UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION (UNCCD)

CANADA'S REPORT ON DOMESTIC ACTIVITIES RELEVANT TO THE UNCCD (2002-2006)

Canada

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LIST OF ABBREVIATIONS

AAFC	Agriculture and Agri-food Canada
AEI	Agri-Environmental Indicator
APF	Agriculture Policy Framework
BMP	Beneficial Management Practice
EFP	Environmental Farm Plan
NAHARP	National Agri-Environmental Health Analysis and Reporting Program
NFSP	National Farm Stewardship Program
NLWIS	National Land and Water Information Service
P/PE ratio	Ratio of normal rainfall to potential evaporation
PFRA	Prairie Farm Rehabilitation Administration
SDS	Sustainable Development Strategy

SUMMARY

Canada has two areas that meet the meteorological definition of drylands. The larger area in the prairie ecozone occupies 46.7 million hectares, including 60% of Canada's cropland and 80% of its rangeland. Its climate is characterized by short, hot summers and long cold winters with low precipitation and high evaporation. This region has been subject to periodic droughts, including the 1930s drought which triggered severe wind erosion, with massive dust storms, leading to the decade being referred to as the "dirty 30s". Drought is a serious and recurring problem for agricultural production and conservation of the landscape resources. The Prairie Farm Rehabilitation Administration (PFRA), which was created in 1935 to assist farmers and communities in their fight against desertification, has been working to develop a near real time system of monitoring precipitation nation-wide.

In the course of the last century, erosion and depletion of the soil's organic matter has reduced soil productivity to the extent that additional fertility inputs are usually required to maintain crop production over large portions of the area. Past response to soil degradation has resulted in significant area of cropland being returned to forage production. Within the last 25 years, changes in cropping systems and the adoption of soil conservation practices (such as reduced and zero tillage) have stopped or begun to reverse the decline in soil fertility and in soil productivity in over 70% of the annually cropped land in the prairies.

Under the Canadian Constitution, the responsibility for agricultural and natural resources is shared between the provincial and federal governments. In Canada, policy integration and sustainable natural resource planning is therefore often achieved through federal-provincial collaboration. Such co-operation often involves extensive consultation, financial assistance and the establishment of formal agreements that provide a framework for partnership-based resource management, such as the Agriculture Policy Framework.

Following the consultation process, the five-year APF agreement between the federal and provincial/territorial governments came into effect in April 2003. It provides a comprehensive strategy to help the sector chart a course to continued prosperity and profitability, by encompassing five elements: business risk management; food safety and quality; science and innovation; environment; and, renewal.

Agriculture and Agri-Food Canada (AAFC) renews its Sustainable Development Strategy (SDS) on a three-year cycle. Currently, the Department's 4th SDS is in the final stages of development. The SDS renews AAFC's commitment to developing sustainable agriculture and reiterates its recognition that sustainability requires the integration of the appropriate environmental, economic and social considerations

Canada is developing a series of national indicators under the National Agri-Environmental Health Analysis and Reporting Program. They include a series of indicators on erosion, soil organic carbon and desertification.

AAFC conducts an extensive research program in sustainable livestock and crop production systems as well as environmental health. Ongoing research activities aim to develop new, improved crop varieties and more efficient, technologically advanced production systems that will contribute to the sustainability of agriculture in Canada. Key research themes include protection of soils, water and air; conservation of biodiversity and organic nutrients; and, the development of alternative pest-control techniques.

The PFRA manages 87 community pastures across the prairies, occupying more than 900,000 ha. Most were established in response to the drought of the 1930s. They provide grazing for local farms, protect the fragile land from erosion and protect biodiversity. For over 100 years, the PFRA's Shelterbelt Centre has provided trees and shrub seedlings to prairie landowners for farm, field, wildlife and agro-forestry plantings.

