Lesson 1

Stage 1 – Desired Results

Established Goals: 8-4-03 **Compare and contrast characteristics and properties of fresh and salt water.** Examples: freezing point, density, dissolved materials, **global distribution**, relative amounts, biologically diverse components of each… GLO: D3, D5, E1

Understandings:	**Essential Questions:**
Students will understand that… water is a shared natural resource and there are concerns regarding availability and distribution.	How do we learn about water from a sustainability focus?
Students will know…	**Students will be able to…**
The limited amount of water that humans actually have access to.	Estimate the amount of water as a resource they have use and compare that figure to actual .

Stage 2- Assessment Evidence

Performance Tasks:	**Other Evidence:**
Students will participate in the introductory lesson on the world's distribution of water.	Exit slip: students will hand in an exit slip that reflects on the new knowledge that only 0.03% of the world's water is actually available for human consumption.

Materials Required

7 clear containers (2 one-litre containers,	1 litre of water
5- 500 ml containers)	Salt (34 grams/approx. 2 Tbs)
1 plate	Blue food colouring
Projector	1000 ml graduated cylinder
OH BLM	One eye dropper
Masking tape	Student worksheet
Pen	

Background Information

Although 75% of the Earth's surface is covered in water, only a very small fraction is available for human use. Of the water that is available to us, some become contaminated from human actions, such as toxic run off from agriculture, factories or pollutants that we dump in the water supply from our sinks at home. Population growth over the past 30 years has caused demand for water to double in about half the countries in the world. Residents of areas with rapidly growing populations, as well as citizens of other countries often experience a water shortage. In the following activity students will gain an appreciation for the limited amount of water actually accessible and the need to conserve it.

Stage 3 – Learning Plan

Water, Water Everywhere Activity (adapted from Population Connection Student Activity 10, used with permission).

Prior to lesson:

- Fill 500 ml container with sand
- Fill a one-litre with water, add 4 drops of blue food colouring and stir
- Label the other 5 containers: one-litre= oceans, 500 ml = polar ice, 500 ml = deep groundwater, 500 ml = freshwater, 500 ml=other
- Make an overhead of attached BLM
- Have 34 grams of salt measured (just less than 2 Tablespoons)

Lesson

Set out the 7 containers

Lead a class discussion on the following questions:

- How much of the planet is made up of water? Record a prediction.
- What percentage of that water do humans have available to them for their use? Get students to write down their prediction

Use a graduated cylinder to distribute the one liter of water into the five empty containers according to the percentages indicated in the figure. (For example, 97.1 % of the water on the Earth is found in the oceans. Because one litre contains 1000 milliliters, 97.1 % of one litre is 971 milliliters. Therefore, pour 971 milliliters into the container marked "oceans." 2.2% is polar ice, .1% is other [saltwater lakes, soil &

atmospheric moisture, glaciers], 0.3% deep ground water, 0.3% freshwater [rivers, lakes, shallow ground water]).
After you have filled the empty containers with the appropriate amounts of water, continue with the demonstration as follows:
a) Add 34 grams of salt (just less than 2 Tbs) to "ocean" container; this will match the salinity of the water sample with the salinity of the earth's oceans (3.5 percent).
b) Place the plastic "polar ice" container in the freezer (or put it aside).
c) Set the "other" container aside. We do not have access to this water.
d) Pour the "deep ground water" into the container of sand.
Ask the students which of the containers represents fresh water that is readily available for human use. (They should easily see that only the jar marked "freshwater" has the readily available supply.) Initiate a discussion on the limits of fresh water supplies, the problems of population growth and distribution, and the contamination of existing supplies. Only a small part of this fresh water (.03 percent of the Earth's total water supply) is accessible. The rest is too remote (found in Amazon or Siberian rivers) to locate, too expensive to retrieve or too polluted to use. Hold a plate in front of the class and dramatically drop the usable portion of fresh water onto it (represent this portion as one drop of water).
Teacher to hand out homework – briefly explain how to fill out the water use chart daily to be used in class in one-week's time.

Exit Slip

As the students are getting prepared to leave class, they are to hand in an exit slip sharing their thoughts on the knowledge on the amount of water available for human use and the comparison of their prediction of water availability to the actual.

Homework Learning Activities

Fill out water use chart (Lesson 1 BLM 2) *make sure to make 2 copies of the first page so that the students can complete all seven days.

Extension Learning Activities

If the teacher feels the students are strong enough, the amount of water in the shower, toilet and brushing teeth can be left blank for the students to determine on their own from researching their current fixtures (ex. to figure out shower amount a student can time how long it takes to fill up a bucket, check on the back of the toilet to determine litres/flush, etc.).

