



# A Comparative Study of Institutional Adaptive Capacity: South Saskatchewan River Basin, Canada, and Elqui River Basin, Northern Chile

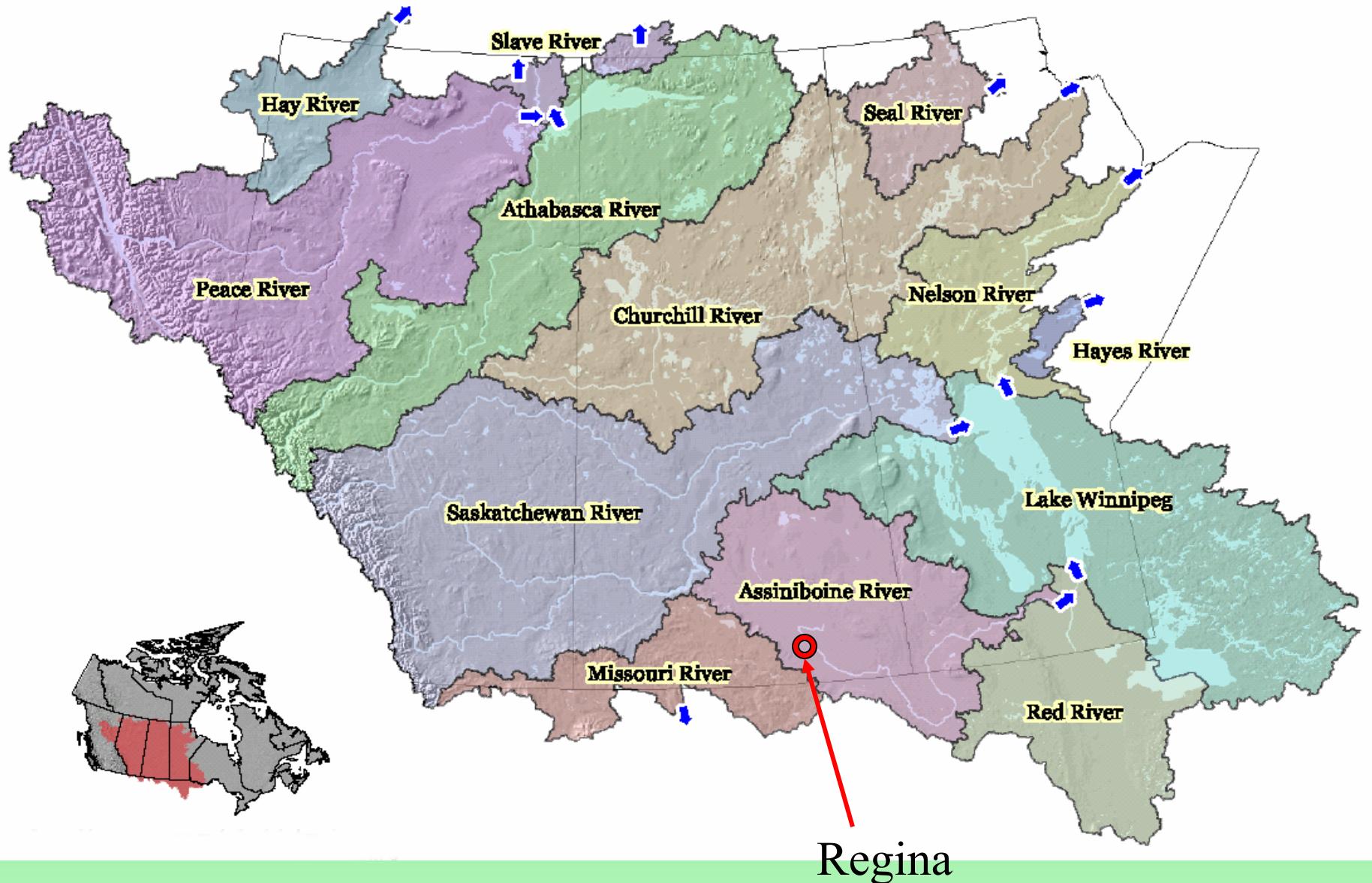
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Understanding Risks and Building Capacity*  
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# The river basins

- The Elqui Basin, Coquimbo Region, Chile: 9,600 km<sup>2</sup>
- The South Saskatchewan River Basin, Alberta – Saskatchewan, Canada: 420,000 km<sup>2</sup>

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- \$2.43 M over five years (2004-2008)



Source: Prairie Farm Rehabilitation Administration (PFRA)



Region IV



Elqui River Basin

# Some similarities

- A similar environment—a dry climate adjacent to a major mountain system and landscapes at risk of desertification.
- In both regions agriculture plays a critical economic role and water resources are important to agriculture.
- The institutions serving the regions are relatively stable.
- Both the Canadian and Chilean governments have ratified the Kyoto Protocol.







