Adaptation to Climate Change in the Canadian Plains

The semi-arid Palliser Triangle in the southern portion of the Prairie provinces is second only to the Arctic in terms of its vulnerability to climate change in Canada. While public awareness about climate change is becoming mainstream, this unique patch of land seems to get lost in the discussions. Public policy to address adaptation to climate change will be a critical element in determining our success or failure as human societies. As such, this symposium will present information and analysis on adaptation to climate change in a policy-relevant and accessible manner for a Saskatchewan audience.
Acknowledgements

Adaptation to Climate Change in the Canadian Plains is organized by the Saskatchewan Institute of Public Policy with the support of:

- Institutional Adaptations to Climate Change Project (IACC)
- Prairie Adaptation Research Collaborative (PARC)
- Canadian Plains Research Center (CPRC)
- University of Regina Conference Fund
- Johnson-Shoyama Graduate School of Public Policy
- SSHRC

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For more information on the Saskatchewan Institute of Public Policy, please visit our website.

www.uregina.ca/sipp
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The Saskatchewan Institute of Public Policy (SIPP) is pleased to be organizing *Adaptation to Climate Change in the Canadian Plains*, a symposium presented by the Johnson-Shoyama Graduate School of Public Policy, the Prairie Research Adaptation Collaborative (PARC), the Canadian Plains Research Center (CPRC) and the Institutional Adaptations to Climate Change (IACC) project. During this one-day symposium, you will hear from a number of knowledgeable speakers on the need for proactive and planned adaptation. Their presentations along with the reactions and views of attendees should produce a variety of potential strategies and policies.

Vigorous efforts to reduce greenhouse gases can mitigate the trend in climate change, but the future will depend heavily on our ability, as societies, to adapt. This symposium will explore the ways in which innovative adaptation strategies depend on effective public policy as well as far-sighted political leadership.

The presentations and discussions will be divided into four sessions:

1. “Climate Change and Why We Need to Adapt” – featuring presentations on the Institutional Adaptations to Climate Change project and several climate change models;
2. “Case Studies: Community Change and Conflict” – highlighting case studies in the Special Areas of Alberta, the Cabri/Stewart Valley in Saskatchewan, as well as First Nations people in Oldman River Dam Conflict;
3. “Future of Policy Making and Governance” – looking at law and policy, at the federal, provincial and municipal/local government levels; and,
4. “Influencing Decision-Makers” – featuring a panel of individuals who spend their professional lives working and influencing decision-makers as they create and implement strategies for adaptation to climate change.

We hope that the discussions in this symposium will lead to more effective long-range policy and planning as we prepare to deal with the impact of climate change in the Canadian Plains. We also hope that both governments, the private sector, stakeholders and community-based organizations will collaborate on the prairie-wide initiative that will help all residents of this region better understand and cope with climate change over the coming years and decades.

Best wishes,

Gregory P. Marchildon
In spite of the growing consensus regarding the importance of global warming, there is still a limited understanding of how climate change may impact the capacity of regional communities and institutions to manage natural resources, such as water. This knowledge gap constrains the possibilities of designing and implementing appropriate instruments to deal with climate change. The adoption of adaptation strategies to climate changes is particularly critical in regions that have the greatest risk or vulnerability, such as dryland areas already subject to water shortages.

The goal of the Institutional Adaptation to Climate Change (IACC) project is to develop a systematic, integrated and comprehensive understanding of the capacities of regional communities and governance 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. The goal is addressed through a comparative study of two regions: the South Saskatchewan River Basin in Canada and the Elqui River Basin of Chile. Both regions have a dry climate adjacent to a major mountain system and landscapes at risk of desertification, as well as an agricultural economy dependent on irrigation water derived from mountain snow and glaciers. As a result of drier conditions and increased climatic uncertainty, they will be similarly affected by climate change. In this context, the specific objectives of the project are:

1. To identify the current social and physical vulnerabilities related to water resource scarcity in the two dryland regions;
2. To examine the effects of climate change risks on the identified vulnerabilities; and
3. To assess the technical and social adaptive capacities of the regional institutions to address the vulnerabilities to current water scarcity and climate change risks.

The IACC project was initiated with a grant from the Major Collaborative Research Initiatives (MCRI) program of the Social Sciences and Humanities Research Council of Canada (SSHRC). Comprised of an interdisciplinary team of 35 researchers and research assistants, the project is an academic partnership of five Canadian universities and one Chilean university. Several government agencies and institutes in Canada and Chile have also committed resources to the project’s development and implementation. Additional information is available on the project website at www.parc.ca/mcri.
Program
April 22, 2008

8:00 REGISTRATION

9:00 OPENING SESSION - CLIMATE CHANGE AND WHY WE NEED TO ADAPT

Gregory P. Marchildon
Professor & Canada Research Chair in Public Policy and Economic History, Johnson-Shoyama Graduate School of Public Policy
Introduction

Polo Diaz
Director, Canadian Plains Research Centre & Professor of Sociology, University of Regina
The Institutional Adaptations to Climate Change Research Project (IACC)

David Sauchyn
Professor of Geography, Research Coordinator for the Prairie Adaptation Research Collaborative and PARC/Manitoba Hydro Research Professor
Future of the Canadian Plains: Climate Change Scenarios

Barry Smit
Professor & Canada Research Chair in Global Environmental Change, Department of Geography, University of Guelph
What We Mean by Institutional Adaptation

~10:15 BREAK ~

10:30 SESSION 2 - CASE STUDIES: COMMUNITY CHANGE AND CONFLICT

Johanna Wandel
Research Associate, Global Environment Change Group, University of Guelph
Alberta’s Special Areas: An IACC Community Case Study

Alejandro Rojas
Professor, Agroecology Program, Faculty of Agricultural Sciences, University of British Columbia
Lessons from the Oldman River Dam Conflict: Conflict and Adaptations to Climate Change

Suren Kulshreshtha
Professor, Agricultural Economics, University of Saskatchewan
Rural Community Vulnerability to Climate Change: Saskatchewan Case Studies

Moderator - Wendee Kubik, Associate Professor of Women’s Studies, University of Regina
~ 12:00 LUNCH AND KEYNOTE ADDRESS ~

Bernardo Reyes, Ecologist, ForestEthics Chile Program, Institute of Political Ecology, Santiago, Chile, Climate Change Impacts in Chile: Policy Challenges for an Export-led Economy

1:15 SESSION 3 - FUTURE OF POLICY MAKING AND GOVERNANCE

Margot Hurlbert
Professor, Departments of Justice Studies and Sociology and Social Studies, University of Regina
The Legal Context

Darrell Corkal
Senior Water Quality Engineer, Prairie Farm Rehabilitation Administration (PFRA), Agriculture and Agri-Food Canada
Water Governance and Government Institutions in Canada's South Saskatchewan River Basin

Gregory P. Marchildon
Professor & Canada Research Chair in Public Policy and Economic History Johnson-Shoyama Graduate School of Public Policy
Federal, Provincial and Local Government Adaptation

Moderator - Phil Adkins, Assistant Director, Ag-Water, Agriculture and Agri-Food Canada, Prairie Farm Rehabilitation Administration (PFRA) and Member of the IACC Advisory Board

~2:45 BREAK~

3:00 SESSION 4 - ROUNDTABLE: INFLUENCING DECISION-MAKERS

Carmen Dybwad
President, Energy Council of Canada, and Former Board Member, National Energy Board

Jo-Ellen Parry
Program Manager, Climate Change and Energy, International Institute for Sustainable Development

Norm Henderson
Executive Director, Prairie Adaptation Research Collaborative (PARC)

Moderator - The Honourable Ralph Goodale, MP, Wascana

4:30 CLOSING REMARKS

4:45 SYMPOSIUM ENDS
LOCATION OF SESSIONS AND MEALS
All symposium sessions and activities are held at the Travelodge Hotel Regina South, 4177 Albert Street. All meals, breaks and sessions will take place in the Imperial Ballroom, located on the lower level (see map on opposite page).

FOOD ALLERGIES OR DIETARY RESTRICTIONS
If you did not already indicate any food allergies or dietary considerations, please advise symposium staff so appropriate adjustments can be made. For those who have already advised symposium staff of any dietary restrictions, your considerations have been taken into account.

