GREEN MATTERS

A newsletter from the Alberta Environmentally Sustainable Agriculture Council

Climate Change:
Acting Locally

From AESA Council's Vice-Chair

by Larry Kitz, Northern Region Sub-Committee

Peter Gamache / Reduced Tillage LINKAGES

Farmers and ranchers love talking about the weather. Rarely a day passes that we do not include it in our everyday conversation. And why not? Weather governs much of what we do in agriculture. So when topics such as global warming arise, we of course want to be engaged and participate in the debate.

Scientists know that greenhouse gases occur naturally in the Earth's atmosphere, keeping the Earth warm. But they have also discovered that concentrations of these gases have rapidly increased over the last century, due to emissions of these gases resulting from modern industry, land use and lifestyles. The majority of scientists studying this issue believe that these increasing concentrations are contributing to changes in temperature, precipitation and wind patterns around the world.

Well, I haven't spent my career studying things like sediment cores from the bottom of the ocean or ancient tree rings to understand how the Earth's climate has changed over thousands of years. And I haven't analyzed the detailed meteorological data currently being collected all over the world, on both land and sea, to understand current global weather patterns. So sometimes I find the predictions about climate change and its possible consequences hard to fathom.

We live on a big planet, I prefer not to think of this issue on a global basis, but bring it down to something I can comprehend: my farm. Carbon does my farm much more good when it is sequestered in the soil profile rather than being released into the atmosphere as carbon dioxide, a greenhouse gas. And it's much better for my farm if the nitrogen fertilizer I apply to my crops is used by the crops rather than being lost to the atmosphere as nitrous oxide, a very potent greenhouse gas.

I'm using beneficial management practices, like direct seeding and timely fertilizer applications, to maintain the soil carbon and nitrogen levels needed for healthy crops. These practices make economic sense. If they also happen to do some good in terms of the global climate, that's even better because the predicted impacts of climate change are very serious.

Scientists are projecting effects like more severe and extreme weather events, more forest fires, damage to water resources, and increasing insect invasions. Such effects could have important economic and environmental consequences globally – as well as right here in Alberta.

This issue of *Green Matters* looks at efforts to improve our ability to adapt to the impacts of changing weather and climate patterns. The first article is about a national network of researchers, producers and policy makers working on issues related to agriculture's ability to adapt to climate change. The other three articles look at the implications of the warmer, drier future predicted for the Canadian prairies, for irrigated agriculture, woodlots and other aspects of our lives.

I am a strong believer that we should all do our part to reduce our impact on the environment. For agriculture, beneficial management practices like the ones promoted at a local level in the AESA Program are the vehicle to do this. If we focus on what we can achieve in our little corner of the planet, we can attain our own goals of sustainability and good stewardship. And along the way, we will be contributing to some much larger goals.

WHAT'S INSIDE

Issue No.24, Summer 2005

Adapting to Climate Risks & Opportunities

Agricultural producers have always adapted to their local climate, trying to reduce any risks and make the most of any opportunities. With predictions that climate change could occur more rapidly than we've ever seen before, effective adaptation is especially crucial. So a national network is bringing together researchers, policy makers and producers to coordinate research and knowledge on climate change impacts and adaptation options for agriculture.

This network is called the Canadian Climate Impacts and Adaptation Research Network for Agriculture (C-CIARN Agriculture). It's one part of C-CIARN, a network of networks that has six other sectoral networks and six regional networks, including one for the prairies (see *'A World of Change'* on the Prairies in this issue). C-CIARN Agriculture, based at the University of Guelph in Ontario, was created in 2001 with a five-year mandate.

Dr. Ellen Wall, coordinator for C-CIARN Agriculture, wants the network to be a proactive, useful tool for the agricultural industry. She says, "[By 2006] I'm hoping we'll have a very clear assessment of where we are with the state of knowledge, with the research, with our understanding of how the agricultural sector is adapting to climate and weather conditions, and with how we can build that adaptive capacity so that they will be able to handle any future climate or weather conditions."

> "...It appears we're in for a bit of climate change right now, and are we really prepared...?"

Having producers in the network helps to keep researchers and policy makers focused on practical, relevant issues, notes Wall. "It's always been very important to have that reality check... [and] to hear about what the ag community is really facing on the ground and also about the innovations and resourcefulness that are out there."

One of the challenges for C-CIARN Agriculture is to raise the profile of adaptation – reminding people that the climate change issue is about more than monitoring and reducing greenhouse gas emissions. A higher profile is key to getting adaptation on the agenda of policy developers and to gaining the interest of agencies that might fund adaptation research.

