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A TIME TO IRRIGATE! Benefits of Irrigation Investments for Global Warming

*Saskatchewan
Irrigation Projects
Association*

The Benefits of Irrigation in Saskatchewan Project has been completed with funding and support from Agriculture & Agri-Food Canada and the Saskatchewan Ministry of Agriculture under the National Water Supply Expansion Program.



Special points of interest:

- Today some 40% of the World's Food Production is produced with irrigation on 17% of the agricultural lands.
- Global warming in Saskatchewan is expected to increase temperatures and the frequency of extreme weather events like droughts and floods.
- Irrigation provides an opportunity to drought proof much of Saskatchewan as a cost effective adaptation response to global warming.



Irrigation Investment Creates Climate Change Benefits for all Saskatchewan

Climate Change is a reality. In the Prairies water scarcity represents the most serious climate risk. Rainfall distribution may change with more in the winter and less in the summer growing season. An increase in the frequency of longer droughts and storms are predicted.

The potential of irrigating over one half a million acres in all regions of Saskatchewan can provide an effective adaptation response with benefits for agricultural production and income, rural economic development and value added, household incomes on the farms and in the cities and for sustainable employment through droughts. Thus irrigation water supply investments over a 20 year period in the Lake Diefenbaker area alone can lead to on farm investments in irrigation equipment, increased crop yields, agricultural value added investments and forward and backward linkages throughout the economy. Additional indirect and induced economic effects mean the original \$2.9 billion dollar investment could lead to an additional \$12 billion of household incomes, \$33 billion of gross domestic product, \$58 billion of sales and over 288,000 person years of employment. Beyond these measurable benefits are other gains for the rural economy, community development and water supply, tourism and the environment. All of these benefits are enhanced when compared against the billion dollar losses for farmers and governments experienced in drought years.

Lake Diefenbaker Irrigation Benefits Study

The Saskatchewan Irrigation Projects Association completed a major socio economic evaluation of the costs and benefits of irrigating 800,000 acres of agricultural lands, mainly around Lake Diefenbaker and also in other regions of Saskatchewan. The study was undertaken by Clifton Associates Ltd. of Regina, Saskatchewan working with specialists from across Western Canada*.

The study found large benefits for agriculture, value added processing, municipal water supplies, tourism, drought proofing and the natural environment. Together these were estimated to provide the opportunity to increase employment in many Saskatchewan cities and smaller towns.



* The Project team for the work consisted of Dr. Graham F. Parsons, Vice President, Clifton Associates Ltd. and Project Manager; Dr. Surendra Kulshreshtha, President of KAEI and Professor of Agricultural Economics at the University of Saskatchewan; Mr. Ray Pentland, President of Water Resource Consultants Inc. and specialist in hydrology and the management of Lake Diefenbaker waters; Mr. David Hill, formerly of the Alberta Irrigation Projects Association, Mr. Darrell Toma, Partner with Toma, Bouma Management Consultants and specialist in Alberta irrigation development and related value chains and rural economic development needs; Mr. Rodger McDonald, President of MR2 Consulting and specialist in municipal and industrial water systems; Mr. Greg Vogelsang, Senior Vice President, Clifton Associates Ltd. and specialist in environmental impact assessments; Mr. David Kent, Chief Engineer, Clifton Associates Ltd. and specialist in rural agri-processing and environmental licensing; Mr. Keith Schneider and Mathew Kreke, specialists in municipal financing, regional development and tourism and, Mr. Toby Thorp, Environmental Scientist, Clifton Associates Ltd.



More Extreme Weather Events may be expected with Global Warming

Climate Change will offer a Special Challenge to Central Saskatchewan

The Intergovernmental Joint Panel on Climate Change warn of far reaching changes in the Prairie climate that include:

- Warmer and fewer cold days and nights.
- Warm spells and heat waves or droughts.
- Heavy rainfall events.
- Increase in the number, frequency and extent of drought affected areas.

Winter snow packs may no longer be the cumulative reservoir of moisture to recharge the soils during a smaller spring run-off.

An increased frequency of extreme weather events in the form of droughts and floods can provide either disasters or opportunities to agriculture depending on the local capacity to adapt and benefit from the new environment.