INFORMATION/REGISTRATION DESK
An information/registration desk is available throughout the symposium. It is located in the Banquet Lobby. Symposium staff will be available to assist you with any questions and concerns and are easily recognized by their BLUE name tags.

BOOKS FOR SALE
Titles related to climate change will be available for purchase (cash, cheque, VISA or Mastercard will be accepted) during the symposium from 10:15 a.m. to 3:00 p.m. in the Imperial Ballroom.

HOTEL CHECK-OUT TIMES
For those staying at the Travelodge, the check-out time is 11:00 a.m. If you require a later check-out time, please make arrangements with the Travelodge front desk.

MESSAGES
Travelodge staff will take emergency messages for symposium delegates at the front desk. The messages will be posted at SIPP’s information desk in the Banquet Lobby.

NAME TAGS
All participants are provided with a name tag, which are available at the registration desk along with the symposium materials and are required for entrance to sessions and meals.

CELLPHONES AND OTHER ELECTRONIC DEVICES
Please turn your cellphone, Blackberry, or pager off during the symposium proceedings. Thank you.
PHILIP E. ADKINS

Philip Adkins, B.Sc. in Civil Engineering, University of Saskatchewan, Saskatoon, 1975, has worked in the field of water resources for the Saskatchewan Department of Agriculture (3 years) and Agriculture Canada, PFRA (30 years). He has experience on a broad range of water development projects (municipal water supply and treatment; irrigation; earth dams and concrete weirs; wells; flood control structures; etc.). He started out in construction inspection and moved into project and program management, and, more recently water resource planning, and management. He spent two years as the acting Manager of AAFC’s then new National Agroclimate Information Service. His international work includes water resource engineering capacity building projects in Indonesia (2) and Ethiopia, under contract to CIDA or UN/FAO. The focus of these projects was on irrigation development. Most recently, he became project advisor to a project led by the University of Regina, Institutional Adaptations to Climate Change: Comparative Study of Dryland River Basins in Canada and Chile. Philip is an active member of the Canadian Water Resources Association (CWRA) as a Branch and National Director.

DARRELL CORKAL

Darrell Corkal, P. Eng. is a Senior Water Quality Engineer with Agriculture Canada, working for a branch known as the Prairie Farm Rehabilitation Administration. He graduated from the University of Manitoba with a Bachelor of Science in Civil Engineering in 1980. With PFRA from 1980 to 1990, Darrell has worked on numerous water resources projects as a project engineer constructing dams, irrigation projects and water treatment plants in the Canadian Prairies, and from 1990–1993 with the St. Lawrence Seaway Authority re-constructing the major concrete locks of the Welland Canal transporting ships past Niagara Falls. Since 1993, Darrell has conducted applied research to protect and treat water for agricultural needs and rural household needs. He has worked closely with farmers, First Nations, researchers, the private sector, engineers and academia. He and his colleagues were granted an award as “Leaders in Sustainable Development” by the five Natural Resource Departments of Canada (2003). In 2004, Darrell joined an interdisciplinary team studying water institutions and the capacity to adapt to climate change impacts on water resources, with study sites in Canada and Chile.

POLO DIAZ

Polo Diaz teaches primarily in environmental issues, social science methodology, social theory, and development. His publications include articles and book chapters on social capital and social cohesion in rural Saskatchewan, climate change, processes of change in rural communities, forestry markets, Latin American development, and rural marginality. He has participated in several research projects on rural issues in Canada and Chile. These include studies on the different dimensions of social cohesion of the farm community; farm work, farm training, and the deskilling of farm labour; regional sustainable development, environmental policies, rural organizations and movements; the economic and social changes of farm households.
and communities; and forestry development. Dr. Diaz is currently leading a major research project on institutional adaptations to climate change focusing on dryland communities in the prairies of Canada and Chile. He participates in a similar international comparative study in Argentina, Bolivia, and Chile.

CARMEN DYBWAD

A native of Sedley, Saskatchewan, Dr. Dybwad has a Ph.D. in Regional Planning and Resource Development from the University of Waterloo in addition to a BA and MA in Economics from the University of Regina. Dr. Dybwad has held several positions with several departments of the Government of Saskatchewan including, among others, the Department of Finance and Executive Council. Carmen’s work in the energy sector started with her tenure at SaskPower. From there she moved to the national scene when she became a Member of the Canadian National Energy Board, on which she served with distinction for seven years. Dr. Dybwad is now the President of the Energy Council of Canada.

THE HONOURABLE RALPH GOODALE, MP, WASCANA

Ralph Goodale became the House Leader of the Official Opposition on February 10, 2006, following his sixth successful election as a Liberal Member of Parliament from Saskatchewan. Raised on a family farm near Wilcox, Saskatchewan, and with degrees from both the University of Regina and the University of Saskatchewan, Ralph Goodale has practical experience in business, agriculture, law and broadcasting, as well as federal and provincial politics. He was first elected in 1974 to represent the federal constituency of Assiniboia. In the 1980s, he became provincial leader of the Saskatchewan Liberal Party and in 1986 was elected a Member of the Saskatchewan Legislative Assembly. Ralph Goodale returned to the House of Commons as the MP for Regina-Wascana in 1993 and was re-elected consecutively in 1997, 2000, 2004 and 2006. Through more than 12 years of Liberal government, he served variously as Minister of Agriculture, Natural Resources, Public Works and Finance; as well as Government House Leader. He has also carried responsibilities for the Canadian Wheat Board, Communication Canada, Métis and Non-Status Indians and the resolution of Indian Residential Schools issues. Ralph Goodale and his wife, Pamela, make their home in Regina.

NORM HENDERSON

Norm Henderson is executive director of the Prairie Adaptation Research Collaborative and adjunct professor at the University of Regina. He holds a Ph.D. in Environmental Sciences and has worked as a senior policy advisor to the Saskatchewan Cabinet on environmental issues. Norm has lectured in environmental economics in Britain at the University of East Anglia, and published regular editorials on policy issues in Canada, the United States and Australia. His current research interests include public policy and environmental stewardship and conservation management under climate change.
MARGOT HURLBERT
Margot Hurlbert, B.Admin., LL.B., LL.M. (Osgoode) practiced law in private practice in Regina, Saskatchewan, for 12 years and then joined corporate practice as the Assistant General Counsel of SaskPower for seven years later joining the Faculty of Arts, University of Regina, as an Assistant Professor in the summer of 2005. Margot served as the Continuing Legal Education Chair of the Canadian Bar Association, Saskatchewan Branch, President of the Regina Women’s Network, on the Board of Directors of the Saskatchewan Lawyers Education Association, and currently sits on the Board of the Public Legal Education Association for Saskatchewan and provincial council of the Canadian Bar Association. Her major areas of research include environmental justice and water.

Suren Kulshreshtha, Ph.D., FCAES, is currently a professor of agricultural economics at the University of Saskatchewan, Saskatoon, a position he has held for the past 38 years. He received his first degrees from Agra University, India, and Ph.D. in agricultural economics from the University of Manitoba. He joined the University of Saskatchewan in 1969, and has taught quantitative methods, and project evaluation, where incorporating environmental considerations in project planning and evaluation is a major focus. He has been a Visiting Scientist at the International Institute for Applied Systems Analysis, at Laxenburg, Austria. He has also served various professional societies in capacities such as Editor of the Canadian Journal of Agricultural Economics, Associate Editor of the Canadian Water Resources Journal, and a Regional Editor, Impact Assessment. He has also participated in several oversees projects in Indonesia, Zambia and India through the Canadian International Development Agency, and has been an invited participant at several FAO and United Nations Environmental Program activities. He has over 480 publications to his credit, with 110 refereed journal articles in over 30 national and international journals. In 2004, the Canadian Society of Agricultural Economics selected him as the Fellow of the Society.

