



Vulnerability to climate change in rural Saskatchewan: Case study of the Rural Municipality of Rudy No. 284

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A B S T R A C T

Keywords:
Climate change
Vulnerability
Agriculture
Exposure
Adaptation
Adaptive capacity

With the likelihood of future changes in climate and climate variability, it is important to understand how human systems may be vulnerable. Rural communities in Saskatchewan having agricultural-based economies are particularly dependent on climate and could be among the most vulnerable human systems in Canada. Future changes in climate are likely to have significant impacts on rural livelihoods, and rural populations will face the challenge of coping with climate change in light of a multitude of other changing socio-economic and environmental conditions. The Rural Municipality of Rudy No. 284 was chosen as a case study due to its access to irrigation, a key tool in climate adaptation for the agricultural system in the area against one of its most notorious climatic features – severe multi-year droughts. Further irrigation development would continue to reduce climate vulnerabilities. Even with irrigation however, the compounding effects of climate and other socio-economic changes will likely require modifications in current practices and policies in order to secure adequate livelihoods. Climate change adaptation in the RM must ensure equitable access to water and potentially irrigation, reduce barriers to collaboration when addressing communal problems, and provide more certainty in government programs.

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1. Introduction

Rural agricultural communities throughout the Canadian Prairies face an uncertain future in light of changing climatic and economic conditions. Agricultural production will be innately impacted by shifts in mean climatic conditions and increases in climate variability, presenting rural communities on the Prairies with opportunities and challenges to remaining viable (Lemmen and Warren, 2004; Sauchyn and Kulshreshtha, 2008; Tartleton and Ramsey, 2008). Adaptation to take advantage of opportunities and face challenges imposed by future climates will be a necessity for the procurement of sustainable livelihoods and healthy lifestyles within rural communities. Climate sensitivities do not manifest in isolation, however; they are related to socio-economic and other biophysical sensitivities that exist at the

community and regional levels. Changes in climate and its variability will be among the numerous stimuli that will require rural people to be agile in the application of technology, government policy and programs, crop insurance, farm production practices, financial management, diversification plans and much more in order to sustain community life in rural settings on the Prairies.

Although the fate of Prairie communities can never be fully predictable, research into their current vulnerability can provide insights into the nature of future climate impacts, sensitivities and coping capacities. This paper presents the results of a bottom up assessment of community vulnerability to various types of climatic conditions, including drought, in the context of other environmental, social, political and economic conditions. The Rural Municipality (RM) of Rudy, Saskatchewan (SK), as shown in Fig. 1, was chosen as a case study to illustrate exposure to problematic conditions, adaptations, barriers to adaptation and useful resources that have been efficiently and effectively applied in adaptation⁴.

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⁴ The study of this RM was part of a larger study of vulnerability to climate change of communities throughout the South Saskatchewan River Basin (SSRB) in Canada and the Elqui River Basin (ERB) in Chile. Funding for this research was received from Social Sciences and Humanities Research Council (SSHRC) via the Institutional Adaptations to Climate Change (IACC) Project (SSHRC Project #412-2003-1001).

