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Agri-Environment Services Branch

PFRA
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AESB
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years

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Message from the Minister

Congratulations to the Prairie Farm Rehabilitation Administration (PFRA) as you celebrate 75 years of continued dedication to farmers.

Having grown up on a farm in Saskatchewan, I am very familiar with the work of PFRA and its tremendous and positive impact on the environment and success of agriculture across the Prairies. Now, those key lessons learned on the Prairies are being applied across Canada through the national Agri-Environment Services Branch, AESB.

This Government is proud to deliver effective programs and exciting economic opportunities to farmers and the sector. We are working hard to build a strong agriculture sector across this great country. One important way we are succeeding is through Canada's Economic Action Plan, which is delivering real results for agriculture, while protecting Canadian jobs and prosperity into the future.

Today more than ever, agriculture remains the backbone of the Canadian and global economy. Our Government will continue to put Farmers First in every decision we make to advance Canadian agriculture.

Thank you for your continued work on behalf of Canadian farmers, and best wishes for many successful years ahead!

Gerry Ritz, P.C., M.P.
Minister of Agriculture and Agri-Food

Message from the Deputy Minister and Associate Deputy Minister

In 1935, Parliament established the Prairie Farm Rehabilitation (PFR) Act in response to severe drought conditions that devastated vast stretches of the prairies and had an impact on the entire country by addressing the economic security and sustainable management of Prairie farmland.

For 75 years, the Prairie Farm Rehabilitation Administration (PFRA) has pioneered new technologies and practices to address cultural practices, water supply issues, soil drifting and land rehabilitation, and today many of these practices and techniques are used all over the world.

An important part of PFRA's contribution has been its work in providing assistance to landowners at a local level, recognizing the diverse needs across the country and the unique concerns in each region, and developing solutions to the agri-environmental challenges farmers faced.

Canada's agriculture sector depends as much today on the sustainable use of productive soils and an abundant, high-quality water supply as we did 75 years ago, and given the agricultural and environmental challenges we face, this type of work is more important than ever.

We applaud the dedication and values that people from PFRA have exhibited over the years and I know this same dedication has been carried forward to the new Agri-Environment Services Branch (AESB). AESB is an important part of Agriculture and Agri-Food Canada in delivering products and outcomes that benefit the sector. Building on a proud history, AESB will continue to be a vital leader in agricultural sustainability and environmental practices in the 21st century.

John Knubley
Deputy Minister
Agriculture and Agri-Food Canada

Andrea Lyon
Associate Deputy Minister
Agriculture and Agri-Food Canada

Message from the Assistant Deputy Minister

Celebrating Our Past and Future 75th Anniversary Publication

If you look closely at the cover of this publication, you will see some of the employees who have helped to build this organization and who continue to make it a success. This publication pays tribute to their tremendous work over the past 75 years and provides a glimpse into our plans for the years to come.

Over the decades, the Prairie Farm Rehabilitation Administration (PFRA) provided assistance to thousands of farmers. Through research, engineering, financial assistance, and technology transfer programs, PFRA had a profound impact on the agriculture sector. Now, the well-known agency on the Prairies has merged with two other organizations to form the Agri-Environment Services Branch (AESB) and become the department's lead on tackling environment issues facing the sector.

As you read through our stories, you will get a great sense of the work we are undertaking which ranges from creating living laboratories to tackle local environment issues to developing global research alliances to deal with climate change.

We are proud to be part of the legacy of 75 years of tremendous work and our people will continue to focus on helping the sector adapt to the agri-environmental issues facing Canada over the coming decades.

Jamshed Merchant
Assistant Deputy Minister
Agriculture and Agri-Food Canada

Agri-Environment Services Branch – Joint Executive Team

Back row left to right: Costa Psihogios, Robert Patzer, Jason Fradette, Alexandre Lefebvre, Greg Strain, Hugh Bailey, Scott Wright
Middle row left to right: David Phillips, Gerry Steranko, Ed Coulthard, Dave Zapshala, Alan Parkinson, Christian Pilon, Richard Butts
Front row left to right: Michelle Harland, Lori Lipinski, Troy Hennigar, Jamshed Merchant, Bill Harron, Ian D. Campbell

The PFRA: 75 Years of helping to rehabilitate the land and restore prosperity

by Lorne McClinton and Suzanne Deutsch

The PFRA, now known as the Agri-Environment Services Branch, is 75 years old; the Government of Canada passed the Prairie Farm Rehabilitation Act that created it on April 17, 1935. The Act mandated the new agency it created with the monumental task of helping the Prairies recover from the terrible years of drought and economic disaster known as the "Dirty Thirties". Along the way they had to find solutions to address the economic security and sustainable management of Prairie farmland by promoting improved cultural practices, water supply activities, soil drifting controls, land rehabilitation, and the use of tree cultures.

Over the past 75 years, the PFRA has earned a world-renowned reputation for soil conservation and environmental sustainability. Its strength has been its ability to remain closely positioned to rural people and communities and its ability to adjust with the times – adapting to the changing needs of the agriculture and agri-food sector – keeping itself relevant and vital.

In examining the history of the PFRA, Canadians today could hardly imagine how bleak life was for Prairie farmers in the 1930s. Huge tracts of land in Alberta and Saskatchewan were slowly turning into a desert. There was no feed or water for livestock and black blizzards of topsoil sometimes blotted out the sun for days. It was Canada's first true environmental disaster and thousands of farm families were on the brink of starvation.

While the "Dirty Thirties" were triggered by drought, it was largely a manmade disaster. No matter where Prairie settlers had come from, they had one thing in common; they all came from areas that had higher amounts of rainfall. The land management skills they brought along with them weren't suited for the Prairies. As historian James H. Gray wrote in his 1967 book, 'Men against the Desert', the best farmers did the worst damage to the soils of the Palliser Triangle.

Common practices like ploughing fields dried out Prairie soils so that when the rains failed in 1929, the topsoil turned to dust and there was nothing to stop the wind from taking it away. Nearly 20% of all improved land on the Prairies suffered from wind erosion and some areas were entirely stripped of topsoil.

Right from the start, the PFRA was divided into two sections: water development and cultural practices.

The water component's task was to find ways to conserve water and to capture the spring snowmelt and rainfall. The cultural segment looked at what could be done to stop wind erosion and reclaim topsoil.

Water development

In the 1930s, most of Prairie agriculture was still literally horse-powered. Water and forage for livestock were critical to all farm operations. The ink was barely dry on the plans when the water development section of the PFRA was flooded with thousands of requests for stock watering dams and farm dugouts. The half-dozen crews, that had been digging dugouts on behalf of Saskatchewan's provincial Water Resources Branch since 1933, had fallen behind. The problem wasn't an easy one to solve.

Construction of the Melita Dam.

South Saskatchewan River Project Irrigation Areas

The PFRA first encouraged farmers to dig their own dugouts by offering a subsidy of up to $75 to cover their out-of-pocket construction expenses. Initial teething problems limited construction to just 49 dugouts in 1935. A committee of farmers and the PFRA eventually revamped the program. Instead of having individual farmers struggling to gouge out their own water holes with make-shift equipment and undernourished horses, they created a new service industry that hired small contractors to dig them with drag lines. These contractors would move into communities and build half a dozen dugouts in a matter of days.

The practice of damming small streams as stock watering reservoirs was established and the case of the Wildhorse Creek, near the United States border, set the legal precedent of how a country in which a river rises, would have the right to control the river within its territory.

Water management continued to be a major part of the PFRA's mandate after the crises of the 1930's had passed. Between 1935 and 2000, the agency assisted with numerous small water-development projects: 148,417 dugouts, 111,552 wells, 14,839 stock-watering dams, 10,723 irrigation projects, and 711 pipelines.

The largest water development project was the design and supervision of the South Saskatchewan River Project, started in 1959. It required building two dams and the construction of a massive reservoir, the 225 km long Lake Diefenbaker. The reservoir now provides irrigation water and supplies drinking water for half of Saskatchewan's population.

The PFRA also established an Irrigation Demonstration Farm at Outlook, Saskatchewan. Today, known as the Canada-Saskatchewan Irrigation Diversification Centre, it operates as a federal/provincial/industry/ university partnership dedicated to sustainable irrigation production practice.

Cultural practices

Finding ways to stop soil drifting and reclaim the Prairies' topsoil was a huge challenge. The problem, as stated by George Spence, the first Director of the PFRA , in a 1966 interview with historian James Gray, was that when the PFRA started up, nobody knew how to do it. Everything in the early years was an experiment.

Asael Palmer at the Lethbridge Experimental farm observed that if stubble and other plant residue were left on the surface of unploughed summerfallow fields, it protected the soil from wind erosion. Scientists like L.B. (Leonard) Thomson at the Swift Current experimental farm and others experimented with ways to do this.

The experimental stations and universities also embarked on the massive job of mapping and classifying prairie soils. Techniques like strip farming, contour farming and planting field shelterbelts were also developed.

The PFRA funded much of this work and then launched a crusade to make sure news of the latest research was spread to farmers. Staff went everywhere the dust blew, made speeches, organised work bees, set up seed depots, supervised the mixing of grasshopper bait and helped convert and repair farm equipment. The PFRA also set up Agricultural Improvment Associations that greatly facilitated the battle to contain and beat the desert. When an attack was launched on a disaster area, a call would go out from the municipal office to the Association members who would round up neighbours and head for the site. Many times more volunteers turned up than equipment for them to work with.

Land reclamation

Two years after the creation of the PFRA, the drought worsened and the Government of Canada expanded the Rehabilitation Act to include land settlement and utilization. The province of Saskatchewan turned over abandoned and degraded land to the PFRA who turned it into community pastures. This meant the most erosion prone land in the province was stabilized and protected under permanent grass cover.

PFRA Community Pasture

The development of the Community Pastures system began in 1937. PFRA initially established 16 pastures which expanded over the years to 85 pastures across the Prairies. The land managed covers some 929,000 hectares of sensitive landscapes. They represent the depth of biodiversity that Canadian native prairie contributes to habitat for a countless number of species, some of which have been listed as threatened and or endangered. AAFC continues in the management of some of the largest blocks of native prairie remaining in North America, providing 3000 livestock producers with summer grazing for 225,000 head of livestock annually. The management of these lands demonstrates how environmental conservation can be achieved in conjunction with a wide range of concurrent economic and recreational activities.

New name and new national focus

In the seventy-five years since the PFRA was founded its collaborative, responsive and practical approach to soil conservation and water management has had a dramatic impact on Prairie life and the agriculture and agri-food sector. The lessons and techniques pioneered by the PFRA are now being put to use all over the world.

In 2009, the Government of Canada broadened the mandate of the PFRA to a national focus and changed the name to reflect this. The new Agri-Environment Services Branch (AESB) operates as a branch of Agriculture and Agri-Food Canada, and builds on the existing strengths of the former PFRA. The new Branch will focus on the development and delivery of science-based agri-environmental knowledge and information tools. Its diverse core of technical expertise has the new AESB well positioned to continue working to build a stronger economy and a better quality of life for all Canadians.