WENDEE KUBIK
Wendee Kubik is an Associate Professor and Coordinator of Women’s Studies at the University of Regina. She teaches courses on Women and Health, Women and Work, Feminist Research Methods, and Introduction to Women's Studies. Dr. Kubik’s research interests focus on farm women, women’s health, aboriginal women, women and work, gender analysis, changing gender roles, participatory action research, and global health issues. Dr. Kubik is currently involved in two major research projects: The CIDA – UPCD Program, Rural Community Water Conservation Project (Canada & Chile), and the SSHRC – Community-University Research Alliance Program (CURA) project “The Healing Journey”. She is also involved in research looking at the health and program needs of Aboriginal grandmothers who are caring for their grandchildren. Wendee is active in the Canadian Women’s Studies Association, AIDS Programs South Saskatchewan, is an Associate member of the Centre on Aging and Health, and is on the Publishing Board of the Canadian Plains Research Centre.
Speaker and Moderator Bios
April 22, 2008

GREGORY P. MARCHILDON

Gregory P. Marchildon is a Canada Research Chair in Public Policy and Economic History at the Johnson-Shoyama Graduate School of Public Policy, University of Regina, and the Director of the Saskatchewan Institute of Public Policy. He is also a Senior Fellow at Queen’s University’s School of Policy Studies and Chair of the Saskatchewan Health Research Foundation. Before this, he served as Executive Director of the Romanow Commission on the Future of Health Care in Canada (2001-02), Cabinet Secretary and Deputy Minister to the Premier of Saskatchewan (1996-2000), and Saskatchewan’s Deputy Minister of Intergovernmental Affairs (1994-96). He is the author of numerous books and articles on public policy and Canadian history, including *Health Systems in Transition: Canada* (2006), *Canoeing the Churchill* (2002), and *Profits and Politics: Beaverbrook and the Gilded Age of Canadian Finance* (1996).

JO-ELLEN PARRY

Jo-Ellen Parry is the Program Manager, Climate Change and Energy, at the International Institute for Sustainable Development (IISD). She brings her broad knowledge of climate change, natural resource management and community development to her various roles as researcher, project manager, network coordinator and program manager. Her recent work has focused on the intersection of adaptation to the effects of climate change, building adaptive capacity in developing countries, and establishment of a post-2012 climate regime. Within Canada, she has worked with the Manitoba Government as it develops its approach to addressing the challenge of climate change. As well, she was recently been appointed to the Ontario Expert Panel on Climate Change Adaptation. Prior to joining IISD, Ms. Parry held several research positions with various academic, NGO and private organizations. She holds a Masters in Environmental Studies from York University, and a Bachelor Science in Environmental Science from the University of Manitoba.

BERNARDO REYES

Bernardo Reyes is both a respected scholar and a highly recognized environmental activist in Chile. He is a researcher and policy analyst with the Institute for Political Ecology in Santiago, Chile, and a program director for ForestEthics Chile where he is leading several initiatives aimed at creating new models for native forest management and protecting critical habitats. He is also a adjunct professor and lecturer in several graduate degree programs in Chile, Bolivia, Brazil and Peru and travels regularly in the region. He is a founding member of the San Francisco-based Ecological Footprint Network as a result of his pioneering work on sustainability indicators. Bernardo holds a degree in marine biology from the University of Toronto and a graduate degree in international development from the Institute for Social Sciences in The Hague, Netherlands.
ALEJANDRO ROJAS

Dr. Alejandro Rojas, holds a Ph.D. in Sociology and conducted postdoctoral research in Ecological Anthropology. He is a full-time faculty member at the University of British Columbia in the Faculty of Land and Food Systems, Agro-ecology program, and chairs the Graduate Program in Integrated Studies in Land and Food Systems. Alejandro is the Principal Investigator on two projects on the security and sustainability in the city of Vancouver and at UBC campus. He is a co-investigator on the SSHRC project Institutional Adaptations to Climate Change and is a member of the leading team of a Canadian-Chilean project about Vulnerability and Adaptation in Rural Communities to Climate Change and Water Scarcity. Alejandro led a four-year Chilean-Canadian research project on Adaptive Environmental Conflict Resolution. His greatest academic greatest passion is sustainability education.

DAVID SAUCHYN

Dr. David Sauchyn is Professor of Geography and Research Coordinator at the Prairie Adaptation Research Collaborative (PARC) at the University of Regina. Since 2000 he has been responsible for facilitating and managing many research projects on climate change impacts in the Prairie Provinces. Dave's main research interests are the climate of the past millennium in Canada's western interior and how knowledge of past climate can inform scenarios of future climate. Dave is a co-investigator in a five-year multidisciplinary study of adaptation to climate change in northern Chile and the Canadian plains. Dave participated in the expert review of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change and he is a lead author of Canada's National Assessment of Climate Change released on March 7, 2008.

BARRY SMIT

Barry Smit is Canada Research Chair in Global Environmental Change and Professor of Geography at the University of Guelph. He has served as the Chair of Environment Canada's Task Force on Adaptation to Climatic Variability and Change and been a member of the Scientific Advisory Committee of the United Nations Environment Program on World Climate Impacts and Response Strategies. He has acted as a consultant to various Canadian agencies including the Canadian International Development Agency, Natural Resources Canada and the Ontario Ministry of Agriculture and Food. He has been lead author and co-ordinating lead author in the Nobel Prize-winning Intergovernmental Panel on Climate Change assessment process. He currently sits on the Ontario Expert Panel on Climate Change Adaptation.

JOHANNA WANDEL

Johanna Wandel is a Postdoctoral Researcher in the Global Environmental Change Group in the Department of Geography at the University of Guelph, where she earned Ph.D. and M.A. degrees. Her research interests are focused on human dimensions of global change, particularly community-level resource use and management in light of climate change.
Opening Session
Climate Change and Why We Need to Adapt

SESSION PRESENTERS

Gregory P. Marchildon
Professor & Canada Research Chair in Public Policy and Economic History, Johnson-Shoyama Graduate School of Public Policy
Introduction

Polo Diaz
Director, Canadian Plains Research Centre & Professor of Sociology, University of Regina
The Institutional Adaptations to Climate Change Research Project (IACC)

David Sauchyn
Professor of Geography, Research Coordinator for the Prairie Adaptation Research Collaborative and PARC/Manitoba Hydro Research Professor
Future of the Canadian Plains: Climate Change Scenarios

Barry Smit
Professor & Canada Research Chair in Global Environmental Change, Department of Geography, University of Guelph
What We Mean by Institutional Adaptation
Session 2
Case Studies: Community Change and Conflict

SESSION PRESENTERS

Johanna Wandel
Research Associate, Global Environment Change Group, University of Guelph
Alberta’s Special Areas: An IACC Community Case Study

Alejandro Rojas
Professor, Agroecology Program, Faculty of Agricultural Sciences, University of British Columbia
Lessons from the Oldman River Dam Conflict: Conflict and Adaptations to Climate Change

Suren Kulshreshtha
Professor, Agricultural Economics, University of Saskatchewan
Rural Community Vulnerability to Climate Change: Saskatchewan Case Studies

MODERATOR - Wendee Kubik, Associate Professor of Women’s Studies, University of Regina
Alberta’s Special Areas
An IACC Community Case Study

Johanna Wandel, University of Guelph
Gwen Young, University of Guelph
Vulnerability to Climate

Exposure of System

Adaptive Capacity of System

Vulnerability

Exposure

– Climate/weather conditions
– Nature of water use
– Livelihood reliance on water, weather

Adaptive Capacity

– Current management of water stress, weather
– Ability to cope with more frequent/sever stress
– Planning for future stress

Goal of IACC Case Studies

To assess the current vulnerability of six Canadian and four Chilean case study communities.

