



# Global Water Futures: Progress to July 2018

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UNIVERSITY OF SASKATCHEWAN

Global Water Futures

[GWF.USASK.CA](http://GWF.USASK.CA)





# Adaptation to change and threat mitigation requires

- **New science** to understand the changing Earth system
- **New modelling tools** to capture interconnected forces and their societal implications
- **New monitoring systems** to warn of critical environmental changes
- **More effective mechanisms to translate new scientific knowledge into societal action** e.g. computer apps, games, visualization tools



# Global Water Futures: Solutions to Water Threats in an Era of Global Change

GWF aims:

- a) to **place Canada as a global leader in water science for cold regions,**
- b) to **address the strategic needs of the Canadian economy** in adapting to change and managing the risks of uncertain water futures and extreme events.

# Global Water Futures - Mission



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- **Improve disaster warning – develop:**
  - scientific knowledge, monitoring and modelling technologies,
  - national forecasting capacity to predict the risk and severity of extreme events
- **Predict water futures –**
  - use Big Data to make informed decisions,
  - Develop better models to assess change in human/natural land and water systems
- **Inform adaptation to change and risk management – to reduce the risk of water threats, design adaptive strategies, and enhance economic opportunities, propose**
  - governance mechanisms,
  - management strategies,
  - policy tools

- \$77.8 million grant from *Canada First Research Excellence Fund* 2016-2023
- GWF has funded 33 Projects
  - 15 universities across Canada
  - 152 university faculty investigators
  - 481 Researchers hired over the first three years
    - graduate students, post-doctoral fellows, scientists, engineers, technicians, and managers
  - 210 partners -- federal & provincial government agencies, First Nations, industry groups, international institutions, NGOs, and communities
  - Opening up to *Affiliated Projects* in 2018
- GWF supports three global programmes
  - UNESCO, World Climate Research Programme, Future Earth
- \$185 million in GWF project and core team funding for first three years
  - \$ 23.5M GWF cash grant awarded to projects
  - \$ 14.6 M GWF funding to operate core teams
  - \$26.8M leveraged by projects (cash)
  - \$119.7M leveraged (in-kind support)

