Alberta WaterSMART and the Sustainable Water Management in the Athabasca River Basin Initiative (ARB Initiative)

June 1, 2016
Topics for today

• WaterSMART and the collaborative approach

• Overview of the ‘Sustainable Water Management in the Athabasca River Basin Initiative’ (The ARB Initiative)

• Current scope of the ARB Initiative

• MRBB interest or involvement
## About Alberta WaterSMART

### OUR MISSION

We are committed to improving water management through better technologies and practices, for the social, economic and environmental benefit of current and future Albertans, and sharing our solutions with Canada and the World.

### ACHIEVED THROUGH

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<th>Project development and execution</th>
<th>Collaboration and communication</th>
<th>Water strategy</th>
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<td>Identifying opportunities and innovative solutions to work toward a vision of improved water management</td>
<td>Valuing collaboration and engagement by bringing diverse individuals and organizations together, to work toward common goals and accommodating multiple interests</td>
<td>Conducting effective projects on water strategy for corporations, consortiums and other organizations</td>
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Supported by people knowledgeable in all aspects of water management at local, regional, and global levels

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Athabasca River Basin Initiative

A basin wide collaborative effort to inform decision making and create a common understanding of the issues and opportunities across the Athabasca Basin for proactive water management.

This initiative will build on existing data, tools, capacity and knowledge to:

- Provide integrated modelling tool to inform water and natural resource management plans, approaches and decision making
- Provide accessible and transparent information on basin water management
- Build a common understanding and trust across the basin
- Identify strategies for adapting to future water challenges
- Identify critical gaps in data, science, processes and policy for effective water management

Learning from the experience in the SSRB
Tailored to the issues and participants in the ARB

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Athabasca River Basin Initiative

This key outcome of this scope of work for the ARB Initiative is to:

• Improved common understanding of water resource issues and opportunities from a basin perspective
• A ‘Roadmap’ that provides useable management and adaptation strategies, and balances the basin’s interests and needs

Core funding for this scope of work provided by AI-EES

• Matching funds contributed from several participant groups and organizations from various sectors (May 2016 to December 2018)

Longer Term:

• Continue this work into the whole Slave River system approach (Athabasca, Peace, Peace-Athabasca Delta (PAD), Slave)
• Build towards a Water Management Plan for the Athabasca Basin
Water Management in Northern Alberta (Athabasca, Peace, and Slave Basins)
ARB Water Management

Building on past and current work

This initiative builds on work completed and underway... including:

• Northern Rivers Basin Study
• Phase 2 Framework committee (P2FC) and Surface Water Quantity Management Framework
• Lower Athabasca Regional Plan and related frameworks
• Athabasca River Basin flood mitigation study
• State of the Basin reports

What’s missing:
A basin wide collaborative effort to inform decision making and create a common understanding of the issues and opportunities across the Athabasca Basin for proactive water management.
ARB Initiative: Work to Date (Phase 1 and 2)

Phase 1 scoped and launched the Initiative and formed the Steering Committee to:
• Support the long-term success of the initiative, including alignment with GoA planning and policy needs and develop the funding strategy
• Guide and complete a model review methodology and assessment for modelling tools to be used in Phase 3 modelling efforts, and
• Develop communication documents for the Initiative.

Phase 2 continues the Initiative through activities including:
• Engaging stakeholders (Indigenous and non-Indigenous) to participate in the Working Group
• Confirming the water management issues and concerns in the ARB
• Identifying perceived risks and opportunities to guide the development of relevant Performance Measures (PMs)
• Developing a summary of other work in the basin and its relation to the ARB Initiative (the ARB Water Sourcebook)
• Developing a suite of draft PMs relevant to surface water quantity management based on participant interests and perspectives basin wide, and
• Setting up a diverse and collaborative Working Group from across the ARB to participate in the Phase 3 collaborative modelling work.
The Athabasca River Basin

This initiative builds on work completed and underway... including:

- Covers nearly 25 percent of Alberta and is characterized by the Peace-Athabasca Delta which is a UNESCO heritage site.
- Headwaters begin at the Columbia Glacier in Jasper National Park, the river travels more than 1,500 km to its outlet into Lake Athabasca located in the northeastern corner of Alberta.
- Moving forward, the ARB will be challenged by concerns about:
  - constrained water resources due to changes in climate and land use;
  - oil sands development in the Lower Athabasca sub-basin;
  - discharge from municipal wastewater treatments into the Athabasca river system from communities along the river (e.g. Fort McMurray, Hinton, Whitecourt, Jasper, Athabasca);
  - unmanaged recreational activities identified by the Athabasca Watershed Council as causing stress in several parts of the watershed;
  - economic activity such as forestry, agriculture, coal mines and pulp and paper mills in the upper portion of the watershed;
  - sand and gravel extraction throughout the watershed; and,
  - potential construction of hydroelectric dams in the region.
History demonstrates extreme climate variability

Athabasca River at Athabasca, 1111-2010

Reinforcing the importance of adapting and building resilience now, before more extreme events

Water in Alberta: focus on adaptation

“The strong link between climate change and water has contributed to the view that if mitigation is about carbon, then adaptation is about water.”
– Alberta Climate Dialogue 2014

Mitigation
is about greenhouse gas
is global
is a trigger
takes time

Adaptation
is about water
must be local
is about action
is needed now

Climate change will have a direct, significant impact on water resources
Alberta can and needs to focus on adaptation
Hydropower potential in Northern Alberta is tied to basin water management
1. Bring together the people that know the water management systems the best
2. Provide a strong base of data and tools

Input data from best available sources...

- Naturalized flow data
- WRMM licence data
- Reservoir operations
- IDM demand data
- Climate variability data

...interactive model of surface water quantity for each sub basin...

~80 years of historic data +3- years with climate variability

...with performance measures reflecting basin interests

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3. Work collaboratively

Identify impacts and opportunities – live modelling sessions

1. Participants build the tools → **common understanding**
2. Participants use the tools → **builds trust and positive relationships** for informed and transparent decision making
3. Participants apply the tools to explore and evaluate opportunities → **Proactive and implementable sustainable water management solutions**

In S. Alberta, this process assessed:

- Impacts from increasing water demands, droughts, floods, and climate variability
- Adaptation strategies and management opportunities to meet growing demand for water and environmental interests
Working Group Participants

When is this work taking place?
• Participating in ~8 Working Group Meetings between September 2016 and February 2018

Who is participating?
Potential Working Group (WG) participants include:
• Indigenous representatives of First Nations and Métis
• Federal and Provincial Governments and related agencies (e.g., Alberta Environment and Parks (AEP), Agriculture and Forestry, AER, DFO, etc.)
• Municipalities (e.g., Jasper, Hinton, Whitecourt, Athabasca, RMWB)
• Watershed Planning and Advisory Councils (WPACS); (i.e., Athabasca Watershed Council, Lesser Slave Watershed Council)
• ENGOs/NGOs (e.g., Ducks Unlimited, Trout Unlimited, Alberta Wilderness Association, CPAWS)
• Industry (e.g., coal, agriculture, oil and gas, forestry, oil sands, utility companies)

What will participants do/share?
• Interests/ideas for water management in the basin (e.g., mitigation, adaptation, and management strategies)
• Perspectives on challenges and opportunities
• Expertise
• Quantitative and qualitative date and information if available
• Active participation
Example of collaborative, interactive modelling tool

South Saskatchewan River Operational Model (SSROM)
Examples of ‘What if…’ questions

Working group participants decide on the issues and opportunities they would like to explore using the modelling tools

- What if precipitation occurs as rain in the spring rather than snow?
- What if current population centers were to double or triple in size?
- What actions will improve water navigability?
- What if we experience the drought of the century?
- What opportunities might potential hydropower facilities provide for water management?
- What land use or land cover changes might mitigate floods and droughts or make them worse? How much difference would such changes make?

