

**ONTARIO INSTITUTE OF AGROLOGY**  
**PROFESSIONAL COMPETENCIES**  
**ENVIRONMENT AND NATURAL RESOURCES**

<p><b>1. Policy, Legislation and Regulations</b></p>	<ul style="list-style-type: none"> <li>• Environmental Protection Act (EPA) <ul style="list-style-type: none"> <li>• Ontario Regulation 153/04</li> <li>• Ontario Regulation 903</li> <li>• Ontario Regulation 347</li> <li>• Ontario Regulation 558</li> <li>• Ontario Regulation 419</li> </ul> </li> <li>• Brownfield Statute Law Amendment Act</li> <li>• Environmental Assessment Act</li> <li>• Ontario Water Resources Act (OWRA)</li> <li>• Safe Drinking Water Act</li> <li>• Clean Water Act</li> <li>• Sustainable Water &amp; Sewage Act</li> <li>• Pesticides Act</li> <li>• Nutrient Management Act</li> <li>• Liquid Fuels Handling Act</li> <li>• GA1/99 - Environmental Management Protocol for Operating Fuel Handling Facilities in Ontario</li> <li>• Occupational Health and Safety Act (OHSA)</li> <li>• Workplace Handling Materials Information System (WHMIS)</li> <li>• Workplace Health and Public Safety Programme (WHPSP)</li> <li>• Hazardous Waste Information (HWIN)</li> <li>• Transportation of Dangerous Goods (TDG)</li> <li>• Demolition Code</li> <li>• Building Code</li> </ul>
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<p><b>1. i. Developing environmental policies, measures and standards</b></p>
<p>Review existing and/or proposed environmental policies/legislation/standards (and the rationale supporting them) to assess implications to stakeholders, including customers, clients and suppliers.</p> <p>Consult with experts, including lawyers, environmental, policy and legislative experts in public, corporate, non-governmental organizations (NGO), and governments, regarding new or revised environmental policies and legislation to make recommendations to regulatory authorities.</p> <p>Draft new or revised environmental legislation, regulations, standards and guidelines.</p> <p>Lobby legislators to develop &amp; enforce appropriate environmental regulations, policy &amp; standards.</p> <p>Develop environmental frameworks to address policy issues across multiple jurisdictions, including legal &amp; legislative limitations of the various jurisdictions.</p> <p>Evaluate environmental business management practices &amp; interprovincial/international policy changes to influence future changes in Ontario's/Canada's legislative framework.</p>

<p><b>1. ii. Interpreting/enforcing/complying with environmental regulations and standards</b></p>
<p>Interpret environmental legislation, e.g. regulations, standards, and municipal by-laws, and their implications to specific applications.</p>

**1. ii. Interpreting/enforcing/complying with environmental regulations and standards (cont'd)**

Provide expert advice to senior management, internal staff, regulatory bodies, interest groups and the public on matters related to disputes, compliance and other environmental issues, including processes for acquiring regulatory approval.

Implement programs, including monitoring activities, to ensure regulatory compliance.

Define environmental performance requirements for specific jurisdictions.

Prepare compliance and regulatory reports for internal use and for filing with regulatory agencies.

Prepare regulatory applications, permits, and operational permit reports (eg. including air permits, waste disposal permits, resource harvesting permits, etc.).

Develop plans and programs to meet regulatory requirements, including monitoring programs and employee information and communication plans.

Evaluate compliance with environmental regulations, including the documentation of violations and noncompliance episodes.

Conduct audits of the environmental performance of organizations and jurisdictions to determine the adequacy of their policies and procedures, and non-compliance issues.

Negotiate the terms and approval of compliance procedures and permits, including approval of development plans and use of technology such as Pollution Prevention, Abatement, and Control (PAC) equipment and systems.

**2. Environmental Assessments, Remediation, Restoration and Reclamation**

**Including ambient air, ground water, surface water, soil, soil gas and sediment quality**

- O. Reg. 153/04
- CSA Standard Z768
- CSA Standard Z769
- *Guideline for Use at Contaminated Sites in Ontario* (MOE, February 1997)

**2. i. Conducting environmental impact assessments**

Assess qualitative and quantitative environmental issues, risks or problems, including their cumulative effect and corresponding socio-economic impacts, to develop mitigative plans and measures.