The objectives of the National Environmental Farm Plan (EFP) Initiative include helping the agriculture sector better identify its impacts on the environment and promoting the growth of stewardship activities within the agriculture industry by developing voluntary environmental plans for farms. The Greencover Canada program is an initiative to help producers improve grassland-management practices, protect water quality, reduce greenhouse-gas emissions, and enhance biodiversity and wildlife habitat. The National Farm Stewardship Program (NFSP) will provide technical and financial assistance to support the adoption of beneficial management practices by agricultural producers and land managers as identified in the EFP.

Agriculture and Agri-Food Canada has a long history of engaging in development assistance activities. The department is currently active in research and development projects in land and water conservation in China, Egypt, Ethiopia and Chile.

The National Land and Water Information Service (NLWIS) is an Internet-based service being developed over the next four years to provide on-line access to agri-environmental information to help Canadians make responsible land-use decisions.

Canada has developed a comprehensive response to the issues of land degradation in its dryland areas. Risk is monitored, science expertise is applied to solving problems, programs are developed to get information to farm managers and technical and financial assistance is provided to help them make improvements to land management.

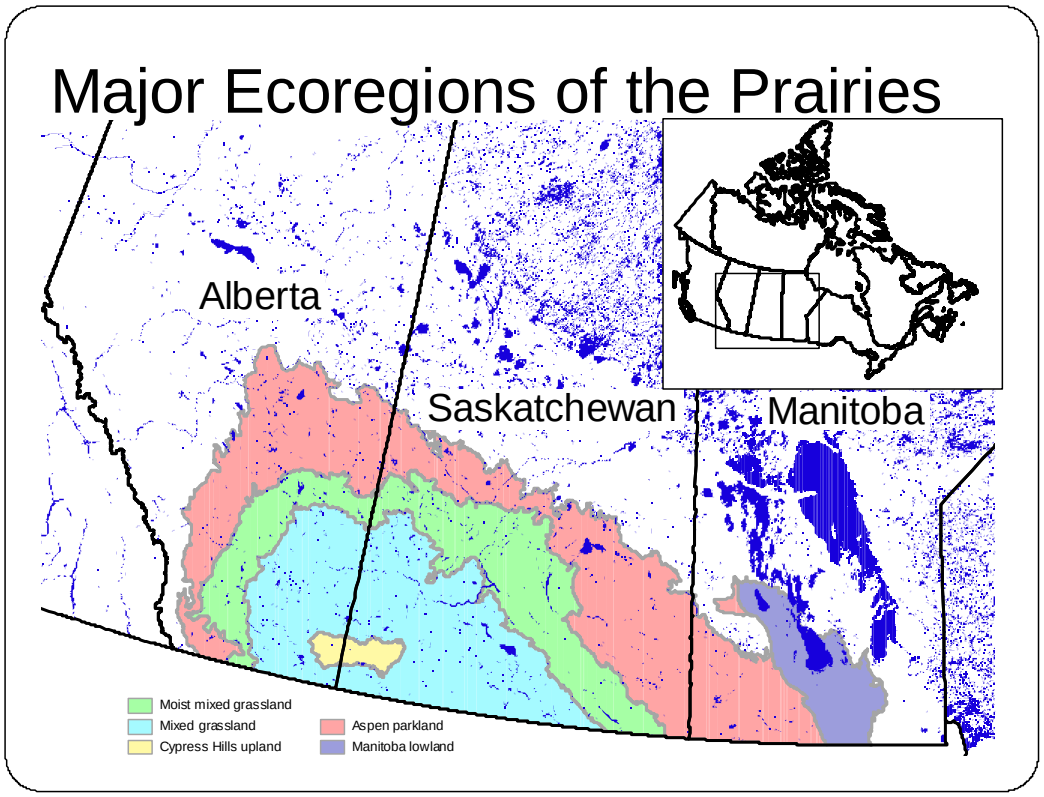
1. CANADA'S AFFECTED REGIONS

A more extensive description of the Canadian situation was presented in Canada's first report on domestic activities, *Desertification: a perspective on Canada, 1999*.