John Kendrew

Rancher near the community of Pouce Coupe in British Columbia's Peace River country

"Water is the big issue here, and PFRA has been instrumental in helping cattle producers in the area overcome that problem. They have provided tremendous support, both technically and financially," Kendrew says. "They brought in new ideas, and coached us into building bigger dugouts that could hold two years' water supply to help deal with drought, and helped us better manage our water supplies. Now we have stored water like never before."

Lake Diefenbaker: PFRA's Crowning Achievement

by Lloyd Crooks

In 1863, Captain John Palliser identified a triangular-shaped area of western Canada, including all of southern Saskatchewan, as "desert, or semi-desert in character, which can never be expected to become occupied by settlers." The area has become known as Palliser's Triangle.

But, the settlers did come, and over time it became apparent that the lack of water, punctuated by the drought of the 1930s, would be the main constraint to development of the area. So today, smack in the middle of Palliser's Triangle, sits Lake Diefenbaker, sparkling like a jewel, turning this "semi-desert" into an oasis, and delivering benefits across the province.

Named for the Prime Minister of Canada at the time, John G. Diefenbaker, Lake Diefenbaker was formed by the construction of two dams. The Gardner Dam, named after former Saskatchewan Premier James Gardner, extends across the South Saskatchewan River valley about 25 kilometres south of the town of Outlook. The Qu'Appelle River Dam, about 40 km southeast of the Gardner Dam, controls the amount of water leaving the lake into the Qu'Appelle River system.

The Gardner Dam and the Qu'Appelle River Dam were designed and constructed by PFRA, which began the engineering and construction of the massive Gardner Dam in 1959. The dam is the largest earth embankment dam in Canada, and one of the largest in the world. It extends five kilometres across the river valley, with a maximum width at the base of 1 ½ kilometres and projects 64 metres above the valley floor at its tallest point. The spillway is more than one kilometre long and took 280 million cubic metres of reinforced concrete to construct.

In 1963, construction began on the Qu'Appelle River Dam. While smaller than the Gardner Dam, at three kilometres long, 580 metres wide and 27 metres high, the Qu'Appelle River Dam is an essential component to maintaining water levels in Lake Diefenbaker. Without it, water from the lake would flow uncontrolled into the Qu'Appelle Valley, substantially limiting the amount of water that could be held in the lake.

"Lake Diefenbaker and Gardiner Dam spillway"

In 1967, the reservoir came into operation. Lake Diefenbaker is 225 kilometres long, extending from the Gardner Dam to a point on the South Saskatchewan River north of Swift Current. It has approximately 800 kilometres of shoreline, a surface area of 42,000 hectares at the full supply level of 556.86 metres above sea level and holds 9.4 billion cubic metres of water.

During the peak of construction, more than 1100 workers and 170 PFRA personnel were working on-site. Hank Larson began his 35-year career with PFRA working on the project.

"I began in 1958 with a summer job as a rod man and ended up working there for 10 years," he explains. "I worked on survey crews on both the Gardner Dam and the Qu'Appelle Dam as well as along the river channel upstream to determine how many trees and how much brush had to be removed from the reservoir area."

Hank retired from PFRA as the Regional Director for northern Alberta and northeast British Columbia and is currently living in Hanna, Alberta. He was born near Outlook, where his grandparents homesteaded in 1903,

so he knows the lay of the land, and remembers what it was like before the lake was there.

According to Hank, "The area was strictly dryland grain farming and mixed farming," he says. "But the landscape has changed. Irrigation has allowed new crops and more intense production. Some of the specialty crops today include potatoes, beans, lentils, corn and alfalfa. That led to the establishment of an alfalfa cubing plant near Outlook, and the product is shipped to California, China and Japan." "The opportunities in the Outlook area today are immense, because the area has the necessary heat units to grow specialty crops, and there is an abundance of water."

Approximately 43,000 hectares of land are irrigated from Lake Diefenbaker, representing about half of all the irrigated land in Saskatchewan. The area has become the hub of potato production in the province. Since precipitation totals only about 260 mm a year, with only 200 of that during the growing season, potato production without irrigation would not be possible. In addition, researchers have determined that an estimated 240,000 hectares in the area are suitable for irrigation, particularly on the west side of the river.

While the face of agriculture in the immediate area has changed, the importance of Lake Diefenbaker to Saskatchewan residents as a whole cannot be overstated. About 45 percent of Saskatchewan's people receive their drinking water from Lake Diefenbaker, either directly or indirectly. Water from the lake is directed down the Qu'Appelle River where it feeds Buffalo Pound Lake northeast of Moose Jaw. The cities of Moose Jaw and Regina draw their water supplies from Buffalo Pound. Saskatoon draws its water supply directly from the South Saskatchewan River, now made more reliable by steady flows from Lake Diefenbaker.

The cost to construct the Gardner and Qu'Appelle River dams was about $120 million. It is estimated it would cost about $1 billion today. PFRA operated the works until 1969 when the Province of Saskatchewan assumed ownership of the works. PFRA continued to provide on-site duties until 1997 when the Province took on full responsibility.

Lake Diefenbaker was PFRA's largest single project during its 75 years of accomplishments and the benefits the project provides will continue far into the future. The new AESB has picked up where PFRA left off, and will continue to work with the agriculture and agri-food sector on issues to the benefit of all Canadians.

Gerry Gross, PAg
Senior Irrigation Agrologist, Irrigation Branch, Saskatchewan Ministry of Agriculture

The crown jewel of PFRA was and is, in my opinion, the construction of the Gardiner and the Qu'Appelle dams which created Lake Diefenbaker. Lake Diefenbaker supplies drinking water to over half the population of Saskatchewan including the cities of Saskatoon, Moose Jaw and Regina. The dam stabilized the in-stream flows in the South Saskatchewan River enabling water users, towns, cities and individual users, to develop intake systems and the dam protects the shoreline from the erosive action of rushing water every spring.

Interview with...

Dr. Harry Hill, former DG, PFRA

Growing up on a farm in Saskatchewan, Dr. Harry Hill lived very close to the land. It was this appreciation for his surroundings and his innovative spirit which led him to pursue a career in agricultural engineering and, as far as he was concerned, PFRA was the place to be.

"I came from the land. I chose agricultural engineering because I wanted to stay involved in agriculture," he explains. "From the time I returned in 1977 (as Director General), I was content with working there. I never seriously considered going anywhere else. I knew this business, so it didn't appeal to me or make sense to go elsewhere."

Dr. Hill first joined PFRA after graduating as an agricultural engineer in 1956. He began his career working on irrigation projects in Saskatchewan, then later with Mel Aaston and Don Mackay in the pasture program on irrigation, stock water and range management. From there he spent a year as a junior engineer designing tunnels and the spillway for the Gardner Dam at Lake Diefenbaker in southern Saskatchewan.

In 1960, he left PFRA to pursue doctorate studies at Oxford University in England then taught at the University of Waterloo in Ontario for eight years. During his tenure at Waterloo he consulted on water resources projects including work on the Okanagan lakes in British Columbia.

After spending four years at Environment Canada, Dr. Hill returned to PFRA in 1977 as the Director General for the branch, a post he held until his retirement in 1995.

"Seeing a project completed that served rural Prairie people was likely the most satisfying part of working with PFRA," Dr. Hill says. "I enjoyed the strong technical and administrative competence of the PFRA staff. I also enjoyed working with farmers to develop projects and seeing those projects implemented."

"Every summer, I would tour our offices to meet with clients and find out what they were thinking," he continues. "Our clients and partners had great respect for PFRA staff's expertise."

Dr. Hill says that during his time as Director General, bringing the soil conservation and land management functions back to PFRA was likely the highest priority objective he accomplished. In 1946, PFRA's soil conservation role had been transferred to another agency. While he was Director General, Hill put the wheels in motion to establish a renewed emphasis on soil conservation within the agency.

"In the 1970s there were huge dust storms on the Prairies and summerfallow left land open to soil erosion," Dr. Hill recalls. "We teamed up with Don Rennie, a soil scientist from the University of Saskatchewan, did a lot of research and promoted changes to cultivation practices. We met with groups of farmers and talked about these issues and eventually this helped to cause a significant change in cultivation practices on the Prairies."

In 1980, the PFRA Soil and Water Conservation Branch was formed and in 1981, PFRA staff began studies on soil degradation and erosion on the Prairies. The following year, large-scale soil conservation projects

began at Warner County, Alberta; Wellington and Canora, Saskatchewan; and Tobacco Creek and Turtle Mountain in Manitoba. In 1984, soil conservationists were hired and located in all of PFRA's district offices.

"Also during the 1980s, PFRA developed a strong economic analysis function that was useful in analyzing Prairie conditions and proposed activities," he says. "We understood that programs had to be clearly thought through to get done."

Dr. Hill says he has many fond memories of working at PFRA including working with rural people to find solutions to their problems, and working with federal Ministers of Agriculture Ralph Goodale and Charles Mayer. Presenting the L.B. Thomson Conservation Award to University of Saskatchewan professor and researcher Don Rennie holds a special memory for him, as well as his overseas activities, primarily in Africa, with the International Commission on Irrigation and Drainage.

"What was unique about working at PFRA was we were very hands-on and went out and met our clients, and remained close to them," he says. "Many federal public servants deliver nationwide programs and never meet the people they serve.

"It is difficult to single out one moment in PFRA's history that stands out over others - there are so many," says Dr. Hill. "Obviously, the first was the passing of the Prairie Farm Rehabilitation Administration Act in 1935 that started the whole thing. Then there was the construction of many major projects, highlighted by the construction of the Gardner and Qu'Appelle Valley dams to form Lake Diefenbaker in the 1960s.

The implementation of the soil conservation and land management activity in the 1980s also stands out. The shelterbelt program, community pastures, and the irrigation centers have also made great contributions over the years."

During Dr. Hill's tenure, PFRA operated nearly 100 community pastures across the Prairies. Also under his directorship, the Saskatchewan Irrigation Development Centre was established in 1986 at Outlook, and the Canada-Manitoba Crop Diversification Centre at Carberry opened in 1993.

Dr. Hill feels that climate change is one of the more difficult challenges the agriculture sector will face in the future.

"The new branch (AESB) may need to keep watch on weather patterns that could bring about changes to runoff, land use, the rate of soil degradation, shelterbelt effectiveness, demand for irrigation, dam safety, especially related to spillway failure, and pasture production."

Now retired with his wife Lorraine in Nanaimo, British Columbia, Dr. Hill has some advice for anyone starting out on a career with AAFC.

"Take pride in serving the public. The civil service is a high calling," he says. "Know the public you serve and what they expect of you."

Anna Warwick Sears

Executive Director for the Okanagan Basin Water Board

"We have received huge support from PFRA staff on our advisory committees. PFRA staff helped develop a hydrologic model to assess current and future water supplies under different climate change and land use scenarios. PFRA funding enabled many components of the overall Okanagan Water Supply and Demand Project."

Providing Protection for People and the Land

Agroforestry Development Centre – Yesterday, today and tomorrow *by Bonnie Warnyca*

In the late 1800s, settlers were ill prepared for the harsh and ever changing climate they had to endure in order to homestead on the Prairies. With little protection from the winds, the summer's heat and the winter's bitter cold, the treeless backdrop soon took its toll on both the families and the livestock. The land and its hopeful bounty were at the mercy of Mother Nature and she could be relentless in her cruelty.