# The Details

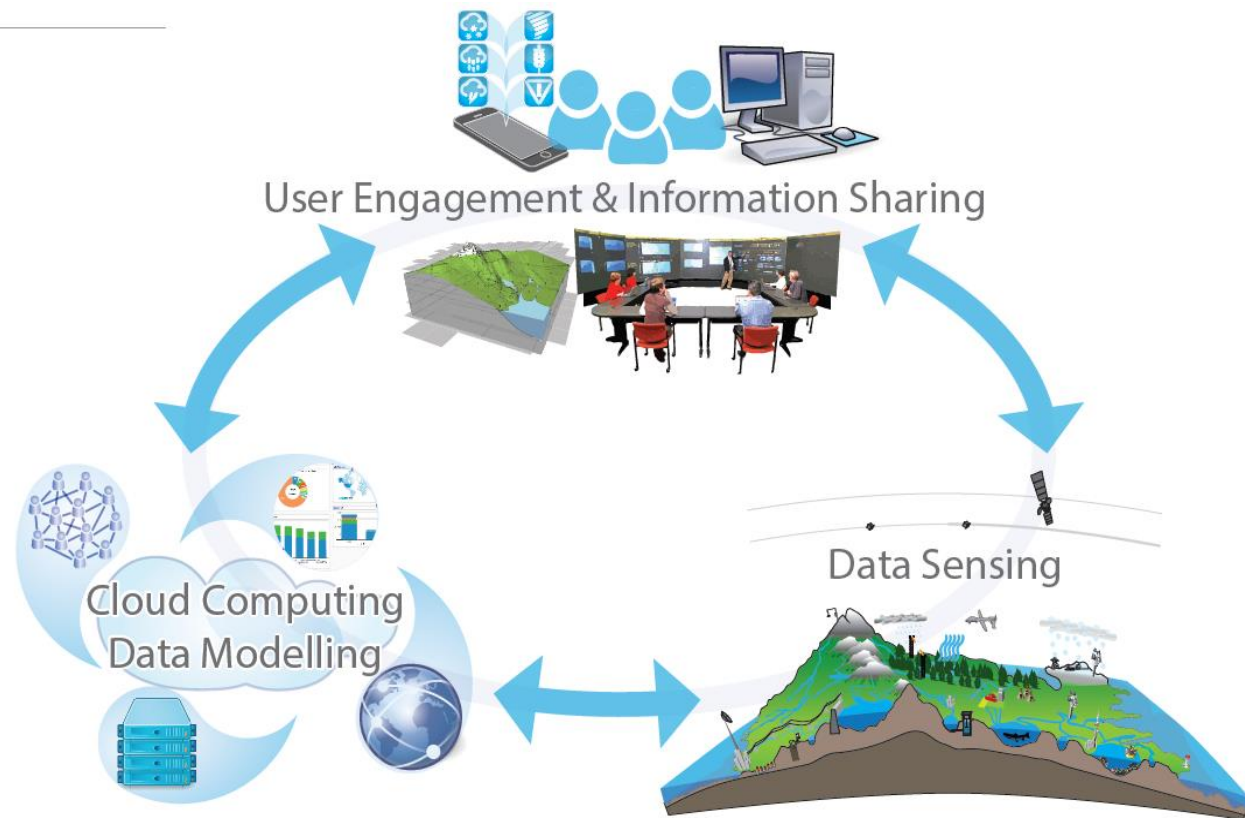


- 21 transformative research, big data and decision support tool projects approved for Pillars 1 & 2
  - Atmospheric Science, Hydrology, Water Quality, Water Management & Governance, Health
  - Sensors, crowdsourcing, computing
- 12 user-question led projects funded for Pillar 3
  - Regional – e.g. Great Lakes, North, Prairies, Mountains, Boreal
  - Sectoral – e.g. Agriculture, Mining
  - Topical – e.g. First Nations co-development, modelling & prediction, algae, climate extremes
- 9 Projects asked to submit proposals for Indigenous Community Water Research
- 6 Core Teams Established
  - 36 core modellers
  - 7 computer scientists
  - 20 observatory technicians (Yukon, NWT, Rockies, Saskatchewan, Ontario)
  - 4 data managers
  - 4 knowledge mobilisation specialists including First Nation member specialist
  - 9 communications specialists
- Observatories Staffed, Predictions Started
  - \$90M in federal budget for National Hydrological Service for enhanced water observations and national water prediction system – .
  - Flood forecasting system implemented for Yukon Territory
  - Mountain snow forecasting system for Bow River headwaters in Canadian Rockies
  - Mackenzie, Saskatchewan river basins modelled for current and future climates
  - Smart Water Systems Laboratory (Western Economic Diversification, CFI)



# GWF National Water Observation and Prediction Strategy

- **Core support teams to deliver national modelling capability, advanced computer science, new observational science and knowledge mobilization**
  - **User-question led project-focussed funding**
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- **Technical Team (20):**  
Observatories & Observations
  - **Data Management (4)**
  - **Computer Science (9) –**  
Human Computer Interface,  
Data & Re-engineering Codes
  - **Modelling Core Team (38)**
    - Hydrological & Water Quality Forecasting
    - Climate Change, Diagnostic Hydrological & Water Quality Modeling
    - Water Resources Modelling
  - **Knowledge Mobilization (4)**
  - **Communications (9)**