In addition to the Canadian prairies, areas of the interior of British Columbia meet the meteorological definition of vulnerability to desertification. This area is difficult to identify at a national or regional scale, as extreme changes in topography lead to large changes in climate over short distances. Agricultural land use in this area includes fruit and wine production and cattle grazing.

a) Landscapes

Canada's prairie ecozone, occupying 46.7 million hectares (see map below), has a P/PE (normal rainfall / potential evaporation) ratio falling in the range 0.05 to 0.65. Any P/PE value less than 1 indicates moisture stress. The landscape was formed by glacial activities and was dominated by mixed and moist-mixed grasslands prior to settlement during the late 1800s and early 1900s. Since then, agricultural activity has significantly altered the prairie landscape, leaving only small isolated portions of the natural prairie. Agriculture is the dominant land use, occupying nearly 97% of the prairie ecozone and accounting for 60% of Canada's cropland and 80% of its rangeland.



In general, the elevation rises from east to west in three distinct prairie levels: the Manitoba Lowlands, the Saskatchewan Plain and the Alberta Plateau. The lowlands and Saskatchewan Plain are separated by the Manitoba escarpment, while the Missouri Coteau separates the Saskatchewan Plain from the Alberta Plateau. In addition to the large areas of moraine[1] and glacier lake plains, there are several significant topographic uplands, including the Cypress Hills in south-western Saskatchewan and south-eastern Alberta.

Throughout the region, there are many areas of rolling landscapes that support local wetlands. These areas are dependent on snowmelt and their size varies greatly from year to year. They support more diverse vegetation, with willows and other shrubs in addition to wetland grasses and herbs. They also provide significant habitat for wildlife, including waterfowl.

b) Climate/Drought

Climate varies across the region. The most arid area is found in southern Alberta and southwestern Saskatchewan, with the landscape becoming progressively more semi-arid to sub-humid moving north and east. This is reflected in the natural vegetation and soil type. There is a progressive change from mixed grassland, through moist mixed grassland and aspen parkland, to a boreal transition zone between the parkland and the boreal forest of the north.

The climate is characterized by short, hot summers and long cold winters with low precipitation and high evaporation. The mean annual precipitation ranges from 250 mm in the arid grasslands in southeast Alberta and southwest Saskatchewan, to over 500 mm in the Manitoba Lowland. Annual potential evapotranspiration varies from highs in excess of 600 mm in the mixed grassland of southern Alberta and Saskatchewan, to less than 450 mm in the moister areas of Manitoba.

The Canadian prairies have been subject to periodic droughts, with intense episodes occurring in the 1930s, 1980s and the early part of the 2000s. The first major drought after settlement occurred between 1921 and 1941, with only brief breaks in 1935 and 1939. The 1930s drought triggered severe wind erosion, with massive dust storms, leading to the decade being referred to as the “dirty 30s”. In 1961, a widespread severe drought limited growing season precipitation to 45% of normal in many areas. The 1980s had back-to back droughts in 1984 and 1985, followed by another in 1988. From a meteorological perspective, these droughts were similar in magnitude to the 1930s but sustained less soil erosion and productivity loss. Widespread drought occurred in 2001 and 2002, with substantial reduction in crop production; this event did not trigger the massive dust storms seen in the 1930s.

Drought is a serious and recurring problem for agricultural production and conservation of the landscape resources. Drought can trigger severe episodes of land degradation. As

[1] An accumulation of debris carried and deposited by a glacier

a result, the Prairie Farm Rehabilitation Administration (PFRA), which was created in 1935 to assist farmers and communities in their fight against desertification, has been working to develop a near real time system of monitoring precipitation nation-wide, publishing new maps daily on a Drought Watch website (http://www.agr.gc.ca/pfra/drought/index_e.htm). The Drought Watch contributes to the North America Drought Monitor, a tripartite collaboration between Canada, Mexico and the United States (http://www.ncdc.noaa.gov/oa/climate/monitoring/drought/nadm/).

