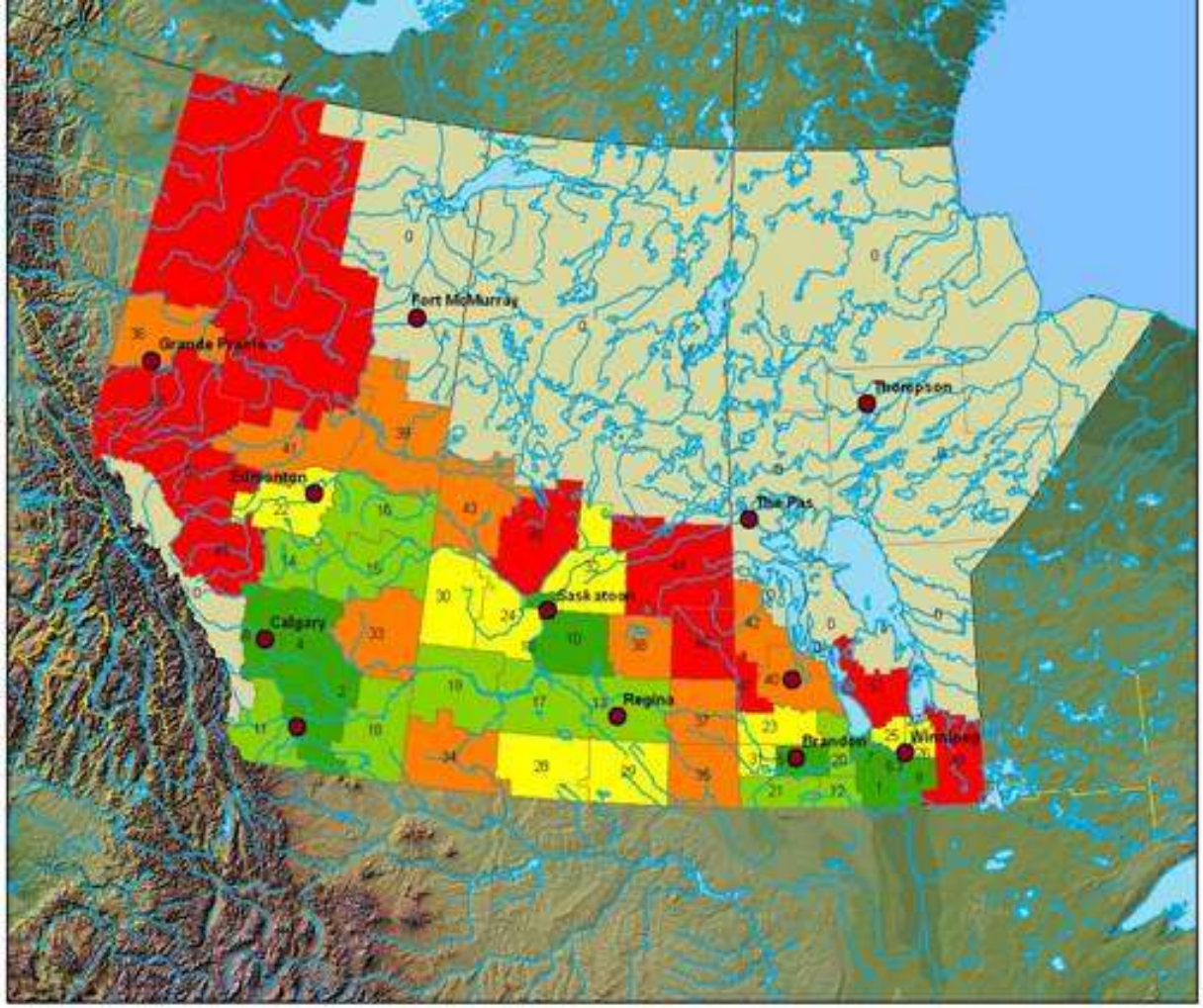
Growing Season Precipitation Coefficient of Variation (%)



Measuring Adaptive Capacity



Adaptive Capacity Mapped



Adaptive capacity:

