CANADIAN FÉDÉRATION
WILDLIFE CANADIENNE
FEDERATION DE LA FAUNE

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Urban Runoff Lesson Plan

Date: **Time:** 2 periods or a ½ day
Grade: Science 9
Unit: Fresh and Saltwater Systems
Topic: Diversity of Organisms in Freshwater Systems

General Learning Objective: *Students will...*

- Analyze human impacts on aquatic systems; and identify the roles of science and technology in addressing related questions, problems and issues

Specific Learning Objectives: *Students will...*

- Analyze human water uses, and identify the nature and scope of impacts resulting from different uses
- Identify current practices and technologies that affect water quality, evaluate environmental costs and benefits, and identify and evaluate alternatives
- Illustrate the role of scientific research in monitoring environments and supporting development of appropriate environmental technologies

Attitudes IS - Show interest in science related questions and issues
Attitudes MR - Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds
Attitudes C - Work collaboratively in carrying out investigations and in generating and evaluating ideas
Attitudes C - Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment
Skills PI - Identify science-related issues and problems and identify questions to investigate, arising from science-related issues.
Skills RR - Research information relevant to a given issue.
Skills CT - Use appropriate vocabulary, including correct science and technology terminology, to communicate ideas; communicate questions and ideas; defend a given position on an issue, based on their findings.

Learner Objectives: Students will...

- Consider, and compare and contrast an undisturbed natural site vs. an urban neighborhood community
- Identify factors affecting water quality
- Explain the relationship between water characteristics (quality, runoff, absorption) and living things

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Materials:
* Arrange for a biologist and urban planner to meet you at each appropriate site

Rivers to Oceans Webisode – Urban Runoff	10 Pipettes
Field Observation forms	Invertebrate & water quality indicator sheet
Binoculars for groups	Meter Stick for water depth
Pencils	GPS units if available
Rubber boots if desired	
Bucket for water sample	
5 ice cube trays for insects	

Previous classes: Discuss field trip objectives and expectations, science related careers, general water quality issues etc.

Organization to Achieve the Objectives

	Time	Teaching Activities	Student Learning & Activities	Modification
Introduce / Set	5 min	Describe to students that today we are going to explore water issues in our own community. Students will identify with two environmental related careers 1) Environmental Scientist 2) City Housing Planner. While students take on the two roles they are to keep in mind the importance of water to humans and the environment and any water management issues Students will visit 2 sites in close proximity to one another – a wetland and an urban development area. Their first job as a Biologist will be to do an ecological survey of the small wetland present. Q – Now I have hired all of you to complete the task, can you tell me what types of things you will be looking for? (*e.g. wildlife, water quality, vegetation,*		

	Time	Teaching Activities	Student Learning & Activities	Modification
		soils) Secondly, students will be working as a City Housing Planner. Here we will investigate the new housing community that is currently being built. Here you will consider any water issues and record them. Later we will be returning to class to discuss the issues we have found.		
Body (in steps)	5 – 20 min	• Students will assess and list water issues in Canada through watching Rivers to Ocean Webisode – Urban Runoff or 20 minute series video	➢ Assess and list water issues	
	5 min	• Students will appreciate and consider field trip and science safety concerns. • Form pre-arranged groups – prep for field trip completed in previous class		
	45 min	***PART A – WETLAND - Prior to approaching wetland*** • Students will apply lab procedures in the field to complete the wetland field form (e.g. date, time, weather, temperature, cloud cover etc)	➢ Assess and describe current survey conditions	-Pair students based on skills and leadership or have an adult with them for assistance
		Stealthy Field Biologist Remind students they need to be very quiet so they do not scare off any birds or animals		
		• Students will approach and identify wetland animals, if there are ducks or birds, ask students if they know what they are? Students will identify and record the sex, behaviour. Reveal any interesting facts?	➢ Observe and record animal information in the field form	-Adult present to help with animal identification, sex etc. - Have laminated picture sheet with common birds and animals
		• Students will assess and determine the dominant vegetation present and	➢ Assess and classify dominant vegetation	