Identify the geographic, social, economic, and environmental scope and parameters to be used for the impact assessment study.

Consult with stakeholders (including regulators, municipalities, public, interest groups, Aboriginals, NGOs, etc.) to gather information regarding the perceived impacts of development activities on the communities, the environment and the natural resources.

Assess areas of potential impact such as biophysical, social, economic, and heritage resources.

Develop a project management plan for the impact assessment study for proposed developments, change in facility operations, change in land use, amended or proposed new policies, etc.

### **2. i. Conducting environmental impact assessments (cont'd)**

Review earth and life science inventories and existing studies to determine if sufficient baseline data is available for the impact assessment study.

Review facility/development design, production/manufacturing processes.

Prepare environmental impact assessment report(s), including mitigation, environmental protection, and recovery plans.

### **2. ii. Conducting environmental site assessment (ESA) - Phase I and II, Designated Substance Survey**

Identify the scope of site assessment project.

Review historical records for the site (e.g. site plans, fire insurance maps, legal title searches, business directories, air photos, satellite images, etc.) to determine previous land use and areas of potential environmental concern.

Carry out visual inspection of site and neighbouring properties to inventory/identify current operations, evidence of discharges, visible contamination, buried tanks, dumping, etc.

Collect related information from key stakeholders (e.g. owners and staff, municipalities, regulators) regarding land use, facility operations, permits, spills, waste storage, relevant legislation, etc.

Conduct investigation, sampling, field screening, and analysis activities (including geophysical mapping, soil identification and logging, hydrogeologic characterization, well development).

Characterize environmental aspects of site (such as ground water gradients, flow direction, soil properties) based on interpretation of data collected during site investigation, sampling and analysis (for example, contaminants, their concentration, general extent, migration, fate and transport).

Prepare site assessment report(s) to meet regulatory requirements, identifying potential risk and scope of further action by appropriate stakeholders, if necessary.

Evaluate possible remediation/restoration/reclamation alternatives, taking into account costs, technological constraints, and stakeholders' concerns.

Develop site remediation/restoration/reclamation plans and programs, including objectives, targets, contamination description, issue resolution process, pilot requirements, time schedule, and cost estimate.

### **2. iii. Developing/implementing site remediation plans**

Determine remediation clean-up targets to make the site fit for its intended use or return it to its original condition (applies to all sites including watershed restoration, forestry site reclamation, mine closures, etc.).

Conduct pilot tests, including treatability studies, to assess the effectiveness of the intended remediation method.

Review facility/development design, production/manufacturing processes.

Carry out full-scale remediation activities (e.g. thermal, biological, chemical or physical treatment, containment, vapour extraction, excavation, etc.).

Monitor post-remediation conditions and results to assess if targets and regulatory requirements have been met.

### 2. iii. Developing/implementing site remediation plans (cont'd)

Prepare remediation completion report, including documentation of remediation and post-remediation monitoring data, and review of environmental outcomes relative to standards, for submission to regulators and stakeholders.

### 2. iv. Developing/implementing site restoration/reclamation plans

Investigate attributes of materials, such as physical, chemical and geotechnical, involved in the restoration/reclamation.

Develop appropriate construction & reclamation procedures and contingency plans based on best management practices and a minimum "footprint".

Provide environmental inspection assessment during construction and reclamation to ensure that regulatory requirements are met and that procedures are being followed.

Monitor post-restoration/reclamation conditions and results to assess if targets and regulatory requirement have been met.

Conduct on-site reclamation activities (including landscaping, tree planting and habitat development) using appropriate species and procedures for re-vegetation.

Conduct on-site restoration activities e.g. restore riparian, coastal zone and wetland habitats.

Prepare site restoration and reclamation report(s) for submission to appropriate regulators and stakeholders.

### 3. Sampling and Analytical Work Related to Environmental Activities

- *Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario* (MOE, May 1996)
- *Protocol for Analytical Methods Used in the Assessment of Properties under Part XVI of the Environmental assessment Act - 2004*

### 3. i. Developing environmental sampling, testing and monitoring programs

Develop environmental sampling protocols, including the frequency and timing of sampling, optimum locations for continuous or discreet sampling, data capture systems, sampling procedures, sampling methodology, personnel, parameter list for analysis, data quality objectives, etc.