• Identify relevant conditions [exposures]
• Document strategies to deal with conditions [adaptive strategies]
• Constraints and opportunities to/for adaptive strategies (past, current, anticipated) [Adaptive Capacity]

Hanna/Special Area 2
Ranchers:

- Little snow/slow runoff = trouble filling dugouts for stock water
- Low soil/subsoil moisture = poor grass growth
- Low early season moisture = poor grass growth
- Freeze-thaw in winter = dries soil, not good for cattle
- Cold, wind = difficult for calves in early spring/late winter
Dryland Farmers:

- Insufficient spring precipitation = poor germination, little early growth
- Open winter, chinooks, fast runoff = insufficient soil moisture
- Repeated dry years = low subsoil moisture, grasshoppers
- Low precipitation throughout growing season = low yields

Dryland farmers strategies

- Change crop mix
- No/minimum tillage
- Diversify operation (cattle)
- Use crop as feed during poor years
- Crop insurance
- Reduce cultivated areas, shift to more ranching
- Off-farm jobs
- Abandon farming altogether

[Compounding stresses: removal of crow rate, low crop prices, disappearance of elevators, grasshoppers]

Conclusions

- Type of reliance of water determines exposure/sensitivity to dry conditions
- Institutional strategies have tremendous capacity to mediate water shortage
- Individual strategies involve technology, insurance, management, pluriactivity

Rancher strategies

- Construct more/better dugouts
- Recharge dugouts from secure water sources via pumps, shallow pipelines
- Keep feed supplies
- Carry hay, pasture insurance
- Dry years: decrease herd size, lease additional land, buy feed
- Off-farm jobs
- Haul stock water

[Compounding stresses: BSE, low calf prices, high feed prices]
Session 2
Case Studies: Community Change and Conflict

Lessons from the Oldman River Dam
Conflict and Adaptations to Climate Change

Alejandro Rojas, University of British Columbia
Lorenzo Magzul, University of British Columbia
Greg Marchildon, University of Regina
Bernardo Reyes, Institute of Political Ecology, Chile
IACC project

SIPP April 22, 2008
Conflicts and potential conflicts

- Oldman River Dam construction in the 1980s
- Dispute between Montana and Alberta over the Milk and St. Mary’s river water sharing agreement
- Inter-provincial water agreement
- Over allocation of water flow

Other factors that can exacerbate impacts of water scarcity

- High interdependence while availability of water is declining
  - Inter-provincial apportionment agreements
  - International agreements
- Poor governance and political instability
  - Unresolved First Nations water rights

Institutional adaptive capacity

- Ability to access resources (financial, technical, human) and knowledge
- Flexibility and legitimacy of its existing institutional arrangements
- Strong networks with others sectors and civil society’s trust
- Leadership, vision, ability to learn from past experiences

Why study role of institutions in resolutions of conflict?

- institutional challenges and adaptation to climate change-induced water insecurities
- Conflict resolution, adaptive capacity and vulnerability of communities and stakeholders
- Power differentials among stakeholders: more or less vulnerable to impacts of climate change.
- Inclusion of a spectrum of interests and values: more equitable access to water, lesser exposure and greater economic opportunities for all water users.

Climate change predicted impacts in NA

Impacts
- Regional rainfall variability will affect the quantity and quality of fresh water—significant impacts
- Increase demand, less supply
  - Human and ecological systems affected
  - Challenges for meeting agricultural, industrial and municipal needs
- Predicted impacts of water scarcity will be exacerbated by population growth

Outline

- Why study water conflicts and the role of institutions in the context of adaptations to climate change
- The Adaptive Conflict Resolution (ACR) model
  - The Oldman River Dam case:
    - Story
    - Key stakeholders
    - Institutional adaptations and ACR
    - ACR Assessment of the Resolution of the Conflict
    - Lessons learned and institutional adaptations
- Conclusions
The Oldman River Dam Conflict: The Story (2)

- Debates on need and locations:
  - Alberta Environment Department: Three River site ranked sixth on environmental impacts but first in terms of economic feasibility and operation.
  - Oldman River Study Management Committee (ORSMC):
  - Environmental Council of Alberta (ECA): 1979 report on the need for Oldman River Dam

Conflicts, exposure, AC & institutions

- Water conflicts affect exposure and adaptive capacity
- Mediate and influence institutional adaptive capacity (how conflicts are managed and resolved).
- Institutions that integrate lessons from conflicts into decision making and policies enhance their adaptive capacity, whereas those that do not may lose adaptive capacity.
- Water is essential for economic development, ecosystem functions and the fulfillment of local values and cultures,
- Successful resolution of conflicts can enhance institutional adaptive capacity which in turn reduce the vulnerability of communities to conditions of water scarcity

The Oldman River Dam Conflict: The Story

- Variability Oldman River flow & sense of insecurity of the agricultural community in the region.
- 1920s: Northern Lethbridge Irrigation District: increasing water withdrawals from the Oldman River.
- 1935: The Prairie Farm Rehabilitation Administration is established for construction of St. Mary River dam in the 1940s and the Bow River dam in the 1950s
- 1970: Discussions on Oldman River dam Northern Lethbridge Irrigation District (NLID) and Alberta government
- Progressive Conservative government of Peter Lougheed, irrigation development and development of a diversified agricultural sector.

The Oldman River Dam Conflict: Key Stakeholders

- Committee for the Preservation of the Three Rivers (CPTR) (displaced farmers)
- Piikani
- Friends of the Oldman River (FOR),
- Alberta Irrigation Project Association (AIPA)
- Government of Alberta
- Supreme Court of Canada
The Oldman River Dam Conflict: Pikani

- The Piikani and the findings of the Environmental Assessment Review Panel,
- Order of the Supreme Court of Canada: To conduct an environmental impact assessment of the dam.
- Panel found that the “Oldman Dam would have cultural consequences for the Piikani.
- Pikani not sufficiently involved in key decisions

The Resolution of the Conflict

- Outcome of the conflict
- The resolution of the conflict: the views of the key stakeholders
- Assessment of the resolution of the conflict from an Adaptive Conflict Resolution perspective

Lessons (1)

- Key factors that contributed to the volatility of the conflict over the Oldman River dam
- Impacts that may have reduced the adaptive capacity of groups directly impacted.
- Lessons contribute to improvements (technology, behaviour, decision making and policy)
- The adaptive capacity of water governance institutions and communities climate change impacts is enhanced.

Lessons learned (2)

- Changes in behaviour
- Changes in organizational capacity and strategies by communities and others stakeholders
- Negative outcomes

Similarities to other conflictive situations

- Dams, economic development and water security in water scarce regions
- Influential stakeholders control: power, knowledge, language
- “consultation” and local communities and stakeholders
- Contradictory attitudes government institutions and the proponents of projects
- Institutions and stakeholders gain understanding regarding the participation of citizens in decisions regarding water governance
- Recognition of the need for an ecological baseline assessment
- Need to have public policies oriented toward the creation of appropriate institutional scenarios for the resolution of water conflicts
- Examples of integrating lessons learned from conflicts into water governance decisions

Conclusion

- The study of water related conflicts provide opportunity to understand adaptive capacity and vulnerability of communities
- Role of institutions in managing or resolving water conflicts influences adaptive capacity and vulnerability of communities
- Need of enabling public policy orientated to the creation of appropriate scenarios for water conflict resolution
Rural Community Vulnerability to Climate Change: Saskatchewan Case Studies

V. Wittrock, P. Diaz, S. Kulshreshtha, B. Matlock, E. Wheaton

1Saskatchewan Research Council,
2Saskatchewan Research Council and the University of Saskatchewan,
3University of Saskatchewan
4University of Regina

Invited Presentation to “Adaptation to Climate Change in the Canadian Plains”
Saskatchewan Institute of Public Policy and Institutional Adaptation to Climate Change Project

April 22, 2008
Regina
Purposes

- Discuss the vulnerability assessment of two communities in southwestern Saskatchewan: Cabri and Stewart Valley
- Use the drought of 2001 to 2002 as a case study to illustrate community capacity and vulnerability

Outline

- Community Descriptions
- Vulnerability Assessment- main exposures, sensitivities and adaptation strategies
- Drought related examples of impacts, adaptation and vulnerability
- Lessons?

Research Area

- Community Descriptions
- Vulnerability Assessment- main exposures, sensitivities and adaptation strategies
- Drought related examples of impacts, adaptation and vulnerability
- Lessons?

Cabri & Stewart Valley

- Agriculture – main economic driver
- Tourism, Oil and Gas are other drivers
- Region subject to climatic extremes
- Populations of the RMs of Riverside (Cabri) and Saskatchewan Landing (Stewart Valley) have been decreasing to 2006.