	Time	Teaching Activities	Student Learning & Activities	Modification
Body (in steps)	40 min	record type of vegetation and % cover in the wetland (e.g. cattails, bulrush, sedges (sedges have edges etc) • Students will observe adult collecting water data– temperature, salinity, water depth • Students will collect and observe invertebrates and determine if they are good or poor water quality indicators • Record and discuss any other observations by looking around at the landscape (e.g. buildings, topography, culverts, pipes etc) ***PART B – Local City Development*** • Students will appreciate different environmental careers and its context to real life economics, population growth, housing demand, as they are now a City Planner. • Students will describe the landscape and record observations • Students will compare and contrast the two sites • Q – if it rains where will the water go? • Students will discuss and describe environmental and water considerations one can foresee with any housing community (water runoff, sewer contamination, over water consumption, water pollution, wildlife habitat) • Identify and describe to students	➢ Observe and record water quality parameters ➢ Collect and classify invertebrates as good or poor water quality indicators ➢ Interpret and record further information about the landscape ➢ Appreciate and consider why it is important to also have urban development ➢ Interpret and record observations ➢ Compare and contrast two sites and recognize the relationship between development and the environmental ➢ Assess, predict and record water / environmental concerns ➢ Consider and record sewer water	

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	Time	Teaching Activities	Student Learning & Activities	Modification
		what a storm drain is, its purpose and water quality issues and consideration needed • Students will learn about a local stewardship program 'Yellow Fish Road Program – Only rain down the drain'. **END OF FIELD TRIP – RETURN TO CLASS TO DISCUSS AND SUMMARIZE OBSERVATIONS...**	quality problems and how it can impact wildlife ➢ Recognize and appreciate stewardship initiatives and opportunities	
Closure	10 min	• Students will interpret and compare and contrast the two sites • Students will describe environmental / water concerns from the field trip • Students will use information from today's lesson in the next lesson to further explore how water quality can impact wildlife and people. Remind students to bring all field forms they completed in the field and colouring pencils etc		
Anchor Activities	- Discuss ways you would solve the water issues your observed today (e.g. water contamination, wetland habitat loss) - Draw and label picture beside of any animals observed (e.g. use scientific names) - Draw diagram of field locations and label (e.g. north arrow, legend etc)			
Assess & Evaluate	**Summative** -Assignment - Accurate, thorough and legible field form	**Formative** - Questioning/checking for understanding - Guided practice in collecting and recording scientific data in the field		

Science 8 – Field Trip
Job: Environmental Scientist
Task: Wetland Monitoring

Field Observation Form

Date:			
Time:			
Observers:			
Location Description:			
GPS Location (Nad 83): **Northing_____Easting_____**			
Species			
Dominant Plants	**Animals**		
	Species	**Sex (M or F)**	**Behaviour**
Weather: Air Temp: _____°C Water Temp: _____°C Wind: _____ Cloud Cover: _____			
Adjacent Land Uses:			
Potential threats to wetland?			
Sketch of Wetland (must be in pencil, include north arrow and legend)			

Teacher Evaluation and Assessment:				
Criteria	**Rarely -1**	**Some - 2**	**Usually – 3**	**Always -4**
Field form complete, neat and done in pencil				
Answers show understanding				
Worked cooperatively with other students				

Science 8 – Field Trip
Job: City Housing Planner
Task: Complete Community Description and Determine Potential Water Issues

Field Observation Form

Date:			
Time:			
Observers:			
Location Description:			
GPS Location (Nad 83): **Northing_____Easting_____**			
Housing Community			
Dominant Plants	**Animals**		
	Species	**Sex (M or F)**	**Behaviour**
Observations of site:			
Potential environmental water issues to consider?			
What is a storm drain? **What are environmental water considerations with storm drains?**			
Sketch of Housing Community (must be in pencil, include north arrow and legend)			
Teacher Evaluation and Assessment:			
Criteria	**Rarely-1**	**Some-2**	**Usually-3**	**Always-4**

Field form complete, neat and done in pencil				
Answers show understanding				
Worked cooperatively with other students				