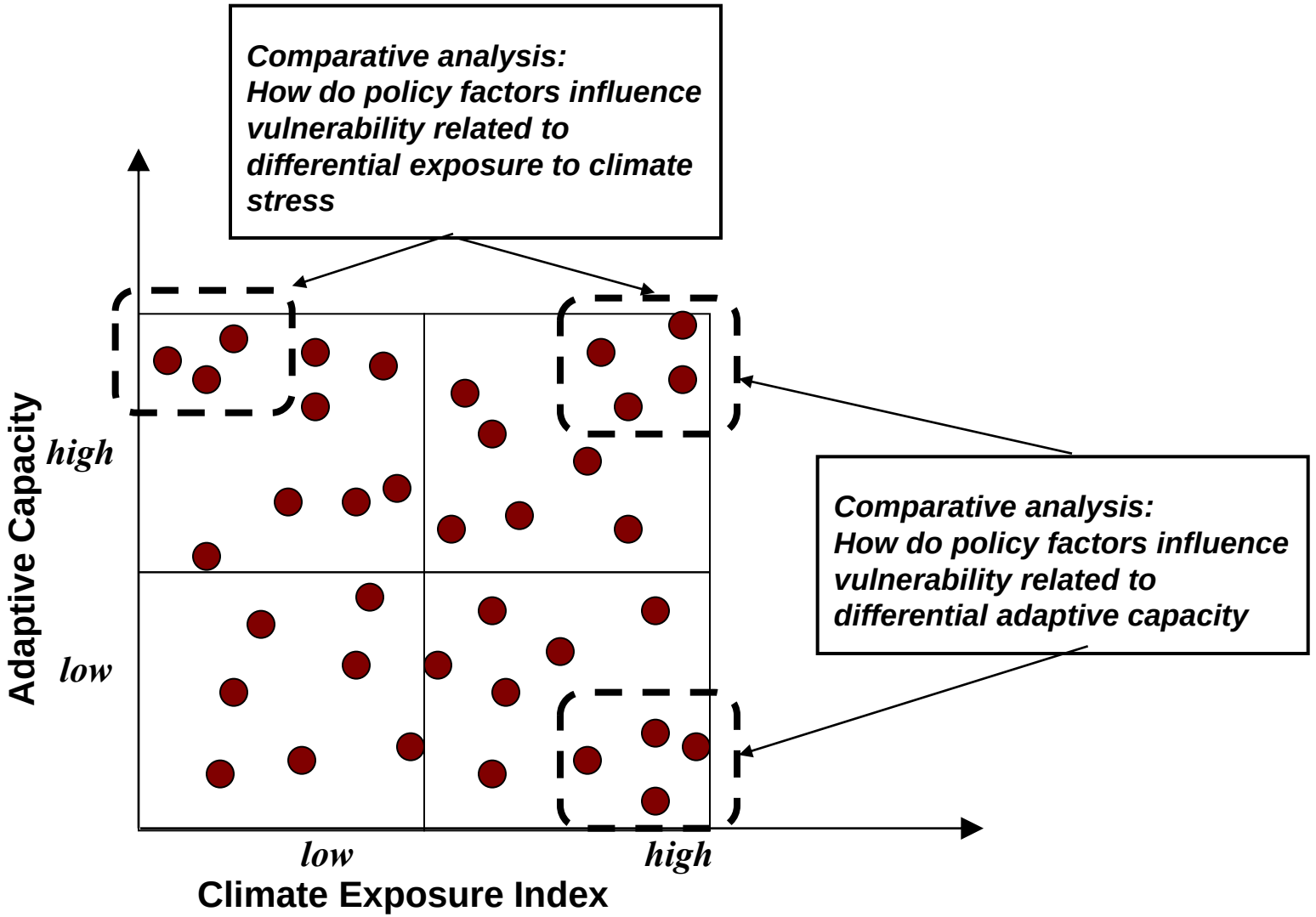
Aggregrated indicator ranks

Six adaptive capacity indicators, make up the overall rankings.