Vulnerability Assessment Methods

- Archival research (history of the communities)
- Semi-structured interviews (41)
- Focus groups (2)

Current Exposures

- Economic Exposures (examples)
  - Lack of employment
  - Low crop prices and high input costs
  - Demographic inequity (young people move away and do not return)
  - Centralization of services in main centres e.g., Swift Current
Current Exposures
• Climatic Extremes (examples)
  – Temperature extremes
    • Late spring/early fall frosts
    • Extreme variability
  – Extended drought periods
    • Wind erosion
    • Decreased water supply (Cabri)
    • Increased grasshopper damage
    • Lower crop and forage production
  Extreme precipitation events
    • Flood damage
    • Hail damage

Current Adaptive Strategies
• Rural communities have learned and need to continue to learn to adapt
• External organizations and mechanisms of farm support such as crop and hail insurance – challenges with program
• Changed farming practices e.g., continuous cropping
• Diversified income – off-farm income
• Social Capital - people work together

Drought and Vulnerability
• 2001 and 2002 were extreme drought years and severe impacts

Grasslands Support Livestock Production

Climate Extremes and Impacts
• Other climate-related exposures mentioned by community members were wind and hail
• Hail storms have been singled out as causing the worst crop damage

Some Impacts and Adaptations: Community Members’ Observations

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Physical</th>
<th>Biological</th>
<th>Social</th>
<th>Health</th>
<th>Adaptations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain Producers (Cabri and Area Residents)</td>
<td>No water available to crop sprays, poor water quality from secondary sources, reduced water - crop quality</td>
<td>Increased sprays, crop production decreased</td>
<td>Reduced income from poor crops, high input costs</td>
<td>Crop Insurance, Hail Insurance (barely covered)</td>
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<td>Drought and hail loosing forage crops, low commodity prices, high input costs</td>
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</tbody>
</table>
Economic Impact on Crop Revenue

- Crop revenue was below break even values in 2001 and 2002 in both RMs.
- Revenue losses occurred for both municipalities of $14.3 million in 2001 and $7.3 million in 2002.
- RM of Saskatchewan Landing (Stewart Valley) was less negatively impacted than RM of Riverside (Cabri) partly due to higher crop yields.

Livestock Production

- Herd size declined between 2000 and 2003 indicating higher culling rate than normal.
- The number of cattle marketed increased in 2000 and 2001 compared to the 1996-1999 period.
- Although this has short-term gains it has a cost to livestock operations longer-term viability.

Water Use

- **Cabri**
  - Had water shortages in 2000, 2001 and 2002
  - Water consumption was highest in 2001 over the 1999 to 2005 period
- **Stewart Valley**
  - Had adequate water supplies
  - Water consumption was highest in 2003 over the 2001 to 2005 period

Adaptive Strategies used for the Drought

- Water Scarcity (example)
  - Water restrictions imposed
    - Community members policed each other
    - Hauled water
    - Found alternative water sources
    - Large water trucks were restricted from using Cabri’s potable water
    - Used grey water
    - Upgraded potable water infrastructure (Cabri extended pipeline further into SSR)

Conclusions

- Vulnerability is shaped by a community’s exposure-sensitivity to various stressors and by its adaptive capacity.
- Stressors are exacerbated by extreme events such as drought.
- Stressors for Cabri & Stewart Valley included water supply and quality issues, increased water consumption, older population, depopulation and centralization of services.

The Future?

- Future viability of the communities is a concern.
- People are generally aware of climate change, but...
- Adaptive strategies tend to be reactive
- Need to strengthen the proactive adaptive capacities to reduce vulnerability
- Need to expand knowledge and foster community resiliency by planning and acting across sectors, issues and political boundaries
- Need integration of ecosystem management, disaster reduction and social and economic development measures.
CLIMATE CHANGE IMPACTS IN CHILE: Policy challenges for an export-led economy

Adaptation to Climate Change in the Canadian Plains Symposium

IACC Project
Bernardo Reyes
Ecologist
ForestEthics Chile Program
Institute for Political Ecology
Regina, April 22, 2008
ECOSYSTEM-BASED APPROACH ON LAND AND RESOURCE PLANNING?

- Well-adapted dryland vegetation and native forests of the northern and central regions are fast disappearing due to the combined effects of agricultural expansion, overgrazing and most recently, due to the substitution of native forests by new irrigated crops.
- Advanced irrigation technology supports the colonization of new land and valleys, displacing subsistence agriculture and native vegetation.
- The process of intensive land use changes has evolved in framework lacking a national policy on integrated basin management.
- Integrated water management and plans to protect water reserves and recharge areas of aquifers are missing in productive, land use planning.
- Both mining and agriculture are dissociated from ecosystem management approaches.
- (Foto en el otro documento)

Desertification and erosion: Major threats to productive systems

- 64% of the country’s 75.6 million hectares are under strong desertification process.
- Desertification and drought are the two most extensive environmental problems in Chile and Latin America.
- Northern drylands and Patagonia tundras are affected.
- Climate extremes are almost a way of life but.
- Over 60 % of the Chilean population and over 75% of the economic activities are associated depending on snow melt and glaciers.
- Over 87% of the glaciers are retreating and their behaviour in the northern region is poorly known and studied.

Decreasing water availability and increasing water demands

- Climatic change also is affecting water reserves in Southern Chile.
- Southern Ice Fields are home to 67% of all glaciers in the country.
- Large glaciers, like O’Higgins, show a decrease of 32 km² between 1961 and 2001 and the trends show the process is accelerating.
- Glaciers in the Southern Andes (e.g. Lanin and Villarrica) show a steep and continuous decline in snow and ice.

Disappearing glaciers

Glacier Lanín Norte (39°S)
Villalba, 2004

Glacier Turbio River, Villarrica, Casassa 2004

Decreased rainfall and increased evapo-transpiration are affecting water availability

Average (30-year period) for La Serena 1869-2004
Similar trends in Southern Chile

Concepción 1930-2002

Changes in rainfall throughout Chile
(50-year average)

Source: Juan Quintana, 2003

South America: Results of the IV Report to IPCC

Mining - the building block of the Chilean economy:
Copper trends over 90 years

World’s main producers of copper

World demand for refined copper

Source: WBMS, 2006
Minerals historically have led exports

Evolution of copper production in Chile and China’s demand for refined copper

Uso de la tierra: principales productos

Chile: Principales productos exportados 2005, valor FOB en millones de US$
The combined effects of mining and agriculture

- Mining at high altitude in and around glacier and snow deposits and headwaters
- Contamination and increased albedo effect
- Increased water extraction on surface and underground aquifers
- Increased disturbance of native vegetation cover
- Damaged recharged systems

Some weaknesses in the Chilean export-led model

- Major export sector intensive use of water and energy
- Chile imports most of its energy
- Water is in relatively short supply in the leading economic regions
- Water reserves are declining
- There is no integration of ecosystem-based approach on productive systems
- Droughts and extreme weather conditions are more intense and more frequent
- Greater vulnerability of subsistence and small farming communities

Major policy challenges

- Markets are blind to long-term productive failures, yet markets are leading policy formation
- Integrated Basin Management is a major pending task: private water right
- Ecosystem protection is key in sustaining aquifer recharge systems
- Re-investment on renewable capital is slow and not a priority
- Integration of climate scenarios on production goals
- Water reserve (glaciers) require protection laws

Thank you

Muchas gracias
Session 3
Future of Policy Making and Governance

SESSION PRESENTERS

Margot Hurlbert
Professor, Departments of Justice Studies and Sociology and Social Studies, University of Regina
The Legal Context

Darrell Corkal
Senior Water Quality Engineer, Prairie Farm Rehabilitation Administration (PARC), Agriculture and Agri-Food Canada
Water Governance and Government Institutions in Canada’s South Saskatchewan River Basin

Gregory P. Marchildon
Professor & Canada Research Chair in Public Policy and Economic History, Johnson-Shoyama Graduate School of Public Policy
Federal, Provincial and Local Government Adaptation

MODERATOR - Phil Adkins, Assistant Director, Ag-Water, Agriculture and Agri-Food Canada, Prairie Farm Rehabilitation Administration and Member of the IACC Advisory Board
The Legal Context

Adaptation to Climate Change in the Canadian Plains

Margot A. Hurlbert
Outline

- Water Models
  - Government agency Management
  - User – based Management
  - Market based Management
  - Water Management Assessment Principles
- Conclusions

THE LEGAL CONTEXT

Water Models

- Government agency management (generally associated with water regarded as public property) – Government defers its authority for the management of water to an agency which assumes authority for directing who does and does not receive water rights in accordance with bureaucratic policies and procedures.

Water Models

- User-based management (generally associated with water regarded as common property) - Water users, or those with license or rights to water join together and coordinate their actions in managing water resources. Decision making is collective among users.