**Figura 3.8** Media móvil de 30 años de las precipitaciones registradas en La Serena, desde 1869 hasta 2000.

Tapado Glacier, 11/2004





# Soil drifting near Oyen, Alberta, May 5, 2002









Bow Glacier

# Team Members and their Institutions

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# Partners

- Canadian Plains Research Center
- PARC/C-CIARN Prairies
- Prairie Farm Rehabilitation Administration (PFRA)
- Alberta Environment
- Saskatchewan Watershed Authority
- Transboundary Waters Unit , Environment Canada
- National Water Research Institute
- Centro de Estudios Regionales
- Comision Nacional del Medio Ambiente de Chile (CONAMA)
- Centro del Agua para Zonas Aridas y Semiaridas (CAZALAC)
- Instituto de Ecología Política (IEP)

# What are Institutions?

- They are structures, comprising rules and standardized procedures for shaping both individual and collective behaviour.
- They mainly take the form of formal organizations characterized by rules, social practices, and continuous repetition of patterns of behaviour.

# Important Distinctions

Forms	Characteristics
Institutional dynamics	Dynamics that affect both formal and informal institutions (private markets – political decentralization)
Formal institutions	Formal organizations; institutions that have a formal structure (public agencies – private organizations)
Informal institutions	Social settings with the capacity to organize social life (communities, households)

# What is institutional adaptive capacity?

- The ability to identify climate change risks, find solutions, and to implement solutions.
- The need to do this in a fair, efficient, and sustainable manner.

# What are the Elements of the Adaptive Capacity of Institutions?

1. The institutional knowledge of the current physical and social vulnerabilities in the basin and of the potential impacts of climate change upon those vulnerabilities;
2. The actual institutional ability:
  - (a) to coordinate with other institutions in order to facilitate the process of adaptation;
  - (b) to engage in practices that could involve using resources to achieve sustainability objectives, e.g. appropriate water management policies and practices to ensure water conservation; and
  - (c) to modify norms (policies, regulations) that act as constraints to adaptation;

# **... What are the Elements of the Adaptive Capacity of Institutions?**

3. The internal characteristics of public organizations – such as the levels of human capital, instrumental rationality, coherence, and resilience – that could facilitate the process of adaptation;
4. Their ability to identify needs and problems; to find solutions to those problems in a way that different interests are considered; and to execute and implement those solutions;

# **... What are the Elements of the Adaptive Capacity of Institutions?**

5. Their ability for establishing planning and decision-making processes able to recognize and evaluate the risks posed by climate change, its impacts, and develop appropriate adaptive responses (e.g. the use of climate change risk in SEA).
6. Their awareness of the ethical and moral values that inform principles of sustainability in support of the functioning and decision-making processes of their institution.