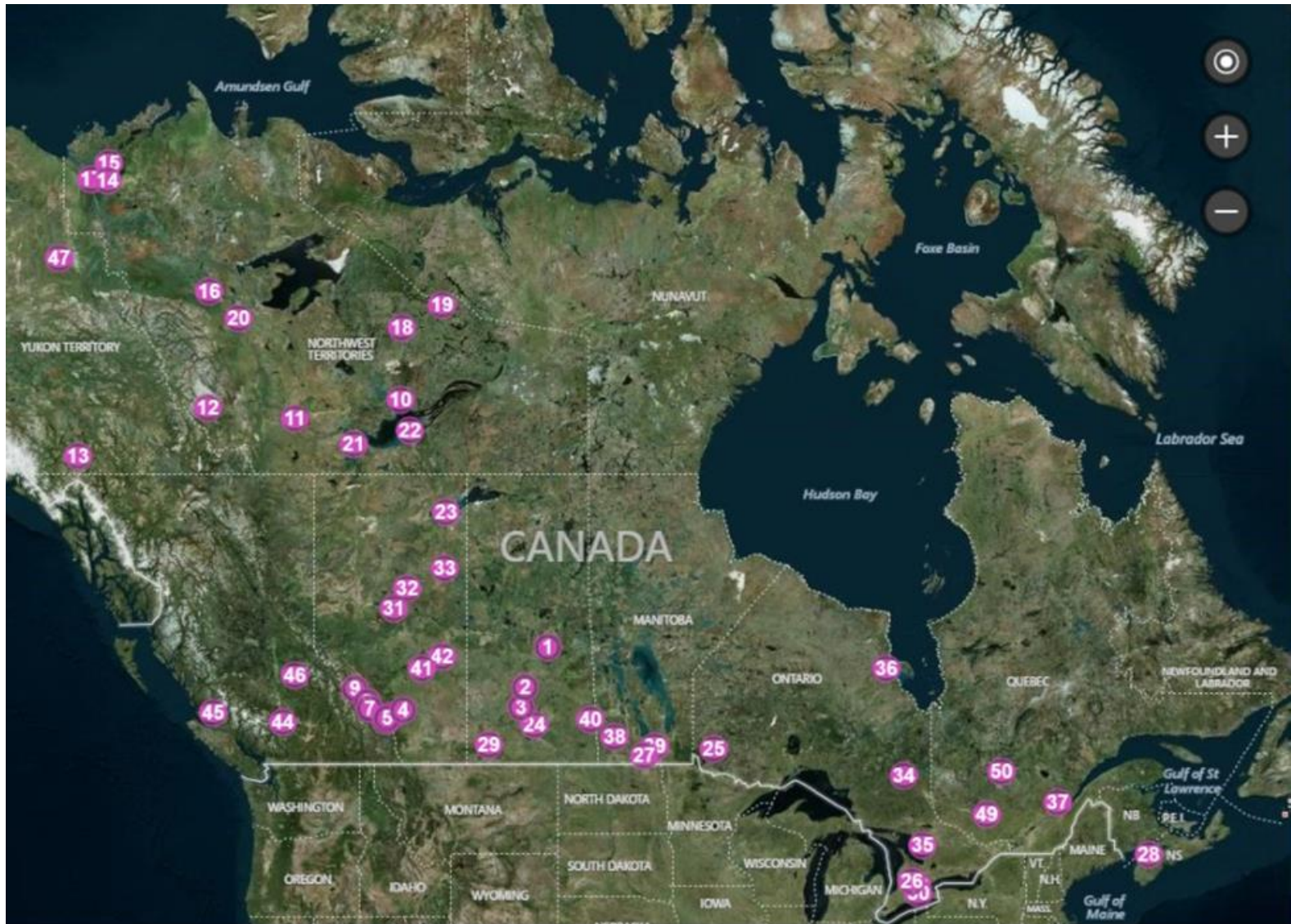


# GWF's Eight Major River Basins





# GWF's 50 Intensive Observation Sites





# Smart Water Systems Laboratory





# GWF Indigenous Community Water Research Strategy



GLOBAL WATER FUTURES & MCMASTER  
UNIVERSITY PRESENT:

- The GWF Indigenous Community Water Research Strategy is co-created with First Nations.
- The strategy comprises three components
  - Regional workshops.
  - Project and Core Team engagement with Indigenous communities
  - *GWF Indigenous Community Water Research Projects RfP.*
    - An April 2018 workshop at Wanuskewin brought together Indigenous community representatives and GWF researchers to scope out and co-create projects.

## FIRST NATIONS WATER SECURITY & CLIMATE CHANGE SYMPOSIUM

June 3, 2018, Gathering  
Place, Six Nations Territory

### KEYNOTES AND DISTINGUISHED GUESTS

- Haudenosaunee Sub-Chief, Leroy (Jock) Hill
- Dr. Carrie Bourassa, Scientific Director CIHR-IIPH
- Dr. Deborah McGregor, York University
- Chief Arvol Looking Horse, Sioux Nation
- Tina Ngata, (Aotearoa/New Zealand)
- Prof. Beverly Jacobs, uWindsor Law

Contact Stephanie Morningstar [mornings@mcmaster.ca](mailto:mornings@mcmaster.ca)  
for registration and information



