Geoscape Ottawa-Gatineau

Grade 7 Lesson Plans to accompany the Geoscape Ottawa-Gatineau poster and website

F. Fiset and J. Aylsworth

Theme Eight: Flooding

List of Expectations		
Grade	Strand and Topic	Expectations
7	Science: Earth and Space Systems The Earth's Crust	• identify the factors that must be considered in making informed decisions about land use and explain their importance

Overview

The Geoscape "Flooding" theme consists of lessons, which will enable students to relate river level and discharge and understand the impacts of flood control.

At the end of these lessons, students will be able to:

- understand the relationship between discharge and river level and flooding
- learn about flood plains around the Ottawa area and what governments and people can do to prevent damage and injury

Suggested Lessons	Brief Description
Students Take Notes	Flooding: Just too much water
Key Word Game	Word Search Game
Lesson	Beware
List of related web sites and resources	Ottawa River Regulation Planning Board Brochure on Flooding http://www.ottawariver.ca/ebrochur.htm Building Dikes to Prevent Flooding: How To Fill And Position Sandbags http://www.cdc.gov/nasd/docs/d001401-d001500/d001489/d001489.html **Ontario Conservation Authorities :** South Nation http://www.nation.on.ca/ Rideau Valley http://www.rideauvalley.on.ca/ Mississippi http://www.mvc.on.ca/

Funding for this project came from Natural Resources Canada and the government of Ontario

Students take notes: **Flooding: Just Too Much Water**

Flooding:

- is a natural process
- happens when the amount of water increases and rises past its banks

Floodplains

- low-lying areas near rivers
- become inundated (flooded) when water levels are high
- buildings, roads and bridges may be damaged or destroyed

Causes of Floods

- rapidly melting snow
- rain on snow
- torrential rainfall
- blockage due to ice jams or landslide debris

The 100-Year Flood

- size of a floodplain depends on the extent of what is called “the 100-year flood”
- does not mean that there is flood every 100 years
- every year, there is a 1% chance of a flood occurring.
- size and location of flood zones must be known to prevent damage when flooding happens.

Defending Against Floods

Damages from floods can be reduced by:

- preventing any development (e.g. roads, buildings) in flood zones
- using the floodplains as parks and playing fields (land use)
- installing physical barriers such as dikes
- using dams as a means to measure high discharges and alert communities downstream of potential flooding
- preventing ice jams in the spring
- Other methods, not used on the Ottawa River:
    - Upstream dams to contain and slowly release floodwater to protect communities
    - Man-made diversion channels to re-direct floodwater past a community (e.g. Winnipeg)

Word Search Game **Flooding** *name:*

M	A	G	N	I	T	U	D	E	O	F	S	Q	N	L
S	D	I	K	E	S	P	O	W	E	R	D	A	M	X
M	S	X	Q	S	D	E	W	E	J	Z	L	W	A	I
E	F	E	E	M	B	A	N	K	M	E	N	T	S	M
F	D	T	C	R	J	E	S	O	N	L	T	D	U	U
L	P	P	L	O	E	V	T	O	Z	E	T	M	N	Q
T	X	C	K	P	R	S	R	A	G	D	A	G	X	E
P	J	I	F	U	B	P	E	R	R	E	O	U	M	B
Z	J	H	L	A	-	U	A	R	R	W	U	O	D	Y
D	N	A	O	D	Y	H	M	T	V	E	O	B	L	P
O	S	B	O	J	C	W	S	C	X	O	Q	L	Z	F
O	X	O	D	S	K	P	V	K	U	Q	I	O	F	A
L	L	H	I	N	U	N	D	A	T	E	E	R	V	Z
F	Z	D	N	N	G	E	Z	N	I	Y	U	R	N	N
D	T	J	G	P	E	R	M	Y	Z	T	H	H	N	G

Dikes
Discharge
Downstream
Embankments
Flood
Flooding
Flood-prone
Flood zones
Flow rate
Magnitude
Inundate
Power dam
Process
Reservoir
Upstream

8.1 Lesson 1 Beware rising river levels

Brief Description
Exercise to demonstrate the relationship between height of river level and rising discharge and allow students to consider flood control methods.

Suggested Materials
Student worksheets

Duration 30-40 minutes

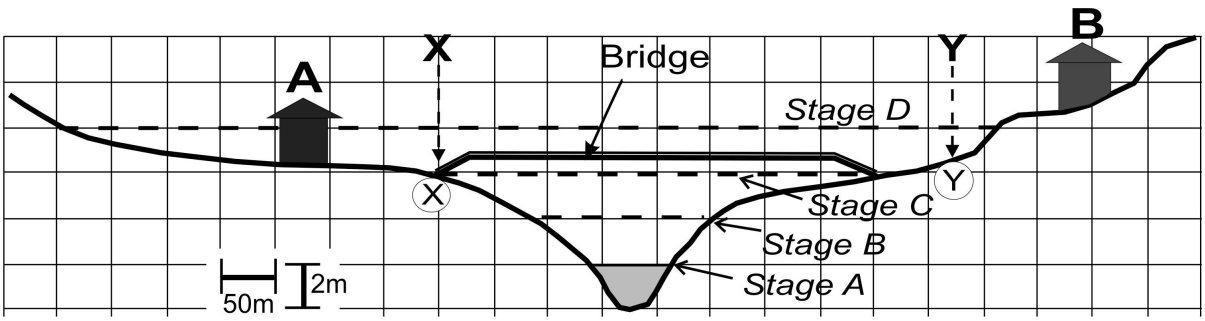
Lesson Instructions

1. Teacher reads the description of how to estimate discharge given on the student worksheet and checks that class understands. An example of the estimation technique could be demonstrated on the blackboard.

2. Students complete worksheet.

3. Results are discussed in class. Teacher guides students to a realization that any preventative action causes a reaction and has costs/impacts that must be considered. The best solution is to avoid development on the floodplain.

Student worksheet: **Cross-section of a Flood**



This is a cross-section across a valley, showing the river, floodplain, 2 towns, and a bridge.

During spring runoff, discharge increases and water levels rise (Stages **A,B,C,D**)

How to estimate discharge

Discharge = volume / time = cross-sectional area x distance / time (m^3/s)

Area can be estimated from the graph. Each grid rectangle is 50 m wide and 2 m high (note different vertical scale). Area of each grid rectangle is $100m^2$. Total cross-sectional area is the sum of all rectangles and part-rectangles beneath the river level.

Distance: in this exercise, distance = 1 m and is perpendicular to the page and can not be seen.

Time = 1 second.

Therefore, "distance / time" is a constant number (1), and can be ignored in your calculation and discharge can be estimated from your cross-sectional area.

1. At each stage of river level, estimate discharge and river height and complete the table.

Stage	River level (m)	Cross-sectional area (m^2)	distance / time (m/s)	Discharge (m^3/s)	Potential trouble?
A	2 m	100 m^2	1	100 m^3/s	No
B			1		
C			1		
D			1		

2. As water levels increase what do you notice about discharge?
3. Where does the extra water go?
4. What could happen at stage C? (bridge)
5. What happens at stage D? (Town A)
6. What happens at Town B?
7. If Town A built a 2 m high dike along the floodplain at position X, what would happen to Town A and to Town B?
8. Mr Man is thinking of building a house at position Y. What do you suggest?