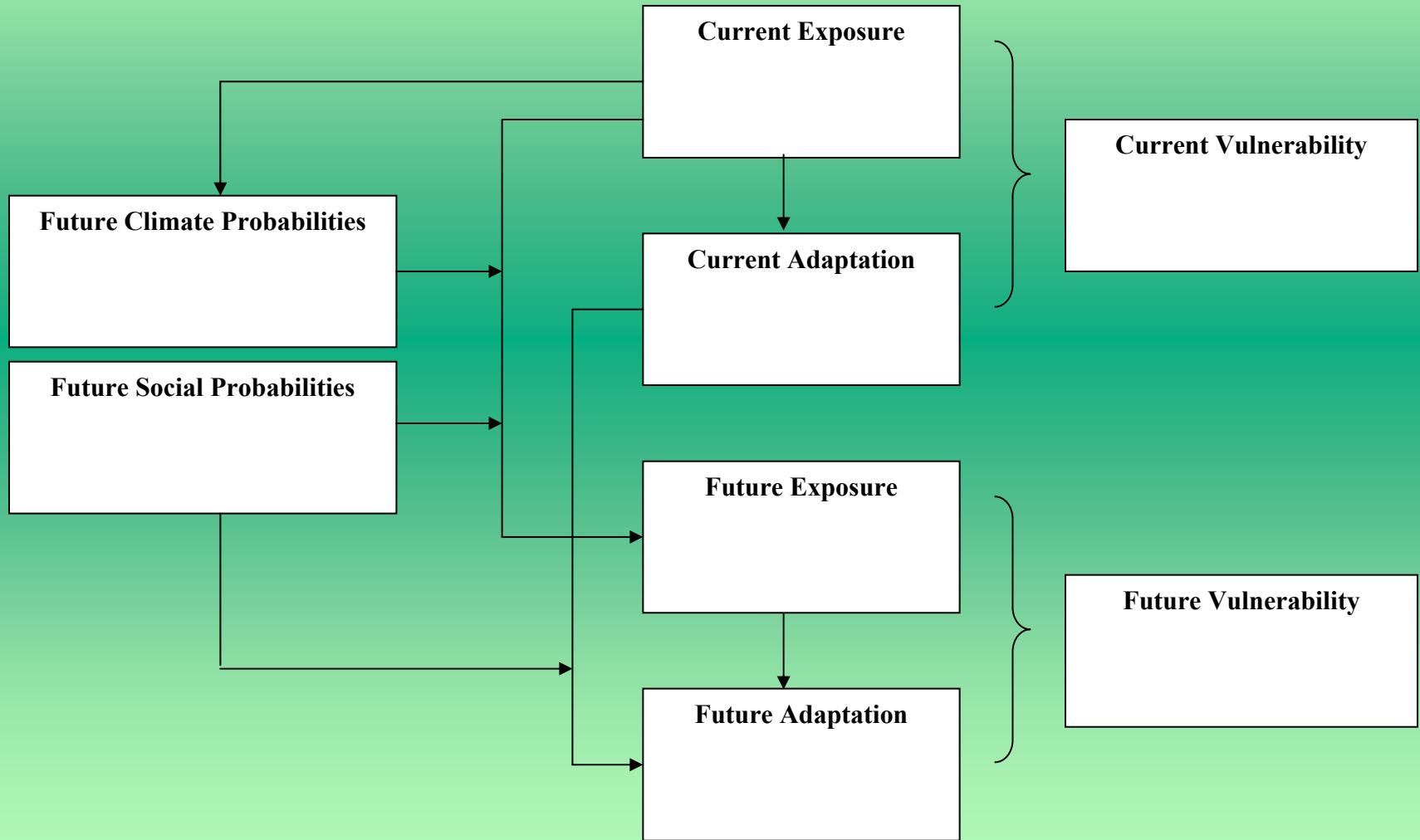
# A policy relevant project

- It addresses a critical issue of national and international significance *that has not* been systematically studied at the empirical level.
- It will provide insights about issues that are central to the design and implementation of adaptation policies and programs.

# Project Goal

The goal of the IACC project is to develop a systematic and comprehensive understanding of the capacities of regional institutions to formulate and implement strategies of adaptation to climate change risks and the forecasted impacts of climate change on the supply and management of water resources in dryland environments.

# Conceptual Framework



# The Objectives

1. To identify the current social and physical vulnerabilities related to the hydrological resources and climatic conditions in the rural sectors of the two basins;
2. To examine the potential scenarios of climate change in the two regions and their potential risks; and
3. To evaluate and discuss the regional institutional capacities to reduce future vulnerabilities associated to climate change and its impact on the hydrological resources of both basins.

# Objective 1: Main activities

- Ethnographic study of rural households and communities (definition and understanding of social and physical vulnerabilities, social mechanisms to reduce vulnerabilities, and formal institutional support)
- An assessment of the capacity of institutions to reduce the vulnerability of these two rural groups (degree of coordination, human capital, conflict management)

# Objective 1: Main activities

- A study of conflicts related to the use of water resources: description of the process, how actors behaved during the conflict, what was the role of the formal institutions, how the conflict was resolved.
- A historical study of institutional adaptive capacities in situations of extreme vulnerability, e.g. 1930s in Canada and 1960s in Chile.