For more information, visit  
<https://bit.ly/2IPJmQ>





# GWF Canada and Policy Initiatives

- Increased engagement with ECCC – lead water department for Government of Canada
  - National Hydrological Service
  - Meteorological Service of Canada
  - Science and Technology
- Developing a MOU with NRCan – basins, remote sensing, groundwater, climate change, glaciers, forestry
  - November science meeting with NRCan
- Water, Peace and Security
- Canada Water Security Strategy
  - Climate change & extreme events, Indigenous water, Transboundary issues, Integrated River Basin Prediction and Assessment – working with FLOW





# GWF International

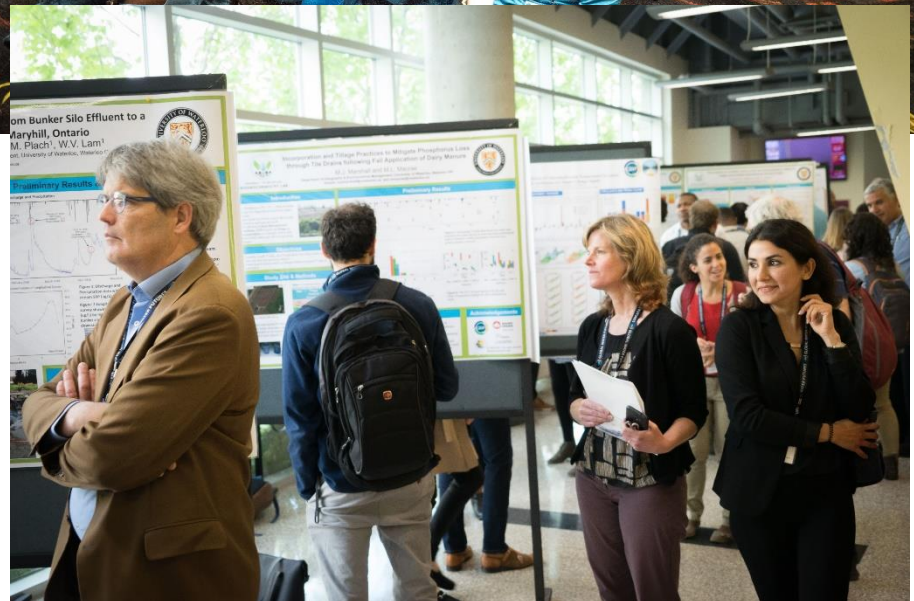
- GEWEX –
  - GWF Regional Hydroclimate Project
  - Water for the Food Baskets of the World
  - INARCH Project – mountain hydrometeorology and hydrology
- High Mountain Initiative (WMO)
- UN Water Action Decade
  - *Canada Water* - Strategy and Action Plan
- Global Environmental Facility - Central Asian Glacier Project (UNESCO)
- Future Earth – Sustainable Water Future Programme - *Climate Impacts on Global Mountain Water Security Working Group*
- Modelling – Iran, India, Israel, Kazakhstan, Spain, Chile
- Third Pole/Three Pole Environment – Chinese Academy of Sciences
- Critical zone Observatory – China-Siberia



# GWF Inaugural Meeting



- 4 remarkable days in June, hosted by McMaster University and Six Nations of the Grand River
- Comprehensive water conference brought together the broader Canadian water community like never before
  - +400 people from across Canada, and from UN, WCRP, Future Earth.
  - 160 presentations from academics, students, researchers, Indigenous knowledge holders, policy makers, managers, communicators,





# GWF Grand Challenge – Sept. 2017



- GWF has identified a *Grand Challenge*: **how can we best prepare for and manage water futures in the face of dramatically increasing risks from a changing climate, developing economy and changing society?**



# GWF Inaugural Statement – June 2018



- GWF has met as a whole for the first time and has brought together a large and comprehensive transdisciplinary group of water researchers and stakeholders in water research who discussed progress in meeting the GWF Grand Challenge. This meeting was remarkable for being exceptionally comprehensive in the subjects represented, for the early and rapid progress shown, and for being hosted and co-organized by a First Nation, on its own territory.
- Special attention was paid to progress in
  - international linkages for GWF,
  - regional and topical scientific advances in Canada,
  - co-creation of knowledge with First Nations
  - needs of Young Professionals and
  - integration of research needs and advances in understanding and technology on
    - modelling and observations,
    - aquatic environment and ecosystems,
    - human-water interactions,
    - watershed management and disturbance,
    - climate and extreme weather





# GWF Annual Meeting





## **Global Water Futures**

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