c) State Of Land Resources

The relatively high natural fertility and good moisture holding capacity of the area's chernozemic[2] soils made them highly productive when first developed for agriculture. The natural fertility of chernozemic soils is held within the organic matter in the topsoil. Both the soil organic matter content and depth of topsoil varies considerably across the prairies, tending to be lower and thinner in drier zones and landscape positions. Unfortunately, the topography and semiarid climate make these soils extremely vulnerable to wind, water and tillage erosion and to organic matter decomposition. Soils on upper slope positions have relatively thin topsoil and may be severely affected by erosion. Topsoils are thicker and fertility as well as soil organic matter is generally higher in lower slope positions; however, these can be affected by poor drainage and, in some areas, by salinity. In the course of the last century, erosion and depletion of the soil's organic matter has reduced soil productivity to the extent that additional fertility inputs are usually required to maintain crop production over large portions of the area.

Past response to soil degradation has resulted in significant area of cropland being returned to forage production. Within the last 25 years, changes in cropping systems and the adoption of soil conservation practices (such as reduced and zero tillage) have stopped or begun to reverse the decline in soil fertility and in soil productivity in over 70% of the annually cropped land in the prairies.

2. THE CANADIAN POLICY CONTEXT

a) Federal-Provincial Jurisdictions

Under the Canadian Constitution, the responsibility for agricultural and natural resources is shared between the provincial and federal governments. Provinces have responsibility for resources within their boundaries. Provincial interests in managing ecosystems are implemented through regulatory and licensing responsibilities within their boundaries. The federal government has responsibility for areas that involve inter-provincial and international considerations.

Achieving sustainable development demands effective integration of environmental concerns in all aspects of policy, and at all levels of decision making. In Canada, policy

[2] A very black topsoil, rich in humus, typical of cool to temperate semiarid regions

integration and sustainable natural resource planning is therefore often achieved through federal-provincial collaboration. Such co-operation often involves extensive consultation, financial assistance and the establishment of formal agreements that provide a framework for partnership-based resource management. The Agriculture Policy Framework is a recent example for one such agreement.

b) Agriculture Policy Framework

The Agriculture Policy Framework (APF) originated from a series of consultations with agriculture stakeholders including producers, processors, academics, environmental non-governmental organizations (NGOs), industry associations, community development organizations, consumers and aboriginal groups. Following the consultation process, the five-year APF agreement between the federal and provincial/territorial governments came into effect in April 2003. It provides a comprehensive strategy to help the sector chart a course to continued prosperity and profitability, by encompassing five elements: business risk management; food safety and quality; science and innovation; environment; and, renewal.

The environment element provides for several programs and activities which have impacted Canada's efforts to control and reduce desertification. Some are national programs undertaken by the federal government, while others are the subject of separate subsidiary implementation agreements between the federal government and individual provinces.

These subsidiary agreements allow each province to identify the program components that would be of highest value for its situation. As a result, the three Prairie Provinces have a total of 21 environmental programs within their agreements. These provincial programs may deal with the joint delivery of federal programs or may operate in addition to them.

The federal programs that are relevant to addressing desertification are discussed below. Many programs are undertaken to encourage land managers (individual farmers) to identify management practices that may have negative impacts on the environment and to assist them to modify their management. A description of national environmental programs can be found at:
http://www.agr.gc.ca/cb/apf/index_e.php?section=env&page=env

c) Agriculture and Agri-Food Canada's Fourth Sustainable Development Strategy

Sustainable development strategies (SDSs), which are prepared and tabled in Parliament every three years, are a key pillar of the Government of Canada's approach to sustainable development. These strategies are important tools that help guide departments and agencies within the Government of Canada in systematically integrating the principles of sustainable development into their policies, programs, legislation and operations. The fourth round of SDSs is scheduled to be tabled in Parliament in December 2006.