The Canadian government quickly responded to the plight of these hardy peoples and in the late 1800s, the Department of Agriculture began testing tree species in Brandon, Manitoba and Indian Head, Saskatchewan in order to provide tree shelter for the prairie dwellers. A permanent tree nursery was established in Indian Head in 1901, and in 1903, its first year of operation, the Centre handed out 6,000 trees to 44 farmers across what would become Saskatchewan and Alberta.

As word spread about the gift of shelterbelt trees, there were more than two million requests for seedlings to be shipped out to farms by train and horse drawn wagon, and on horseback over the next four years. Today, after more than 100 years in operation and having surpassed an incredible milestone of 600 million trees distributed in 2008, the Centre is ever expanding its role within AESB. While the Agroforestry Development Centre will continue to administer the Prairie Shelterbelt Program, the mandate has changed from a regional shelterbelt concept to a national focus built upon a broad suite of agroforestry practices.

"We don't know what the climate variability will be in the future, but we want to put practices in place to help to reduce the risk of its effect on the landscape. We are working on developing new cultivars to survive in this period of change."

Trees ready for shipment 1917

Diverse population of trees acting as more than just a barrier but also providing ecological services

Local farm women transplanting conifers

"Trees play a major role in protecting waterways, pollination services, future carbon sequestration, bio-energy and so much more." suggests Bruce Neill, AESB Agroforestry Development Centre Manager.

The research team at the Agroforestry Development Centre is studying the environmental effects of trees across Canada. They are focusing on native species such as balsam poplar, green ash, willow and non-invasive foreign species to find the plant strains that are hardiest and most likely to withstand the climatic pressure of the Canadian plains in the future.

To this end, over the past four years, the Centre's Research Unit collected balsam poplar tree samples from 60 locations across Canada and the United States. This collection is collectively referred to as AgCanBaP. The collection sites range from the farthest reaches of the north including northern Quebec, Labrador, NWT and the Yukon, and Alaska to as far south as southern Ontario and Coronach, Saskatchewan.

"We chose the native balsam poplar, or the black poplar because it is a species that occurs naturally all across Canada," explains Bill Schroeder, AESB Agroforestry Research Manager. "The study investigates how these plants respond to different climates, how they grow, when they break and set bud, and length of growth time. These collections are being used to study the adaptability of tree species when relocated to other locations within North America."

Agroforestry Development Centre

The genetics of the balsam poplar will also be used for breeding purposes to supply an improved cultivar of this native species for agroforestry planting in all regions of Canada. The research team is crossing different balsam poplars with the goal of developing more adaptable hybrids.

The samples have been planted in common gardens across Canada to assist in other Canadian agroforestry scientific research. "We believe that the balsam poplar has potential for a positive impact on water quality such as in riparian zones," continues Schroeder.

Another recent project underway at the Centre focuses on ecobuffers which are a grouping of tree and shrub species as opposed to individual species. The grouping is custom designed to suit the ecological conditions present in a particular site, matching compatibility with soil conditions and levels of access to nutrients and to water. Ecobuffers capture a site much quicker and require far less maintenance.

Schroeder says that ecobuffers are much more resilient because of built in diversity. They are better able to withstand pests and droughts than monoculture systems and will respond better to potential problems expected with climate (change) variability.

In the beginning, the role of the Centre was to provide a simple yet effective solution to supply early settlers with trees for shelter, a source of material for building and fuel needs.

Future shelterbelts may no longer be just a uniform site with long rows of single species trees standing as brave barriers. Instead, they will likely include a more diverse population of trees and shrubs to provide added ecological services. A multi-species approach that mimics nature, such as the network of natural trees and shrubs that can still be found in many untouched areas of the nation, may be used. Future shelterbelts may be more complex than the early single species approach, but then, so are the anticipated benefits.

"If you put your portfolio all in one stock you're bound to be in trouble at some point," suggests Schroeder. "The new multi species ecobuffer approach is a tree investment for the future."

Although ever-changing, history shows that the Centre is as relevant to the protection of Canada's landscape today as it was more than a hundred years ago!

From the Mississippi to the Red

by Bonnie Warnyca

The 1993 flood along the Missouri and Mississippi rivers and their tributaries in the U.S. Midwest was one of the greatest natural disasters in the country's history. From May to September, the rivers spilled their banks, bursting through levees inundating 50,000 homes, flooding 15 million acres of farmland, displacing local residents and destroying much of the infrastructure in the area. The situation had been aggravated by saturated soils from the previous fall and a heavy spring runoff, and fed by record-setting rainfall during the spring and summer.

Farmland washed-out during the Red River Flooding

As the floodwaters began to recede in late summer, the true degree of the devastation became apparent. Total damage costs were estimated at $15 billion.

Much of the responsibility for the monumental task of repairing the damage fell on the shoulders of the United States Department of Agriculture's Soil Conservation Service. When Canadian Minister of Agriculture Charles Mayer volunteered assistance to his American counterpart, USDA Secretary Michael Espy, the offer was quickly accepted. By September, 10 PFRA staff members, including engineers and technicians, had arrived in the flood-stricken region to offer their skills and expertise. They had responded to a call from their own department for people to volunteer for the onerous undertaking.

PFRA engineer Stella Fedeniuk was among the contingent. She says volunteering to go was a huge commitment. Each person had to commit to a three-month stay with little or no chance of coming home during that time to visit family and friends.

"First we went to Kansas City, Missouri for an orientation, then on to other locations to begin the work," she explains. "I went to Quincy, Illinois where I worked out of the FEMA (Federal Emergency Management Agency) operational office with the FEMA supervisors.

Our job included investigating sites requiring remedial work, surveying, assessing the impact of the flooding on infrastructure, and arranging for, and supervising contracts."

"The biggest project I worked on was in the town of Havana where we set up a 1350 foot pipeline to pump water from an over-flowing lake to the Illinois River. There was no other recourse to protect the town from flooding but to pump the water out."

Other PFRA staff were located in communities throughout the Mid-West including Manhattan and Topeka, Kansas, St. Joseph and Chillicothe, Missouri, and Atlantic and Ottumwa, Iowa. They worked with teams of Americans managing and supervising tasks such as levee repairs, bridge rebuilding, riverbank stabilization, and removing silt and debris from stream channels to improve stream flows. They also provided surveys and designs for reconstructing and armoring eroded river banks, assessed damages on private projects and implemented various slope protection options.

Four years later, PFRA staff applied their skills and experience in fighting another massive flood, this time at home. By late winter 1997, it was apparent a major

spring flood along the Red River of the North was imminent. Before the flood arrived, PFRA mobilized survey crews to determine elevations throughout the Canadian portion of the Red River Valley. The data they gathered provided municipalities, towns and individuals with critical information related to the height of the dikes needed to hold back the flood waters.

"What PFRA brought to the situation was a better perspective on how to work on smaller projects, and how to deal with individual landowners," says Ms Fedeniuk. "We were also familiar with conducting environmental assessments, something that was just starting to become commonplace. Some of us also had a lot of experience with working with different options for stream bank reinforcement."

To help the Canadian Coast Guard, Manitoba Natural Resources, the Armed Forces, and the Emergency Medical Services in their duties such as emergency evacuation and rescues, PFRA staff customized a geographic information system (GIS) to provide accurate and timely geospatial information to assist with such issues as navigation.

"The system was also used to map the locations of non-evacuated residents, livestock, navigational obstructions, and the condition of the dikes," explains Ron Lewis, AESB Geomatics Services Manager, who was a PFRA employee involved in the work. "We had staff strategically co-located with other emergency management people in the flood zone. They used laptop computers loaded with the data and GIS software to provide real-time spatial information to within ten meters of the actual position. The system has been a valuable tool many times since, including during the recent Red River floods in 2006 and 2007."

In 1997, flood protection works, including the Red River Floodway, were pushed to their limits. Subsequently, it was decided to upgrade the works on a cost-share basis between the federal government, Manitoba and local communities. Canada provided $65 million under the Canada-Manitoba Partnership Agreement on Red River Valley Flood Protection for projects such as the community ring dikes, those on individual properties, provincial flood protection works, and the secondary dikes within Winnipeg. PFRA staff worked with Western Economic Diversification Canada administering the federal funding. In addition, PFRA engineers provided technical guidance in the design and planning of the upgraded flood protection works, and during construction.

Under the Agreement, PFRA led the development of an interactive web mapping application to provide water managers and future flood fighters with an easy-to-use map-based tool to assist them in preparing and responding to flood events in the Red River Valley. The application leveraged flood modeling information from the Province, detailed LIDAR (Light Detection and Ranging) elevation information captured shortly after the flood in 1997, and the location of new pads and dikes throughout the valley. Some of the tools available through the application helped users identify how high the flood waters were predicted to reach, when the flood waters were expected to arrive and how many sand bags would be required to protect their property.

Tony Kettler is currently the Manitoba Region Ag-Water Manager with the AESB in Winnipeg. In 2005, as a PFRA employee, he was seconded to the Manitoba Floodway Authority to act as the federal representative on the $660 million Red River Floodway upgrade. He worked closely with the Authority, providing technical advice, administering federal funding, and implementing the Canadian Environmental Assessment Agency federal screening report.

"Besides the capital expenditures, there were several studies conducted," he says. "For example, I led a hydraulic study on the diversion channel inlet and the West Dike of the Red River Floodway. The dikes along Turnbull Drive built to protect private property had negatively altered the hydraulics of the inlet by cutting off overland flow, so we had to design a fix to get the inlet back to original capacity or better. The work also included modeling analysis of wind induced wave set-up and up-rush on the West Dike, which barely held flood waters back in 1997. One good rain or a big south wind could have caused West Dike failure and inundation of the City of Winnipeg."

PFRA was asked to participate because, with nearly seven decades of accomplishments, it was recognized as a world leader for its work on projects such as the mammoth Lake Diefenbaker project in Saskatchewan and the rehabilitation of the Bassano Dam in Alberta.

PFRA's contributions to flood-fighting efforts and flood control projects over its 75 years have provided immeasurable benefits to millions of people across Canada. This expertise and experience will serve the new AESB well into the future.

Midwest Flood relief 1994: Back row left to right: Wade Morrison, Arnold Giddings, Jim Melville, Bert Lukey (PFRA volunteer co-ordinator), George Shepherd, Bob Cameron
Front row left to right: Walter Saciuk, Bob Stevenson, Stella Fedeniuk, Ron McIntyre (PFRA volunteer co-ordinator), Ed Hunchak. **Missing:** Albert Engel

Matthew Ball

Agrologist with the Agriculture Branch of the Yukon Department of Energy, Mines and Resources.

"They (PFRA/AESB) have helped us in establishing a number of off-stream livestock watering systems for a number of producers in the area. We don't have a PFRA office here, but their staff have been wonderful in providing advice and guidance over the phone and through email any time we need it."

Don Ruzicka

farmer near Killam, Alberta

"There are about 24 miles of shelterbelts on this land. And they all came from the PFRA Shelterbelt Nursery at Indian Head. Today, about three-quarters of the trees we plant are flowering and berry-producing species, for wildlife benefits, primarily. "

WEBs Living Laboratories across Canada

by Lorne McClinton and Suzanne Deutsch (with field notes from Buzz Crooks)

Canada is known around the world for its pristine lakes and rivers and Canadians have a strong desire to keep them that way. That's why AAFC's AESB has partnered with a host of producers, university researchers and conservation groups like Ducks Unlimited Canada to set up living laboratories on nine small watershed sites across Canada, to find the best ways to minimize potential water quality problems caused by agricultural activities.

