Abstract

Agricultural land use impacts the water used by over 90% of Canada's population and has a direct influence on the health and safety of Canadians. Trends toward more diverse and intensive agriculture present a higher risk to land and water resources. Proper planning of agricultural development is essential for Canadians to capture economical benefits while retaining environmental quality. However, the information needed by land managers to make environmentally responsible land use decisions is often not available nor is it accessible.

Agriculture and Agri-Food Canada is developing a National Land and Water Information Service in partnership with other federal departments, provincial governments, NGO's and industry groups to provide land use decision makers with access to information, tools and expertise using GIS technologies.

The National Land and Water Information Service, in partnership with others, will lead in providing the best available information, analysis and interpretation of land and water resources to all Canadians. This will result in improved land and water management decisions within a National framework. The National Land and Water Information Service will measurably improve the environmental performance of the agriculture and agri-food sector to provide a quality of life Canadians deserve through improved stewardship of our land, water and air resources.
In the 2001 Speech from the Throne, the Government of Canada set out a commitment to move Agriculture beyond crisis management. A new Agricultural Policy Framework (APF) has been developed to help the Agricultural sector address emerging challenges such as increasing domestic and foreign consumer demand, increased global competition, and advances in science.

Agriculture and Agri-Food Canada (AAFC) has agreed in the Agricultural Policy Framework to “make available to land use decision makers, decision tools and environmental information to support and inform local and regional land-use planning and management”. To meet this commitment, AAFC proposes to develop a National Land and Water Information Service (NLWIS) that will “lead in providing the best available information, analysis and interpretation of land and water resources in partnership with others to all Canadians. This will permit improved local and regional agricultural land and water management decisions within a National framework.” and will “measurably improve the environmental performance of the agriculture and agri-food sector to provide a quality of life Canadians deserve through improved stewardship of our land, water and air resources.”

The NLWIS will only be possible through the cooperative and collaborative efforts of many partners and co-deliverers. The activities of this service will cross the interests and mandates of various levels of government and non-government agencies and will benefit land managers, community groups, the agricultural sector, all levels of government and the general public.

Municipal officials and landowners of more than 250,000 farms and over 60 million hectares of farmland across Canada make land use decisions that have an impact on the water used by 90% of the Canadian population. This results in a direct influence on the health and safety of the majority of Canadians.

Agriculture in Canada is becoming more intensive and diverse as a result of globalization of the industry. Livestock numbers are increasing dramatically and the management of a more diversified crop mix is becoming more complex. These trends present higher risk to land and water resources and farmers have limited resources to deal appropriately with these changes. The need to plan the development of agriculture has never been more acute. While economics are driving agricultural growth, environmental quality and safety of our water supply are concerns of Canadians. Proper planning of agricultural development is essential for Canadians to capture the benefits of economic opportunities.

The water contamination incident that occurred in Walkerton, Ontario in May 2000 underlies the need for a sound environmental approach to the management of agricultural operations ensuring the safety and security of domestic drinking water.
Municipal officials are under increasing pressure to make decisions on multi-million dollar agricultural developments. They have to balance an individual’s economic plans with the needs of the community and are pressured by an increasing focus on the environment. They are required to make timely decisions and will do so, with or without the best information that could be available to them. For the most part, local officials do not have the skills, information or facilities to make decisions based on the available resource information.

Currently, the information on natural resources and the impact of agriculture on those resources is the responsibility of a number of federal and provincial departments. In most cases, the data is not stored in a consistent format across the country, and in many cases is not consistent within a province. Often the data is not in a digital format, which reduces the capability to manipulate and model the impacts of agricultural development.

In order to plan for the future and assess performance, it is essential that data be combined from a number of sources. For example, to plan development of future livestock expansion it is essential to know surface and subsoil types, availability and risk to ground and surface water, location of communities and residences, availability of land and capability of land to spread manure and produce feed, location of roads and electricity and local and provincial regulations. This information is not readily available from a single source.

Agriculture and Agri-Food Canada has tools, knowledge and expertise to provide Canadians with information to support responsible land use and development decisions that are made on a day-to-day basis. Access to technical skills and spatial information would ensure appropriate and environmentally sound land management decisions at the local, regional and national levels.

AAFC has begun efforts to realize this vision by implementing the National Land and Water Information Service, built upon and augmenting the current capacity of the department. NLWIS is a major step towards a consistent national approach to agricultural planning in which the federal government has a mandate.