Legend

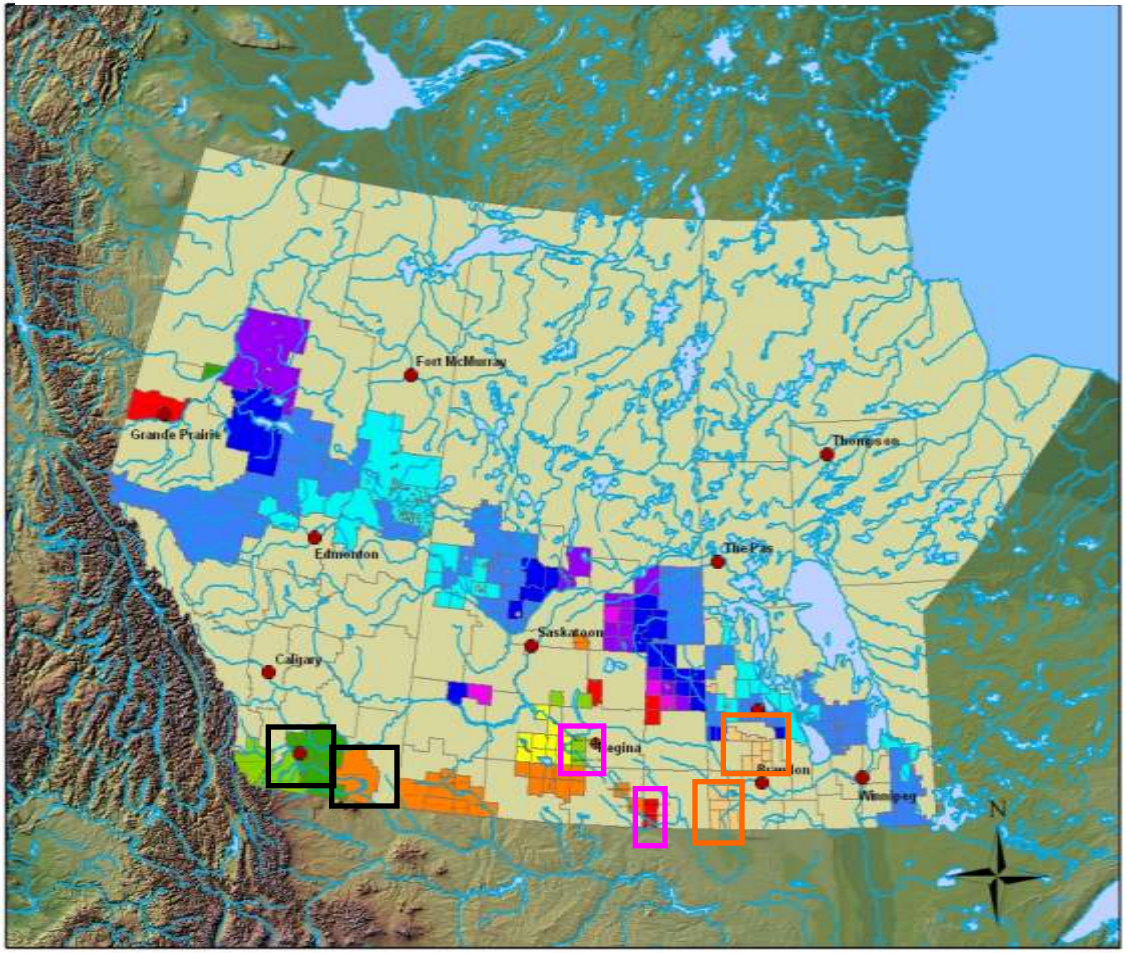
- 0 - 10
- 11 - 21
- 22 - 32
- 33 - 43
- 44 - 53

