

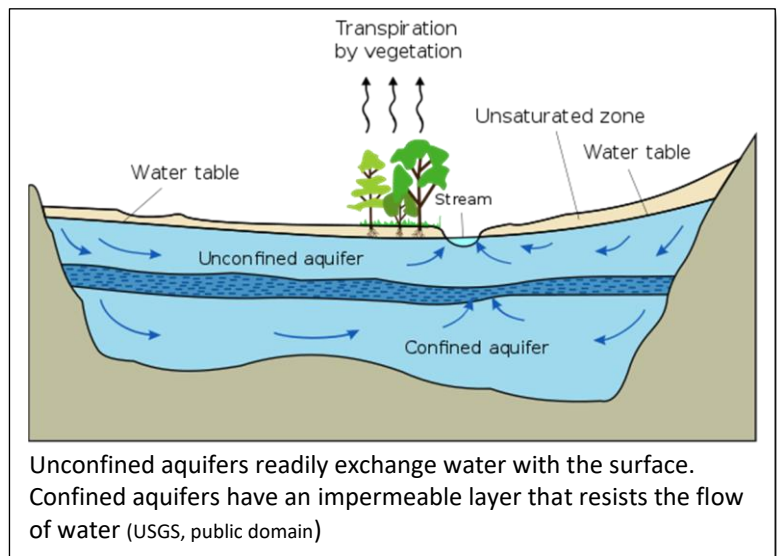


Groundwater fills the pores in layers of rock and sediments. Layers that contain water are known as aquifers. In this activity we will model confined and unconfined aquifers, observing the flow of water and contaminants.

Groundwater may be confined by an **aquiclude** that does not allow any water movement (shown in brown in the diagram). An **aquitard** is a layer that acts as a barrier but allows some water to seep through (shown in dark blue in the diagram).

Materials

- Clear cup
- Crushed ice
- Drinking straw
- Lemonade
- Ice cream
- 100s & 1000s
- Blue food colouring



Unconfined aquifers readily exchange water with the surface. Confined aquifers have an impermeable layer that resists the flow of water (USGS, public domain)

Directions

- Fill a plastic cup 1/3 with crushed ice (represents the gravels & sands of a confined aquifer)
- Add lemonade to cover the ice (represents groundwater)
- Add a straw (represents a bore)
Putting the straw in before the ice cream is important when sealing the aquifer
- Add a layer of ice-cream (represents the confining layer)
be sure that it seals the sides
- Add more crushed ice on top of the confining layer (represents the unconfined layer)
- Add 100's & 1000's (represents contaminants)
- Add blue food colouring to another bottle of lemonade (represents rainfall or aquifer recharge) and pour it over the top of the unconfined aquifer (the top section)
- Note the movement of the contaminants
- Draw (suck) up through the bore (straw) to see what happens when a confined aquifer is depleted

Geological Terms and Concepts

Water table, saturated zone, permeable, porous, aquifer, aquitard, aquiclude, confined, unconfined, sedimentary rocks, sandstone, shale, limestone



Discussion

1. Draw a diagram of the experiment and label it with geological terms that describe the system.
2. Describe what happened during the recharge process (when blue lemonade was added).
3. Based upon your observations, did the ice cream represent an aquitard or an aquiclude? Explain.
4. What will happen to water quality in different types of bores if there is surface contamination? (see diagram below for examples)

Diagram of experiment

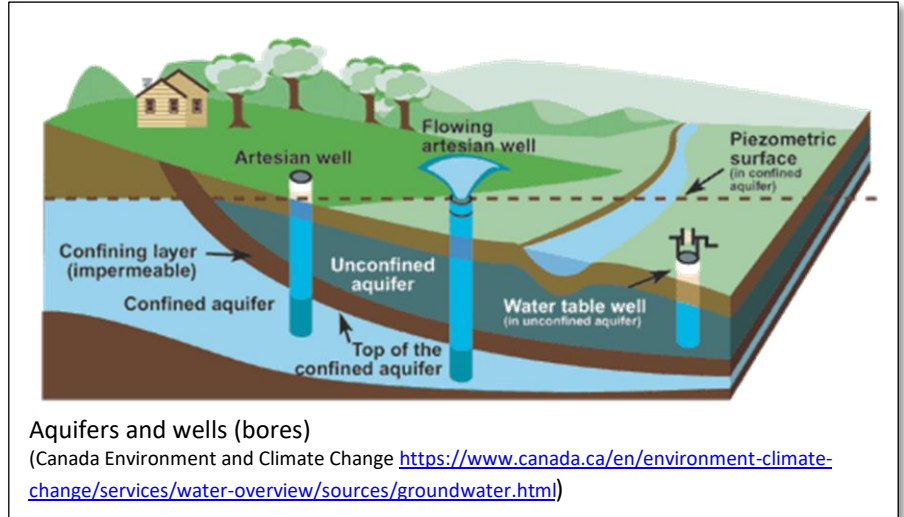
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5. Match each of the following rocks with an appropriate groundwater term.

- | | |
|-----------|-----------|
| Limestone | Aquiclude |
| Sandstone | Aquifer |
| Shale | Aquitard |



Reference:

Thank you to the Ribbons of Blue program for sharing this fantastic activity with us many years ago!

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