The development of knowledge related to soil, water, climate and biodiversity is the key to supporting agricultural land managers in the decision making process to utilize and protect the natural resources. Through NLWIS, AAFC will support responsible environmental choices by land managers by providing land and water information and decision support systems that encourage improved decision-making. Land management decisions at national, regional and local levels require this range of support to ensure due consideration of social, economic and environmental objectives.

NLWIS will be developed using proven Geographic Information System (GIS) technology. AAFC has developed two major nodes of GIS expertise through land and water activities with the
Prairie Farm Rehabilitation Administration (PFRA) and the National Soils Data Base and Canadian Soil Information System (CanSIS) in Research Branch. AAFC has worked to develop and maintain expertise in the use of commercial off-the-shelf software to create GIS products and provide GIS Services for clients and partners. The coordinated development of GIS in the department is insured through shared GIS software licenses, common data structures, metadata standards and participation in departmental technical working groups.

To meet the objectives of the project, five components have been identified:

- Expertise that includes the human resources to interpret the information and to collect and maintain the land and water information system;
- Applications that meet user needs to support decisions;
- Data that is current, accurate and at an appropriate scale;
- Infrastructure that includes the hardware, software and telecommunications that permit connectivity of the system to the Internet; and,
- Partnerships with other governments, industries and farm groups who have ownership of or a need for land and water information.

There are many activities that must be undertaken to ensure the success of the National Land and Water Information Service. Enhancement of current IM/IT infrastructure, systems architecture and the development of web interfaces must be considered to deliver such an initiative across Canada.

Relevant and accessible data that is current, accurate and at an appropriate scale is required to meet the needs of the client. Since data will be coming from multiple partners and other sources, there will be challenges in collecting, coordinating, normalizing, and validating it. As well, managing the aspects of data relating to ownership, ability to share, privacy, negotiations for use, precedence and data integrity will require significant work. Data is a fundamental building block of the NLWIS and significant attention will be focused on this effort.

Conversion of land/soil and water data into useful information and knowledge will be one of the major responsibilities of the NLWIS. Utilization of in-house expertise and through partnerships with other agencies and departments, various decision support tools (algorithms, models, etc) will be made available (or developed as needs arise) to facilitate the dissemination and utilization of this knowledge.

Land/soil and water databases contain scientific and technical information that is not easily understood or utilized by the general public at large. It is primarily for the use of resource specialists, managers and planners. The development and maintenance of these databases is a very technical activity. To be useful to a broader audience of users, NLWIS must maintain and develop the requisite scientific and technical expertise to:
• Ensure quality control, quality assurance and regular updates of the databases themselves;
• Provide the scientific capacity to evaluate, interpret, extrapolate and convert this data into information and knowledge in terms that less technical users can appreciate and utilize; and,
• Develop innovative (scientific) applications of these databases to meet the increasing demands for use of and impacts on our natural resources.

Through this support, NLWIS will play a key role in the sustainability of land and water resources, the agriculture environment and industry as well as the preservation of the agriculture land base. The information and technical advice available through NLWIS will assist in recognizing and analyzing a particular situation, designing and implementing appropriate practices and monitoring results.

In addition to scientific and technical expertise, NLWIS will have a well-trained staff in the area of technology transfer. Databases, information and knowledge are of no value if it is not provided in the appropriate places in a timely fashion. Technical extension staff and expertise will need to be much broader based to respond to local, provincial and regional issues at the grass roots or farm gate level. NLWIS will provide regular technical support and training to local (provincial) extension and resource specialists in the applications of the soil and water information and in the use of interpretive decision support tools that utilize the resource information.

Ultimately, the National Land and Water Information Service will benefit all Canadians by providing appropriate information to ensure that responsible land management decisions are being made to sustain a safe and healthy environment. The public will have confidence that these decisions are based on the best available information and the result will be a better quality of life through improved environmental stewardship.

**Biography**

Bill Harron, MSc, PAg

Bill Harron who graduated from the Universities of Calgary (BSc Geog) and Alberta (MSc Soil Science) has a background in mapping land resources for suitability for a variety of uses including agriculture, irrigation and reclamation. In 1992 Bill took on the responsibility of implementing GIS in the Prairie Farm Rehabilitation Administration, a branch of Agriculture and Agri-Food Canada. Recently he has been leading the development of a National Land and Water Information Service.

Robert Parkinson, M.Sc.
Robert Parkinson has over ten years of experience in managing GIS projects and has been instrumental in the implementation and integration of GIS within municipal and governmental organizations. He has a certificate in Theoretical and Applied Geographic Information Systems from Simon Fraser University and a M.Sc. degree in the field of GIS from the University of Salford.