Collaborator Engagement and Knowledge Mobilization

Hayley Carlson

June 13, 14:30-14:45

Knowledge Mobilization:

"The **reciprocal and complementary flow and uptake of knowledge** between researchers, knowledge brokers and knowledge users—both within and beyond academia—in such a way that may benefit users and create positive impacts within Canada and/or internationally" – SSHRC, CFREF

"…**moving knowledge from formal research projects into active use**. It involves the sharing of knowledge between research producers and users often through the help of third parties.
Neither the scientific nor practitioner/user community owns the problem of making science usable for decision makers."
- GWF KM White Paper

CFREF – How are your partners involved in various stages of the research process?

- Planning of research
- Design/data collection
- Analysis of results
- Exchange/Dissemination of research knowledge
- User of research knowledge

Planning of the Research:

Model	Name	Institution
GEM-Hydro	Étienne Gaborit (Setup and Watroute) Maria Abrahamowicz (SVS) Dorothy Durnford (Watroute) Young Lan Shin (Watroute)	Environment and Climate Change Canada (ECCC)
WATFLOOD	Frank Seglenieks	
HYPE	Tricia Stadnyk Hervé Awoye	University of Manitoba
LBRM	Lauren Fry	US Army Corps of Engineers (USACE)
	Tim Hunter Drew Gronewold Drew Gronewold (U of M)	National Oceanic and Atmospheric Administration (NOAA-GLERL)
WRF-Hydro	Lauren Reed Katelyn Fitzgerald	National Center for Atmospheric Research (NCAR)
MESH	Amin Haghnegahdar Daniel Princz Shervan Gharari	University of Saskatchewan
VIC-GRU		
VIC	Hongren Shen	University of Waterloo
SWAT	Xiaojing Ni Yan Yongping	Environmental Protection Agency (EPA)

*Table does not include RAVEN

Work Package A5 (Modelling Intercomparison)

- Collaborators are direct participants in the research team and provide in-kind time, models and data.
- The research team converses and negotiates extensively to develop a shared terms of reference for the framework guiding modelling in this project.
- Used a survey to collect more information about what the partners are using hydrologic models for, key areas for calibration, and desired outputs, time-steps and forcing data.

Table 1. Data Aquisiton Contacts for Water Management Modelling (Theme B)

Name	Position and Organization
Jollin Charest	Manager of Basin Water Management Section, Alberta Agriculture and Forestry
Janet Yan	Climate Change Engineer, Alberta Environment and Parks
Andrea Gonzalez	Water Management Modelling Engineer of Basin Water Management Section, Alberta Agriculture and Forestry
Carmen delaChevrotiere	Transboundary Water Quantity Specialist of Transboundary Waters Secretariat, Alberta Environment and Parks
Shoma Tanzeeba	Hydrologist of Resource Management Program, Alberta Environment and Parks
Islam Zahidul	Hydrologist-Water Policy Specialist of Water Policy Branch, Alberta Environment and Parks
Theo Emmelkamp	Developer of Alberta Water Use Reporting System, Alberta Environment and Parks
Tom Tang	Team Lead of Environmental Modelling, Alberta Environment and Parks
Bernard Trevor	Manager River Forecast Team, Alberta Environment and Parks
Khaled Akhtar	Leading Hydrologic Model Review in the River Forcast Centre, Alberta Environment and Parks
Anil Gupta	Manager, Alberta Environment and Parks
Andrew Thornton	Supervisor of Licensing and Water Use Data, Saskatchewan Water Security Agency
Bob Halliday	Board Chair, Partners for the Saskatchewan River Basin
Laurie Tollefson	Science Manager of Agricultural Water Management, Agriculture and Agri-Food Canada
Kelly Farden	Manager of Agronomy Services, Saskatchewan Ministry of Agriculture
Ed Loewen	Irrigation Technologist, Saskatchewan Ministry of Agriculture
Ivan Freisen	General Manager of the Eastern Irrigation District
Richard Phillips	General Manager of the Bow River Irrigation District
Brian Sander	Water Master of the Western Irrigation District
Joanne Hans	Consulting Analyst, Statistics Canada
Greg LeBlanc	Data Dissemination Officer, Statistcs Canada
Monica Cortez	Data Dissemination Officer, Statistcs Canada
Lalani Zayesha	Data Dissemination Officer (FSWEP Student), Statistics Canada