Water Models

- Market (generally associated with water owned as private property) – Water is allocated and reallocated through private transactions. Users can trade water rights through short term or long term agreements or temporary or permanent transfers, reallocating rights in response to prices.

Water Management Assessment Principles

- Decentralization and subsidiarity
- Accountability
- Participation
- Predictability
- Financial Sustainability
- Transparency
Decentralization and Subsidiarity

- Delegation of responsibility and authority of water management to the lowest feasible level.
- This involves managing surface waters at the catchment’s level with involvement of all stakeholders;
- Decentralization and subsidiarity is important for two main reasons:
  1. Allows for local community practices and values which are then adopted and embraced in practice. Community participation ensures community commitment;

Participation

- By all stakeholders – whether public or private, communities or non-governmental organizations (NGOs).
- Broad consultation of government agency management
- User based models – irrigation districts
- Watershed advisory councils

Predictability

- Predictability – all laws and regulations should be applied fairly and consistently.
- Water allocation decisions
- Dispute resolution procedure
- Government organizations, departments and their roles

Accountability

- Service Delivery
- Conservation
- Water Management
- Quantity
- Quality

Adaptation to Climate Change

April 22, 2008

The Legal Context
Conclusions

- The user-based management model scored highest of all models.
- Support for user based management is increasing locally and internationally.
- The trend to decentralization and user based governance requires attention to integration of water quality management and minimization of decentralization costs.
- Although government agency management initially scores low, this is partly due to the generic, flexible nature of the wording of the governing legislation.

Transparency

- Clear policies, rules, regulations, and decisions, with information available to the public.
- All Western Canadian provinces employ the government agency model and have legislation containing clear rules for water license priorities and the procedure for applications for water licenses.
- There are also obligations on government officials managing water to communicate decisions to applicants in respect of their decisions in relation to determining conflicts.
- Overall, Western Canadian provinces employ a high degree of transparency through their government agency model.
Session 3
Future of Policy Making and Governance

Water Governance and Government Institutions in Canada’s South Saskatchewan River Basin

Darrell R. Corkal, P. Eng. , PFRA
Saskatoon, Saskatchewan, Canada

SSHRC MCRI – Institutional Adaptations to Climate Change
Saskatchewan Institute of Public Policy

Adaptation to Climate Change in the Canadian Plains Symposium
Regina, SK April 22, 2008
Outline

• Human Settlement and Water Use
• Water Management Mandates
• The Prairie Provinces Water Board
• Catalysts for Change
• The Views of Stakeholders
• Looking Forward

First Nations

• Aboriginal peoples date back 11,000 years:
  – Hunters, gatherers
  – Plentiful food source
  – Nomadic, pedestrian
• Perhaps one of the most adapted peoples to water and climate pressures
• Collapse of bison herd after introduction of:
  – The gun
  – The horse
  – European trade and market (of bison fur)

Western Canadian Settlement

• 1800s: Prairies sparsely settled
• 1894: North West Irrigation Act
• Early 1900s: European settlement
  – Free land for settlement
  – Model: one farm every 1.6 km
• 1920s: society faces severe droughts

Historic Acts of Parliament

• Northwest Irrigation Act, 1894
  – To promote settlement and Agriculture
  – Water owned by crown, licenses & appropriation “first in time” subject to cancellation
• Boundary Waters Treaty, 1909
  – International agreement with US, boundary waters, International Joint Commission
• Natural Resources Transfer Agreement, 1930
  – Natural resources were transferred to provinces
  – Water management becomes a provincial mandate
• Water is not mentioned in the Canadian Constitution

Drought in 1920s & 1930s: provincial and national crises

• Dust storm near Lomond, AB (1930’s)
• Soil drifting on an abandoned Farm yard near Cadillac, SK

Institutions created to help society adapt:
• Special Areas Boards in Alberta
• Prairie Farm Rehabilitation Administration

Palliser Triangle – “unfit for habitation”

– mapped by John Palliser
– exploration 1857-59 after extensive drought

Map outlining Palliser’s Triangle and the Dry Belt.
The key to Prairie Agricultural Adaptation: Chernozemic Soils

Scientific Research from PFRA's Dominion Experimental Farms:
- Preserve soil structure; zero or low tillage; adaptive crop varieties

Provincial Water Mandate
- Provinces retain water management mandate
  - Natural Resources Transfer Act, 1930
- Key Saskatchewan ministries:
  - Watershed Authority, Environment, Health, Agriculture, Power, Parks, Water Corporation
- Key Alberta ministries:
  - Environment, Health, Agriculture, Infrastructure and Transportation, Sustainable Resource Development, Climate Change Central

Federal Water Mandate
- Water is not mentioned in the Constitution
- Trans-boundary flow, environment
- Environment, Health, Agriculture, Parks, Indian and Northern Affairs, Natural Resources, Fisheries and Oceans, Transport, Foreign Affairs, International Joint Commission
- 19 departments spend $750 million/yr
- Activities are fragmented

Local government; NGOs
- Municipal Governments:
  - drinking water, wastewater, environmental protection, economic development
- Regional and Local Health Authorities
- NGOs: development to environmental protection:
  - rural water utilities, irrigation districts, Ducks Unlimited, watershed groups, conservation advocacy, Pollution Probe,
- The Canadian Water Model:
  - water is a shared jurisdiction
  - described as a “patchwork quilt” with overlapping roles
  - sometimes difficult to know who does what, when, why, where, and how

Irrigation Adaptations in SSRB:
- 772,000 ha irrigated land (5% of basin’s Ag land, 18% of basin’s Ag product)
- Irrigation removes 22% of the natural flow and accounts for over 90% of the basin’s consumptive water uses

Prairie Provinces Water Board

The SSRB is ~ 80% of Canada’s 1 million ha of irrigated land

12,000 ha irrigated land (5% of basin’s Ag land, 18% of basin’s Ag product)
- Irrigation removes 22% of the natural flow and accounts for over 90% of the basin’s consumptive water uses.

The key to Prairie Agricultural Adaptation: Chernozemic Soils

Cereal Cultivation in Canada

Source: soilsofsask.ca
University of Saskatchewan

The SSRB is ~ 80% of Canada’s 1 million ha of irrigated land

The SSRB is ~ 80% of Canada’s 1 million ha of irrigated land

https://www.aquatic.uoguelph.ca/rivers/sask.htm

12

13

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Challenges in water governance

- Use of market-based instruments
- Water rights/trades - competition
- Ecological needs (in-flow needs)
- Water as an economic good
- Local empowerment in water management
- Myth of abundance is being shattered
- Widespread concern over water quality


1. Water is a finite, vulnerable, essential resource
2. Water must be managed in a participatory manner involving all stakeholders
3. Women play a central part in water management
4. Water has economic value and should be recognized as an economic good

Catalysts for Change

- Walkerton, Ontario:
  - Town of 5,000
  - May, 2000: 7 deaths, 2,300 ill
  - Canada’s worst-ever E.Coli contamination
    - Direct cost: $64.5 million; considering human suffering: $155 M
  - Provincial Inquiry: Justice O’Connor
    - “For years, the operators engaged in a host of improper operating practices”
    - “the MOE’s [Ontario’s Ministry of Environment] inspections program should have detected...and corrected...[these practices]”
    - “[The PUC’s commissioners [town administrators] were not aware of [these practices]”

- Kashechewan First Nation, Ontario
  - October, 2005, northern community of 800
  - Entire community evacuated to avoid E. Coli in drinking water,
    - Had been under a boil water advisory more than 2 years
  - “Premier Dalton McGuinty said [Oct.26] that Ottawa has been “missing in action” for the past two years”
  - Evacuation cost: $16 million
  - “Existing Federal statutes are not equal to the task...none provides an adequate platform for comprehensive regulation” [of drinking water on First Nations]
Change is complex

- 1985 Federal Water Inquiry
- 2000, 2001, 2005 Prov. inquiries
- Critical reviews by:
  - Policy Research Institute
  - Auditor General of Canada
  - Standing Senate Environ. Committees
  - Conference Board of Canada
  - Council of Canadians
  - Environmental groups (e.g., Pollution Probe, Sierra Club)
  - Goldwin Water Group of Concerned Scientists and Citizens
- Provincial changes are significant

Improvements to water governance are complex, involve many players, and are very difficult to achieve.