Case Study Identification with Vulnerability Space Mapping



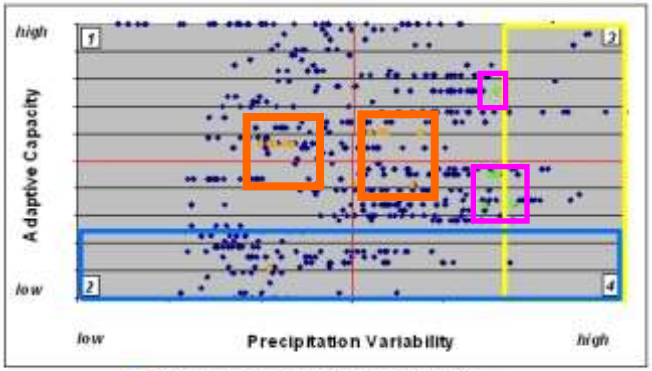
Vulnerability Space Map

Adaptive Capacity vs. Precipitation Variability



Legend

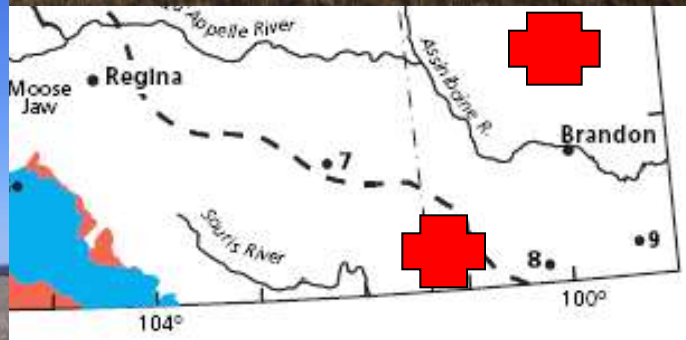
25% Highest Precip Variability classified by Adapt Capacity (AC)	*25 % Lowest Adaptive Capacity classified by Precip Variability (PV)*
HIGH AC	HIGH PV
LOW AC	LOW PV



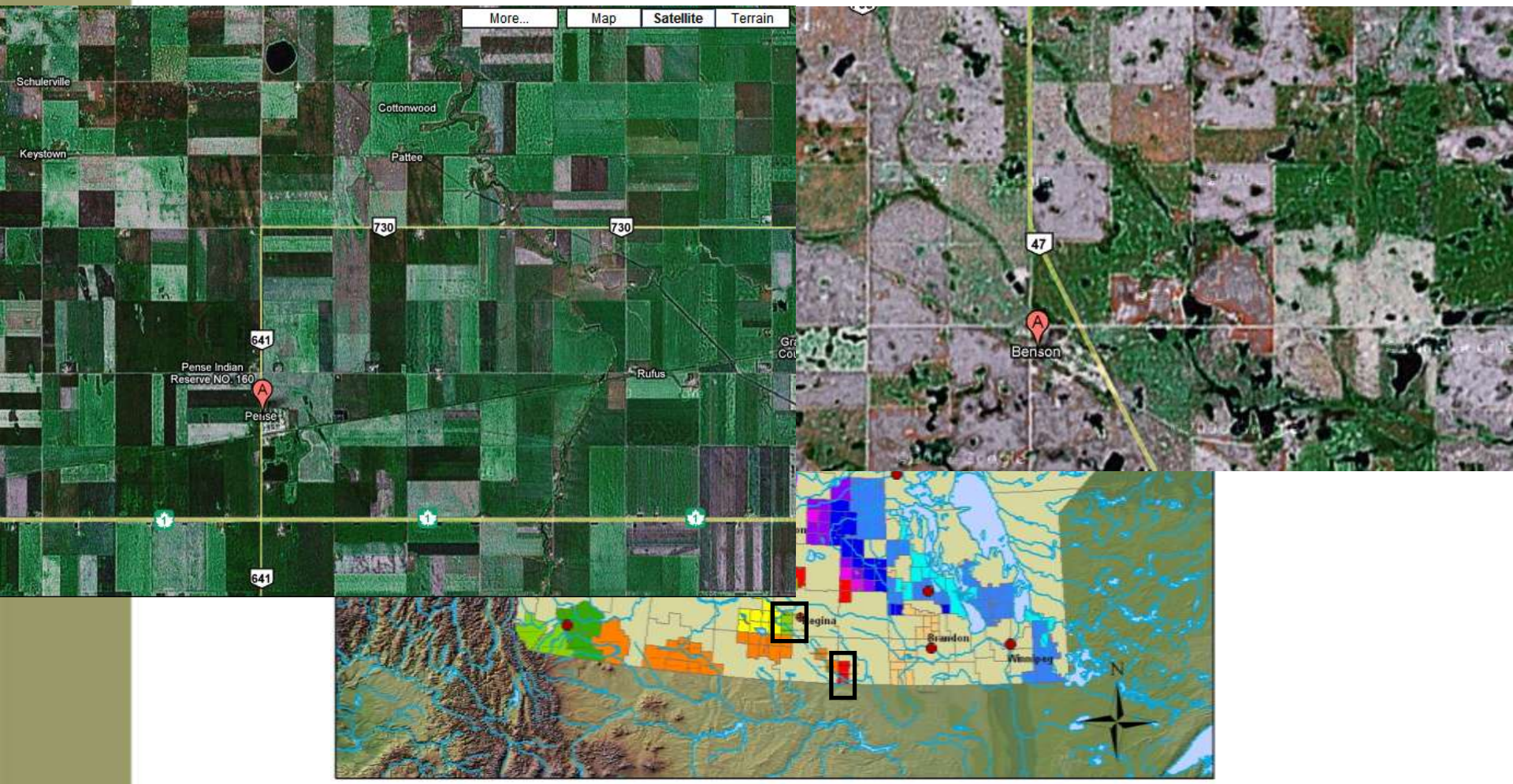
- Saskatchewan Case Studies
- Manitoba Case Studies