Determine the need and scope for sampling program, including environmental indicators, and sampling constraints (such as access to sites, fiscal or other limitations).

Modify existing sampling programs to reflect evolving environmental circumstances (e.g. changes in parameter tests, sampling locations, sampling frequency, etc.).

Develop site specific work plans, including QA/QC methods, measuring/monitoring procedures and analytical equipment to be used for the specific application (e.g. air, water, soil, sediments, rock, fauna, human, workplace, etc.).

### **3. ii. Collecting samples and data for environmental purposes**

Determine the appropriate sampling containers, protocols, preservation methods, and collection apparatus, etc.

Deploy analytical test instruments or sampling equipment (such as data capture systems, continuous monitoring devices, drilling cores, water bailers, etc.), including assembly and documentation of any deviation to standard procedures.

Collect samples and specimens from air, water, flora, fauna, soil, fish, tree, human, etc., using appropriate sampling procedures and apparatus.

Use appropriate techniques to prepare (code, preserve, pretreat and transport) samples for analysis while maintaining chain of custody requirements and sample integrity.

Perform direct measurement of physical parameters for air/water/soil, including for example, temperature, flow rates, pressure, gaseous/particulate emissions, etc.

Maintain appropriate records and ongoing documentation pertaining to analytical work, including regulatory documentation.

Maintain analytical test instruments and monitoring or sampling equipment as per manufacturers' user maintenance specifications and standard operating procedures, including calibration of instruments/equipment.

Collect data for environmental assessment from imageries obtained from sources such as remote sensing devices, satellite, and aerial/terrestrial/under-water cameras/sensors.

### **3. iii. Analyzing and interpreting environmental samples and data**

Interpret analytical data to identify trends, significant changes from historical patterns, deviations, or evidence of environmental stresses, etc.

Conduct statistical analysis of data using appropriate computer software, databases, etc.

Determine how results will be applied, for example redesigning sampling protocol, redesigning research methodology, developing a baseline data set, etc.

Conduct quality control reviews of data collection, processing, and analysis to ensure data is 'fit for purpose' using accepted scientific practices and proper Quality Assurance/Quality Control (QA/QC) protocols.

Prepare summary reports of analysis results using technical formats such as tables, charts, and diagrams for integration into technical reports and/or presentation to expert and/or non-expert audience through scientific journals, oral presentations, etc.

Classify samples using applicable classifications (e.g. CSCC soil classification, taxonomy, sorting sample by phylum, order, family, species)

<b>4. Waste Management Systems, Processes and Procedures</b>	<ul style="list-style-type: none"> <li>• Ontario Regulation 347</li> <li>• Ontario Regulation 558</li> </ul>
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**4. i. Developing/implementing waste management plans and programs**

Assess the effectiveness and applicability of waste management programs and technologies to identify, for example, appropriate waste management solutions.

Identify optimum methods for the segregation and physical handling of materials at waste management facilities and/or in landfills.

Establish procedures, such as Corporation Support and Recycling, for residential and commercial waste handling by a municipality or private company, including recycling programs.

Develop waste management plans, including waste reduction programs, that address the needs of specific industries, organizations, departments, institutions, etc. and incorporate applicable regulations.

Assess the cumulative effects and performance of waste management strategies.

Conduct audits of waste management facilities to assess their adequacy to process waste and meet corporate and regulatory standards.

Implement programs for the management of hazardous and non-hazardous wastes, including: handling, storage, collection, transportation, treatment, disposal (regarding all types of residential, municipal, commercial, and industrial wastes, including agricultural waste, forest harvesting debris, etc.).

Ensure regulatory requirements are met in the collection, transport, storage and disposal of hazardous wastes.

Implement 3R programs (e.g. using alternative processes, composting, waste-to energy programs, reusing harvesting debris, spreading manure, etc.).

Analyze waste streams and volumes to determine feasibility of operations, commercial waste opportunities, and/or waste reduction strategies.

**4. ii. Monitoring waste application/disposal/reduction programs and activities**

Characterize waste and waste streams.

Track waste generation: source, volume, type, location, storage, transportation and disposal.

Determine requirements of new/improved waste disposal, treatment and recycling systems (e.g. waste volumes, types and methods of treatment).

Conduct waste audits (to determine, for example, if waste is properly managed and if material being disposed conforms with intended use of the disposal facility/site).

