Student Name _____ **Date_____**

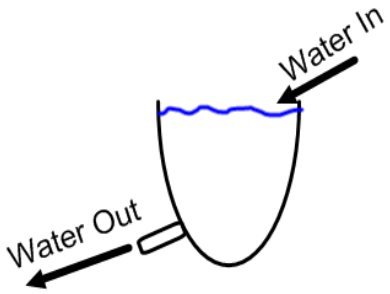
Lab Intro – The Great Drought of 2012

Here in Seattle we rarely have problems with lack of water, but many places in the U.S. and around the world water is much more scarce. Yesterday we talked about how water is often stored in large reservoirs or dams so that it is available for people to use during the dry months of the year.

The picture above is of a really cool reservoir located in Penang, Myanmar.

How they work

A reservoir is filled by rivers, streams, and/or groundwater that empty into it. It is emptied by pipes or channels that deliver the water to the people (although it is usually treated at a water treatment plant first) that need it for drinking or irrigation.



The water level (depth) of a reservoir changes over the course of the year. During the summer when there is less rain or snow and people use more water, the water level is usually lower.

What will eventually happen if water is taken out of the reservoir faster than it's put in.?

What will eventually happen if water is put in faster than it is being taken out?

Reservoir Draw-Down Lab

Water resource engineers must research and do calculations to ensure that the reservoir doesn't lose all of its water. In this lab we will take on the role of a water resource engineer and model input/and output rates of our reservoirs. **When the water level of a reservoir is decreasing, it is called draw-down.**

Step 1: Create your reservoir

Follow the instructions given by your teacher to create your reservoir. You will need:

- Empty plastic bucket with ml marks
- Short piece of garden water tube
- T-valve
- Shut-off valve
- Graduated cylinder
- "Catch" Bucket (Unmarked)
- Timer

Your completed reservoir should look like the one in the picture below:

Picture coming soon!

Make sure your shut-off valve is closed. Then fill your reservoir up to the 500 ml mark.

GROUP ROLES: Each group member choose one role below. Work together, but everyone must turn in their own completed lab.

Rivers/Streams/Runoff: Name_____

This person will be in charge of putting water into your reservoir according to the directions in step 3.

Water Users: Name_____

This person will be in charge of removing water from your reservoir according to the directions in step 2.

Timer & Recorder: Name_____

This person will keep track of time and record all observed data.

Step 2 – Calculate your water output rate.

- Place your graduated cylinder under the shut-off valve. Open the valve and start the timer.
- Let the water fill your cylinder fill nearly full. Close the valve and stop the timer.
- Record the amount of water in the cylinder and the time spent to fill it.

Water Level_____ Time Passed_____

Calculate your water output rate (volume per time) _____.

Step 3 – Calculate your water input rate. (do not refill your reservoir yet)

- Fill your graduated cylinder to the 10ml line. Pour the water into your reservoir while starting the timer.
- Continue pouring 10ml of water into your reservoir every minute for the next 3 minutes.

What is your water input rate (volume per time)?_____

Will water be entering or leaving your reservoir more quickly?

What do you think will happen to the water level when you have both output and input at the same time?

Step 4 – Run your reservoir model

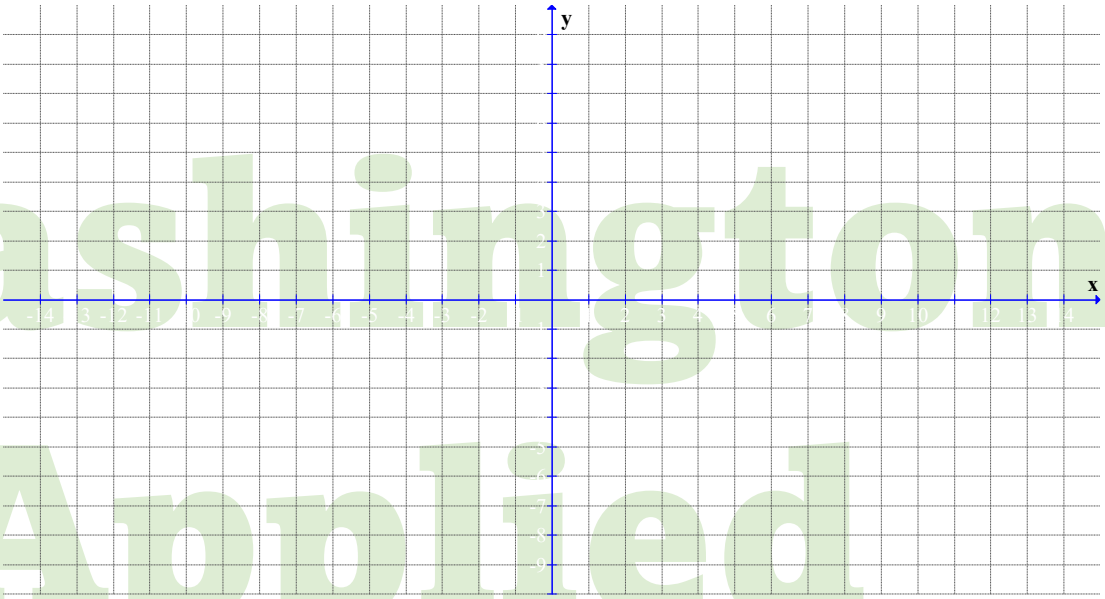
Now you will put water in and take water out of the reservoir at the same time and record the water level.

Before starting this process, try to predict the rate of draw-down in your reservoir? How did you come up with your prediction?

- Make sure your reservoir is filled to the 500ml mark. Have 10ml of water ready in your graduated cylinder and your "catch" bucket is underneath your shut-off valve.
- Start the timer, open the shut-off valve, and pour in 10ml of water all at the same time.
- Leave the valve open and continue to add 10ml of water every minute.
- Record the water level of your reservoir every 90 seconds on the table below.

Time (min)	Water Level (ml)
0	100
1.5	
3	

Graph the data in the table on the coordinate plane below and draw a line a best fit.



What is the slope of the line in your graph above? What does it represent in your reservoir model?

What is the y-intercept of the line? What does it represent in your reservoir model?

Write a slope-intercept form equation that models your reservoir. Identify the independent and dependent variables and explain what they represent.

Compare your water input and output rates to the slope of your line. What do you notice?

Use your equation to find how long it would take to empty your reservoir. If you have time, continue your experiment until empty and compare the actual time to your calculation.

What would your water level be after 8.5 minutes?

Since you are the water resource engineer, what recommendations would you make to keep this total draw-down from happening?

Reservoir Lab Rubric

Check and make sure you have completed all of the items shown below!!

Group Member Names _____

Scored Items	Points Possible	What you think you deserve	Teacher Score
Intro questions answered	3		
Reservoir Correctly Completed	5		
Output Rate Calculated	5		
Input Rate Calculated	5		
Reservoir Model Data Table Complete	10		
Completed graph of Data	5		
Best Fit Line Correct	3		
Correct Slope-Intercept Equation	5		
Reflection questions complete - (2 points per question)	14		
Positive Group Norms Followed, Negative Norms Avoided	10		
Materials and space cleaned up	5		
Total	**70**		