Design and Data Collection:

Work Package B1 (Water Resources)

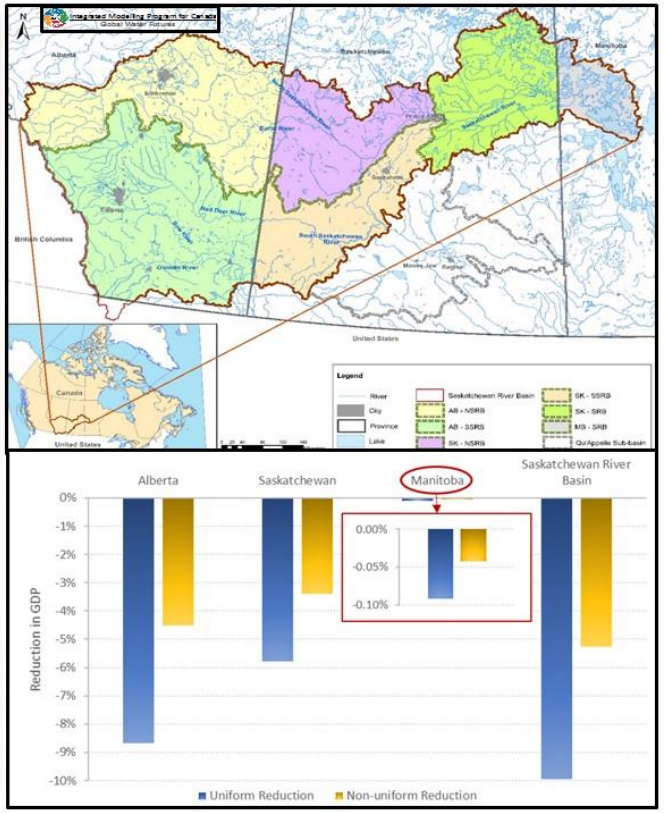
- Engaged extensively with collaborators during research design and data collection to learn more about the basin, modelling methods currently used in the basin, and data sources might exist.
- Team has a ‘data acquisitions contact’ list that is shared between the team members to coordinate engagement – the list currently has 21 contacts across provincial and federal governments, agricultural groups and NGO’s.

Analysis of Results:

Work Package D1 (Outreach)

- Engaged the IMPC Knowledge Mobilization Oversight Committee in analysis of results from the user engagement survey which was used to build the social network analysis for IMPC.
- This took place during a regularly scheduled KMOC meeting in Year 2 of the program.

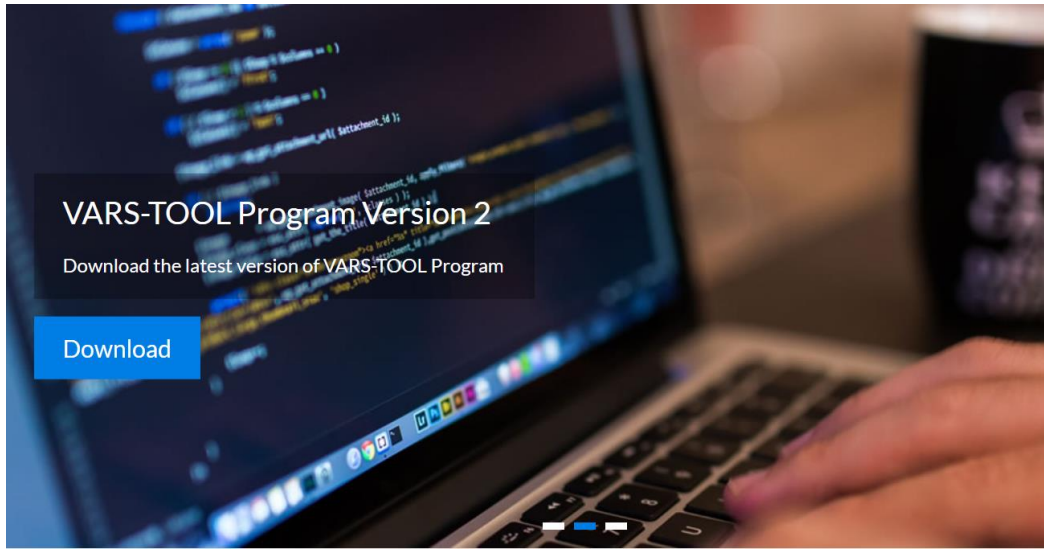
Exchange and Dissemination of Research:



Work Package B3 (Hydro-Economics)

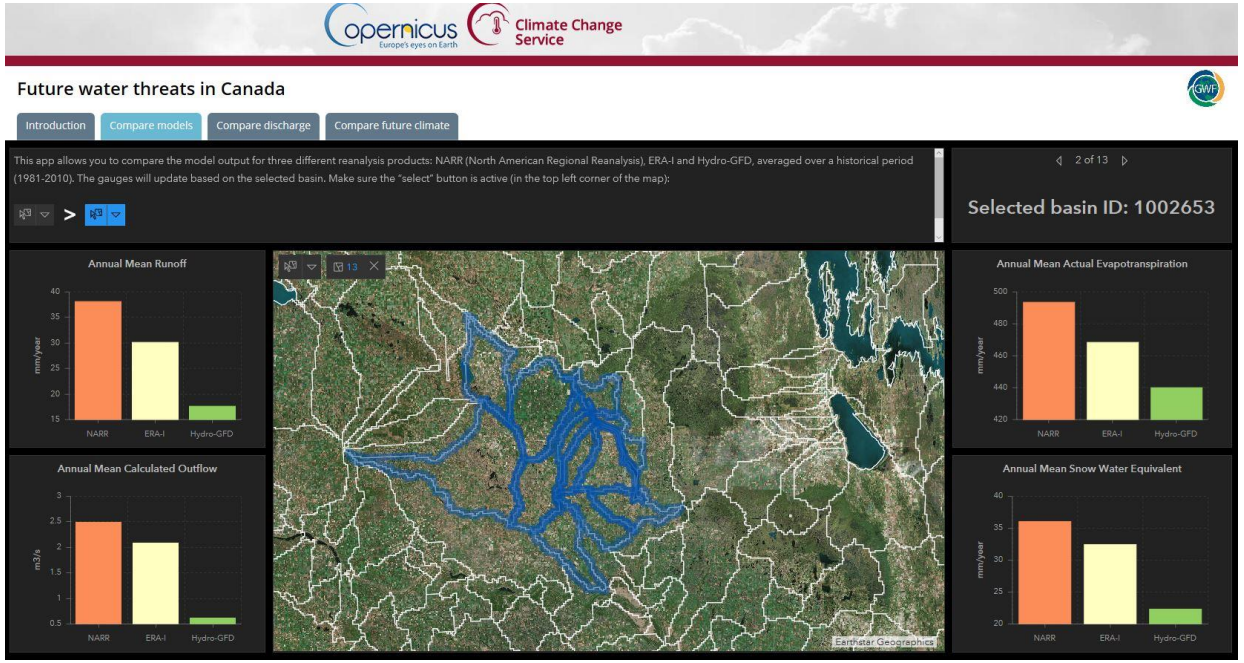
- Met with the Saskatchewan Chamber of Commerce (Water Council) to discuss preliminary results and incorporate Chamber feedback into further research activities.
- Discussed additional data sources and assessed modelling assumptions (in the absence of available data) from the perspective of the Chamber.

Use of Research Knowledge



Work Package A7 (Predictive Uncertainty)

- Generated VARS, a sensitivity analysis toolbox with minimal computational cost. Software has been downloaded from organizations such as BASF Canada, Agriculture and Agri-Food Canada and the US Environmental Protection Agency.



