



The Land and Infrastructure Resiliency Assessment Project



Severe flooding, as pictured above, can strand livestock and submerge crops.

Agriculture and Agri-Food Canada's (AAFC) Land and Infrastructure Resiliency Assessment (LIRA) Project helps decision-makers assess adaptation responses to flood events. Extreme flood events over recent years show that agricultural areas in Canada are vulnerable to climate variability, which could result in water contamination, soil degradation, lost crop production, and damaged rural infrastructure restricting the movement of on-farm inputs and agricultural commodities. Climate change may

increase the magnitude and frequency of extreme flood events and therefore cause even greater impacts in the future. This raises some important questions, such as: Is it possible to be proactive and adapt a local landscape to mitigate flood-related damage? Would the benefits outweigh the costs to implement an adaptation?

LIRA aims to help answer these questions through the development of a standardized cost-benefit assessment tool, applicable in any region of the country. The LIRA methodology allows decision-makers to:

1. Assess the risk to a region's infrastructure systems and the environment due to extreme runoff events; and
2. Develop and rank adaptation responses that reduce socio-economic and environmental costs.

LIRA assesses the economic vulnerability of an area to a range of extreme precipitation events that are plausible based on the historic record and climate change research. It also considers an assessment of the potential socio-economic value of adaptation. While the LIRA methodology is principally based on an economic platform, it is also a comprehensive, integrated and innovative approach which takes into account climate,

hydrology, land use, rural infrastructure, watershed and regional planning, geomatics, and social and environmental vulnerability.

LIRA is transitioning the methodology from research to implementation in five phases. LIRA methodology was developed and initial pilot testing was conducted prior to 2012, in Phases 1, 2 and 3. Between 2012 and 2013, Phase 4 pilot studies were conducted in Saskatchewan and Nova Scotia to test the applicability of the methodology across diverse stakeholders and regions of the country. Researchers worked with high quality geographical data, surface runoff modeling, professional expertise and local knowledge to generate LIRA flood hazard maps for the local landscapes. Working with local stakeholders and technical experts to develop adaptation options, a cost-benefit analysis was then performed to rank potential adaptation solutions.

Results from all studies validated the LIRA model, particularly in Redberry Lake, Saskatchewan, where surface run-off modeling output maps were a realistic representation of a significant flooding event that took place in April 2013. Overall, pilot studies were successful in developing relevant projections of costs and benefits for adaptation responses to destructive flood situations. This will provide the key aspect of long-term adaptation solutions and effectively support governing bodies in decision-making.

Phase 4 also included a revised version of a LIRA manual, an innovative prairie hydrology model developed by the University of Saskatchewan, and new probabilistic economics software. Phase 5 will allow the transfer of LIRA methodology to operational settings, which will facilitate appropriate climate adaptation policies and investments on the landscape throughout Canada. Preparation for Phase 5 is currently being explored with interested provincial ministries, industry and non-governmental organizations to develop “Transitional Prototypes” across the country. This would involve development of externally-led studies to create templates and test operational protocols in preparation for Phase 5 program implementation.

AAFC’s National Agroclimate Information Service (NAIS) of the Agro-Climatic, Geomatics and Earth Observations (ACGEO) Division of the Science and Technology Branch is leading the development of LIRA along with other federal departments, non-government organizations, universities, watershed groups, and local and regional governments.

For more information please contact AAFC’s **National Agroclimate Information Service** at nais-snia@agr.gc.ca or visit AAFC’s **Drought Watch** website at www.agr.gc.ca/drought.

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Paru également en français sous le titre: *Projet d'évaluation de la résilience des terres et des infrastructures*

AAFC No.: 12330E

ISBN: 978-1-100-25811-9

Catalogue No.: A59-24/2015E-PDF

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