In the context of Canadian agriculture and agri-food production, sustainable development means producing, processing, and distributing agricultural products in a manner that supports or enhances the high quality of life we enjoy in Canada, both today and into the future. The very nature of farming, with its reliance on natural resources such as land and water, calls for sustainable practices. Since the dust bowl years of the 1930s, when the Prairie Farm Rehabilitation Administration set out to help Prairie farmers conserve their farmland soil and safeguard water supplies, the Government of Canada has promoted the environmental, economic, and social sustainability of Canadian agriculture. As the concept of sustainable development has evolved over the past 35 years, Agriculture and Agri-Food Canada has built on this early experience and moved into a position of world leadership in the development and implementation of beneficial farm management practices such as conservation tillage.

Agriculture and Agri-Food Canda's vision for its fourth SDS is to strengthen the integration of the three pillars of sustainable development by ensuring that the Department's work makes stronger cross-linkages among economic, environmental, and social themes

3. FEDERAL AAFC PROGRAMS

a) National Agri-environmental Health Analysis and Reporting Program

One of the goals of the APF is to position Canada as a global leader in environmentally responsible production while improving air, water and soil quality and conserving biodiversity. To help ensure that the agriculture industry is on the correct path to achieving this goal, and to help determine the impact policies and programs have on the environment, the Government of Canada established the National Agri-Environmental Health Analysis and Reporting Program (NAHARP).

More than ever, achieving environmental sustainability in agriculture has become a pressing and complex challenge. In some sectors, environmental concerns pose a direct constraint to growth, and could increasingly affect the agriculture industry's ability to serve existing international markets and to compete for new ones.

To manage these concerns effectively, it is important to first understand the pressures and opportunities that exist in terms of environmental sustainability. In 1993, in response to the need for agri-environmental information and to assess the impacts of agricultural policies on the environment, AAFC began developing a set of agri-environmental indicators (AEIs) to determine how environmental conditions within agriculture were changing over time, and how such changes could be explained.

Results of this work were published in February 2000 in a report called Environmental Sustainability of Canadian Agriculture: Report of the Agri-Environmental Indicator Project (2000). Further to this initial work, and in light of current and future needs for this kind of information, AAFC decided to strengthen its capacity to develop and

continuously improve on AEIs, as well as the tools that use these indicators to develop policy and programs. AAFC is establishing this capacity through NAHARP.

Indicators of soil quality such as wind, water and tillage erosion, soil organic carbon and desertification are included in NAHARP and will be discussed below. Other indicators monitor environmental farm management, water quality, air quality, biodiversity and the food and beverage industry. An interim report, Environmental Sustainability of Canadian Agriculture: Agri-Environmental Indicator Report Series – Report #2, was published in 2005.

- **Erosion Indicators**
  Three separate indicators were developed to identify areas at risk to wind, water and tillage erosion and to assess how this risk is changing over time under prevailing agricultural management practices. The risk assessment is based on the application of models that estimate the annual amount of erosion per unit area. Areas at very low risk (less than 6 tonnes a hectare per year) and are considered to be able to sustain long-term crop production and maintain agri-environmental health under current conditions are one of five classes of the risk assessment. The four remaining classes represent the risk of increasingly unsustainable conditions that call for soil conservation practices to support crop production and reduce impacts on water quality.

  The water erosion indicator shows that the Prairie Provinces experienced an increase in the very low risk class of croplands, from 83% in 1981 to 92% in 2001. This was mainly due to reduced tillage, reduced summer fallow, and removal of marginal land from production. The situation for wind erosion is similar, with an increase in the very low risk area for the prairies from 72% to 86% from 1981 to 2001. The risk of tillage erosion has, and still is, much higher than either wind or water erosion. It too showed an increase in share in the very low risk category from 40% in 1981 to 53% in 2001. Overall, risk of soil erosion is being reduced, and thus one of the major potential sources of land degradation is being addressed.