Adaptation isn't always on the front burner for producers, either. Wall says, "From what I understand, there are a number of reasons why producers tend not to give adaptation a lot of focus. One is that they are already doing it." With strategies like growing different crops, diversifying their operations, and obtaining crop insurance, producers try to minimize various risks including weather and climate risks.

She adds, "There is also so much going on in agriculture right now. When you look at the stresses for the Canadian agri-food sector, the weather just doesn't matter at all at one level, compared to BSE and trade. But the weather is one of those fundamental elements that, if we're not prepared to consider it, just might be a big problem."

Wall cites the example of the profound drought that is currently crushing Australia's agricultural industry, and she says, "We need to make sure that crop insurance and income stabilization programs are robust enough to help producers [adjust to such major changes]. Another big issue that I hear from producers is using biotechnology to build drought resistance into crop varieties. What would relying on GMO [genetically modified organism] technology mean for their markets? ... These are all things that we have to have some deeper understanding of."

Although producers may not be focusing on global climate change, they are well aware of long-term weather patterns in their own area. Wall says, "Wherever we've gone across Canada, most of the producers we've spoken to can point out that [weather conditions] really do appear to be quite different now than they were 25 to 50 years ago, just based on their own experience and the experience of the old timers around them."

Wall adds, "Even if our climate is changing purely because of normal, natural patterns, that's still something to be aware of. I mean, we did have an ice age here 10,000 years ago! So of course the climate is changing; it's always changing. What I'm saying is, 'It appears we're in for a bit of climate change right now, and are we really prepared, do we know enough to ensure that our ag sector is in a good position to handle this on top of all the other things that they are having to handle right now?' "

For more information, visit the C-CIARN Agriculture website at <http://www.c-ciarn.uoguelph.ca/>.

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Irrigation & Climate

Over the next 50 to 100 years, Alberta's climate is expected to become warmer and possibly drier than it is now. A longer, warmer growing season could allow irrigation farmers in southern Alberta to grow crops now grown in the central or southern U.S., or to harvest two crops per year of some current crops, like silage barley. But will there be enough water to grow those crops?

Alberta's irrigation industry is acting now, through research and innovation, to meet the challenges and opportunities ahead.

Research: Bringing the future into focus

Almost all of Alberta's irrigated land lies in the South Saskatchewan River Basin. This basin is the focus of a three-year research project called *Climate Change and Water in the South Saskatchewan River Basin.*

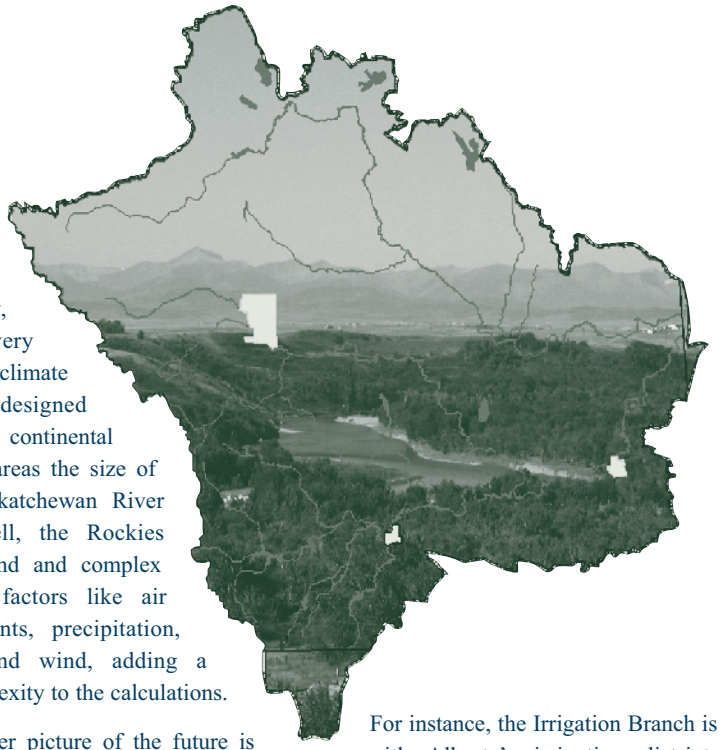
"Particularly in the South Saskatchewan River Basin, as population continues to grow, as economic activity continues to grow at unprecedented rates, the demand for water even today will put a significant strain on the water supply in the next two decades. If you place climate change on top of that, it adds even more complexity to the whole issue," says Brent Paterson, Head of the Irrigation Branch of Alberta Agriculture, Food and Rural Development.

Paterson is a member of the project's advisory committee. He says, "We want to understand as quickly as we can what the impacts [of climate change] might look like, so that we can make the best use of the available water resources, from an agricultural, social and environmental standpoint."