**4. iii. Developing/implementing water supply and water efficiency plans and programs**

Assess the environmental aspects of the design, operation and maintenance of water and wastewater distribution systems.

Monitor the effectiveness of water/wastewater programs and water treatment equipment and processes to meet environmental performance requirements.

<p><b>5. Human and Environmental Health and Safety and the Environment</b></p>	<ul style="list-style-type: none"> <li>• Risk Management</li> <li>• Risk Assessment</li> <li>• Environmental Management Systems</li> </ul>
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**5. i. Developing corporate environmental plans, policies and procedures**

Advise senior management and other stakeholders on environmental matters related to personal and corporate liability.

Advocate with senior management and other key stakeholders to ensure due consideration of and commitment to environmental management and sustainable development principles and strategies.

Develop the environmental component of the organization's (or jurisdiction's) strategic plan, including the vision, mission, programs, practices and tools that support the environmental policy.

Evaluate the potential environmental liability (and subsequent socio-economic impact) of a property as it relates to acquisition, expansion, changes in operations, or divestiture.

Develop the organization's environmental policies, based on stakeholders input where appropriate, that conform with legislation and technical standards/guidelines.

**5. ii. Monitoring/addressing occupational and public health and safety**

Evaluate the significance of environmental occupational/public hazards and safety issues as a basis for the development of policies, programs and procedures.

Develop organizational procedures concerning environmental and occupational/public health and safety matters.

Implement measures to mitigate the health & safety hazards associated with environmental issues created by operations or construction activities and their by-products such as hazardous leachates, effluents and dusts.

Liaise with stakeholders and emergency response experts to develop emergency response plans and procedures in cases of environmental crises such as accidental emissions, discharges, releases, explosions, leaks or spills that could cause a threat to humans and the environment.

Respond to the human health risks/dangers of catastrophic events and insidious damage, such as the release of toxic gases.

Monitor existing or potential environmental health hazards and stressors such as noise, energy (UV, IR, radiation), chemical/biological pollutants in the air, water, and/or soil.

Assess the effectiveness of health and safety programs for continuous improvement of programs and results.

Develop preventative programs that help protect workers' (or the public's) health and safety in response to environmental concerns.

Develop and implement programs to manage risk to the public.

Monitor HVAC systems relative to health and safety standards for indoor air quality.

**5. iii. Implementing environmental management systems**

Develop an Environmental Management System which is consistent with the organization's strategic plan and regulatory requirements, including goals, objectives, and targets.

Address the environmental management components of new operations, new projects, facility expansions, etc.

### **5. iii. Implementing environmental management systems (cont'd)**

Advise on the selection of environmental contractors and consultants that meet the organization's policies and regulatory standards.

Implement programs and practices that encourage accountability, for example, by integrating environmental responsibilities into employees' jobs.

Integrate risk management decisions into the Environmental Management System and/or corporate business/strategic planning.

Implement the Environmental Management System strategies and practices.

### **5. iv. Managing Environmental Management Systems (EMS) and practices**

Use information systems to monitor and track regulatory compliance, environmental incidents, permits, waste streams and other Environmental Management Systems requirements.

Revise Environmental Management System practices and outcomes to correct non-conformance.

Manage audits of the Environmental Management System in order to take corrective actions where needed.

Benchmark the organization's Environmental Management System against that of other companies and against international standards (e.g. ISO).

### **5. v. Conducting environmental risk assessments**

Identify hazards, opportunities or potential risks to human health, the environment, facility operation/financial loss, legal liability, social impact, public perception through such activities as collecting source data, reviewing literature, investigating illness/injuries, and obtaining feedback from workers or the public.

Predict the probable exposure to hazards using exposure and chemical fate/transport models, and the physical and chemical properties of contaminants.

Conduct quantitative risk assessment to identify the direct and indirect consequences of individual and multiple environmental impacts, including remediation and restoration activities if applicable.

Develop risk management strategies, including prioritization of risks and actions to address ecological and human risks, and to manage financial, legal, social, and public perception issues.

Assess the effectiveness of risk management activities to minimize impact on the environment and human health.