WEBs allows researchers and producers to understand the impact of agricultural practices on the landscape.

This project, called the Watershed Evaluation of Beneficial Management Practices (WEBs), is looking at the environmental and economic impact of certain agricultural beneficial management practices (BMPs) on a watershed scale. Each of the nine projects, led by a researcher from AESB or Research Branch, includes biophysical, economics, and hydrologic modelling components. Two of the sites (in Manitoba and Quebec) are also pilots for testing an integrated economic-hydrologic modelling approach.

Launched in 2004, under AAFC's Agricultural Policy Framework, WEBs accomplishments include scientific discovery, increased producer awareness of the benefits of changing farm practices, and interdisciplinary collaboration. WEBs research is continuing under AAFC's Growing Forward initiative.

Scientific discovery

The South Tobacco Creek Watershed in Manitoba has served as an important training ground for students of agriculture and the environment.

"The watershed serves as an excellent outdoor laboratory that allows students to experience their environment in a holistic manner," says Dr. David Lobb, a professor in the University of Manitoba's Department of Soil Science. "It integrates land and water resources with agricultural and non-agricultural land uses. As well, it lets students participate in the innovative research taking place in their own back yard."

In the Black Brook project, in the heart of New Brunswick's potato country, research has demonstrated that BMPs do not always perform as expected. Brook Harker, WEBs Project Manager says the Black Brook study has shown that use of diversion terraces and grassed waterways can significantly reduce water runoff and soil erosion, but there is a trade off. Water is now going down through the soil profile and nutrient concentrations in the groundwater base flow into the streams are increasing. It's a reminder that there are no easy solutions, that successes in one area may have negative consequences in another.

WEBs has produced other insightful results because conditions in the field are much more complex than those studied in small plot settings, Harker says. It's shown, for example, that some BMPs which are effective at reducing runoff from rainfall events during the growing season may be less effective at controlling runoff during snowmelt when the ground is still frozen.

"We've also learned that BMP performance can be very soil specific," says Harker. "What might work well on one soil type might not perform very well when applied to another. This can be an issue because the base soil map information that's available is often too general to be very accurate."

This became apparent within the Bras d'Henri/ Fourchette project, near Quebec City. A detailed soil survey conducted after the BMPs were implemented discovered there was much greater difference between the soils in the intervention and the control watersheds than was originally thought. This discovery helped WEBs researchers to explain their findings and also served as a valuable contribution towards understanding the influence of the landscape on BMP performance.

"It continues to amaze me what can be accomplished when you have the right mix of resources and dedication from everyone involved."

Dr. David Lobb explains his sediment sourcing research using suspended sediment collectors (pictured) and radionuclides at a field tour of the South Tobacco Creek Watershed.

Producer participation

The innovative research conducted in WEBs would not be possible without producers willing to allow the studies to be conducted on their farms. Participating producers have already begun to appreciate the positive impact BMPs can have on the environment.

"We never knew the water quality aspect was so complex," Jean-Pierre Fortin, a producer participating in the Bras d'Henri WEBs project says. "This project allows us to understand the impact of our agricultural practices at the landscape scale."

Using his new knowledge, Fortin modified his crop rotation system to improve plant uptake of soil nutrients. He also reduced his use of herbicides and has taken measures to reduce soil erosion. Currently he is experimenting with hog slurry management practices that are designed to reduce nutrient loss through air and water.

In British Columbia, fencing was installed at Gene Puetz's farm to prevent his cattle from drinking directly from the Salmon River, an important salmon spawning stream. He says the project was a good thing.

"It created awareness among the general public and local producers of what can be done when you put your mind to it," Puetz says.

While the Salmon River study results didn't clearly show improved water quality in the short term, reductions in sediment loading to the river as well as improvements to riparian health were demonstrated, Harker says. The high cost of fencing in the area makes it a complex issue. However, there are incentive programs to help farmers offset costs.

Watershed groups are a key partner in all WEBs watersheds and provide a link between producers and researchers. The Eastern Canada Soil and Water Conservation Centre plays a huge role in the Black Brook project. The Centre shares their experiences in soil and water conservation with the agriculture industry and the general public, explains Executive Director Jean-Louis Daigle.

"Local people know who we are and we have credibility," says Daigle.

"That has allowed us to develop positive working relationships with everyone concerned. Producers are very keen to make this area a model of land stewardship. There is a real interest from industry, producers and the public to continue the efforts being undertaken in the WEBs project."

Collaborative research

In addition to contributing to the awareness of BMPs among producers, WEBs gives researchers in various disciplines the opportunity to work together and share information. Dr. Rob Jamieson, an associate professor at Dalhousie University, works in hydrologic computer modelling. Connected with the Thomas Brook WEBs project in Nova Scotia's Annapolis Valley, he appreciates the collaborative research conducted in WEBs.

"The Thomas Brook project created a focal point for agricultural watershed research efforts in Nova Scotia, bringing together a diverse group of researchers and community stakeholders," Jamieson says.

The way that the WEBs project has woven a network of soil scientists, economists, hydrologic modellers and other agri-environmental specialists together is so successful that it's been heralded as a model of inter-agency collaboration. Harker says the project's success is really just a logical extension of PFRA's historic pioneering work with farmers, watershed groups and other stakeholders.

"What makes it all the more rewarding though, is the knowledge that project findings will help scientists, policy makers and producers take the right steps to achieve a tangible difference in water quality."

BMPs work differently in snowmelt runoff conditions than during summer rainfall events.

Fencing at the Salmon River Watershed has demonstrated a reduction in sediment loading as well as clear improvements in riparian health.

Watershed groups that can link researchers and producers are critical to the success of WEBs.

Sandra Bathgate

secretary for Saskatchewan Irrigation Projects Association (SIPA)

"The work of PFRA in irrigation research, particularly at the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) at Outlook, has been a huge benefit to our members. One example is the expansion of canola acreage under irrigation in this area, and the dramatic increase in yields."

A Helping Hand

Canada's International Development Assistance

by Lorne McClinton and Suzanne Deutsch

Water harvesting, building dams, irrigation management, soil conservation and pasture management are all part of Canada's efforts to give a helping hand to those who need it the most. For more than 50 years, PFRA's professional and technical staff have shared their expertise in managing soil and water resources with the world. Their work assisting the Canadian International Development Agency (CIDA) has helped Canada meet its foreign policy objectives by providing tangible, much needed relief in the global fight against hunger and poverty. The AESB is proud to carry this heritage forward into the future.

From 1965 to 2005, PFRA provided technical expertise to more than 30 CIDA funded projects in 25 countries including Ghana, Indonesia, Egypt, Pakistan, and many more. Most of these projects drew on the same soil conservation, irrigation development and management skills that the PFRA had developed and utilized in western Canada. CIDA learned that PFRA provided high quality results at a reasonable cost. Since then, PFRA/AESB has played an increasingly prominent role as the executing agency for large international development projects such as Egypt's ten year, $20.5 million National Water Quality and Availability Management (NAWQAM) Project.

In Egypt: water resource management

Egypt's population is growing rapidly and is projected to double by 2050. It is a hot and arid land that is primarily desert. It has a limited amount of good quality farmland and a finite supply of water. Making the best use of the water they have is critically important.

"The Government of Canada's goal through the NAWQAM project was to assist the Government of Egypt in developing an effective and coordinated national system for sustainable water resource management," said Laurie Tollefson, Canadian project director.

The project had four main components: establishing a national water quality network, managing water availability, reusing agricultural drainage water and developing information and communication management systems.

Egyptian Family

The Nile River is Egypt's only major source of water so determining its water quality from Lake Nasser in the south of the country to the Mediterranean in the north is vitally important. One of NAWQAM's major accomplishments was developing a national water quality monitoring network along the Nile and, with the help of Environment Canada, assisting an Egyptian laboratory to become an internationally accredited water quality laboratory.

REMEMBER THE PAST

PFRA- Prairie Farm Rehabilitation Administration | AESB- Agri-Environment Services Branch
1935 • 2010

1935

PFR Act receives Royal Assent on April 17.

1937

The Community Pasture Program begins. Sixteen community pastures are fenced and seeded by December and opened for grazing in 1938.

1939

The Eastend, Val Marie and West Val Marie dams are completed, providing drinking and irrigation water to southwest Saskatchewan.

1946

Soil drifting control is removed from PFRA's mandate. Emphasis is placed on "structural" projects in water and pasture development.

Control structures on Echo, Crooked and Round Lakes in the Qu'Appelle River system in Saskatchewan are completed.

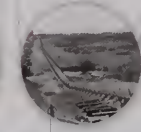
1948

PFRA is granted special funds for construction of irrigation and drainage works in British Columbia.

Carrying capacity of community pastures improves. In 1938 one cow needed 58.7 acres of land to graze; by 1948 it needs 20.5 acres. A total of 1.4 million acres are fenced.

1950

Responsibility for the dikes and flood control works along the Assiniboine River from Portage la Prairie to Winnipeg is transferred to PFRA.



1952

Farmers begin resettling the Hays District of the Bow River Irrigation Project in Alberta.

1954

Travers Dam in Alberta and Morden Dam in Manitoba are officially opened.

1956

The Motherwell Building in Regina is officially opened on July 23. PFRA occupies three floors.

1959

Prime Minister Diefenbaker officially launches construction of the South Saskatchewan River Project (Gardiner Dam) on May 27. An estimated crowd of 14,000 people attend.

1962

Since the 1930's, 5,000 families have been resettled by PFRA to new lands in the same municipality or to irrigation projects in Saskatchewan and Alberta.

PFRA administers the Agricultural Rehabilitation and Development Act in western Canada.

Michael J. Fitzgerald
PFRA, Director
1962-1970

1966

The South Saskatchewan River Project is completed. Prime Minister Pearson and Premier Thatcher open Gardiner Dam and the Qu'Appelle Dam.

1970-1973

J. Gordon Watson
PFRA, Director

1971

The tree nursery begins shipping trees by truck rather than train.

1975

PFRA's 40th Anniv
PFRA has helped
95,999 dugouts,
10,516 wells, 11
stockwatering da
and 6,037 irrigat
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1977

The Tree Nursery
Indian Head,
Saskatchewan
celebrates its 75
anniversary. It sh
400-millionth tre

William M. B
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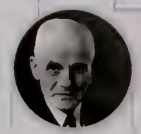
1930 1940 1950 1960 1970

1936

Reservoirs and irrigation structures are built or repaired in southwest Saskatchewan. Farmers are resettled on or near the projects.



1938-1947

George Spence
PFRA, Director

1940 -1945

World War II. The war effort cuts budgets, reduces staff and puts most work on hold.

Irrigation projects are slowly expanded.

1941

PFRA operates 43 community pastures with another 11 under development.

1943

Duncairn Dam on Swift Current Creek in southwestern Saskatchewan is completed.