The project is being conducted by the Prairie Adaptation Research Collaborative (see *'A World of Change' on the Prairies* in this issue). It is evaluating the effects of climate change on water availability and the socio-economic implications of the changes in water availability.

A key aspect of the project is predicting the hydrologic conditions – like snow pack and snowmelt – in the Rocky Mountains. That's very important because about 90% of the flow in the South Saskatchewan River originates in the Rockies. Unfortunately, that's also very difficult. Most climate models are designed for a global or continental scale, not for areas the size of the South Saskatchewan River Basin. As well, the Rockies have a profound and complex influence on factors like air mass movements, precipitation, temperature and wind, adding a daunting complexity to the calculations.

South Saskatchewan River Basin



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Having a clearer picture of the future is especially urgent because changes to water management infrastructure can take years of planning and development. Paterson says, "As an example, we now count on our snowmelt to occur in the Rocky Mountains in April, May and June. We begin operating things like reservoirs, canals and diversion canals when the main snowmelt is occurring, so we can fill up off-stream reservoirs. One suggestion is that we may have snowmelt periods in January or early February and then have the weather get cold again. We don't currently operate [irrigation infrastructure] in winter because of concerns like ice freeze-up and blockages. But we may have to consider adapting our infrastructure systems to capture the snowmelt when it comes, rather than losing early melt-water and then not having sufficient water later."

Innovation & Action

Paterson is confident in agriculture's ability to adapt to climate change. "With improvements in irrigation technologies and management, we're using 30% less water to grow a crop today than we did 25 years ago. We expect to see even further improvements in efficiency."

For instance, the Irrigation Branch is working with Alberta's irrigation districts on an irrigation measurement and modeling program. Paterson says, "Within the irrigation districts, which are the largest areas of irrigated land in the province, we know for every parcel of irrigated land, how much water is used each year, what crop is being grown, and what irrigation system is used."

That information helps the districts and farmers to better understand the current situation and to make well-informed decisions on crop and irrigation system options. Branch staff are also using the program to assess the effects of higher temperatures on crop water needs and the implications for irrigation districts.

Paterson concludes, "The agriculture industry has faced adaptive requirements in every decade – pest management, too much rain, too little rain. We are seeing huge advances in crop genetics, integrated pest management, water management. ...There may be some hard decisions to make, but they won't be decisions made out of ignorance or panic. They'll be made to make the best use of economic opportunities."

Woodlots in Changing Landscapes

In a changing climate, species that can walk, fly, swim or slither away from an unsuitable environment will have a distinct advantage over trees. That could mean trouble for Alberta's forested lands and for their role in maintaining healthy landscapes. And that makes sustainable woodlot management more essential than ever.

A warmer climate could mean a longer growing season, increased tree growth rates and the ability to grow different tree species. But other possible changes – like drier conditions, and increased variability and extremes in the weather – could have negative effects on forests.

"Forests will be under stress because many trees won't be in their normal range [for weather conditions]. And trees that are stressed are more susceptible to disease and insect infestations," says Victor Brunette, Manager of the Alberta Woodlot Extension Program for Alberta Agriculture, Food and Rural Development. "We expect a lot of insect infestations, new diseases, and more severe outbreaks of diseases we have now."

Lower precipitation levels would reduce tree growth and increase the risk of fires. Increased weather variability could mean sudden temperature changes that could set back tree growth. Brunette explains, "[For example], if it's very nice and mild in December and suddenly the temperature drops drastically, trees that are not necessarily in their best range could suffer from not having hardened for the winter."

Even without climate change, Alberta's forested areas face serious challenges. Brunette says one estimate is that Alberta has lost roughly 2.5 million acres of forested land since the late 1980s, due to conversion of forested areas to other land uses like agriculture, oil and gas, and urban development. Another challenge is the narrow age range of trees in many forests. He says, "In Alberta right now, a lot of forests are about the same age. So if they are really threatened or damaged or stressed, because they are already over-aged, climate change might affect them even more."

> "We may be at the hinging point right now."

Brunette emphasizes the importance of trees in healthy, resilient landscapes. "Well balanced landscapes have 10, 20 or more percent of trees on them," he notes. Forested areas perform significant landscape functions like increasing water retention, slowing water runoff, protecting water quality, providing shade, reducing wind speed, catching snow, and storing carbon.

"We may be at the hinging point right now. If we decide to protect nature at the landscape level, we will be better prepared in five, 10 and 20 years to face climate change impacts," says Brunette. The Alberta Woodlot Extension Program is playing a part in this by raising awareness of the importance of retaining private woodlots and by providing information to landowners on sustainable woodlot management.