## **Objective 2: Main activities.**

- A definition of the different scenarios of climate change in the next decades for the two regions. The scenarios will be derived from global climate models based on different emission scenarios.
- Examination of the potential contingent effects of climate change risks on the identified vulnerabilities.

## **Objective 3: Main activities**

- An analysis of the current institutional capacities in the context of the future scenarios of climate change risks.
- A discussion process with the institutions (focal groups, conferences, workshops) to identify the changes required to adapt to the new climatic conditions.

Unit 1A: Climate vulnerabilities – community case studies

Unit 1B: Analysis of the role of institutions in the resolution of conflicts related to water scarcity

Unit 1C: A historical study of institutional adaptation to water scarcities

Unit 1D: Analysis of environmental vulnerabilities

Unit 1E: Assessment of the capacities of formal institutions to deal with water related climate vulnerabilities and climate change risks

Unit 2: The effects of climate change scenarios on the identified vulnerabilities

Unit 3: Student training

Unit 4: Geospatial data

Unit 5: Dissemination

Development of conceptual frameworks, selection of case studies, methodologies, and identification of stakeholders.

PAST AND CURRENT

Assessment of Current Vulnerabilities

Assessment of historical “adaptive institutional capacities”  
Unit 1C (Dec 2007)

Assessment of current vulnerabilities of rural communities  
Unit 1A (Dec 2006)  
Unit 1D (Dec 2007)

Assessment of conflicts and “adaptive institutional capacities”  
Unit 1B (Final - June 2006)

Assessment of the ‘adaptive institutional capacities’  
Unit 1E (Dec 2007)

FUTURE

Assessment of future climate probabilities  
Unit 2 (Dec 2007)

Assessment of future vulnerabilities (analysis of the interconnections among future climate, economic and social scenarios and the current vulnerabilities of rural communities) and meetings with stakeholders to discuss potential future adaptive capacities)  
Final - Dec 2008

# Program of Activities

Activities	2004	2005	2006	2007	2008
Objective 1	XXX	XXX	XXX		
Objective 2	XXX	XXX	XXX		
Objective 3			XXX	XXX	X
Dissemination	XXX	XXX	XXX	XXX	XXX

# Working Papers

- Vulnerability of Communities to Environmental Change – Smit, Wandel, Young
- Value and Ethical Analysis in Vulnerability to Climate Change - Morito
- Institutions and Adaptive Capacity – Rojas, Diaz.
- South Saskatchewan River Basin Biophysical Baseline - Lac, Conlan, Sauchyn
- Climate Change Scenarios – Wittrock, Wheaton, Kulshreshtha
- Elqui River Basin Bio-Geo Physical Characterization - Cepeda, Fiebig, Morales, Salas

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## Prairie Adaptation Research Collaborative



The **Prairie Adaptation Research Collaborative** is a partnership of the governments of Canada, Alberta, Saskatchewan and Manitoba mandated to pursue climate change impacts and adaptation research in the Prairie Provinces. Our objective is to generate practical options to adapt to current and future climate change. We are also charged with fostering the development of new professionals in the emerging science of climate change impacts and adaptation.

PARC also hosts [C-CIARN Prairies](#), part of the national Canadian Climate Impacts and Adaptation Network.

Climate models generally forecast drier and warmer conditions and increased climate variability for the Prairie Provinces. This implies stress on agriculture, reduced river and stream flows, increased fires and pathogen stress in our forests, and impacts on biodiversity, to highlight a few challenges. Since its inception in 2000, PARC has been involved in dozens of interdisciplinary projects to address climate change impacts and adaptation issues. Explore our site to view our research projects and reports and learn about our support for graduate researchers and interns. Climate change affects all of us in some way - how does it affect you?



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# Institutional Adaptations to Climate Change



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## Canada-Chile Case Study on Adaptation

With the Kyoto Protocol ratification, the governments of Chile and Canada acknowledged climate change as a national priority. It is common sense among the world research community that climate change cannot be suddenly stopped despite the best mitigation efforts, thus adapting to climate change is a necessity. Although some level of autonomous adaptation can be expected, planned adaptation can potentially reduce economic losses and residual damage.

In 2001, the Intergovernmental Panel on Climate Change acknowledged that snow-melt dominated watersheds are highly sensitive and vulnerable to climate change. Glaciers are