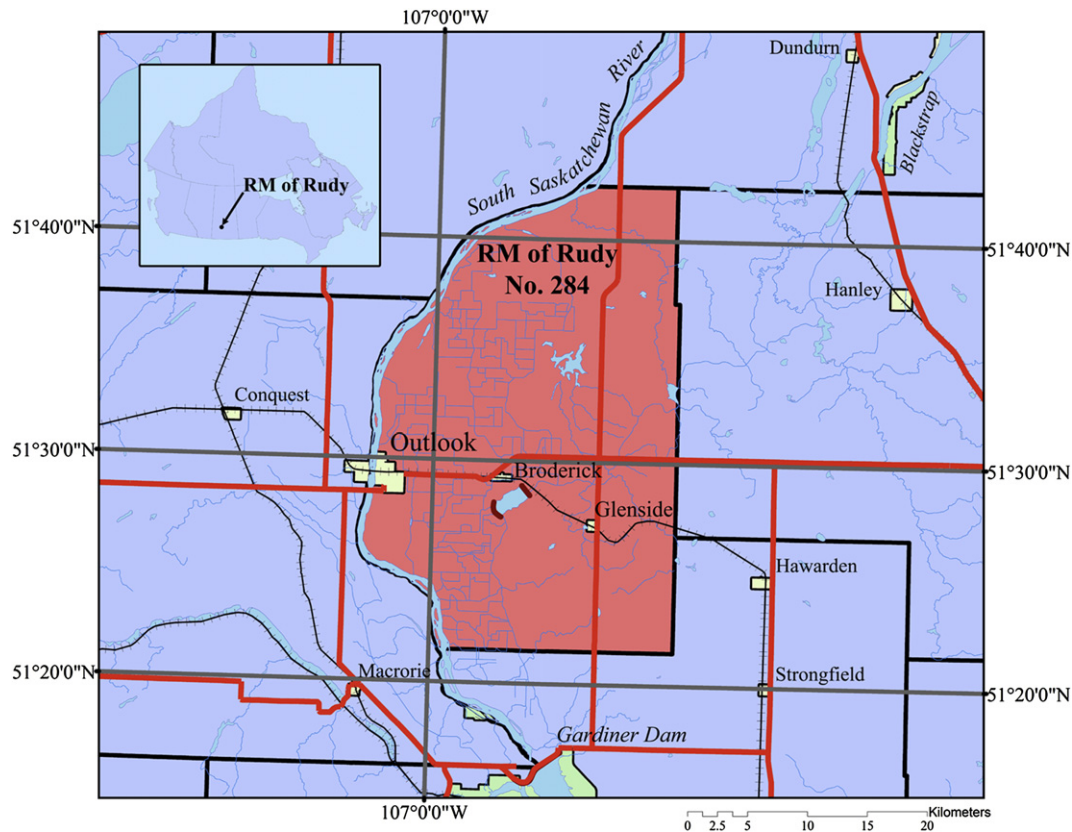


Fig. 1. Map of the Rural Municipality of Rudy No. 284 (ISC, 2005; NRCan, 2008).

There are many interesting characteristics of Rudy that make it a good case study. There is a major community, Outlook, located in the RM and throughout the RM there is a mix of dryland and irrigation farmers. This allows for comparisons to be made between the two types of producers – irrigation and dryland.

The involvement of community members and local stakeholders was an integral part of this research. Vulnerabilities to climate-related and other stimuli were documented from the perspectives of community members and then complimented with socio-economic and biophysical data on the region, an approach successfully used in similar work (Ford and Smit, 2004; Belliveau et al., 2006; Young et al., 2010). Results are thus reflective of local priorities, preferences and capacities in an attempt to increase the utility of results when implementing projects or designing policy aimed at reducing vulnerability to climate change (Paavola and Adger, 2006).

The paper begins with a description of the conceptual framework of vulnerability applied to the community. Next, the current socio-economic, environmental and climatic context is presented to provide background information on conditions currently affecting the community that influence exposure to climate change and adaptive capacity. A discussion of the methods used to complete this research follows. A section on the current vulnerabilities of the RM is presented next, and is divided into four subsections on: (1) institutions; (2) climate variability and weather; (3) water quality and quantity; and (4) economic and social conditions. Then the projected impacts of climate change are outlined, followed by a discussion of the constraints to adaptation. The next section presents recommendations in terms of vulnerability reduction and, finally, the conclusion summarizes the key arguments and findings of this paper.

2. Conceptual framework

In the climate change literature, vulnerability is considered a function of exposure, sensitivity, and adaptive capacity of the system (Yohe and Tol, 2002; Smit and Pilifosova, 2003; Turner et al., 2003; Ford and Smit, 2004; Luers, 2005; Smit and Wandel, 2006; Young et al., 2010). Exposure refers to the nature of the stimulus and the degree to which the system is unprotected from the effects of this stimulus, which is a reflection of the occupancy characteristics, or sensitivity, of the system (Downing, 2003; Smit and Pilifosova, 2003; Smit and Wandel, 2006). Occupancy characteristics refer to social, political, economic, cultural, institutional and environmental conditions that define the sensitivity or ability of the system to respond to a stimulus (Smit and Wandel, 2006). Adaptive capacity refers to the ability to adjust to exposures in ways that limit damages, take advantage of opportunities and cope with impacts (Wheaton and Maclver, 1999; Bryant et al., 2000; Yohe and Tol, 2002; Smit and Pilifosova, 2003; Füssel and Klein, 2006; Smit and Wandel, 2006). Adaptive capacity is influenced by economic wealth, technology, information, infrastructure, knowledge and skills, social capital and institutions at the local and regional (and national) levels that are dynamic overtime and interact with broader socio-economic and political processes (Watts and Bohle, 1993; Adger, 2000, 2003; Smit and Pilifosova, 2001, 2003; Klein and Smith, 2003; Smit and Wandel, 2006; Belliveau et al., 2006).

Vulnerability to climate change does not manifest due to climate alone, but rather arises in the presence of multiple stressors, including social, political, environmental, cultural and institutional characteristics exogenous and endogenous to the community (Diaz, 2008; Belliveau et al., 2006). Community members must cope with climate impacts and the impacts from other stimuli simultaneously.

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