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Droughts in Canada: An Overview

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Since human activities and ecosystem health are dependent on adequate, reliable water supplies, droughts pose a serious threat to society and the environment. Large-area, prolonged droughts are among Canada's costliest natural disasters having major impacts on a wide range of sectors including agriculture, forestry, industry, municipalities, recreation, health and society, and aquatic ecosystems. They frequently stress water availability by depleting soil moisture, reducing stream flows, lowering lake and reservoir levels, and diminishing groundwater supplies. This ultimately affects several economic activities including for example, decreased agricultural production, less hydro-electric power generation, and increased freshwater transportation costs. Droughts also create major environmental hazards such as reduced water quality, wetland loss, soil erosion and degradation, and ecological habitat destruction. Moreover, in response to the economic and environmental significance of droughts, scientific concern has been expressed regarding climate-change impacts on future drought frequency, duration, and severity over various regions of the globe including Canada.

Although most regions of Canada have experienced drought, southern regions of the Canadian Prairies are more susceptible mainly due to their high variability of precipitation in time and space. This presentation provides an overview of droughts in Canada with an emphasis on the Canadian Prairies. Firstly, past trends and variability in drought occurrence across various regions of the country during the instrumental and recent paleo record are reviewed. Potential future droughts as they relate to climate change are also discussed. This is followed by a description of existing knowledge regarding the large to synoptic-scale atmospheric causes related to Canadian drought. Current monitoring techniques, modelling and prediction capabilities, and adaptation strategies of Canadian droughts are then presented. The talk concludes with the identification of major research gaps and program needs regarding Canadian droughts that will aid in our ability to understand and predict their occurrence, monitor/model their status, and adapt to their negative effects.