1948-1956

Leonard Baden Thomson
PFRA, Director

1951

Hoof and mouth disease is discovered near Regina. PFRA staff help slaughter infected herds, dispose of carcasses, and disinfect vehicles and farm land.

Gordon Leslie MacKenzie
PFRA, Director
1957-1962

1957

Dry years across the Prairies from 1957 to 1962 dramatically increase demand for water development projects. Community pastures are stocked to capacity.

1961

PFRA's largest dugout Birch Hills community is constructed in Saskatchewan and holds almost 34 million gallons of water. Opening ceremony of Thomson Lake on the Wood River in southwest Saskatchewan. It is named in honour of PFRA's second Director.

1964

Community pastures are built on Indian reserves for the first time. Grazing revenues are shared with the bands.

1966

The Governments of Canada and Ghana sign an irrigation development agreement and 10 PFRA staff are sent to Ghana to work on the project.

1968

The Shellmouth Dam in Manitoba is completed. PFRA is transferred from the Department of Agriculture to Forestry and Rural Development.

Walter Barron Thomson
PFRA, Director
1973-1976

1972

PFRA becomes more involved in municipal water infrastructure in Manitoba and Saskatchewan for improving sewer and water facilities in rural communities.

Harry M. Hill
PFRA, Director
1977-1995

1980

PFRA creates a Soil and Water Conservation Branch.

PFRA establishes a Dam Safety Program to evaluate the safety of Canada-held dams under PFRA's responsibility.

75
Anniversary.
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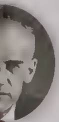
M. Berry
Director
1977



1982

Large-scale soil conservation projects begin at Warner County, Wellington, Canora, Tobacco Creek and Turtle Mountain.

1983

PFRA is transferred back to Agriculture Canada on March 3.

1987

The Tree Nursery is renamed the Shelterbelt Centre.

1989

Permanent Cover Programs are announced for the Prairies, paying farmers to seed forage on annually cropped marginal lands.

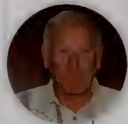
PFRA delivers government emergency drought programs for livestock, greenfeed and water supplies.

1991

A record 11 million tree seedlings are distributed by the Shelterbelt Centre.

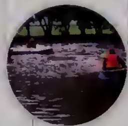
1996 - 2001

Bernie Sonntag
PFRA, Director General



1997

Red River Flood. Staff help prepare emergency plans, monitor flood conditions, track people and livestock and direct rescue missions. After the flood, staff treat contaminated wells and dugouts.



2000

The Canada-Manitoba Partnership Agreement on Red River Valley Flood Protection is signed. The program is designed to protect farm yards, businesses and communities during a flood. PFRA provides technical and project management support.

The Prairie Agricultural Landscapes (PAL) report is released.

The Water Harvesting and Institutional Strengthening Tigray (WHIST) Project in Ethiopia begins with PFRA taking on the role of Canadian executing agency.

2002

PFRA is given the responsibility of meeting national outcomes under the Agricultural Policy Framework's (APF) Environment Chapter.

2001-2003

Bob Wettlaufer
PFRA, A/Director General

2004

National Land and Water Information Service (NLWIS) – provides open and free access to data, information and tools over the internet to support sound land use decision making by Canadians.

PFRA is given responsibilities for national programs and projects as part of the Environment Team. New PFRA offices open in British Columbia, Ontario, Quebec and Atlantic Canada.

2007

Circovirus Inoculation Program (CIP) a Government of Canada plan to mitigate the effects of current and future diseases in the Canadian hog herd.

2005 – 2008

Harley Olson
PFRA, A/Director General

2008

In the spring of 2008, the PFRA Shelterbelt Program distributed its 600 millionth tree to producers in Western Canada.

2008 - present

PFRA assists the Leamington Area Drip Irrigation Inc., to plan a $10 M project to convey irrigation water from Lake Erie to their intensive tomato production fields.

Jamshed Merchant
AESB, Assistant Deputy Minister

1980 | 1990 | 2000

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1988

Severe drought hits the prairies. Crops and pastures are affected.

1989

PFRA supplies project management and engineering services to the Blood Indian Irrigation Project.

1991

PFRA helps to administer Green Plan Agreements to promote the use of environmentally sound farming practices on the Prairies.

1993

The U.S. Midwest is hit by widespread flooding. A team of ten PFRA staff spend three months helping with reconstruction.

1995

The Western Grain Transition Payments Program compensates landowners for reductions to land values due to the end of the Crow Rate. PFRA issues cheques to 215,000 people.

1996

PFRA utilizes GIS and satellite imagery to verify land cover across the prairies which is used in the application of the Western Grains Transition payment program (WGTPP).

1998

PFRA launches the Prairie Agricultural Landscapes (PAL) project, studying prairie land resources and their ability to support agricultural production and processing.

2000

The PFRA Shelterbelt Centre celebrates its 100th anniversary. Construction of the Centre's new $2-million state-of-the-art greenhouse and laboratory is announced.

2002

Through the APF, the Greencover initiative to enhance sustainable land use through the planting and management of forage and trees, and the National Water Supply Expansion Program to develop and enhance agricultural water resources are announced.

2003-2005

Carl Neggers
PFRA, Director General

2006

PFRA administers the Cover Crop Protection Program (CCPP) designed to compensate producers who were unable to seed crops due to spring flooding or excess moisture.

2009

April 1st, 2009 Agriculture and Agri-Food Canada creates the new Agri-Environment Services Branch which incorporates the former Prairie Farm Rehabilitation Administration, the National Land and Water Information Service (NLWIS) and the Agri-Environment Policy Bureau.

December 2009, Canada becomes a founding member of the Global Research Alliance on Agricultural Greenhouse Gases in Copenhagen, Denmark.

2010

CELEBRATING ACHIEVEMENT – 75 YEARS OF SUPPORTING SUSTAINABLE AGRICULTURE!

LOOK TO THE FUTURE

PFRA- Prairie Farm Rehabilitation Administration | AESB- Agri-Environment Services Branch
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"Another aspect of the project was developing ways to reuse agricultural drainage water mixed with fresh water near Lake Manzalla in northern Egypt," says Tollefson. "Soil and crop management guidelines and strategies were developed to allow it to be used for agriculture in an environmentally safe manner, while not endangering human health.

In China: sustainable development

Giving people the tools they need to help themselves has been an important part of almost all of the international development projects that the PFRA has been involved with. The Sustainable Agriculture Development Project (SADP 1) in China is a good example.

Conditions were dire in the Inner Mongolian Autonomous Region (IMAR) of China in 2000. Erosion, overgrazing and desertification had severely degraded soil conditions in the region. The Government of China, IMAR and CIDA, asked the PFRA to execute a five-year plan to help improve the environmental and economic sustainability of IMAR agriculture.

So the PFRA shared their range management, conservation tillage technology and other resource conservation knowledge with key University and Ministry of Agriculture staff. The knowledge they passed on allowed farmers to improve their livestock profitability and reduce the degradation of their grasslands. Direct seeding and crop residue management helped improve the overall sustainability of cropping systems.

Improved training and extension services had a ripple effect when extension workers spread their new found knowledge of sustainable agricultural technologies to their colleagues and farmers. SADP 1 was so successful it was decided the project should be extended and a second phase of this project called SADP 2 was launched. This project was developed to promote environmental sustainability in China by offering training on how to manage the environmental issues linked to rural poverty in western regions of China.

The majority of China's poorest women and men live in the western regions of the country and rely on agriculture for their livelihood. Continued and enhanced growth of the economy are essential if China is to reduce poverty, prevent social instability and reduce inequity between poorer western regions and better off coastal areas. As with SADP 1, project capacity development and training of trainers were key to this project.

The project also had an impact on gender equality. Women were included in both the training and extension services. Ethnic considerations were addressed by having participants from various ethnic groups travel to Canada for field trips and training. Documents were translated into many minority languages to try and reach most ethnic groups.

Afghanistan: the Dahla Dam

The Arghandab Irrigation Rehabilitation project, sometimes called the Dahla Dam project, is located 34 kilometers north of Kandahar. It's Canada's signature aid project in Afghanistan and PFRA/AESB has played a major part in it, Tollefson says. The dam and its reservoir were originally built by the USA in the 1950's but had fallen into disrepair from lack of maintenance due to many years of instability. The rehabilitation of the dam and downstream works had been identified as a key priority by the Afghani government. CIDA, aware of the PFRA's experience in international water management projects, requested that the PFRA develop a technical team, conduct an appraisal mission and develop a report describing what needed to be done. The current project is based on their report.

The Dahla Dam project has a wide scope. It includes the construction of new and rehabilitation of existing structures and facilities as well as the implementation of agricultural and rural development measures required to maximize the use of land and water resources.

"The key to rebuilding agriculture in Afghanistan is water," said Tollefson. "Since 85% of its production comes from land that is irrigated, water development is a prerequisite for growth, stability and sustainability. PFRA and today's AESB are contributing through

Canadian Team in Afghanistan

this project to the stability that will enable the reconstruction of the country to move forward."

Multiple rewards

International development projects aren't a one way street and in fact have been a fantastic learning process for those participating. Staff involved often say they have learned more than they have taught. Technical skills are developed and information is returned to Canada. In addition, the support costs to CIDA projects are cost recoverable.

Retired PFRA engineer Fred Kraft took part in several international aid projects over his career. He had always wanted to do international work so when he had the opportunity to do so, it was a dream come true. He said he really enjoyed the experience because we were actually helping these people in a very significant way.

"It's a good feeling knowing someone is going to eat because of you," said Kraft.

Through the initial work of PFRA and the knowledge gained through many years of helping Prairie people, PFRA has evolved into a new national branch that is well positioned to continue helping Canada meet its international objectives. By building on the strengths of PFRA, the new AESB will help build a better quality of life for the citizens of Canada, and citizens of the world.

Water Quality Monitoring of the Nile

Dahla Dam – Afghanistan

Zero Tillage in Inner Mongolia

Jay Slemp, Chairman of the Alberta Special Areas Board of southeastern Alberta

"PFRA, along with Special Areas, began with a mandate to provide secure water sources in the drought-stricken region. Capturing the runoff in the area was critical because we don't get a lot of runoff. In addition, PFRA is to be commended for its role in converting marginal cropland back to permanent cover, and for its shelterbelt program."

Interview with...

Reg Adam

Reg and Catherine Adam

When Reg Adam joined PFRA on a full time basis in 1952, his main goal was to help with the development of irrigation in Saskatchewan as well as serve the agriculture sector. His first job with PFRA had been in 1947 as a survey rod man at the Gardner Dam. As a new graduate from the University of Saskatchewan, his duties were as a surveyor and construction inspector at the Gardner Dam. In reflection, Reg considers his time at the Gardner Dam as one the most satisfying periods of his career.

In 1962, he accepted a position as a District Officer in Weyburn, then as a District Officer in Red Deer in 1965. In both communities, he was responsible for delivering water development programs to small communities, farmers and ranchers.

"Development of farm water supplies and community water supplies is the biggest challenge that agriculture is still facing today," Reg says. "It was the challenge when PFRA was formed in 1935 and still relevant today, 75 years later."

In 1971, Reg joined the Department of Regional Economic Expansion (DREE) as an Implementation Officer working in the Lesser Slave Lake Region of Northern Alberta. His primary role was to deliver programs for industry to locate in the Lesser Slave Lake area.