HYPE (Dr. Stadnyk) in a Copernicus C3S Showcase, addressing needs of Manitoba Hydro

Work Package C1 (Scenarios)

- *Canada in a Changing Climate* is the national assessment of how Canada's climate is changing, the impacts of these changes and how we are adapting to reduce risk.
- Working on the "Water Resources Chapter" for the National Issues Volume.
- 200+ papers reviewed, 12 in-depth interviews with Canadian water experts
- Other volumes to be released on health issues, indigenous resilience, and regional perspectives

Integrated Modelling Program for Canada
Global Water Futures
PRAIRIE WATER
GLOBAL WATER FUTURES

National Hydrology Research Centre
11 Innovation Boulevard
Saskatoon, SK S7N 3H5 Canada
Tel: (306) 966-2021; Fax: (306) 966-1193
Web: http://gwf.usask.ca/impc

Sharla Hordenchuk, Executive Director Climate Change Branch
David Stevenson, Manager of Climate Change Policy

Saskatchewan Ministry of Environment
3211 Alberta Street
Regina, Saskatchewan
S4S 5W6

August 16, 2018

RE: Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy

We are researchers from the University of Saskatchewan writing on behalf of the Global Water Futures (GWF) program in response to the July 5th Plenary with updates on the regulatory and resilience framework for *Prairie Resilience*. Thank you for the opportunity to both attend the in-person engagement session and to provide written comments.

The researchers contributing to this letter are part of two GWF projects – Prairie Water and the Integrated Modelling Program for Canada – that also provided comments during the first round of engagement. For reference, these are dated February 28 and March 16, respectively. These projects also met with representatives from the Ministry on August 7th, which informed our comments below.

The Plenary noted that the *Resiliency Framework* is not intended to be comprehensive. As such, we limit our comments to the proposed measures for each of the five main areas, and the changes between the first and second iteration of the framework. We note issues that could be addressed more comprehensively through other initiatives briefly below.

The Plenary also noted that the *Resiliency Framework* considers the data available for each indicator, and the monitoring resources required. Our conversation with Ministry representatives on August 7th confirmed that data constraints and limitations were a major factor in determining which measures were ultimately chosen for the ***Resiliency Framework***. This is unfortunate, as it limits Saskatchewan's ability to monitor important indicators of the resiliency of our natural, physical and social systems. It also suggests that Saskatchewan should seriously consider different and improved methods of data collection to support decision-making and monitoring. In our submission, we suggest several areas in which data collection can be improved, and highlight where it has limited the development of resiliency measures.

Climate change will affect Saskatchewan primarily through impacts to our water systems; it is therefore prudent to focus measures in the ***Framework*** on building resilient water systems. As *Prairie Resilience* notes, Saskatchewan has the incentive to be solutions oriented because the land is integral to our economy, and we have already experienced the impacts of climate-related events. These impacts have occurred primarily through changing water regimes. For example, the period between 1999 and 2004 contained some of the driest conditions in the historical record across the Prairie region, severely stressing water supplies. This prolonged dry period affected the productivity of many sectors, and in 2001–2002 reduced GDP by $5.8 billion and contributed to negative or near zero farm income

GLOBAL WATER FUTURES
SOLUTIONS TO WATER THREATS IN AN ERA OF GLOBAL CHANGE

National Hydrology Research Centre
11 Innovation Boulevard
Saskatoon, SK S7N 3H5 Canada
Tel: (306) 966-2021; Fax: (306) 966-1193
Web: http://gwf.usask.ca

Mary-Ann Wilson
Manager, Climate Change Impacts and Adaptation Division – Lands and Minerals Sector
Natural Resources Canada
Ottawa

April 4, 2019

RE: Request for feedback on *An Inventory of Methods for Estimating Climate Change-Informed Design Water Levels for Floodplain Mapping* (Report No. NRC-OCRE-2019-TR-011)

Dear Mary-Ann

This is a letter of review from researchers at the University of Saskatchewan, Global Water Futures (GWF) program in response to your request for feedback on the National Research Council (NRC) Canada report providing an inventory of methods to estimate climate change-informed design water levels in floodplain mapping. Thank you for the opportunity to provide written comments.

