Economic Value of Irrigation in Alberta

Irrigated Crop Production Update Conference
Lethbridge, Alberta
January 19-20, 2016

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Funded by Growing Forward 2
Global population is currently 7 billion, and is expected to grow to at least 9 billion by 2050.

World food requirements may need to double in the next 30 years.
Irrigation makes up nearly 20% of the world’s agriculture land base (~300 million ha).

However, it produces nearly 40% of the world’s food.

Up to 80% of future food requirements may need to be met by irrigation.
Feeding the World

Only 5 countries currently have the potential to significantly increase food production:
- Argentina;
- Brazil;
- Canada;
- Russia; and
- USA.

Sufficient land and water;
Suitable climate;
Reliable infrastructure; and
Efficient commercial and financial services.

Source – Schreier and Wood, 2013
About 1 million ha of land in Canada is irrigated.

69% of that is located in Alberta.
Irrigation in Alberta

- About 690,000 ha of land irrigated.
- Approximately 5% of Alberta’s cultivated land base.
- 98% of irrigation occurs in the SSRB.
Economic Impact of Irrigation in Alberta

- Irrigation plays a significant role in Alberta’s agricultural and economic landscape.

- Several studies have documented the economic impacts of irrigation in Alberta.
  - UMA, 1984
  - UMA, 1993
  - Hart Water Management, 2001

- Much has changed since the last major economic study was completed.
Current Study Objectives

- Provide an up-to-date assessment of the value of Alberta’s irrigation industry.
- Better understand the current and future role of irrigation in Alberta’s economic landscape.
- Assess the impact of irrigation on the social well-being of Albertans.
Study Area

- Total Irrigated Area is ~690,000 ha
  - 566,000 ha in Irrigation Districts.
  - 124,000 ha in Private.

- Actual Irrigated Area (2000 – 2011) was 600,795 ha
  - 491,017 ha in Irrigation Districts.
  - 109,778 ha in Private.

Source: ARD 10
Linkages to Economic Assessment

- Irrigation Infrastructure
  - Rehabilitation
  - Operation & Maintenance
    - Water Supply
    - Recreation/Tourism
    - Hydropower
    - Commercial Fishing

- Drought Mitigation
- Crop Production
  - Backward Linkages
    - Fertilizer
    - Seed
    - Pesticides
    - Feed
    - Machinery
  - Forward Linkages
    - Food Processing
- Livestock Production

- Global Marketing Opportunities
  - Attracting New Business
  - Increased Exports
  - Rural Economic Development

- Climate Change

- Increased Revenue to GOA
- Increased GDP
- Increased Income
- Increased Employment
Impacts Assessed

- Direct impacts of farm-level irrigation activities.
  - Value of sales and employment.

- Indirect impacts through backward linkages.
  - Sale of inputs (fertilizer, seed, machinery, services).

- Induced impacts through backward linkages.
  - Businesses that sell inputs support other industries.
Impacts Assessed (cont.)

- Indirect impacts through forward linkages.
  - Processing of irrigation products.

- Induced impacts through forward linkages.
  - Processing industries

- Other quantitative or qualitative impacts.
  - Recreation, Hydropower, Habitat development
Economic Analysis

- Three interlinked computer models were developed and used.
  - **Irrigation Benefits Simulator Model (ISBM)**
    - Assessed farm-level economic impacts of irrigation.
  - **Alberta Regional Input-Output Model (ARIOM)**
    - Assessed secondary economic impacts of irrigation.
  - **Fiscal Impact Analysis Model (FIAM)**
    - Assessed fiscal impact on the GOA and GOC resulting from irrigation-related activities.
Economic Analysis

- Irrigated crop and livestock production.
- Backward and forward linkages to crop and livestock production.
- On-farm investment in machinery and equipment.
- Infrastructure rehabilitation, operation, and maintenance.
- Drought Mitigation.
- Recreation.
- Hydropower generation.
- Commercial fishing
- Non-irrigation water use.
Qualitative Assessments

- Habitat Development
- Diversification
- Rural Development
- New Business Opportunities
- Climate Change
Results
Irrigated Crop and Livestock Production

- Irrigated crop and livestock sales totaled about $1.4 billion/year.

- 4.7% of Alberta’s cultivated land base generated 19% of the total provincial sales.

- Irrigation sales equated to about $2,400/ha, compared with $329/ha for dryland – about 7 times greater.
Agricultural Processing

- Irrigation-related agriculture processing generated about $2 billion in total sales.