- **Soil Organic Carbon**
  Soil organic carbon, or soil organic matter, strongly influences many important aspects of soil quality and is a key component of good soil health. It helps hold soil particles together and stabilizes the soil structure, making the soil less prone to erosion and improving its ability to store and convey air and water. The improved structure helps the soil maintain an uncompacted state. Soil organic matter stores and supplies many nutrients needed for the growth of plants and soil organisms. It binds potentially harmful substances, such as heavy metals and pesticides. Because it enters the soil through the partial decomposition of dead plant material, it acts as storage for carbon dioxide captured from the atmosphere. Loss of soil organic matter ultimately leads to reduced yields and decreased sustainability of the soil resource.

The soil organic carbon indicator utilizes the Century Model to simulate above and below-ground production of plant material as a function of soil temperature as well as water and nutrient availability. This indicator is derived from the slope of a ten-year simulation of soil organic carbon. This identifies areas with increasing or decreasing soil organic matter. The share of cropland with stable to increasing soil carbon increased from 25% in 1981 to 72% in 2001.

As indicated in the erosion models, changes in crop management associated with less tillage, reduced summer fallow and increased conversion of marginal cropland to forage is credited with the change.

- **Desertification**
  A desertification indicator is part of the NAHARP program but has not yet been reported. It is challenging to develop a desertification indicator as desertification (land degradation) is not the result of a single process. An indicator must be developed to account for the major causal processes. Otherwise, some form of monitoring productivity as a proxy for landscape health will have to be used. This indicator will be dependant on the results from the other land quality indicators and requires development of new models. The proposed indicator will be based on: an integrated estimate of erosion that combines wind, water and tillage erosion and accounts for the interactions between them; an assessment of the sensitivity of different landscapes to erosion; and, a rainfall efficiency index based on vegetation productivity measured by remote sensing.

  Although each of the erosion methods is currently treated independently in the indicator program, they do not act independently within the landscape. Simply summing the erosion rates for wind, water and tillage will not provide an adequate estimate of erosion risk. Further research is being conducted to develop a model that provides an improved method to estimate erosion rate due to the combined effects of wind, water and tillage.

  Landscapes not only differ in their rates of erosion, but also in the impact that erosion will have on productivity. A model, which simulates the impact of a range of erosion rates on crop productivity, will be used to develop a better understanding of the sensitivity of different parts of the landscape to erosion. From a series of model results, the indicators will determine the sustainable erosion rate for each landscape. A simple comparison with the integrated erosion rates occurring under current management will identify the areas at risk to land degradation due to erosion (i.e. the areas where estimated current erosion rates exceed the sustainable erosion rate).

  Remote sensing can provide estimates of the productivity of vegetation. In dry areas, annual variation in water availability can mask trends in declining soil productivity. In order to develop an assessment of the productivity trend, an index that removes or accounts for the direct influence of precipitation is required. The simplest index, dividing the estimated production by the rainfall, is currently

being verified. This index has been termed 'the rainfall use efficiency' as it shows the productivity per unit of precipitation. Higher values should occur in healthy landscapes.

The final indicator will compare the identified level of risk of land degradation due to erosion with the remotely sensed productivity index, which monitors the previous 20 years of landscape change.

b) Innovation

AAFC conducts an extensive research program in sustainable livestock and crop production systems as well as environmental health. Ongoing research activities aim to develop new, improved crop varieties and more efficient, technologically advanced production systems that will contribute to the sustainability of agriculture in Canada.

With farmers using 68 million hectares of land in a variety of different ecozones, Canada's natural resources are inevitably affected by agricultural practices. But that impact does not necessarily have to be negative. Researchers at AAFC are using science and innovation to make sure that farming activities are compatible with environmental health. Key research themes include protection of soils, water and air; conservation of biodiversity and organic nutrients; and, the development of alternative pest-control techniques.