Below we provide a number of comments addressing the report. For reference, we briefly outline our focus and position on achieving a coordinated vision for flood risk management in Canada.

Global Water Futures and Our Vision for a Coordinated Canadian Response to Flood Risk

As noted by many federal agencies, there are currently significant challenges in the way of accurately assessing flood risk in Canada, including the lack of national, standardized and up-to-date flood risk maps. In addition, our water systems are responding to unprecedented climatic change and the loss of stationarity, which requires that we transform the way we predict and prepare for flood and high flow events. Global Water Futures has addressed this challenge by assembling global expertise in atmospheric, cryospheric, hydrological and water management modelling to deliver pioneering solutions for flood forecasting, disaster warning and risk management. Fundamentally, our position is that building resiliency and adaptive capacity to manage flood risk requires more than improved mapping approaches, and relies inherently on integrated monitoring, modelling and prediction systems that can incorporate the dynamic and non-stationary processes that characterize our current and future water systems and the calculation of flood risk. Further, these technological tools must be employed by trained professionals with comprehensive institutional support. Our aim is to contribute significantly to the national dialogue in this regard for not only improved disaster warning, but also for accurate predictions of Canada's water future and decision-support for managing risk.

General Comments

Overall, we find the NRC report to be comprehensive. The report correctly points to various uncertainties in global model structures, internal climate variability, downscaling, bias correction methods, hydrological model selection and model parametrization, and highlights the compounding effects of "cascading uncertainties."

GLOBAL WATER FUTURES
SOLUTIONS TO WATER THREATS IN AN ERA OF GLOBAL CHANGE

National Hydrology Research Centre
11 Innovation Boulevard
Saskatoon, SK S7N 3H5 Canada
Tel: (306) 966-2021; Fax: (306) 966-1193
Web: http://gwf.usask.ca

The Federal Flood Mapping Committee

September 20, 2018

RE: Request for feedback on two streams of work for Expanded Flood Mapping Committee

We are researchers from the University of Saskatchewan writing on behalf of the Global Water Futures (GWF) program in response to the request for feedback on the creation of a flood risk information portal, and the development of a long-term vision for flood mapping in Canada. Thank you for the opportunity to both participate in the Expanded Flood Mapping Committee and to provide written comments.

Below we provide a number of comments specifically addressing the questions put forward by the E-FMC Committee. Prior to these specific comments, we outline our vision for a coordinated national response to flooding.

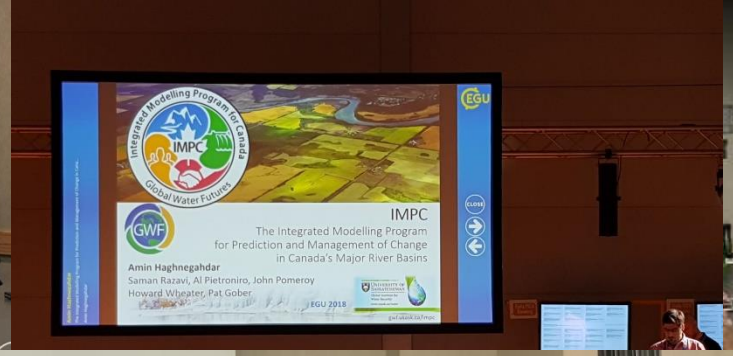
A Coordinated Canadian Response to Flood Risk

As the *Way Forward for Flood Mapping in Canada* factsheet notes, there are currently significant challenges in the way of accurately assessing flood risk in Canada, including the lack of national, standardized and up-to-date flood risk maps, a failure to consider pluvial, coastal and ice jam-related flood events, and the lack of accessible information for the Canadian public. In addition, our water systems are experiencing unprecedented climatic change, which will require we transform the way we predict and prepare for flood events.

