

## MODULE AGR3110: WATER MANAGEMENT

**Level:** Advanced

**Theme:** Management and Conservation

**Prerequisite:** None

**Module Description:** Students explain principles of water management and establish appropriate water management practices for an agriculture or horticulture enterprise.

**Module Parameters:** Access to community and government agencies responsible for sustainable agriculture development.

**Supporting Module:** AGR1110 Resource Management

### Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>describe the hydrologic cycle</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a presentation or report that provides:               <ul style="list-style-type: none"> <li>an illustration of the hydrologic cycle depicting precipitation, evaporation, transpiration, condensation and groundwater flow</li> <li>an explanation of changes that occur to water as it is recycled in the natural environment.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Presentations/Reports: Advanced Level, AGRPRE-3</i></p> <p><i>Standard</i>  <i>Complete the presentation or report to a standard of 3 on the rating scale</i></p>	10
<ul style="list-style-type: none"> <li>identify water sources important to agriculture in Alberta</li> </ul>	<ul style="list-style-type: none"> <li>given an outline map of Alberta, locating and naming all major sources of surface water in the province.</li> </ul> <p><i>Assessment Tool</i>  <i>Task Checklist for Mapping, AGRMAP</i></p> <p><i>Standard</i>  <i>Complete mapping to a standard of 3 on the rating scale</i></p>	10



**MODULE AGR3110: WATER MANAGEMENT** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• conducting field-based investigations of three or more technologies used in agriculture to:               <ul style="list-style-type: none"> <li>– manage limited and/or excess water supplies (e.g., irrigation, storage, diversion, drainage)</li> <li>– maintain water quality (e.g., cropping rotations, conservation tillage, management systems for animal waste, pesticide management).</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Observation Checklist for Field-based Investigations, AGROBS</i></p> <p><i>Standard</i>  <i>Complete all sections of the checklist as they apply to objectives of the field investigation</i></p> <ul style="list-style-type: none"> <li>• developing a water management plan for an agriculture venture. Management plan to address:               <ul style="list-style-type: none"> <li>– available surface and groundwater supplies</li> <li>– water requirements according to estimates of consumption</li> <li>– water treatments to ensure its suitability for use</li> <li>– management practices to compensate for water deficiencies and/or environmental concerns.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Criteria: A Water Management Plan, AGR3110–3</i></p> <p><i>Standard</i>  <i>Complete the water management plan to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• observations of individual effort and interpersonal exploration during the learning process.</li> </ul> <p><i>Assessment Tool</i>  <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

**MODULE AGR3110: WATER MANAGEMENT** (continued)

Concept	Specific Learner Expectations	Notes
Hydrologic Cycle	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• define and illustrate the water cycle</li> <li>• describe the roles of evaporation, precipitation, run-off and infiltration in the water cycle</li> <li>• explain physical, chemical and biological changes in water as it is cycled in the natural environment.</li> </ul>	<p>Explain the role of the hydrologic cycle in replenishing water supplies.</p>
Water Sources and Quality	<ul style="list-style-type: none"> <li>• describe the main sources of water for agriculture; e.g.:               <ul style="list-style-type: none"> <li>– ground water</li> <li>– surface water</li> <li>– precipitation</li> </ul> </li> <li>• describe on-site systems used to collect and distribute water for agriculture</li> <li>• describe and give examples of physical, chemical and biological characteristics of water important to plants and animals; e.g.:               <ul style="list-style-type: none"> <li>– turbidity, temperature, odour and taste</li> <li>– dissolved oxygen, pH, mineral content</li> <li>– bacteria, viruses, algae and plankton</li> </ul> </li> <li>• perform tests to determine the characteristics of water and its suitability for an agricultural use.</li> </ul>	<p>Investigate:</p> <ul style="list-style-type: none"> <li>• groundwater reserves</li> <li>• major surface water resources</li> <li>• precipitation patterns.</li> </ul> <p>If possible, organize a well-watching demonstration.</p> <p>Interpret water test results for specific uses in agriculture.</p> <p>Perform a test for water hardness.</p> <p>Analyze local water supplies through the local health unit.</p> <p>Determine water quality requirements for a plant/animal production enterprise.</p>
Agriculture Effects	<ul style="list-style-type: none"> <li>• explain how agricultural practices may affect the water resource at local and global levels; e.g.:               <ul style="list-style-type: none"> <li>– land clearing</li> <li>– soil cultivation</li> <li>– use of chemical fertilizers and pesticides</li> <li>– irrigation and draining practices</li> <li>– overgrazing/animal wastes</li> </ul> </li> <li>• describe the effects of erosion and siltation on water quality</li> <li>• relate specific agricultural practices to physical, chemical and biological changes that occur in the water resource</li> <li>• debate a global issue regarding the impact of agriculture on water supply and/or water quality.</li> </ul>	<p>Consider impacts of limited/excess water supplies on:</p> <ul style="list-style-type: none"> <li>• humans</li> <li>• livestock</li> <li>• crops</li> <li>• wildlife</li> <li>• ecosystems.</li> </ul> <p>Investigate on-site collection systems.</p> <p>Invite a rural development specialist to discuss impacts of intensive agriculture on water quality.</p> <p>Explain “static level” and “drawdown” in relation to a farm well.</p>

**MODULE AGR3110: WATER MANAGEMENT** (continued)

Concept	Specific Learner Expectations	Notes
<p>Water Management Practices</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• describe and assess techniques used to manage limited and excess water supplies in agriculture; e.g.:               <ul style="list-style-type: none"> <li>– irrigation, storage, recycling</li> <li>– diversion, drainage, flood control</li> </ul> </li>   <li>• identify and apply treatments for enhancing water quality both before and after use in agriculture</li>   <li>• research forms of water ownership and legal aspects of water control; e.g.:               <ul style="list-style-type: none"> <li>– public, private and deeded ownership</li> <li>– government controls on pollution</li> </ul> </li>   <li>• describe and assess agriculture practices aimed at maintaining water quality; e.g.:               <ul style="list-style-type: none"> <li>– cropping rotations</li> <li>– management of animal wastes</li> <li>– conservation tillage</li> <li>– optimal fertilizer and pesticide management</li> </ul> </li>   <li>• explain how the maintenance of wetlands contributes to water management</li>   <li>• describe strategic alliances developed among municipal, environmental and user groups to address environmental impacts.</li> </ul>	<p>Discuss the significance of:</p> <ul style="list-style-type: none"> <li>• cropping rotations</li> <li>• animal waste management</li> <li>• wetlands management.</li> </ul> <p>Assess the potential of existing water supplies to meet projected water requirements for a specific agriculture venture.</p> <p>Explain how agriculture can assist in treating municipal wastes.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• water rights</li> <li>• control of effluent disposal and pollution</li> <li>• diversion of natural waterways.</li> </ul> <p>Compare agriculture practices in two locales having significant variance in their water resources.</p> <p>Obtain the “Wetland Environments” kit (available from Ducks Unlimited).</p>