Brunette adds, "Whether we are talking climate change or not, we still need to reduce the level of deforestation if we want to protect the water in this province. Alberta has only 2% of the national water supply. And to protect the water quality and quantity over the long-term, we have to manage our forests and landscapes in a better way."

Ducks Unlimited Canada

New Processing Scholarship!

The AESA Agri-Food Processing Scholarship, established in April 2005, is available to Alberta students in at least their second year of post-secondary studies related to environmental issues in agri-food processing.

The scholarship, created by AESA's Processing Based Committee, provides a maximum of $3000 to successful applicants. It is being offered through a partnership of the Processing Based Committee, Alberta Agriculture, Food and Rural Development, and the Alberta Food Processors Association.

Processing Based Committee member Dr. Terry Rachuk says, "We want to make students aware of the value of sustainability in processing and the importance of issues like effluent, solid wastes and energy use, and practical options for reducing inputs, and for reusing and recycling byproducts."

The application deadline is August 1, 2005. For details and an application form, go to <http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/aesa9737>, or call Laura Campbell at 780-422-4385.

COUNCIL PROFILES

Roger Bryan/AAFRD

Ron Pettitt

"The biggest environmental issues for the food processing industry are energy use and waste management – trying to be more efficient in energy use and cutting down on the waste going to the landfills or municipal waste treatment systems," notes Ron Pettitt. On AESA Council, Pettitt represents the Processing Based Committee, the industry-government committee that guides AESA's Processing Based Program.

The Processing Based Program provides cost-shared assistance to agri-food processors for developing and adopting environmentally friendly practices. Being environmentally friendly is "the right thing to do" and can save money too, says Pettitt. "For example, we've done projects with companies to recover the methane from their anaerobic lagoons and use it as a fuel source in their processing plants. That cuts their costs down and also eliminates the impact on the environment. And improving water use efficiency and reducing waste can cut down on municipal waste charges for large processors. It's a win-win."

Pettitt has many years of experience in the private and public sectors of Canada's agri-food processing industry. He has also been active in a wide variety of industry associations like the Canadian Institute of Food Science and Technology and the Packaging Association of Canada.

For the past four years, Pettitt has been Director of the Processing Development Division of Alberta Agriculture, Food and Rural Development. Prior to that he was the Head of the Food Processing Development Centre (FPDC), one of the four units in the Division. These units offer a range of services for innovative agri-food processors.

The FPDC, built in 1984 and expanded in 2002, is the main unit. Pettitt says, "Processors come to the Centre to develop new products and new processes. We are a federally registered facility, so the products that they develop here can be test marketed anywhere in Canada and internationally."

The other units are the Food Science and Technology Centre, the Centre for Agri-Industrial Technology, and the Consumer Products Testing Centre. They provide various research and testing services for developing diverse products from agricultural commodities.

> "...improving water use efficiency and reducing waste can cut down on municipal waste charges..."

A fifth unit, the Agrivalue Processing Business Incubator, will open in 2006. It will provide new processing companies with services such as business planning and marketing as well as space to run their businesses. "There are no other food processing incubators in Canada – it will be the only one of its kind," says Pettitt.

The Division's expanding facilities and services are nourishing the entrepreneurial spirit of Alberta's growing agri-food processing industry. The Processing Based Program can help processors ensure that this growth is sustainable.

Roger Bryan/AAFRD

Murray Klutz

Partnering is a common thread in many of Murray Klutz's activities these days.

As an Industry and Government Liaison for Ducks Unlimited Canada (DUC), Klutz is involved in developing partnerships with the agriculture, forestry, and oil and gas industries, and with governments. These partnerships focus on extension programs, field projects and policy development.

DUC is a private, non-profit organization whose mandate, simply put, is "to conserve wetlands all across Canada," says Klutz. Prairie farmers are key partners in that effort. The prairies are the primary nesting area for waterfowl on the continent. Since most of the prairie landscape is privately owned, partnering with farmers is vital.

Along with thriving partnerships, DUC's success also comes from its sound science. "We base our decisions on the best science that we can get. So we have a very active research group, and we also partner with research organizations and universities across the country," says Klutz.

> "We base our decisions on the best science that we can get."

Klutz has a strong agricultural background. He grew up on a mixed farm near Daysland. "We had annual crops, forages, a cow-calf operation, a small feedlot, and sometimes we even had some pigs and chickens. The neat thing about that was that I had a chance to be actively involved in virtually all parts of production agriculture."

After graduating from the University of Alberta in Agriculture, Klutz worked for Alberta Agriculture, and then went to Dow AgroSciences for nine years. He joined DUC two and a half years ago.