"The programs offered through DREE involved infrastructure development as well as social development programs," Reg explains. "Under these programs under-employed and unemployed people were provided the opportunity to develop skills that enabled them to take advantage of the job opportunities that were being created.

DREE was 'way ahead of its time as it took in the three circles for successful development including environment, social and economics," Reg says. "My ten years with DREE were very rewarding because I could see a great deal of progress being made."

In 1980, PFRA Director General Dr. Harry Hill encouraged Reg to return to PFRA as head of the PFRA Alberta Affairs office and it was a position he held until his retirement in 1994. His role was to act as a liaison between PFRA, provincial government departments, other federal departments, and provincial agricultural organizations. In this tenure, he was involved in negotiations related to the development of several federal-provincial agreements as well as the Blood Indian Irrigation Project and the Bassano Dam Rehabilitation Project.

The Bassano Dam project was one that Reg found especially challenging. All the water delivered through the irrigation system of the Eastern Irrigation District in south-central Alberta is diverted from the Bow River at the Bassano Dam. The Bassano Dam came into operation in 1914 and by the 1980s, it was in urgent need of repair. A three-year dam refurbishing project, supervised by PFRA, began in 1984 - the concrete was resurfaced, new gates installed and the structure was computerized for a total cost of $14 million.

Currently, about 1,200 irrigation farmers receive their water from the Bassano Dam through a system of 4,800 kilometres (3,000 miles) of canals and drains and thirteen internal storage reservoirs. In addition to on-farm irrigation, the system also supplies water to all the industry, wetland habitat projects, towns and villages in the area, serving a population base of 18,000 people.

The Blood Indian Irrigation Project southwest of Lethbridge was another challenging project that Reg was involved in. The project is the largest privately owned and operated irrigation system in the country and the second-largest in North America. In 1989, after long negotiations, led by Reg, an agreement was signed with the Blood Indian Tribe to build the project. PFRA provided management and engineering services during construction and the irrigation project officially opened in 1994.

"Building trust within the Aboriginal community was a huge challenge," Reg says. "It requires a lot of diplomacy and tact. You have to understand the people you are working with and be open and flexible to new ideas, and find ways to solve problems. I was very pleased with what we accomplished there."

Reg was with the federal government for 45 years - 10 years with DREE and 35 at PFRA. He says he has absolutely no regrets and he enjoyed every moment of his career. In particular, he enjoyed the people he worked with at PFRA, describing them as dedicated, competent staff who believed in what they were doing. Former colleagues say Reg was the ultimate team player and humble to the point of never wanting to take credit for getting the job done.

Reg is currently enjoying retired life with his wife Catherine.

Wanda McFadyen,
Former Executive Director of the now dissolved Farm Stewardship Association of Manitoba (FSAM)

"PFRA was instrumental in getting FSAM off the ground," McFadyen says. "They, among others, believed that the program should be delivered by an independent third party. They pushed to see that got done, and contributed immensely to the process of setting up the Environmental Farm Plan program through resource support and office space in the development stages of the program."

So Much Information, So Many Possibilities: The Agri-Geomatics Unit

by Bonnie Warnyca

Geomatics at Agriculture and Agri-Food Canada dates back to 1972 with soil specialists capturing Canada Land Inventory information in a digital environment (Geographic Information System - GIS) for map production and analysis. By the late 1980s, GIS was being used to deliver programs and services and really began to play an integral role in new agriculture policy creation.

In Western Canada, PFRA with 23 district offices and over 600 employees, was one of the first to implement GIS software, hardware and education to enhance its decision making process for livestock expansion, ground water investigations and soil erosion.

From left to right, Derek Bogdan, Bill Western, and Matt McBurney verify the integrity of agri-environmental data within the Agri-Geomatics Internet mapping application. As these Internet mapping applications are designed to support both internal and external decision making, it is imperative that a high standard of data quality and mapping is adhered to. When discrepancies are encountered, it is helpful to call upon a team of geomatic specialists to troubleshoot the issue.

By the late 1990's PFRA was producing web mapping applications on the Internet for producers to begin to leverage geospatial capabilities on issues such as riparian health without having to purchase geospatial hardware or software. As PFRA's strength grew in GIS, it was able to deliver on large projects such as the federal Western Grains Transportation Payment Program (commonly known as the Crow benefit payout). The payout required a verification process for thousands of landowner applications making claims through the Program. By using GIS and combining classified satellite imagery, cadastral parcel fabric and the database of applicant claims, PFRA was able to efficiently and effectively deliver the Program.

In Eastern Canada another branch of AAFC, Research Branch – Eastern Cereal and Oils Research Center (ECORC), was using GIS to manage complex special datasets such as the Soil Landscapes of Canada, a national dataset that contains an immense amount of detail on soils for all of Canada. The results were Web mapping applications such as the Soil Orders of Canada which allows internet users to easily identify which soils are found in their geographic area.

Within other parts of the AAFC Research Branch, programs such as the National Agri-Environmental Health Analysis and Reporting Program (NAHARP) were using GIS to analyze and communicate agri-environmental health across Canada.

It soon became apparent that in order to further the geomatics capabilities of AAFC there would have to be a significant investment. A five-year major crown project (MCP) through The National Land and Water Information Service (NLWIS) began in 2004. The project created an enterprise geomatics environment to support desk-top and Web-based mapping and services. The goal was to support the environment programs of the Agricultural Policy Framework (APF) by creating an Internet-based service to provide authoritative data sources on land, soil, water, climate and biodiversity. Upon completion it offered a comprehensive knowledge base for sharing geospatial information throughout AAFC.

From left to right, David Lee, Heidi Faulkner, Tamara Rounce, and Brian Morrison perform peer review of a draft Agri-Geomatics mapping project. Such peer review sessions are part of the Agri-Geomatics quality assurance process to ensure output products, such as this one, adhere to cartographic standards, errors are caught, and suggestions for improvement are incorporated before the final product is released.

Through this work, Canadians now have one-stop access to information on agriculture and the environment through a Web portal (atlas.agr.cg.ca). Online since 2006, the portal provides interactive maps, planning tools, expertise, and geospatial data across the country. It pulls together agri-environmental data from dispersed sources using interoperable GIS technology. The service also provides expert help to apply and interpret the information. Currently, there are more than a dozen geographic applications available over the internet in Canada's two official languages.

The portal contains a wide range of interactive maps which are an effective way to visualize and explore the data created and/or maintained by AAFC and its collaborators. Some have broad public appeal while others are important components of policy oriented programs such as the Agri-Environmental Indicators Web map product (atlas.agr.gc.ca/AEI). These indicators can be used to assess the efficacy of targeted environmental policies and programs in order to identify areas where special farm management techniques are needed.

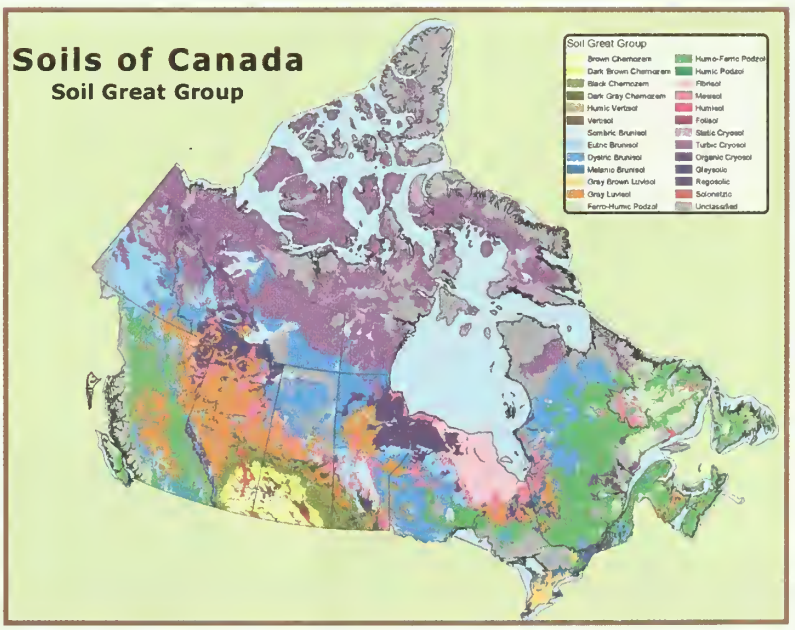
One of the newest tools, the Biomass Inventory Mapping and Analysis Tool (atlas.agr.gc.ca/bimat), was developed to broaden knowledge about the availability of Canadian residual biomass as a renewable resource.

With the official close of the NLWIS MCP in March 2009, the fully operational service has been in place for more than a year and has been integrated into the new Agri-Environment Services Branch (AESB) under a new unit called Agri-Geomatics. This new unit ensures the ongoing sustainability of the MCP deliverables.

"Currently there are more than 200 AAFC GIS users taking advantage of the enterprise geospatial data repository and corporate GIS tools," reports Dr. Dolores Durant, Senior Geomatics Advisor, Agri-Geomatics Unit. "That number will continue to increase as new users are provided access via a service request to Agri-Geomatics."

Agri-Geomatics will support innovation by helping to develop geospatial tools required to broaden research and development and experimental discoveries. Enterprise geomatics will help to hasten the information from the laboratory and field to the landscape in order to integrate information in a more unified and comprehensive way.

"The possibilities through geomatics within AESB are endless and Agri-Geomatics' capabilities are structured to accommodate growth. The agriculture sector will also reap these benefits as they will have access to ever more agri-environmental information and tools that are needed to support better management of the agricultural landscape," expresses Durant.



Example of a map produced by the Agri-Geomatics unit.

Agri-Green Technologies for Solving Environmental Problems

by Lorne McClinton and Suzanne Deutsch

Green technologies, an evolving group of practices and technologies that increase productivity while addressing environmental concerns are expected to play a major role in Canada's economy in years to come. The new Agri-Green Technologies Secretariat (AGTS) in AAFC's AESB has been created to help propel the agriculture and the agri-food industry to the forefront of this exciting new area.

Having a competitive agriculture sector is critically important to Canada's economic well-being and the sector must be able to meet or exceed trade-based environmental performance standards. Innovative applications of agri-green technologies can help the sector with these standards as it continues to economically and efficiently produce safe, high-quality food.

Canadian agriculture industry and research is full of new practices, technologies and products that have the potential to change the agricultural sector. Research in the area of greenhouse gas emissions, nutrient source and transport studies, sustainable cropping systems, livestock science, and agroforestry are just some of the practices and technologies which will capitalize on all three aspects of sustainability – the environment, economics and the needs of society.

"In the past, for example, farmers often looked at excess crop residues as a problem to get rid of," says Salim Silim, AESB biological lead. "Not anymore. This residue has value. Alternative fuel makers are busy working on aspects of technology to use this excess biomass to make biofuels."

AGTS has identified key priority areas where existing AESB expertise can help the sector achieve successes. Areas such as agroforestry, nutrient management,

> *"Farmers may now have the environmental benefits of practices such as no-till farming and also potentially profit from residue harvest."*

Biochar

Anaerobic digestors

An experimental planting of willows grown for biomass

precipitation harvesting, biomass conversion technologies, biofuels and other biomaterials offer exciting potential for the agri-food sector.