Case Study Location inside and outside P

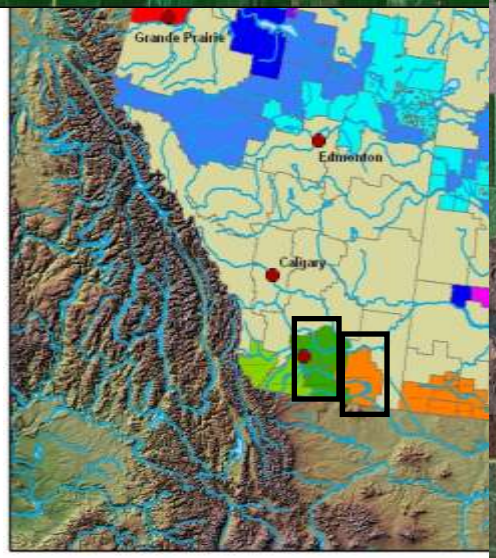
Geoscience Canada 1997, Volume 24 Number 3, p. 121-133



Saskatchewan: Pense and Benson



le and Foremost



Perceptions of Climate Change

Coaldale

- “moving to a hotter/wetter climate”
- “more weather events with global warming…more extremes”
- “events are more extreme than we’re used to in the 70s, 80s, and 90s.
- “whether we blame that on global warming or just natural phenomena, we’ve had some extremely dry and wet events.

Foremost

- 2000-2001 season regarded as unprecedented drought – “much drier than the 1930s” (?) –this region has extremely high rainfall variability historically
- Heavy rains in 2002; natural drainage systems overloaded – “no where to pump it”
- Increasingly erratic growing season 01 harvest in August; 02 harvest into Dec.
- Earlier seeding times; GPS crucial for night time seeding when heat, but not light available.
- perception of increasing number of drought years, punctuated by extreme wet events.
- Warmer winters – new pests (pea weevils and wheat mites) surviving warmer winters…

What does it all mean? The big POLICY stories

1. Institutional

No-till / Reduced tillage – strong evidence that its been a critical adaptation already.

- *massive effort required to overturn traditional practice (summer fallowing); relies on an array of informal and formal institutions - extension critical.*

2. Economic Instruments

Drainage – Ecological Goods and Services

- The next increment of soil and water conservation must come from watershed management; drainage needs to be intregrated with broader watershed function – ***especially nutrient management.***

Take Home Point:

Smart EGS Programming = Lake Winnipeg Basin Management = Prairie Adaptation

- EGS instruments to support a portfolio approach watershed management
  - *Soil and water conservation*
  - *Nutrient management*
  - *Carbon sequestration*
  - *Habitat provision*

- *EGS cost-efficiency analysis for AAFC (EcoRessources and IISD, 2008) determined instruments for watershed best practice portfolio produced least-cost defined public environmental benefit.*

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The Lake Winnipeg Basin Summit:
The Solutions Agenda
Nov 30-Dec 1, 2010

Premise: We can learn from history and the rest of the world.

Day 1

- *The Basin Narrative*
- *The Lake Narrative*
- *The Solution Narrative*

Day 2

- *Discussion, Critique, The Story of the Future*

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