Around the world irrigation is becoming a practical way to adapt to the new climatic realities by storing the additional waters that come with the storms and floods and irrigating through the droughts.

The Five Lake Diefenbaker Irrigation Projects, with the existing irrigation in the area would together form one of the larger irrigated areas in North America.

Five Lake Diefenbaker Irrigation Infill and Expansion Projects

Five irrigation expansion and irrigation projects have been identified on both sides of Lake Diefenbaker. The projects are both to infill within existing irrigation developments and to expand beyond them, particularly on the west side of the lake. The regional water supply costs associated with these projects are anticipated to cost some \$2.9 billion over twenty years.

Infill & Expansion Projects

- The South Saskatchewan River Irrigation District Expansion and Infill Project
- The Luck Lake Irrigation Infill and Expansion Project
- The Riverhurst Irrigation Infill and Expansion Project

New Expansion Projects

- The Westside Irrigation
- The Qu'Appelle Irrigation

Together these projects would add between 435 to 542 thousand acres to the existing 107 thousand district and private irrigated acres in the region to create one of the larger irrigation areas in North America with an irrigation potential of nearly 650 thousand acres.



Droughts are found throughout Saskatchewan

Nearly all regions of Saskatchewan experience drought in some years. In 1961, severe droughts were found in most regions of the province. In 1988, the severe drought was found in the southwest and south central regions. In 2001, only the north and south central parts of the province escaped from well below average rainfalls that were between 40% and 60% below the long term average of the 1961–1999 period. Review of the climatic record makes it quite clear that there are no regions of Saskatchewan that are immune from drought.

Global warming is expected to increase the frequency of severe extreme drought. The paleo climatic research in the Prairies makes it clear that the drought patterns of the 20th century may not be representative of the long term patterns of natural variation in the drought frequency and severity. The long term historical record of tree ring data suggests that prior to the twentieth century droughts were a common occurrence and often lasted longer and were more severe.



The 1930s droughts saw the soil blow from the fields to fill the ditches.

The 2001, 2002 Droughts Cost Saskatchewan Billions of Dollars and Thousands of Jobs.

The Prairie droughts of 2001 and 2002 in Saskatchewan and Alberta cost an estimated \$3.6 billion in lost agricultural production. The largest loss in 2002 at more

than \$2 billion. Gross Domestic Product declined by some \$5.8 billion in 2001 and 2002 with a single year loss in 2002 of \$3.6 billion. Employment losses exceeded 41,000 jobs

and net farm incomes were negative or zero. The costs of drought on the natural environment are seen in diminishing wetlands and lost fauna and flora.



Drought reduces agricultural yields and may lead to the loss of valuable topsoil

Agricultural Value Added Supply and Processing Opportunities

Value added processing has for too long been a distant dream in rural Saskatchewan. The frequent return of drought however is a continual threat to agri value added investments.

Today the opportunities for these value added food invest-

ments are better than ever before with the relocation of many of these facilities from water short regions of the United States and the growth in demand from an expanding Prairie and growing world population. Demand for meat products is increasingly linked to

the growth and increasing wealth of India and China. Powdered milk consumption in China trebled between 2002 and 2007. 400,000 irrigated acres are expected to be withdrawn from production in southern California by 2020.



Pipelines as both municipal and irrigation water supply systems

Adapting to Global Warming—Protection from Drought

Science suggests that the 20th Century may have been a relatively wet century that still contained a few droughts in most decades and the social, economic and environmental disaster of the 1930s.

Global Warming is a reality. Scientists tell us Prairie temperatures will rise and that droughts may become longer and more frequent. The losses from Prairie droughts already run to billions of dollars.



Yet irrigation is shown to provide insurance from drought and net returns that amount to \$270/acre over a normal drought year. Adaptation to drought will become a necessity for farms, industries, communities and cities.

Irrigation water supply systems provide the storage and distribution systems that benefit agriculture as well as the urban and rural economies.

Protection from drought must also been seen as a requirement for a sustainable natural environment in which wetlands and their wildlife can be preserved. Many Ducks Unlimited Canada projects are fed from irrigation water supply systems.

Irrigation will be an important Adaptation Response to global warming and a future expected to include increased temperatures and extreme weather events—droughts and floods.