<p><b>6. Pollution Prevention, Abatement and Control</b></p>	<ul style="list-style-type: none"> <li>• Ontario Municipal/Industrial Strategy for Abatement (MISA)</li> <li>• Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater (MOE, Jan 1997)</li> <li>• Protocol for Conducting a Storm Water Control Study (MOE, August 1994)</li> <li>• Pollution Prevention Planning Guidance Document &amp; Workbook (MOE, March 1995)</li> </ul>
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<p><b>6. i. Coordinating environmental aspects of facility design and operation</b></p>	
<p>Coordinate the implementation of the environmental aspects of plans, protocols and procedures related to facility construction and operations.</p> <p>Determine the environmental aspects of the needs and requirements associated with the design and operation of the proposed facility, plant, landfill, etc.</p> <p>Develop plans, protocols and procedures to address the environmental aspects of facility design, construction, operation and closing.</p> <p>Implement measures to correct environmental or safety problems relative to the facility or operation site.</p>	

<p><b>6. ii. Implementing pollution prevention, abatement and control (PAC) methods</b></p>	
<p>Develop recommendations for the best Pollution Prevention, Abatement, and Control (PAC) measure(s), including the evaluation of control options versus process changes such as treating discharges versus upgrading the processes that created them.</p>	

<p><b>6. iii. Mitigating climate change impacts</b></p>	
<p>Develop strategies and programs to address energy consumption and greenhouse gas generation (such as biological carbon sinks &amp; CO<sub>2</sub> sequestration) that conform with applicable federal and/or provincial requirements.</p> <p>Develop greenhouse gas emissions/climate change reports.</p>	

<p><b>7. Strategic Partnering, Planning, Monitoring &amp; Reporting for Sustainability</b></p>	<ul style="list-style-type: none"> <li>• <i>Our Sustainable Future</i> (MNR, February 2005)</li> </ul>
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<p><b>7. i. Liaising and Partnering with Stakeholders</b></p>	
<p>Liaise with stakeholders (e.g. governments, private sector, environmental experts, farmers, producers, NGOs, culturally diverse groups, communities, etc.) to collaborate on stewardship and sustainability issues and concerns (e.g. broad-based habitat preservation and management practices and ecological fiscal reform).</p> <p>Develop partnerships with key stakeholders (e.g. industry, governments, academic, public, and various interest groups) to address environmental sustainability and stewardship issues and concerns.</p>	

### **7. i. Liaising and Partnering with Stakeholders (cont'd)**

Identify ethical and cultural concerns regarding the social, cultural, spiritual, and economic valuing (such as of specific natural resources), and the implications for informed decision making regarding sustainability.

Build consensus regarding the goals and time lines of sustainable development initiatives (e.g. use of natural resources), considering the competing interests of stakeholders (e.g. increased productivity or harvesting, protecting habitats, access and rights to land, etc.).

Develop partnership and stewardship agreements which incorporate sustainable development guidelines, indicators, targets and processes for measuring progress related to specific environmental issues.

Secure partnerships involving industry joint ventures, environmental consulting and/or environmental technology transfer with other countries.

### **7. ii. Developing sustainable development indicators, plans and strategies**

Identify best practices and guiding principles (such as Bellagio Principles) for sustainable environmental development.

Provide technical input to the development of positions on environmental issues and sustainable development plans, in areas such as reasonable timelines, priority actions, indicators towards progress, etc.

Develop a framework and policies for identifying sustainable development approaches and solutions which balance social, economic and environmental needs, with input from key stakeholders.

Evaluate the economic, environmental and social implications (short and long term) of potential sustainable development initiatives.

Create sustainable development plans (e.g. long-term, municipal master plans), that take into consideration holistic, integrated, ecosystem-based management strategies.

### **7. iii. Implementing/monitoring sustainable development strategies and programs**

Implement sustainable development strategies, including the promotion of sustainable development practices (such as "green building" and sustainable communities).

Monitor the changing needs of stakeholders and the effectiveness of sustainable development strategies over short and long timelines to determine if strategies, targets and/or timelines need to be modified.