"AESB will be examining new green technologies, researching them, setting up demonstrations, and deciding whether or not there's potential for Canada," says Dr. Richard Butts, AESB, Director General of Knowledge, Innovation and Technology. "The final step in the process is coming up with a set of recommendations or technologies that can be distributed to the agriculture and agri-food sector."

Scope of agri-green technologies

Most agri-green technologies can be placed in one of the two following categories: production/ remedial technologies and/or bioprocess technologies. Production/remedial technologies are production or processing systems that have the potential to minimize the overall environmental footprint of agriculture while improving economic competitiveness. This includes practices such as nutrient management, water conservation, use of nanotechnology, production of bioenergy, phytoremediation, alternative farming systems and pest management.

Bioprocess technologies on the other hand, focus more on business opportunities and societal concerns for sustainability. These include use of agricultural resources to produce non-food items such as biofuel produced from biomass and value-added use of agricultural waste or residues. For example carmakers, corporations and industries are increasingly demanding bio-products sourced from the agricultural sector. Other examples could include developing crops that can be used for pharmaceuticals or nutraceuticals.

Bioenergy Cycle

Agroforestry, for example, has tremendous potential for biomass to be used for on-farm energy production. AESB's agroforestry expertise will partner with Natural Resources Canada and various industries to investigate opportunities to develop this potential. Demonstration sites will display the technology, analyse data and determine economic feasibility. Dr. Butts is hoping that the recommendations will lead to an increased interest and use of biomass production on Canadian farms.

Nanotechnology is another good example of agri-green technology. It shows potential in addressing environmental concerns both in primary production and in processing. Michelle Harland, AESB, AGT Manager explains that tiny sensors for moisture and nutrient management can help reduce pesticide use or water use by targeting applications in time and space. The spectrum of potential uses of this cutting edge technology is significant and how much it will be used in the agricultural production system, is yet to be determined.

Ms. Harland says that the government sees these green technologies as an opportunity to address priority issues such as climate change and water quality and quantity issues, as well as other current and emerging environmental challenges.

According to Ms. Harland, the Agri-Green Technologies Secretariat is still in the early days of evolution and AESB is in the process of determining how it can play the most effective role. The branch will draw on its experts in engineering, biological sciences, and other fields, and use this expertise to advance agri-green projects.

"The philosophy of PFRA and now AESB has remained the same throughout the past 75 years," Harland says. Whether we are talking about digging dugouts to capture snowmelt like the PFRA did in the thirties, or developing nanotechnology to improve farm production techniques in the future, we're still bringing research to the agricultural landscape.

Coping with the Coming Climate

by Lorne McClinton and Suzanne Deutsch

Farmers have always had to contend with Mother Nature, but climate change is more than a blip in weather—it has the potential to change the environment substantially. Canada is expected to be among the most affected countries in the world, with significant warming over most of the country, and most of the interior getting even drier than it already is. AAFC is working hard to ensure the agriculture and agri-food sector is well prepared for the future.

A massive thunderstorm on the prairie. Alberta, Canada

AAFC has undertaken three different, but highly integrated exercises to ensure the agriculture sector is ready - developing an AAFC climate change strategy; conducting a series of Foresight workshops to develop diverse scenarios for the long-term future under climate change; and hosting a series of workshops geared specifically to developing a roadmap for climate change adaptation at the local/regional level. AAFC's AESB has taken the lead on two of these: the development of AAFC's climate change strategy, and the regional climate change adaptation workshops and resulting roadmap.

Climate Change Strategy

Over the past decade, many organizations including AAFC, have been examining the threats and opportunities presented by climate change to determine what can be done to reduce the rate of change. While much work has already been accomplished, a more coordinated approach was needed. In response, AESB took the lead in AAFC to develop a departmental climate change strategy in April 2009.

The AAFC Climate Change Strategy provides a framework that will guide the department in helping the agriculture and agri-food sector and rural communities take a coordinated and informed approach to climate change. A pro-active strategy will increase the sector's resilience to changes in climate and allow it to take advantage of related economic opportunities.

"The climate change strategy takes a broad look at the issues and has four main outcomes," says Carla St. Croix AESB, Senior Policy Advisor.

They include: mitigation- this refers to ways the sector can reduce its greenhouse gas emissions while maintaining or increasing productivity; adaptation - any activity that helps the sector cope with the negative impacts of climate change and enhances resiliency; new possibilities - helping stakeholders take advantage of any new opportunities that present themselves; and representing Canadian agricultural interests internationally while sharing knowledge and expertise with other countries.

Re-focusing through consultation

To date most of AAFC's energy has been focused on mitigation but now there is a need to start looking at how the agriculture sector can adapt to the impacts and opportunities of climate change. In the past year, AESB conducted a series of climate adaptation workshops across Canada to gather detailed ideas for helping farmers deal with the impending impacts of climate change.

AESB staff met with academics, provincial government officials, producers, industry associations, environmental organizations and First Nations to learn what the regional concerns are and try to develop paths to adapt to climate change impacts.

Issues raised by stakeholders were varied. In Newfoundland, for example, the conversation turned to the reliability of the ferry link to the mainland. Agriculture in that province mainly revolves around animal production and the island doesn't produce enough feed and must import it.

"If climate change increases the number of storms in the North Atlantic, and there are lots of reasons to believe it might, then that may mean a less reliable ferry link," says Ian Campbell AESB, Director Integrated Natural Resources. "This could mean that it will be important to develop more feed production and storage capacity on the island so producers can survive longer and more frequent ferry interruptions."

"The goal of the workshops was to not only identify problems, but to also identify specific, concrete solutions," Campbell says. "If we accept the fact that the Prairies are going to have a more variable, and in all likelihood diminished, water supply, how do we deal with that? Do we build more storage, do we increase water use efficiencies, or do we move to less water intensive agriculture? What's the best combination of these three approaches?"

"Climate change is real," says St. Croix, "and it is also evident that, despite uncertainties surrounding impacts, rates or magnitude of change, there is a need to act to help the Canadian agricultural and agri-food sector develop a path forward in the face of climate change. Some successes have already been achieved; however, through coordinated action in partnership with all stakeholders, much more can be attained."

Corn plants in the field damaged by too much rain water after planting

An F3 tornado sets down in a field

Drought-Cracked mud in wheat field

Landscape Ecology Looks at the Big Picture

by Bonnie Warnyca

In 2005, AAFC, under the Agricultural Policy Framework (APF), began to investigate the effects of biodiversity and related ecosystem services for agriculture. The review concluded that pollination and pest control services appeared to be the most promising to increase both the profitability of existing farm enterprises and their ecological compatibility.

Ron Anderson, Field and Technical Lead in Alberta, extracting bees from aerial net

The knowledge network that grew out of this funding opportunity led to a new collaboration between Steve Javorek (AAFC Research Branch, Kentville, Nova Scotia), Gary Bank (AESB Agroforestry Development Centre, Calgary), and Mark Wonneck (AESB Range and Biodiversity Unit, Calgary).

Since 2007, these three have worked closely on several projects examining the relationship between landscape patterns, wild bee pollination services and agricultural production. One project focused on blueberry production in Nova Scotia, New Brunswick and PEI; another looked at canola production systems in central Alberta; and a third study focused on the role of pollinators in native fescue grasslands in the foothills of Alberta.

"By taking an ecological approach to problem solving we looked at not only the cropped field but what was around that field and how it affected productivity," says Wonneck. "Landscape ecology looks at the relationships between landcover patterns and ecological processes. In agriculture, this means looking at fields, ditches, wooded areas, wetlands, streams and the riparian areas, slopes, even buildings, farmsteads and shelterbelts and how they impact on the functioning of the agricultural production system."

In order to address issues such as climate change, rising input costs and competitiveness in global market systems, the challenge for this new collaboration within AAFC, is to find out how to increase the resilience of agricultural production systems – resilience referring to the capacity of the system to recover quickly and adapt to stresses and change.

Over the last three years of collaboration, there have already been some surprising and exciting discoveries. In the canola project for example, one of the most interesting findings showed that there is significantly less pollination in the centre of 64 ha fields compared to that on the edge of fields. Wonneck attributes this drop to the great distance bees have to fly from their nests to get to the centre of the fields.

Steve Javorek had already shown that when you build habitat for bees around blueberry and cranberry production in the Maritimes, you increase productivity.

"We want to see if we can demonstrate a similar kind of economic effect for canola production," adds Wonneck.

"In canola, somewhere between 30 to 50% of pollination services are provided by insects – mostly wild bees," reports Wonneck. "Since canola only flowers three to four weeks and many species of bees forage for many months, canola flowers alone are not enough to support wild bee populations."

"Therefore, to fully pollinate the crop, the non-cropped areas around fields must have sufficient habitat for bees. This means sufficient flowers and nesting sites such as bare soil, abandoned rodent holes, hollow stems, rotted trees and flowers etc. Placement of habitat is also important. Because bees travel daily between their nests and flowers, they tend to concentrate their foraging around their nests."

Pest control is another matter as different crops have different needs. Currently, research suggests that about 90 percent of agricultural pests are controlled naturally by their enemies such as birds, beetles or spiders. Pesticides and other control methods are used to deal with the ones that get out of control. Whatever can be done in the non-cropped areas around a field to enhance natural pest control and reduce the need for pesticides will also be a part of future research within landscape ecology.

This team is also currently collaborating with the AAFC Research Branch to look at pest control in grape production in vineyards using habitat to enhance pest control.

Armed with a mandate to do the research and get the adoption of better practices out as soon as possible, the team is working hard at figuring out how producers can enhance the "free" ecosystems services in nature and leverage them to add resilience to production systems.

"You can never do only one thing', is a maxim in ecology," says Wonneck. "We try to keep this in mind in all of the work we do. As well, helping producers decrease their risk and simplify their operations in ways they care about, and that are more ecologically compatible makes for a win-win situation."

Bombus rufocinctus

Pan trap mounted on stake in canola field July 2008

Global Greenhouse Gases Collaboration

by Lorne McClinton and Suzanne Deutsch

Researchers around the world are working hard to find the best ways to reduce agriculture's greenhouse gas emissions and help farmers increase productivity. To improve their combined efforts, Canada, along with over 25 other countries, announced in Copenhagen on December 16, 2009, the formation of a new group to co-ordinate global research efforts. This group, the Global Research Alliance on Agriculture Greenhouse Gases, will keep scientists in member countries abreast of research work that's being done by others to allow for more opportunities for collaboration and to accelerate progress and prevent needless duplication.

AAFC's research and technology has made Canada a world leader in methodologies to calculate agricultural greenhouse gas emission inventories. For example, a study, led by Dr. Brian McConkey at the Semiarid Prairie Agricultural Research Centre in Swift Current, Saskatchewan showed that Prairie soils could sequester up to .4 tonnes of carbon dioxide per acre every year if producers used no-till farming practices.

Senior Officials Meeting in Wellington New Zealand

Canada's participation in the Global Research Alliance, coordinated through AESB and Research Branch, will allow others around the world to benefit from work like McConkey's and help prevent them from using limited research funds to "re-invent the wheel". It will also give Canadian scientific and technical experts and producers access to the latest studies, technologies and practices in New Zealand, Australia, the United States, Europe, Asia and South America.