- This was about 18% of the total provincial food processing sales.

- Irrigation-related agricultural processing provided:
  - $1.7 billion to the provincial GDP;
  - $1.0 billion in labour income; and
  - 17,000 jobs
Irrigation Infrastructure and Government Revenue

- Operation, maintenance and rehabilitation of irrigation infrastructure in southern Alberta generated about 1.3 billion in revenue for the GOA and GOC.

- Government revenue always exceeded irrigation-related expenditures, with a Revenue to Expenditure ratio of about 3:1.
Total Economic Impacts

- Alberta’s irrigation industry annually generated:
  - $3.6 billion to the provincial GDP;
  - $2.4 billion in labour income;
  - 56,000 jobs.

- GDP multipliers:
  - Every $1.00 of irrigation sales increased the GDP by $2.54, and labour income by $1.64.
  - Every m$^3$ of water delivered for irrigation and other related uses generated about $3.00 to the provincial GDP and $2.00 in labour income.
  - Every $1.00 invested by the GOA generated $3.00 in added revenues.
Irrigation’s Contribution to the Agri-Food GDP

- Alberta’s irrigation contributed about 20% of the total provincial agri-food sector GDP.

- Almost 90% of the benefits accrued to the region and province, and only 10% to irrigation producers.

- Earlier studies showed an 86 : 14 breakdown in benefits.
Future Opportunities/Challenges

Climate Change

- Increased crop diversification (increasing temperature)
  - Corn (silage and grain) and soybeans.
  - Increased yields of many crops possible (e.g. alfalfa).
Future Opportunities/Challenges

Climate Change

- Water Supply and Management
  - Climate models are not conclusive, but there is consensus that summer flow in SSRB rivers will be less.
  - Potential river flow reductions of -20% (-8% to -24%).
  - Increased temperatures will likely increase water demand by crops.

- Future irrigation expansion and water management strategies should take into account water supply and increasing water demands.
Future Opportunities/Challenges

Climate Change

- Droughts
  - Intensity and duration may increase.
  - Current reservoir storage and management provides water for 1 or 2 drought years.
  - Storage on the Colorado River system provides water for at least 4 drought years.

- A long-term drought strategy should be developed for the Irrigation Districts.
- Increased storage capacity would help mitigate the impacts of sustained droughts for all water users.
Future Opportunities/Challenges

Market Changes

- Global food demand is increasing.
  - China, India, and Southeast Asia are key growth regions.

- Future food demand will focus more on:
  - Meat and meat products;
  - Processed foods;
  - High quality foods; and
  - Environmentally sustainable food products.

- This provides good opportunities for Alberta’s irrigation industry.
Future Opportunities/Challenges

Value-Added Processing

- Processing of irrigation crop and livestock products add significant value of the irrigation industry.
- Irrigation Districts have the necessary water, land, skilled irrigation producers, and produce high quality products.
- Attracting new agri-food processing industries to southern Alberta should be a priority.
- Partnerships (e.g. GOA, Irrigation Districts, Southgrow) are needed to communicate this message outside Alberta.
Conclusions

- Irrigation productivity and water use efficiencies have improved significantly in the past 15-20 years.

- Irrigation continues to play a key role in helping grow the Alberta economy.

- Communities related to the irrigation industry demonstrate what a strong, vibrant rural economy can achieve.

- Increasing world food demand will provide even greater economic opportunities for Alberta’s irrigation industry.

- Water supply and water management will continue to be important challenges for the Irrigation Districts and the irrigation industry.
Acknowledgements

- **Project Coordinator**
  - Brent Paterson – Paterson Earth and Water Consulting

- **Project Co-authors**
  - Dr. Suren Kulshreshtha – University of Saskatoon
  - Dick Hart – Hart Water Management Consulting
  - Dr. Lorraine Nicol, University of Lethbridge

- **Technical Support**
  - Allan Florizone, Edmonton
  - Dr. Kamar Ali, University of Lethbridge
  - Bonnie Hofer – Bonnie Hofer Design Graphics, Lethbridge

- **Project Support**
  - Dr. Shelley Woods, Alberta Agriculture and Forestry
The Canadian National Committee on Irrigation and Drainage (CANCID) will host an international irrigation conference in Saskatoon in 2018.

400 -500 delegates are expected, representing 60+ countries.

Part of the conference will include a tour of Alberta’s irrigation area.