APES **Name_____**

Swamped! –Part 3: My Watershed

Background: Now that we know what can happen to our precipitation as it strikes different surfaces, let's trace it as it flows from one place to another. What determines where it flows? This activity will help you to identify your local watershed and give you information that can be used in problem solving a water protection plan for your area.

Question / Initial Thoughts:
Use the space below to describe what you think is in your watershed and how water moves throughout your watershed.

Part 1: Mapping our Watershed

Materials:

- Topographic map of your area
- Tracing paper
- Tape
- Colored pencils

Procedure:
1. Survey your topographic map for features related to this topic, i.e. rivers, streams, populated areas, ponds, marshes, industries, etc...

2. Affix tracing paper to the corners of the map with the tape. Mark your school with an "X".

3. Locate the nearest stream or river. Using a colored pencil, trace the waterway as far as you can upstream and downstream. Draw in and label all upstream bodies of water, including lakes, tributaries, and marsh areas.

4. The sources of these waterways are the highest points in your area where rainwater and melted snow begin to drain. Use the same colored pencil to mark each of these sources with an "O" for origin. This entire colored area, land and water, is your watershed. Next, draw arrows to show the movement of water as it travels from high to low.

5. With another colored pencil identify with lines or dots the populated areas and all the places that could produce pollution and affect your watershed. These areas can represent houses, factories farms, golf courses, and other potential sources of water pollution.

6. Provide a key to identify which color was used for each part of the procedure.

Analysis:
1. Describe the major components of your local watershed.

How did you determine the direction the streams in your watershed flowed?

2. Describe 5 potential sources of point and non-point water pollution in your watershed.

3. Locate one of your "O's." Describe where pollution entering at that point may travel to as it moves through your local watershed.

4. If pollution enters the stream near your community, what natural mechanisms can prevent it from getting into other parts of the watershed?

5. Where does your watershed ultimately drain? _____

6. Explain why it might be useful to think of our oceanic planet as one giant watershed.

Part 2: Exploring the Characteristics of our Watershed
Now that you have the lay-of-the-land, you will explore your local watershed using digital data tools. Follow the steps below to investigate the characteristics of your watershed.

Materials:

- Computers with Internet access
- Model My Watershed: https://app.wikiwatershed.org

Procedure & Questions:
1. Go to Model My Watershed and spend a few minutes to familiarize yourself with the buttons and maps. Next, put your school address into the search bar to bring up your location. Change the view to "satellite."

How does the map on Model My Watershed compare to the topographic map? What are the benefits of using both models of your location?

2. Turn the different hydrologic unit code (HUC) layers one at a time starting with USGS Subbasin Unit (HUC-8), followed by USGS Watershed Unit (HUC-10), and then USGS Subwatershed Unit (HUC-12). While each layer is turned on, roll your curser over the map to discover the names of each area within the layer.

Define" hydrologic unit code" based on what you see, and then describe what happens when you change layers.

Identify your watershed names for the following:

USGS Subbasin Unit (HUC-8): _____

USGS Watershed Unit (HUC-10): _____

USGS Subwatershed Unit (HUC-12): _____

3. Leave the USGS Subwatershed Unit (HUC-12) turned on and zoom out until you can see the entire subwatershed unit that includes your school.

How many subwatersheds are in your town? _____
List them:

4. Select one of the subwatersheds, and click someplace in the middle of the subwatershed unit. This will take you to a new screen that provides detailed land cover, soil, and animal analysis.

What is the area (km^2) of this subwatershed? _____

List the top 5 land covers found in this subwatershed and their percentages:

List the top 2 hydrologic soil groups (A-D) and their percentages:

5. In the upper right corner, click on Model, and select "Site Storm Model" and leave the model at Current Conditions, and set the precipitation to 5 cm. As you manipulate the variables, the output of the model will adjust itself. In the space below, copy the data from the Runoff and Water Quality tables.

Runoff Table:

Water Quality Table:

6. What do you think would happen if you change the land cover of the subwatershed?

Click on the "New Scenario" tab, and change your land cover or select a conservation practice. Once you select an option, you will identify areas in your subwatershed where you want that option. After identifying an area, run the model leaving the precipitation at 5 cm. Use the space below to document the changes in the runoff and water quality. Note that you can click the "Compare" button in the upper right to see how your model-runs compare.

Runoff Table:

Water Quality Table:

Reflection:
What can you use this watershed tool for?

Part 3: Where does the water go in our watershed?
Now that you know the characteristics of your watershed, you will explore how surface water flows throughout it, and the types of land use and land cover surrounding the surface waters that may affect water quality and quantity within your portion of the watershed. Follow the steps below to investigate the streams and tributaries in your watershed.

Materials:

- Computers with Internet access
- USGS StreamStats: https://streamstatsags.cr.usgs.gov/streamstats/
- USGS National Map – Hydrology: https://viewer.nationalmap.gov/viewer/nhd.html?p=nhd

Procedure & Questions:
1. Go to the USGS Stream Stats website at: https://streamstatsags.cr.usgs.gov/streamstats/ and in the "search for a place" box put in your zip code. Next, click on New Jersey in the left menu. You can close the dialogue box with the latitude, longitude, and other georeferencing data.

2. Zoom to Level 15, and click on "delineate" to add a point to the map. Click on a blue point on a stream in your area, and you will see a yellow partitioned area around the stream which is the drainage area for that stream.

3. When the delineation is complete, click “continue” in the left menu. Next, Under “Select Scenario” select “Seasonal Flow Statistics.” Click on “Basin Characteristics” and then click on all of the boxes. Finally, click “continue” to build your report, and then “continue” to read your report. To save your file, click on “Download CSV” to save the file to your download folder on your computer.

Use the space below to summarize the characteristics of the drainage are you selected. You will find this information on the report you created.

5. In the upper left corner you will see a small stack  . Click on this stack to reveal more options to use with StreamStats. Click on Basemap, and then change the basemap to “ESRI Imagery.” Zoom into your drainage area to begin to quantify the amount of impervious surfaces in that area, the sources of water contaminents, etc…. Explore the use of this data tool, and report your findings below.

6. One last data tool! – Go to USGS National Map – Hydrography at https://viewer.nationalmap.gov/viewer/nhd.html?p=nhd This data tool will provide you with additional information such as the direction of the flow of the streams.

Explore the various layers available and use the space below to describe what this data tool can be used for when studying our watershed.