What are my community’s water concerns?
Integrated Modelling Tool

**Regional Climate Models**: models various future climate scenarios for the Athabasca Basin regions

**Land Use and Land Cover Model**: models changes to land cover based on natural and anthropogenic changes to the landscape

**Hydrological Model**: models hydrological processes, and changes those processes have on streamflow

**Outputs**: future daily precipitation and temperature forecasts

**River System Model**: models river flow, changes to flow based on human and environmental use, and infrastructure operations

**Outputs**: changes to streamflow based on changes to climate and landscape

**Outputs**: changes to streamflow, impacts on human and environmental uses and needs
Performance Measures for the ARB
How it all Fits Together

Best Available Data
- Climate Change Data
- Hydrometeorological Data
- Land Cover Data
- Water Management Data

Collaborative Modelling Tools
- ARB Land Use and Hydrological Models
  - Climate
  - Land use
  - Hydrology
- ARB River Management Model

Collaborative Modelling with Participants
- Identification of current and future issues and impacts from basin growth, climate and land use changes
- Identification and assessment of management, mitigation, and adaptation strategies

Basin-Wide Participant Working Group
- Indigenous representatives (First Nations and Métis)
- Federal and Provincial Governments and related agencies (e.g., AEP, AF, AEMERA, DFO)
- Municipalities (e.g., Jasper, Hinton, Whitecourt, Athabasca, RMWB)
- Watershed Planning and Advisory Councils (i.e., AWC, LSWC)
- ENGOs/NGOs (e.g., Ducks Unlimited, Trout Unlimited, AWA, CPAWS)
- Industry (e.g., coal, oil and gas, forestry, oil sands, utility companies, agriculture)

Roadmap for sustainable water management in the Athabasca River Basin
Challenges and opportunities are basin specific, and will vary compared to similar work in other parts of Alberta and the world.

- Adjust Dickson Dam operations (for WCO, supply, functional flows)
- Long term watershed management agreement with TA for the Bow
- Advance natural detention opportunities (Room for the River)
- Advance conveyance opportunities (Room for the River)
- Restrict greenfield development in the floodplain
- Increase St Mary operating FSL by 1M
- Raise winter carryover in irrigation serving reservoirs
- Further shortage sharing within and between IDs
- Develop shortage sharing frameworks by basin
- Improve and resource forecasting
- Effectively implement Alberta’s wetland policy
- Apply land use best management practices
- Promote further municipal conservation

SSRB wide
## SSRB Adaptation Roadmap

### Increasing degrees of adaptive capacity

#### Already In Progress
- Achieve CEP Plan targets
- Assign and transfer water allocations
- Share water within IDs
- Upgrade critical water management infrastructure
- Release functional flows (Oldman)
- Build flood defence berms where necessary
- Institute Ghost Reservoir flood operations agreement
- Develop large scale flood mitigation facility on the Elbow
- Replace Glenmore stop logs with operable gates

#### Level 1
- Institute a long term watershed management agreement with TransAlta for the Bow
- Raise winter carryover in irrigation serving reservoirs
- Further shortage sharing within and between IDs
- Develop shortage sharing frameworks by basin
- Restrict greenfield development in the floodplain
- Increase St Mary operating FSL by 1M
- Effectively implement Alberta’s wetland policy
- Improve and resource forecasting
- Adjust Dickson Dam operations (for WCO, supply, functional flows)
- Advance conveyance opportunities (Room for the River)
- Advance natural detention opportunities (Room for the River)
- Apply land use best management practices
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#### Level 2
- Redesign operations of all upstream Bow reservoirs for water supply purposes
- Expand and balance Chin Reservoir (Oldman)
- Build new SAWS and Acadia off stream storage
- Pursue more extensive relocation and buyouts in floodplain
- Build series of new off stream storage in the Oldman basin
- Build series of new offstream storage in the Red Deer basin

#### Level 3
- Build new storage low in the Bow basin (~Eyremore)
- Build new off stream storage in the WID (~Bruce Lake)
- Build new on stream storage in the Southern Tributaries (~Kimball)
- Build new on stream storage low in the Red Deer basin (~Ardley)
- Reduce minimum flows through municipalities as an exceptional measure

Blue highlights the most promising strategies within a level
Water: the key to our sustainable future

For more information:

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