Canadian perceptions of water governance

- The Canadian public perceives water strategy as ‘piecemeal, lacking coherence, and hence inadequate to ensure that water will be managed appropriately in the face of conflicting demands’ – Pearse, 1986, Author of the 1987 Federal Water Policy.
- “...the current institutional governance of water leads to fragmentation of the issue between many federal departments and agencies...” – Policy Research Initiative, 2005, reporting to Privy Council.
- Canada needs a “national approach that transcends ...inter-jurisdictional boundaries” – Senators Banks and Cochrane, 2005, Water in the West, Standing Senate Committee
- “Our water institutions aren’t ready for the challenges ahead, including economic growth and changing climate.” – Conference Board of Canada, 2007

Views of Stakeholders

Some comments from Canadian stakeholders:

“...the government is the problem right now...we inherited a system by which politically 4 years is the horizon. And [with climate change] we’re talking 10, 20, 30, 50 years. We don’t have a political system that thinks that far ahead. And I don’t know what we as a collective people can do to change it. But it needs to be changed in order for us to be sustainable.”

The Views of Stakeholders

Some comments from Canadian stakeholders:

“...kids coming out of high school think we have this abundant supply of water...there’s no concept that that’s ever going to end

‘...you can’t exclude government, but [the driving] force has to be the people’...‘we’re working either against government policy or lack of policy’

‘...we’re all part of the problem but we’re also part of the solution...’

Positive Governance Changes

- The Prairie Provinces Water Board:
  - Effective Federal/Provincial collaboration
  - Strengthen from “duty to co-operate”
  - Conference Board of Canada, 2007
- Stakeholder involvement
  - Alberta’s Water for Life
  - Saskatchewan Watershed Authority
- Potential for increased roles:
  - National Water Research Institute
  - Prairie Farm Rehabilitation Administration
  - Water in the West: Under Pressure
The 2001-02 drought affected a larger area than the 1931 drought, and caused:
- $3.6 billion drop in Canadian Ag production
- $5.8 billion drop in Canada’s GDP
- 41,000 job losses

Source: Wheaton et al., 2005

What institutional adaptations might assist rural communities dealing with water stress?

Acknowledgments

Go to PARC website for more Project Information:
http://www.parc.ca/mcri/index.php

Reference: The Case of Canada – Institutions and Water in the South Saskatchewan River Basin

This work is funded by Social Sciences and Humanities Research Council, Major Collaborative Research Initiative

The authors are grateful to all members of our interdisciplinary research team – there is a great need for mixing social and physical sciences.
Federal, Provincial and Local Government Adaptation

Gregory P. Marchildon
Director, Saskatchewan Institute of Public Policy (SIPP), and Canada Research Chair in Public Policy and Economic History, Johnson-Shoyama Graduate School of Public Policy

Adaptation to Climate Change in the Canadian Plains Symposium
Regina, April 22, 2008
Government and Institutional Adaptation to Climate Change

- Though not alone, government is the key player in terms of public programs and policies concerned with climate change
- Key reason: democratic accountability and the public interest
- Government as an extension of the community in response to climate change
  - Local (municipal + school boards + FN bands)
  - Provincial
  - Federal

A Decentralized Country?

- Yes
  - Political decentralization
  - Fiscal decentralization
  - Administrative (program) decentralization
- No
  - Constitutional role of federal government in key areas (e.g. environment)
  - Role and power of local government

Federal-Provincial Co-ordination and Competition

- Required for numerous reasons
  - Policy interdependence and overlap
  - Constitutional ambiguity
  - Shared jurisdiction and governance
- Federal-Provincial Ying and Yang
  - Collaboration and institution building v. competition and conflict
  - Pragmatism v. sole control and jurisdiction
- Historical examples from the Canadian Dust Bowl of the 1930s

The Palliser Triangle

1. Relief

- “Keep them on the land”
- Relief before Depression: Alberta + Ottawa
- Highlighted weaknesses of local government
- Largest effort – the Saskatchewan Relief Commission
  - Drought impact worse in southern SK in 1930s: population + climate
  - 300,000 residents on relief!
- Limited objective: prevent starvation and keep them farming (and out of the cities)
2. Relocation

- "Get them off the land"
- No rain. No crop. No tax. No school.
- Special Areas Board, Alberta
  - Collapse of local governments: Why?
  - Board set up by provincial government
  - Subsidized relocation and organized depopulation after 1930 NRTA
  - Encouraged larger and more economic ranches
- SW Saskatchewan in 1930s
  - Subsidized relocation to northern fringe

3. Reclamation

- Special Areas case: provincially-sponsored transformation of land tenure
- Federal government and the Prairie Farm Rehabilitation Administration (PFRA)
- Federally-sponsored land rehabilitation + soil and water conservation projects
- PFRA highlighted differences between Saskatchewan and Alberta in 1920s and 1930s
  - High degree of collaboration between Ottawa and Saskatchewan
  - High degree of conflict (but also some cooperation) between Ottawa and Alberta

The work of the PFRA

- Extensive Surveys:
  - soil
  - watershed
  - water power
- Earthen dams
- Shelter belts
- Dugouts for stock-watering
- Managed community pastures (if province transferred land to federal government)
Federal, Provincial and Local Government Adaptation

Federal, Provincial and Local Levels of Government

- Assessment of strengths and weaknesses (keeping in mind constitutional authority)
- Build up knowledge infrastructure (federal government)
- Build up policy and planning capacity (provincial government)
- Build or even transform local government
- Improve collaboration and cooperation

Concluding Observations

- Prolonged drought in the Palliser Triangle
  - Does climate change make it more likely? Yes.
  - Will we be better prepared? Depends.
- Collaborative-competitive federalism as defining feature of institutional adaptation in Canada
- Institutional relevance and readiness today given likely impact of climate change? (e.g. PFRA? Special Areas Board? Local governments? Provincial governments?)

Government Policy and Planning

- Agriculture and sustainability of land and water resources
- Research infrastructure
- Regulatory framework (land + water stewardship)
- Information and knowledge dissemination re: best practice for use of land and water
- Programs that help manage and mitigate risks

Need for Effective Governmental Direction in Future

- Long-term: Canadian Plains and impact of global warming on average temperature
  - Higher temperatures (summer) + evapotranspiration
  - Precipitation (winter v. summer) + river basin flows
- Medium-term (drought cycle): may exacerbate intensity and length of drought:
  - History of previous droughts
  - Water balance
  - Example: $3.6 billion loss in 2001-02 droughts
Session 4
Roundtable: Influencing Decision-Makers

SESSION PANELISTS

Carmen Dybwad
President, Energy Council of Canada, and Former Board Member, National Energy Board

Jo-Ellen Parry
Program Manager, Climate Change and Energy, International Institute for Sustainable Development

Norm Henderson
Executive Director, Prairie Adaptation Research Collaborative (PARC)

MODERATOR - The Honourable Ralph Goodale, MP, Wascana
Halting climate change will not be easy. It will require finding ways to cut pollution from fossil fuels to a fraction of its current level. It will require doing this in ways that do not destroy economies and that are fair. Reducing our emissions may limit the extent of climate change, but significant climate change may be already unavoidable. Our efforts to mitigate climate change will have to be matched by efforts to adapt to its effects. Such adaptation efforts are already being considered in low lying countries/regions (for example the Maldives) where rising water levels are of concern, or wine growing regions where changing weather patterns mean changing the types of vines grown (as in South Africa) or even changing the types of transportation used as seen by the Inuit where dog sleds are replacing snowmobiles because of the dangers posed by thinning ice.

Coupled with potential changes to hydrological cycles are other changes in demography, agriculture, and industry not to mention international relations that impact the demand for what is arguably becoming a very scarce resource: fresh water. What will all these competing demands for water coupled with a growing demand for energy mean for the energy sector?