Water Use Chart (1.1)

Day of Week _____	Minutes in one day or number of times/day	# litres	Total
Shower/bath (time it takes to fill tub)	X	**20** =	
Toilet	X	**12** =	
Brush teeth	X	**4** (if you leave the water running) **or** **1** (if you turn off the water while brushing) =	
Laundry	X	**200** =	
Dishwashing	X	**40** (if dishwasher) **or** **35** (if by hand)=	
Additional drinking water (found in foods)		**15** =	
Leaky plumbing		**50** =	
Total			

Day of Week _____	Minutes in one day or number of times/day	# litres	Total
Shower/bath	X	**20** =	
Toilet	X	**12** =	
Brush teeth	X	**4** **or** **1** =	
Laundry	X	**200** =	
Dishwashing	X	**40** **or** **35** =	
Additional drinking water		**15** =	
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Toilet	X	**12**	**=**	
Brush teeth	X	**4** **1**	**=** **or** =	
Laundry	X	**200**	**=**	
Dishwashing	X	**40** **35**	**or** **=**	
Additional drinking water (found in foods)		**15**	**=**	
Leaky plumbing		**50**	**=**	
Total				

	Total for 7 days
Shower/bath	
Toilet	
Brush teeth	
Laundry	
Dishwashing	
Additional drinking water (found in foods)	
Leaky plumbing	
Grand Total	(a)

Figuring out averages

Divide grand total _____(a) by 7 = _____(b) to get your household daily average

Take your household daily average and divide by # of people in your house (b)

_____(b) divided by _____(c) = _____(d) to get your personal daily average

Parent/guardian signature: _____

Due Date: _____

Questions :

1) Compare your *daily average* (d) to the following national averages (remember that we did not include watering the lawn, washing the car, filling humidifiers, fish tanks, hot tubs, or swimming pools or any water related activities like going to a swimming pool).
National Averages

Canada =350 litres/person/day,

United Kingdom=175 litres/person/day,

Bangladesh 45 litres/person/day.

What do you notice about your average as compared to these others. _____

_____

_____

_____

2) Review your water logs.

- What changes can you make the easiest?
- What changes are you willing to try?
- How can you assist your family in conserving water?

_____

_____

_____

_____

_____

_____

Jour de la semaine _____	**Minutes dans une journée ou nombre de fois par jour**	**# litres**	**Total**
Douche/bain	X	**20** **=**	

(temps nécessaire pour remplir la baignore)			
Toilette	X	**12** =	
Se brosser les dents	X	**4** (si vous laissez couler l'eau) **ou** **1** (si vous fermez le robinet en vous brossant les dents) =	
Lessive	X	**200** =	
Laver la vaisselle	X	**40** (si lave-vaisselle) **ou** **35** (si à la main)=	
Eau potable additionnelle (qu'on trouve dans la nourriture)		**15** =	
Fuites de plomberie		**50** =	
Total			

Jour de la semaine _____	**Minutes dans une journée ou nombre de fois par jour**	**# litres**	**Total**
Douche/bain	X	**20** =	
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Laver la vaisselle	X	**40** (si lave-vaisselle) **ou** **35** (si à la main)=	
Eau potable additionnelle (qu'on trouve dans la nourriture)		**15** =	

Fuites de plomberie		**50 =**	
Total			

Calcul des moyennes

Divisez le grand total _____(a) par 7 = _____(b) pour obtenir la moyenne quotidienne de votre maison

Prenez la moyenne quotidienne de votre maison et divisez-la par le # de personnes chez vous (b)

_____(b) divisé par _____(c) = _____(d) pour obtenir votre moyenne quotidienne personnelle

Questions :

1) Comparez votre moyenne quotidienne (d) aux moyennes nationales suivantes (n'oubliez pas que nous n'avons pas inclus l'arrosage du gazon, le lavage de voiture, le remplissage des humidificateurs, des aquariums, des bains-cuves ou des piscines, ni toute activité qui se rattache à l'eau comme la visite à une piscine).
   Moyennes nationales

Canada = 350 litres/personne/jour,

Royaume Uni = 175 litres/personne/jour,

Bangladesh = 45 litres/personne/jour.

Que remarquez-vous par rapport à votre moyenne comparée à celle des autres?

2) Faites la revue de votre journal de bord sur l'eau.

- Quels changements sont les plus faciles à faire?
- Quels changements êtes-vous prêts à essayer?
- Comment pouvez-vous aider votre famille à conserver l'eau?