The long-term success of the agricultural industry in Canada is based on the productive ability of natural resources and the implementation of practices to this end. Research efforts at AAFC aim to make sure farming activities and environmental health go hand in hand.

c) Community Pastures and Shelterbelts

The PFRA manages 87 community pastures across the prairies, occupying more than 900,000 ha. Most were established in response to the drought of the 1930s. They provide grazing for local farms and protect the fragile land from erosion. As a large block of native range, the community pasture system provides opportunities to protect biodiversity.

For over 100 years, the PFRA's Shelterbelt Centre has provided trees and shrub seedlings to prairie landowners for farm, field, wildlife and agro-forestry plantings. Technical assistance is provided to show how tree plantings can support sustainable agriculture by improving soil moisture and reducing soil erosion and energy requirements. The Shelterbelt Centre conducts research to develop new types of trees and uses for existing species.

d) Environmental Farm Planning

The objectives of the National Environmental Farm Plan (EFP) Initiative include helping the agriculture sector better identify its impacts on the environment and promoting the growth of stewardship activities within the agriculture industry. An environmental farm plan is a voluntary and confidential process. Individual farmers use these plans to systematically identify environmental risks and benefits from their own farming operations, and to develop action plans to mitigate the risks. The EFP process allows farmers to set priorities for actions which address on-farm environmental concerns, as well as those which serve the public interest. Producers who develop EFPs may be eligible for technical and financial assistance to implement their on-farm action plans through the National Farm Stewardship Program and the Greencover Canada Program (see below).

e) Greencover Canada

The Greencover Canada program is an initiative to help producers improve grassland-management practices, protect water quality, reduce greenhouse-gas emissions, and enhance biodiversity and wildlife habitat. It contains four components: converting environmentally sensitive land to perennial cover; improving management of agricultural land near water bodies; technical assistance to help producers adopt beneficial management practices; and, planting trees on agricultural land. This program is the latest of a series of previous successful permanent cover and conservation cover programs which focussed mainly on the conversion of sensitive crop lands to perennial cover.

f) National Farm Stewardship Program

The National Farm Stewardship Program (NFSP) will provide technical and financial assistance to support the adoption of beneficial management practices by agricultural producers and land managers.

Beneficial management practices (BMPs) are farm management practices that: (1) minimize and mitigate impacts and risks to the environment, by maintaining or improving the quality of soil, water, air and biodiversity; (2) ensure the long term health and sustainability of natural resources used for agricultural production; and, (3) support the long-term economic and environmental viability of the agriculture industry.

Recognizing that agricultural landscapes, farming practices and potential environmental risks vary across Canada, the National Farm Stewardship Program has been designed to allow provinces the flexibility to support BMPs that address regional priorities. By ensuring that BMPs eligible under the program are nationally acceptable and regionally appropriate, the NFSP supports Canada's objective to be recognized as a leader in environmentally responsible agricultural production.

g) National Water Supply Enhancement Program

The National Water Supply Expansion Program (NWSEP) supports the Environment element of the APF through the development, enhancement and protection of vital water resources to help address water constraints in agricultural areas of Canada. NWSEP focuses on assisting Canadian producers to develop and enhance long-term agricultural water supplies in order to help reduce the risk of future water shortages and to meet the everyday growing needs of a vibrant Canadian agricultural sector. NWSEP provides assistance for: On-farm water infrastructure (small scale water development projects, such as dugouts/ponds, off-stream storage, wells); Multi-user water supplies (Larger scale infrastructure projects, such as tank loaders and regional water pipelines); and, Strategic initiatives (Studies, planning activities and/or undertakings that increase the knowledge base of the water resource).

h) International Collaboration

The international component of APF is designed to maximize international opportunities arising from progress on the domestic front. It is comprised of four components: (1) gaining recognition and building markets; (2) improving market access; (3) overcoming technical barriers; and, (4) enhancing international development.