So while the energy sector is taking serious steps to limiting emissions to reduce the possibility of climate change, it must also face the reality that a changing climate, coupled with increased demand for water by other sectors, will have a feedback effect on the production of energy. This impact is even more pronounced when we consider that the demand for energy is growing, not abating. If human activity is altering rainfall patterns, as suggested in a recent Environment Canada study, then what will be the effect on this country’s energy production? Will there be enough water to continue with oilsands production? Will there be enough water to fill hydro dams? Will there be enough water to cool currently existing thermal plants? If not, how will we adapt? Will technological advancements help? Do we need to re-think how and what types of water we use in energy production? Will we need new regulations governing where plants are sited? Will we need new policies governing the allocation of water? Do we even need to worry? The questions are many; the imperative to consider them is real and nowhere more so than on the Canadian Prairies.
Since emerging as an important public policy issue in the early 1990s, the climate change debate has focused primarily on how we can reduce our greenhouse gas emissions in the most effective manner. Little attention was given to determining how we would adapt to the consequences of climate change. This situation is changing in Canada and elsewhere in the world, largely in response to events such as Hurricane Katrina and the release of seminal reports like the IPCC’s Fourth Assessment Report. Today, the urgent need to prepare for the impacts of climate change – and adapt to the impacts already being experienced – is increasingly being recognized at all levels of society and across sectoral and national boundaries. In Canada, the need to adapt to climate change is becoming an important policy issue, as witnessed by recent discussion of this issue by the Council of the Federation.

At the International Institute for Sustainable Development (IISD), we have been increasingly involved in the issue of adaptation to climate change over the past ten years. IISD is a not-for-profit research institute established in 1990 that has offices in Winnipeg, Ottawa, New York and Geneva. The Institute focuses on advancing policy recommendations in the areas of climate change and energy, international trade and investment, measurement and assessment, and sustainable natural resource management. IISD has been actively engaged in the international climate change arena since the signing of the UN Framework Convention on Climate Change in 1992. Our work currently is focused on the design of a post-2012 climate regime, market mechanisms for mitigating climate change, and the role of trade and investment in transforming energy systems – as well as adaptation to climate change in Canada and elsewhere.

Internationally, IISD has examined the dual impact of climate change and trade liberalization on India’s agricultural sector; how to reduce the vulnerability of Rwanda’s hydroelectric sector to the impacts of climate change through upstream watershed management practices; and ways to enhance the capacity of Kenyan farmers to cope with the increasing prevalence of drought. As well, IISD has helped develop a project screening tool that helps planners and managers of community-level projects to better understand the links between climate change, livelihoods and their work.

In Canada, we are currently completing the second phase of a project being implemented in partnership with PFRA and the University of Manitoba. The project, “Adaptation as Resilience Building on the Canadian Prairies,” is studying actual adaptation responses by Canadian prairie farmers through comparative case studies in Manitoba, Saskatchewan and Alberta. The premise of the project is that by looking carefully at successful (and unsuccessful) examples of adaptation to existing climate variability in regions of high historic climate stress, it is possible to learn how to promote adaptive capacity and thus build the resilience of prairie communities to climate change. Results from the project will provide input into the design of Canada’s next Agriculture Policy Framework.

Case studies from the Prairie Resilience Project are also contributing to a project IISD is undertaking with an Indian research organization, The Energy Resources Institute, which is looking at Adaptive Policy-making. The
objective of this project is to determine how we can design policies that respond well to anticipated and unanticipated circumstances. As we know, public policies are generally designed implicitly or explicitly to operate within a certain range of conditions but often face challenges outside of this range. The result is that many policies have unintended impacts and don't accomplish their goals. As we face increasingly uncertain times caused by climatic changes and surprises, there is a growing risk that current policies will impede our capacity to adapt. Thus, to help policies help people, policy-makers need ways to design policies that are adaptive to a range of conditions.

So what are some of the main lessons IISD has learned through these and other projects?

First, preparing for and responding to climate change require an integrated approach; adaptation considerations need to be integrated into the center of decision-making and policy-making at the local, sectoral, national and international level. In particular, there is a need to bring adaptation considerations into economic planning and budgetary processes and to support interdisciplinary and coordinated decision-making processes.

As well, we have come to recognize that adaptation to climate change provides an additional motivation for undertaking sustainable development activities, such as integrated water resource management, sustainable agricultural practices and integrated rural development. These findings are particularly relevant for the southern Prairies, where water stress is expected to become increasingly acute. By pursuing a water soft paths approach, ensuring the maintenance, valuation and enhancement of ecosystem services, and promoting watershed-based planning and management, we can increase our resilience to more frequent and intense Prairie droughts and floods.

We know that to a great extent, adaptation is a place-based activity, with planning and implementation of adaptation measures undertaken in response to local circumstances and capacity. However, municipal, provincial and national policy makers need to play a critical role in supporting bottom-up efforts. Public policies can help create an enabling environment for adaptation through capacity building, removal of barriers, knowledge sharing and financial support.

Finally, we have also learned that there are many outstanding issues and questions that need to be addressed. For example,

• How do we determine responsibility for facilitating adaptation between different levels of government?
• How do we enable the sharing of tools, knowledge and processes between communities, in Canada and elsewhere, that are already responding to climatic impacts?
• How do we provide local communities with access to the information they need to make adaptation-based decisions—and with the capacity to implement these decisions?
• How can we most effectively leverage existing funding streams to support adaptation? and
• How do we prioritize among the many actions that need to be taken?
The Prairie Research Adaptation Collaborative (PARC) was created in 2000 as a joint climate change research initiative of the governments of Canada, Alberta, Saskatchewan and Manitoba. Its mandate is to equip decision-makers in the Prairie Provinces with the tools and knowledge to successfully adapt to a changing climate. PARC is centred at the University of Regina.

Since its inception, PARC has organised, undertaken and supported many relevant research projects, particularly in the areas of climate change impacts on agriculture, forests, and water resources. PARC’s Summary Document series makes research results as broadly assessable as possible. PARC also advises governments, organises workshops, speaks to stakeholders and the media, and trains new personnel in the growing field of climate change impacts.

In 2006 and 2007 PARC led the “Prairies Chapter” of the recently released national assessment of climate change impacts and adaptation in Canada. In 2008 PARC completed an important summary document: “Climate Change Impacts on Canada’s Prairie Provinces: A Summary of our State of Knowledge”. In an understandable way, with reference to the latest research, this document lays out our best current understanding of ongoing and future climate impacts in the Prairie Provinces. The challenges are very serious – the Prairies, already a dry region, are getting drier.

Here are our key conclusions:

- There will be lower summer streamflows, falling lake levels, retreating glaciers and declining soil moisture. Less water will be stored as winter snow and ice – historically a reliable and important source of water. Water scarcity may constrain economic and population growth in Alberta.
- Within the framework of an environment that is tracking warmer and drier, there will be more flood events, severe storms and climatic extremes. The climate is becoming increasingly variable season to season and year to year.
- Droughts of extreme severity or long duration are an increasing threat to communities and industries, particularly agriculture.
- Generally summers will be especially dry.
- Much of the projected temperature increase will occur in winter and spring. There will be reduced energy demand for heating and higher demand for cooling.
- A shorter, warmer, winter season will make winter ice roads less viable and will hinder some forestry and energy industry operations. Some agricultural and forests pests will survive warmer winters more easily – mountain pine beetle is a serious threat. Ice-fishing, snowmobiling and skiing may decline.
- Higher potential forest, grassland and crop productivity from increased heat and atmospheric CO₂ will be limited by available soil moisture.
• There will be major ecosystem changes. Aquatic habitats will be stressed and some fish and waterfowl populations will decline. Non-native plants and animals will appear on the landscape, while some native species will decline or disappear entirely. The southern boreal forest is at serious risk.
• Some vector-borne diseases, such as West Nile virus and hantavirus pulmonary syndrome, could become more common.
• The most vulnerable people to climate change impacts include the elderly, children, the poor, those with underlying health problems, farmers, and Aboriginal peoples.
• Adaptation to climate change is necessary. Minimum tillage practices and crop diversification in the agricultural sector, infrastructure and water conservation programs across the Prairies, new water policy in Alberta, and re-engineering of the Red River floodway in Manitoba, have enhanced resilience and increased adaptive capacity.
• Climate change impacts are on-going, and the acceleration of impacts is now inevitable. To avoid the most damaging worst-case climate change impacts scenarios, significant reductions in greenhouse gas emissions are urgently required.

PARC looks forward to continuing to contribute to our knowledge and understanding in the challenging climate times to come.