As part of his work for DUC, Klutz serves on many boards and councils, including AESA Council. "My role on AESA Council is two-fold," he explains. "Because of my agricultural background and training, I bring to Council biodiversity issues from the conservation and wildlife sector but in a manner that is understanding of the agriculture industry."

And from Council, he brings back to DUC information on current trends in agriculture. "Because of the diversity in representation on AESA Council, whatever is new is shared pretty readily." He also brings back "a greater understanding of the needs of the agriculture industry so that we can incorporate that into our programming and planning."

Like DUC, AESA Council also emphasizes partnering and coordination. For example, Klutz is a member of Council's Agro-Environmental Programming Subcommittee. Its task is to "search for ways to coordinate communication and look for synergies and ways to improve efficiency and effectiveness [among stewardship programs]," he explains.

For both DUC and AESA, partnerships are powerful forces for positive change.

‘A World of Change’ on the Prairies

When you ask Dr. Norman Henderson what are the main challenges that climate change presents for the three Prairie Provinces, he says, “That’s really difficult to answer because it affects just about everyone and everything that they do.”

Henderson is the Executive Director and a Senior Research Associate with the Prairie Adaptation Research Collaborative (PARC). He says, “Next to northern Canada, the Prairie Provinces are expected to have the most noticeable climate change impacts in all of Canada.” He lists an array of effects in “a world of change” – from taxi drivers losing business in mild winters, to stresses on communities that depend on ice roads, to lower water levels resulting in less hydro power and in rising prices for other energy sources.

“It’s happening right now.”

He stresses that the Prairie Provinces are already seeing climate change impacts like drier conditions and more forest fires. “People tend to think about climate change as an oncoming problem, as a train in the distance that’s coming at us, but that’s not the case. It’s happening right now. It’s not just something that will happen, it’s something that has been happening.”

PARC conducts and disseminates research on climate change impacts and adaptation options in the three Prairie Provinces. It carries out this mandate by funding research, holding workshops and conferences, co-funding three research professors (one in each of the three provinces), and fostering the development of new researchers. PARC also hosts C CIARN Prairies, one of the six regional nodes in the national Canadian Climate Impacts and Adaptation Research Network.

Created in 2000, PARC has been involved in dozens of research projects in such diverse sectors as agriculture, water, forestry, biodiversity, socio-economics, earth sciences, energy and policy. Examples of its agricultural research include: evaluating climate change impacts and adaptation strategies related to forage and livestock production; and assessing climate change effects on herbicide effectiveness and weed/crop competition.

PARC’s current research priorities are forestry and water resources. Henderson explains, “We made that decision a couple of years ago because forest impacts and water impacts were likely to be the most severe and key impacts in the Prairie Provinces, and also they were areas where there wasn’t necessarily a lot of prior research.”

As well, both sectors depend on multi-year decisions, making it more crucial to have reliable predictions. He says, “For example, if you build a dam, you expect to operate that over the coming decades. And when you choose to replant an area with a particular species of trees you are expecting those trees to be there in 30 or 40 years. So they make a commitment, based on a best guess of what the future will look like.”

PARC is a federal-provincial partnership, with Natural Resources Canada, Alberta Environment, Saskatchewan Industry and Resources, and Manitoba Conservation providing annual funding. PARC also partners with a variety of agencies on specific projects. For more information, visit <http://www.parc.ca> and <http://prairies.c-ciarn.ca>.

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Climate projections for the Prairies

- Temperature: increasing, with greater increases in night temperatures and winter temperatures
- Precipitation: possibly slightly increasing, but not enough to keep pace with temperature increases
- Evaporation: significantly increasing
- Soil moisture: decreasing
- Growing season: longer
- Water resources: increasing variability, earlier peak flows
- Extreme events: increased frequency and magnitude of extreme events, including drought

Source: PARC website

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Green Matters is the newsletter of the Alberta Environmentally Sustainable Agriculture (AESA) Council. AESA Council consists of representatives from Alberta’s agriculture and food processing industry, environmental organizations and municipal, provincial and federal governments.

AESA Council’s vision is that Alberta has a thriving agriculture and food industry that is operating in an environmentally responsible manner. Its mission is to lead the agriculture and food industry in addressing environmental challenges. And its goal is to develop and deliver collaborative environmental stewardship initiatives that result in sustainable growth of Alberta’s farm, ranch and agri-food processing industry.

The purpose of *Green Matters* is to provide a forum for discussion of environmental issues in Alberta’s agriculture and food processing industry.

To subscribe to *Green Matters*, call 780-422-4385. Green Matters is also available online at <http://www1.agric.gov.ab.ca>.

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