Agriculture and Agri-Food Canada has a long history of engaging in development assistance activities. AAFC acts as the implementing agency for projects with portfolio agencies and other government departments such as the Canadian International Development Agency (CIDA), Foreign Affairs Canada and International Trade Canada. It also works with international development organizations such as the UN's Food and Agriculture Organization (FAO), U.S. Agency for International Development (USAID), the Swedish International Development Agency (SIDA), in addition to collaboration with other donor and recipient countries to implement agriculture development projects. While these activities are taking place, other developing countries often seek the support of AAFC to help them address their needs.

The China-Canada Agriculture Development Program is a CIDA-led initiative. It is comprised of three projects, two of which have Agriculture and Agri-Food Canada as the Canadian Executing Agency: The Small Farmers Adapting to Global Markets Project, begun in 2003, and the Sustainable Agriculture Development Project, begun in 2004 (Phase 1 of this Project ran from 1999-2003). The third project is the Animal Health Extension Services Project. The Sustainable Agriculture Development Project (SADP) began in 1999, with the completion of its first phase in 2003. Phase 2 followed in 2004, with a five year mandate. Phase 1 was designed to address sustainability issues on grazing and cropland in Inner Mongolia. Phase 2 is an expansion of that effort into more provinces in western China.

Projects in Egypt and Ethiopia build on AAFC’s strengths in developing water conservation programs to provide stable and assured supplies of water to support irrigation and domestic water needs.

In collaboration with the University of Regina, PFRA staff are contributing to an academic social sciences research program intended to gain understanding of society's institutions and their capacity to adapt to climate change, considering vulnerabilities associated with increasing pressure on limited water resources. The research will be conducted in two semi-arid regions of the world, the South Saskatchewan River Basin in Alberta and Saskatchewan, Canada and the Rio Elqui river basin in the Coquimbo Region of Chile. Climate change projections indicate that both areas may experience increases in temperature, variable changes in precipitation, and a net decrease in available water for agriculture. While both regions would be seriously affected, the ability of society to adapt to such changes is unknown. The project will combine data from physical sciences with social science research. Research results will be useful in helping guide future strategic policies and programs to adopt coping strategies for water resources management, climate change, and sustainable development in dryland regions. This project is funded by the Social Sciences and Humanities Research Council of Canada

i) National Land and Water Information Service

The National Land and Water Information Service (NLWIS) is an Internet-based service being developed over the next four years to provide on-line access to agri-environmental information to help Canadians make responsible land-use decisions. NLWIS will be built on a foundation of partnerships and collaboration. The project is being led by AAFC. Close collaboration with other federal departments, provincial, territorial and municipal governments, non-government organizations, producer and industry groups, and academic institutions will lead to the success of the service. NLWIS will link agri-environmental information from these dispersed sources and make it available through a recognized point of entry on the Internet.

By providing geospatial information, decision-support tools and improvements in national data collection, analysis and reporting, the NLWIS will support a number of environmental programs under the APF. Included in these programs are Environmental Farm Plans and Environmental Assessments, Greencover, National Farm Stewardship, National Water Supply Expansion and Water Quality Surveillance. This service will benefit the agricultural sector and all Canadians by contributing to the development of better agri-environmental policies. It will increase public awareness of the relationship between agriculture and the environment, and it will improve land-use decision making and risk management.

Development of the NLWIS will build on other efforts to reduce agricultural risks and better use Canada's land, soil, water and biodiversity resources. Among these efforts are initiatives to identify BMPs that protect land from wind and water erosion, improve water supply and quality, enhance biodiversity and increase carbon sequestration in the soil; help producers adopt these BMPs for soil, nutrient and livestock management; and, measure and track the environmental performance of Canadian agriculture.

j) Study of Environmental Regulations for Agriculture

The objective of the research study is to investigate the impact of environmental regulations at the farm level. The study evaluates the overall efficiency and effectiveness of existing regulations for the sector and will make recommendations for feasible and workable regulations. The study is expected to achieve the following results: assess the impact of environmental regulation on private and societal costs and benefits; and, evaluate the effectiveness and efficiency of environmental regulations to ensure the sustainability of the sector.