<p><b>8. Natural Resources Planning &amp; Management</b></p>	<ul style="list-style-type: none"> <li>• Provincial Policy Statement</li> <li>• Significant Wildlife Habitat: Technical Guide (MNR, October 2000)</li> <li>• Natural Heritage Reference Manual (MNR, June 1999)</li> <li>• Ontario's Forest Management Guides (MNR)</li> <li>• Public Lands Act</li> <li>• Aggregate Resources Act</li> <li>• Mining Act</li> <li>• Forestry Act</li> <li>• Fish &amp; Wildlife Conservation Act</li> <li>• Provincial Parks &amp; Conservation Reserves Act</li> <li>• Conservation Land Act</li> <li>• Federal Fisheries Act</li> <li>• Species at Risk Act</li> </ul>
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<p><b>8. i. Developing plans &amp; programs for ecosystem &amp; habitat preservation and/or the management of natural resources</b></p>
<p>Investigate significant occurrences and changes that may signal the need for a resource management and/or ecosystem preservation plan.</p> <p>Seek input from technical specialists (e.g. biologists, taxonomists, modelers, etc.) and other stakeholders (governments, NGOs, aboriginal peoples, etc.) with respect to the resource management and habitat protection (such as the identification of important habitat sites).</p> <p>Determine the resources and partnerships required to implement a natural resource management/conservation plan (e.g. funding mechanisms, services).</p> <p>Formulate integrated natural resource and/or ecosystem &amp; habitat management plans (including interim management plans for public consultations) and programs to address identified preservation and conservation needs.</p> <p>Identify criteria, in collaboration with stakeholders, for evaluating proposals and land-use plans to determine impacts of changes in use of land resources such as conversion of agricultural land to urban use.</p> <p>Develop long term integrated land-use plans (for urban, recreational, industrial, and agricultural uses) that include strategies (such as landscape ecology) to minimize adverse environmental impact.</p> <p>Establish indicators of the health of ecosystems, based on established baseline data or extrapolations from similar ecosystems.</p> <p>Determine opportunities, options, and targets for increased productivity, utilization or yield of natural resources.</p> <p>Use models and data (such as projections of population growth, municipal infrastructure needs, and increased demand for resource-based commodities) to forecast the environmental impact of long-term requirements for land resources such as parks, natural recreation sites, agricultural land, and urban development.</p>

**8. ii. Conducting studies related to ecosystem & habitat preservation and/or the management of natural resources**

Develop methods for indexing existing natural resources and parameters (e.g. wildlife populations and harvest mortality)

Carry out comprehensive inventory of natural and physical resources.

Define data (e.g. age, size, structure of population, genetics, distribution, migration patterns, abundance, water temperature, environmental factors, etc.) to forecast future state of natural resources, such as fish populations.

Establish the biodiversity baseline (e.g. nature, number and location of species involved).

Identify the impact of development/exploration/exploitation activities on the biodiversity of surrounding natural habitats (such as the "downstream" impacts of agricultural activities on surrounding soil and water).

Evaluate the capability of target sites to sustain restoration, rehabilitation and/or enhancement activities (of fisheries, forestry, etc.).

Conduct baseline studies of specific ecosystem(s) and/or natural resource(s) by completing an inventory to characterize ecosystems and natural resources, and/or to determine suitability for an intended use.

Prepare baseline report including gap analysis report where baseline data is incomplete, interpretation of baseline data and development of recommendations for consideration by stakeholders and decision makers.

Evaluate the benefit of human-built structures (such as dams, ditches and fish weirs) to prevent destruction or erosion and/or to rehabilitate the habitat.

Evaluate best sites and routes (e.g. gas/oil wells, gas processing plants, pipelines, and mines) for habitat and ecosystem preservation and conservation of natural resources.

Conduct modeling of ecosystem variables to predict potential outcomes of habitat restoration practices (such as fisheries rehabilitation or forestry regeneration).

Design monitoring systems for measuring human impacts on natural resources and/or ecosystems.

Determine how and to what extent the natural resource can be modified (e.g. soil tilled, forest harvested) based on its characteristics.

Identify effective resource management practices, including consideration of cultural and spiritual values of various stakeholders (such as First Nations) and jurisdictions.

Define data (e.g. age, size, structure of population, genetics, distribution, migration patterns, abundance, water temperature, environmental factors, etc.) to forecast future state of natural resources, such as fish populations.

**8. iii. Implementing programs & practices related to ecosystem & habitat preservation and/or the management of natural resources**

Implement ecosystem and habitat preservation projects and practices (such as preservation of fish and wildlife habitats and restoration in lakes, rivers, streams, wetlands, marshlands, etc.) to protect and conserve the biodiversity and health of ecosystems.