Irrigation Water Supply systems provide agriculture, industries towns and cities with secure water supplies even during periods of drought.

Stable Sustainable Rural Futures in Spite of Drought

For many years, Saskatchewan's rural population has declined as farmers left the land. Periodic droughts would erode farmer equity and increase farm debt increasing farmer vulnerability to volatile and often decline commodity prices. Developing a diversified irrigation economy provides a stable foundation for long term rural futures. Irrigated agriculture provides for stable farm supplies as a basis for further agricultural processing. The regional water supply investments required for the irrigation expansion are transformative in creating sustainable employment and new competitive, productive and profitable rural economic enterprise. These regional water supply systems continue through the drought years and allow the rural economy to continue to function, expand and grow.

The size of the benefits associated with a diversified agricultural economy can be seen on the ground in the irrigation economy of southern Alberta - one of the driest and drought prone areas of the southern Prairies. The benefits of irrigation are confirmed by cost benefit ratios as high as 16 to 1 at a 5% discount rate and steadily increasing employment and population. Significantly, the value and benefit of irrigation investments increase when the future probability of increased drought that is now being predicted by the world's scientists is included.



Lake Diefenbaker Water Storage for Drought Proofing and Irrigation



Wildlife Benefits in Wetlands

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Create a Legacy! Become Involved!

Realising the benefits from Lake Diefenbaker Irrigation requires leaders to change the direction of development. For over half a century the potential of the Gardiner Dam and Lake Diefenbaker remains unfulfilled, while Prairie waters are developed in the neighbouring provinces of Alberta and Manitoba.

The Saskatchewan Irrigation Projects Association is committed to fully developing Saskatchewan's irrigation development potential both around Lake Diefenbaker and in other areas of the province. Contact us soon for either a copy of the study or for more information.

*Roger Pederson
Doug Ball
Sandra Bathgate*

Saskatchewan Irrigation Projects Association

Mailing Address:

Box 391
Central Butte
Saskatchewan
Canada SOH 0T0

Phone: 306-796-4420
Fax: 306-796-2223
Email: sbathgate.sipa@sasktel.net

Website:

WWW.IRRIGATIONSASKATCHEWAN.COM



Lake Diefenbaker's Unrealized Potential

Time to Irrigate!

The 2nd Recommendation of the 1952 Royal Commission of Inquiry into the South Saskatchewan River Project recommended that *"when the time comes that the Project represents the then best use of water for irrigation, the present finding (to reject the project) should be reviewed in the light of changing conditions.*

That time has come! The world food shortage, the reduction in North American irrigated acreage in California alone, the prospect of global warming in the Prairies, more frequent and longer droughts and positive economic returns to the project suggest it is now ***Time to Irrigate!***



Today, water allocated to irrigation shows positive benefits throughout the society, the economy and the environment. Benefits are identified for producers, city dwellers and for the sustainable rural diversification of a large part of the Saskatchewan economy. Irrigation has already transformed the agricultural economies of the drought prone irrigation districts of southern Alberta and Manitoba.

The future of rural Saskatchewan has been a dilemma for many. Rural folk have left as economic options were reduced. Irrigation offers a real prospect to transform the long term future of central Saskatchewan and create the diversified legacy for which the Gardiner Dam was originally built as a response to drought.

Planning a Growing Future Now with Irrigation

Irrigation development requires a long term regional development and early funding to commence the transformational change that is possible. There will be barriers to development of the resource including an aging population and the need for targeted immigration and investment capital into the region, power and transportation infrastructure, irrigation research and demonstration for new cultural and water conservation practices will be required and a Lake Diefenbaker Irrigation Development Agency will be required to manage the process over many years. Climate change will not wait!

Further study and waiting for better conditions can be costly. Cost benefit ratios for the project all increase when the work is completed over a twenty year period rather than a 40 year period. The cost inflation of the project from less than \$100 million in 1952 to \$2.9 billion today is further evidence of the costs of delay. The stop and start policy framework practiced by both federal and provincial governments has itself been a barrier to sustained development of and investment in the opportunity.

Long term commitments by federal, provincial and municipal governments and the many agricultural, local and environmental stakeholders will be required to plan for, and invest in a sustainable, long term and transformative future in the new era of global warming and climate change.