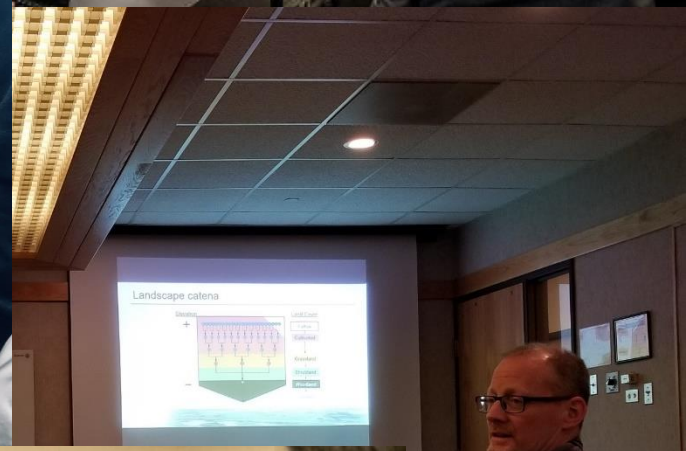
Activities under the GWF initiative respond to this challenge, assembling global expertise in climate and hydrologic modelling to deliver pioneering solutions for flood forecasting, disaster warning and risk management. Fundamentally, our position is that building resiliency and adaptive capacity to manage flood risk requires more than improved mapping approaches, and relies inherently on monitoring, modelling and prediction that can incorporate the dynamic and non-stationary processes that characterize our current water systems. Our aim is to contribute significantly to the national dialogue in this regard for not only improved disaster warning, but also for accurate predictions of Canada's water future and decision-support for managing risk.

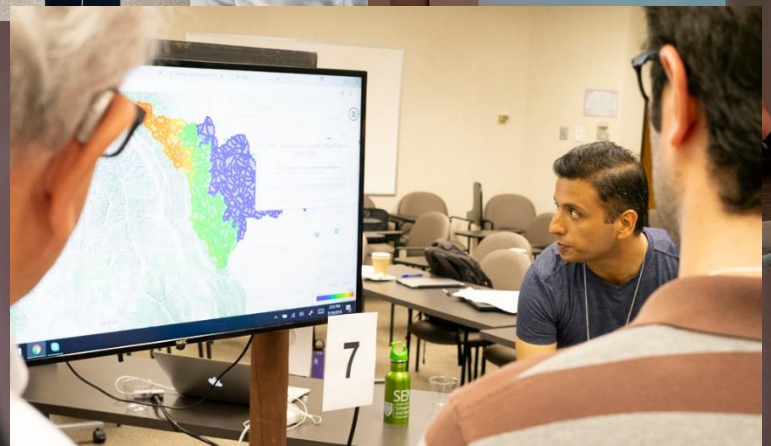
To reduce our exposure to, and damage from, floods we need to invest in approaches that incorporate improved prediction, avoidance and active mitigation:

- Improved prediction involves better seasonal weather predictions, improved severe weather prediction and precise forecasting for rivers, streams, overland flow, groundwater and lakes. These approaches allow for short-term adaptation such as sandbagging for floods, reservoir management, and orderly and safe community evacuations.
- Avoidance includes land use zoning of appropriate locations for development and conservation based on careful and continuously updated floodplain mapping – without prejudice as to whether the floods are caused by rainfall, snowmelt, overland flood, ponding, streamflow, groundwater, lake level change, sea level change, wind storms or bank erosion. As all water sources are connected, the sources of flooding should not be considered separately.


Integrated Modelling Program for Canada
IMPC
Global Water Futures
GWF
EGU
IMPC
The Integrated Modelling Program for Prediction and Management of Change in Canada's Major River Basins
Amin Haghnegahdar
Saman Razavi, Al Pietroniro, John Pomeroy
Howard Wheater, Pat Gober
EGU 2018


Amin Elshorbagy
University of Saskatchewan
Bin Luo
Manitoba Infrastructure
Anil Gupta
Alberta Environment and Parks
Al Pietroniro
University of Saskatchewan


Landscape catena


7

Year 3 – KM Strategies to meet deliverables

Four engagement workshops are planned for Year 3 of the program to meet strategic user engagement objectives of the program:

- Ag-Water Research Expo (June 14, 2019)
- Modeling Workshop (October 8, 2019)
- Stakeholder Scenarios Workshop (February 2020)
- Environmental/Cultural Flows Workshop (TBD 2019-2020)