Advise producers on the full range of sustainable resource utilization and harvesting practices and techniques, such as soil conservation/enhancement technologies (e.g. tillage options, measures to prevent wind and water erosion, crop rotation, cropping systems, nutrient management, residue management).

**8. iii. Implementing programs & practices related to ecosystem & habitat preservation and/or the management of natural resources (cont'd)**

Implement agricultural land conservation practices (such as preventing wind or water erosion, maintaining soil organic matter, correcting or controlling soil salinity problems, etc.) to conserve the availability and productivity of agricultural land.

**8. iv. Monitoring/evaluating effectiveness of programs & practices related to ecosystem & habitat preservation and/or the management of natural resources**

Continuously monitor soil, water, flora, fauna, and field conditions in ecosystems.

Assess the effectiveness of conservation and preservation practices, including the interpretation of monitoring data and the validation of conclusions with experts in the field (e.g. government agencies, harvesters, industry, and non-governmental organizations).

Monitor inventories of natural resources (including land) and species biodiversity to continually improve the conservation and preservation practices of these resources.

Evaluate the effectiveness of alternative conservation practices (such as silviculture systems) that are perpetual or require minimal maintenance.

**9. Environmental Research & Technology Development**

**9. i. Designing/developing environmental research & development proposals, programs and projects**

Conduct review of literature and existing data pertinent to the potential research program/project.

Define the scope, strategy and objectives for specific environmental research projects and programs.

Write a proposal, communicating the scientific rationale behind the environmental research project to obtain funding and/or approval from internal, industry, government, or other sources.

Identify research priorities and opportunities for funding, considering financial viability and other indicators such as, current environmental conditions, scientific knowledge gaps, need for industrial improvements, socio-economic and cultural factors.

Develop a research action plan (e.g. establish budget, deliverables, timelines and human resource needs) for consideration by stakeholders and decision-makers.

**9. ii. Conducting environmental research/publishing results**

Critique reports, proposals and publications of peers.

Develop specific research methodologies and protocols.

### **9. ii. Conducting environmental research/publishing results (cont'd)**

Develop recommendations for the application of research findings.

Provide expert guidance to others who may be assisting with the research within or outside the organization.

Conduct original research (e.g. eco-toxicology studies, developing models, identifying optimal agrichemical application rates, etc.).

Write up results in accordance with rigorous publishing guidelines (for publication in peer-reviewed journals, presentation at conferences, etc.).

Analyze research findings to determine if research objectives have been met, or if research methodologies need to be modified.

## **10. Environmental Communications & Public Awareness**

### **10. i. Developing/Implementing environmental communications & awareness programs**

Act as the organization's spokesperson concerning environment-related issues and inquiries (e.g. health & safety, contamination of air, water, soil, ground water, etc.).

Provide technical input into the development of marketing and communication plans, materials and/or presentations.

Make presentations to a variety of audiences (including schools, and community and non-governmental organizations) to build awareness of environmental issues, concerns and/or programs (e.g. the health-related effects of chemical enhancements to agricultural food production).

Develop content of environmental awareness programs designed, for example, to encourage and reward environmentally responsible behaviour.

Establish goals for the communication/awareness program and ways to measure effectiveness of outcomes in attaining the goals.

Collect information on the topic at hand (e.g. literature review, interviews, investigation, surveys, expert input, public opinion polls).

Identify constraints, sensitivities, or opposing views and means to address them so that the message reaches the designated target audience(s) (using a variety of formats such as printed materials, videos, internet, CD ROMs), and addresses the environmental concern(s).

Champion the program and its implementation with media, outside audiences, organizations, etc.

### **10. ii. Presenting expert information on environmental matters**

Participate as a speaker, panelist, witness, or expert in conferences, public forums to address environment-related topics and issues, or hearings (such as defending the Environmental Impact Assessment report).

**10. ii. Presenting expert information on environmental matters (cont'd)**

Provide technical advice for selection of content and speakers for conferences, seminars, meetings, focus groups, and public consultations and forums to address environment-related topics and issues.

Provide technical advice for the development of appropriate communications/public relations strategies to address employee and public concerns about environmental issues and risks.

Prepare final proceedings of conference for participants (e.g., written or electronic).