The Global Alliance is so new that member countries haven't yet worked out all the details of the organization's charter, says Robert Patzer, Director of International Partnerships with AESB. The goal is for the Alliance to develop into an effective network that will facilitate the dissemination of scientific findings and technology, as well as collaboration between countries and organizations working in the area. Members will be able to share knowledge, share research results and cooperate whenever it makes sense to do so.

The organization's work will be focussed on three broad areas: a livestock group headed by New Zealand and the Netherlands, a cropping systems group led by the United States, and a rice group piloted by Japan.

"Two important cross cutting issues have also been identified: soil carbon and nitrogen cycling; and inventory and measurement methodologies," Patzer says. "France and Australia are going to take the lead on the first and Canada is taking the lead on the second."

"Canada is a world leader in measurement, reporting and verification issues around carbon sequestration in agriculture landscapes," says AESB's Bob Turnock, Deputy Director, International Partnerships. "We have a lot to contribute and offer in the broader global discussion on these topics."

Turnock expects that Canada will also be making major contributions in both the livestock and cropping systems subgroups. AAFC has a lot of experience with

intensive and extensive livestock operations, rangeland management and their impact on water resources. AAFC has also helped provide direction in these areas and look at the climate change mitigation aspects for all components at the same time.

AESB's irrigation expertise at the Canada-Saskatchewan Irrigation Diversification Centre in Outlook, Saskatchewan for example, could make major contributions to help understand greenhouse gas emissions under intensive irrigation systems. It can also help gain a better understanding of how to possibly increase energy and water use efficiencies in these systems from a climate change perspective.

Agroforestry is another area where Canada has a lot of know-how and researchers at the AAFC Agroforestry Development Centre in Indian Head, Saskatchewan will be able to make major contributions by sharing their knowledge of riparian buffer strips and other agroforestry systems. They will also help with the development of agroforestry practices for biomass and biofuel production.

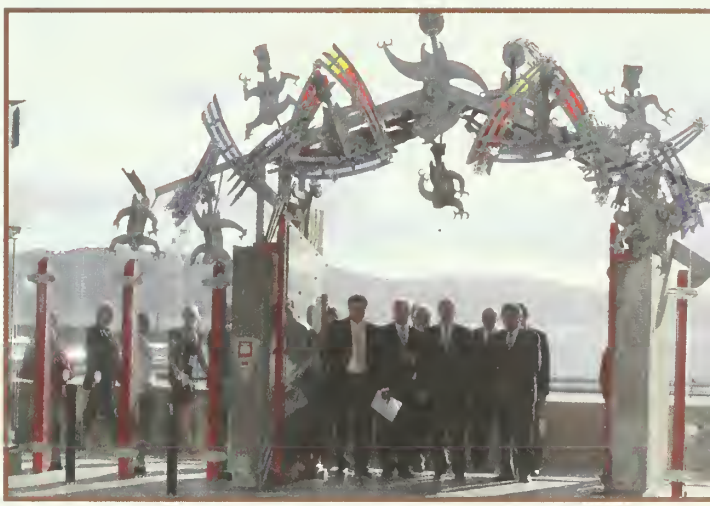
An underlying theme in the Global Alliance's work will be to find ways to increase the agriculture sector's productivity by minimizing the inefficiencies associated with the production of greenhouse gases. This will increase profitability and the sector's resiliency by finding ways to cope with the adverse impacts of climate change.

Global Alliance Registration Desk

"Nitrogen fertilizer that is lost as nitrous oxide emissions from the soil doesn't benefit the crop," Patzer says. "Methane emissions from livestock are a sign that their digestion is not as efficient as it could be. If you can find ways to improve their digestion and keep more energy in the animal, it improves productivity and reduces methane emissions. It is a classic win-win situation."

"Another great example is carbon sequestration," Patzer adds. "It reduces greenhouse gas emissions; and it enhances soil quality and water retention capability. This helps increase productivity and resiliency so it enhances the producer's ability to adapt to the effects of climate change. It's a triple win - mitigation, adaptation and productivity."

"The Global Research Alliance on Agriculture Greenhouse Gases is still in its early days," Turnock says. "The Global Alliance and the work around it, is going to be fundamental to the future of AESB. It will play a major role in our current work and help direct our activities in the future."



Senior officials arriving in Wellington New Zealand to attend the Global Research Alliance meeting

Interview with...

Walter Nemanishen

Although Walter Nemanishen didn't officially join PFRA until 1980, in the 20 years of his career leading up to that event, in his words "I was systematically becoming a clone of PFRA!"

"In reality, I had worked very closely with PFRA from April 1961 when I joined Saskatchewan Agriculture's Family Farm Improvement Branch as an agricultural research engineer," he explains. "We worked together on various investigations seeking solutions to farm, hamlet and village water supply problems.

In 1966, I transferred to the Saskatchewan Water Resources Commission as a reservoir-planning engineer. At that time, the Provincial agency was working closely with PFRA to take over responsibility for Lake Diefenbaker and the operation of the Qu'Appelle River control structures and the Gardner Dam, both of which PFRA had constructed. In preparation for assuming control, a systematic transfer of the vast knowledge and expertise related to Lake Diefenbaker took place between PFRA and the Commission."

As was common among university graduates of the early 60s, Walter had no computer science training. During 1968 and 1969, he attended night classes to earn a diploma in Computer Sciences, a necessary asset in his field.

The state-of-the-art water resource knowledge Walter had accumulated during his time working with the Saskatchewan Water Resources Commission and from his dealings with PFRA, drew the attention of the Water Survey of Canada (WSC). In 1971, he was recruited by the WSC and moved to Calgary to serve as Senior Hydrologist for the Prairie Provinces Water Board's Streamflow Forecasting Study, which was being directed by PFRA Senior Engineer, Bill Berry. While with the WSC, Walter was involved in many challenging water resource investigations.

In 1980, he took a position with PFRA in Calgary as a Reservoir Planning Engineer.

"Prairie water resources were evolving rapidly during the 1960s, 70s and 80s," Walter says. "New positions were being created and I was lucky enough to have the expertise PFRA was looking for."

Over the next 18 years, he spearheaded many initiatives of great national and international importance. In 1985 he was the lead investigator and author on the Alberta Water Sourcing initiative and report. In 1992 he attended an international conference in Australia on Drought and Desertification where he made valuable contacts with many experts on El Nino, drought forecasting, and drought-cycle forecasting.

Walter was asked what accomplishments in his work made him the most proud.

"There were many! But I can only claim partial credit because I always drew on the knowledge of various PFRA and WSC experts," he says. "High on the list was solving the 'Gordian Knot' mystery of what was the source of major datum level discrepancy between the Lesser Slave Lake levels recorded prior to 1930 and after 1950. I spotted the errors, one of which was made about 1915 by the Geodetic Survey of Canada. Ted Cheng and I documented the investigation and as a result of the report, the Alberta Government built a structure at the lake outlet to control water levels.

Walter also expressed pride in his role in the initiative that discovered the buried Milk River Valley in southern Alberta that immediately became the source of clear, pure water for about 100 drought-stricken farmers and ranchers in the area.

"We had listened to a local rancher," explains Walter. "We were at a meeting at an old, disused schoolhouse about 10 kilometres southwest of Milk River when the rancher shouted from the back of the room 'PFRA should check for groundwater to the north!'. About 30 days later we found it."

Walter admits he has had to overcome many challenges during his career.

"Team work is the best way to face challenges. Some of my engineering professors told us that knowledge is cumulative so it is essential to remember we are not 'Lone Rangers', but need to consult with colleagues and experts.

Knowing the right experts to talk to, acting quickly and decisively and listening to local people are keys to overcoming challenges."

Walter devoted 50 challenging and productive years to drought mitigation, soil conservation and water resource engineering. His significant contribution to the scientific community and society has been recognized on numerous occasions.

"Being awarded the Commemorative Medal for the 125th Anniversary of Canadian Confederation was probably the best moment of my working life," he admits.

Although he spent a large portion of his career as an engineer in Alberta, he was awarded an Honourary Lifetime Membership by the Saskatchewan Institute of Agrologists in 1997 with his name added to the "Wall of Honour" in the College of Agriculture at the University of Saskatchewan. He is a lifetime member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta.

His knowledge and experience with PFRA was recognized in 1995 when he was selected as one of five long-term employees to write the corporate history of the PFRA.

Walter Nemanishen doesn't seem to be slowing down. He starts his day at 4:30 am and goes to 10:00 pm, six days a week. He is currently working on completing his PFRA report on Dr. Abbot who himself worked productively until he was 100. Perhaps Nemanishen will do likewise,

Walter and his grandson Kevin in 2007 prospecting in the La Ronge, Saskatchewan Gold Belt

Grant Pederson
Chairman of the Board of Trustees
South Saskatchewan River Irrigation District Testimonial (SSRID)

"The key to our district has always been the research farm at Outlook (CSIDC). It has always remained as the research farm where new crops and equipment can be show-cased. We have seen the changes from flood irrigation to pressurized sprinkler systems, from wheat, barley and alfalfa crops to adding potatoes, beans, canola and corn to our rotations."

Interview with...

Yaprak Baltacioglu

A wide smile spreads across Yaprak Baltacioglu's face when she talks about joining the Environment Bureau at Agriculture and Agri-Food Canada (AAFC).

It was in the early 1990s when Ms. Baltacioglu was brought to AAFC to help develop Canada's Green Plan, one of the government's first large agri-environmental policy initiatives. The wide-eyed junior policy advisor was tasked with writing the last piece of the Green Plan memorandum to Cabinet.

"I had never written anything to Cabinet in my life!" explains the current Deputy Minister of Transportation, Infrastructure and Communities. "Every word that I wrote was such a cool, cool experience."

AAFC's contribution to the Green Plan was the National Soil Conservation Program, which fell under the Prairie Farm Rehabilitation Administration (PFRA). Ms. Baltacioglu soon discovered that PFRA was leap years ahead of Ottawa when it came to the environment.

"They (PFRA) knew about the environment not because it was attractive or the hot issue in Canada," she said. "They felt it. They knew it. They understood it deeply."

As AAFC's Assistant Deputy Minister for policy from 2000-2002, Ms. Baltacioglu understood the environmental challenges facing the sector. When the original Agricultural Policy Framework (APF) was launched in 2003, the framework broadened to include 14 farm environmental programs. Ms. Baltacioglu remembers some of AAFC's provincial counterparts were skeptical that producers would take part in the programs.

The skeptics were wrong.

"It was these programs that were highly used with APF and then with Growing Forward" she said. "The department was running out of money because of their popularity!"

In March 2007, Ms. Baltacioglu came back to AAFC as Deputy Minister (DM) just as APF was ending and the department was launching its new program under Growing Forward. Drawing on her past experience, the first female Deputy Minister of one of Canada's oldest departments, once again saw the need for the environment policy and technical teams to work together.

Ten months after her appointment, Ms. Baltacioglu announced the new Agri-Environment Services Branch (AESB) that would focus on agri-environment related activities. The branch integrated PFRA, the National Land and Water Information Service and the Agri-Environmental Policy Bureau.

"When AESB was created it was the first time we had coherence in the department. It was close to 20 years for all of these things to come together."