The Hillsborough River:

Part of Our Planets Water System

In each community, the source of the water can be different. Some communities depend on groundwater and some on surface water. Some communities depend on joint partnerships with neighboring communities so that they can share the same water source. For us, the city of Tampa has a priceless resource, **the Hillsborough River**. From this river, our city can sustain itself from a continuous and clean source of potable water. But where does this water come from? What role does the Hillsborough River play in the overall water system in Florida?

The Hillsborough River headwaters start in the Green Swamp near the juncture of Hillsborough, Pasco and Polk counties, and flows 54 miles through Pasco and Hillsborough Counties to an outlet in the city of Tampa on Tampa Bay. The middle river is the portion of the river north of the dam at 30th Street and is the primary source of water for Tampa.

Brief History of Water in Tampa

In the 1800s, long before we utilized the water from the Hillsborough River, citizens got their water by private wells, cisterns and tanks. Tampa's first water plant went into operation on April 20, 1899, operated by the privately owned, **Tampa Waterworks Company**. It pumped well water to supply the city of Tampa until March 6, 1923, when the people voted to purchase the Waterworks plant for the city.

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The Hillsborough River as part of the big picture.

Working backwards, the Hillsborough River is part of a larger water system that sustains Florida and the southeastern US. The Green Swamp is a wetland, which is characterized as having a water table that stands at or near the land surface for a long enough season each year to support aquatic plants. The Green Swamp is part of a larger watershed in where water flows down hill into the wetland. As water passes through the soil it will continue to move until underground pressure forces it to remain in one place, thereby, the water table is the level at which the groundwater pressure is equal to atmospheric pressure. The relatively horizontal plane atop this zone constitutes the water table. A sustainable amount of water within a unit of sediment or rock, below the water table, is called an aquifer. Aquifers and groundwater are the secondary sources of potable water for the city of Tampa. When we are in period of drought, the city of Tampa can access groundwater from the aquifer to the Hillsborough River. In Hillsborough County, we have a second watershed that contributes water to the Hillsbrooug River, the Hillsborough River Watershed spans a total of 379.9 square miles, 48% of which lies within Hillsborough County.

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Exercise: Build a Watershed

This experiment illustrates the basic properties of a watershed: how water flows from higher elevations to lower elevations, and how watersheds are interconnected. You will understand how the placement of buildings, roads, and parking lots can be important to watershed runoff, and how careless use and disposal of harmful contaminants can have a serious effect on downstream watershed denizens.

Materials Needed

- ☐ 1 large tupperware container (about 1.5'W x 3'L x 1'H)
- ☐ 2 lbs. of modeling clay 3 lbs. of sand (any type of sand will do)
- ☐ 2 lbs. of aquarium gravel
- ☐ 1 roll of wax paper (or any other impervious, water repellant surface, tin foil, plastic wrap, etc.)
- ☐ 1/4 cup of cocoa mix, iced tea mix, or other flavored drink mix (to represent chemicals)
- ☐ 1 spray bottle or bucket full of water

Procedure:

1. Wash the aquarium gravel carefully to remove any powdery residue that may add cloudiness to the water. Fill the container to about 2 inches from the bottom with the gravel. Slope the gravel slightly so, that at one end (downslope), the gravel is only about _ inch deep and, at the other end (upslope), the gravel is about 3 inches deep. This gravel layer will represent the aquifer.

2. Mix the clay and the sand. The consistency of this mix should be gritty, with slightly more clay than sand. This mixture should allow water to run freely over it, but if left standing, the water should slowly permeate the surface. Add this mixture to the container carefully, so as not to disturb the slope of the aquifer already placed. The slopes should be similar, with about 2 inches of sand/clay mix overlying the gravel already placed, and on the downhill end there should be about 3" of gravel left exposed.

3. Carve a channel in the middle of the clay/sand layer, about _ inch deep and about 1 inch wide. This channel will represent the main river of the watershed. Near the top of the slope, split the channel into two or three separate channels to represent tributaries. You may wish to add other tributaries along the main branch of the "river" to further illustrate other watersheds.

Exercise: Build a Watershed (continued)

4. With some extra clay/sand mix, build little hills between the tributaries. These hills separate the smaller watersheds, but when looked at as a whole, the entire "river" system is one watershed. You may also wish to add some small model trees or green felt to represent forests or fields. Buildings can be represented with small blocks of wood.

5. Along the main river, flatten out an area that is about 8 inches by 3 inches. Cut out a piece of wax paper to be about 4 inches by 3 inches in size. Stick this down onto the clay sand mix, sloping it slightly towards the river. If necessary, use some clay to hold the edges down. Explain to students that this wax paper represents the impervious surface of a parking lot.

6. Fill the bottom of the aquarium up to about 2 inches from the bottom with water. The water should fill all of the aquarium gravel "aquifer" area, and should just reach up to the lowest extent of the clay/sand mixture. Explain to students that the aquifer captures and transports water that seeps down through the soil.

7. Using the spray bottle, simulate rain over the flattened soil area and the parking lot. Note that the "rain" soaks through the soil, but runs off the parking lot to the river.

8. Sprinkle some cocoa mix over the sides of one of the smaller watershed, the cocoa represents pollution. Over one of the unpolluted "watersheds," cause some rain with the spray bottle (*it may be necessary to cause more rain by pouring water). Note that the runoff from the rain is clean. Now, make it rain over the polluted area. Note how the pollution travels down through the watershed, contaminating all downstream areas.

Follow-Up Questions

1. What are some possible sources of watershed pollution the City of Tampa?
2. What other impervious surfaces besides parking lots can cause excessive runoff in a watershed?
3. What can be done to reduce our impact on watersheds and their environment?