

Groundwater Flow Model Read this First

Groundwater is an important natural resource. Between 80 and 85 percent of the population uses ground water as a drinking water supply. Groundwater is used for irrigation and also used by livestock, industry and in a multitude of other ways. In many places, ground water discharges to the surface and serves as the base flow for streams. Groundwater's importance results, in part, from its widespread availability and use. As a result of an increasing number of water quality problems, there is a growing concern about protecting the quality of our groundwater supplies, along with conserving our available supply.

The groundwater flow model is used to demonstrate groundwater movement principles. Constructed with clear Plexiglas, the model allows viewers to watch how the water within a groundwater system travels. For example, the movement of water towards a pumping well can be easily observed.

Water is introduced into the model using inverted quart jars at the ends of the model. A vacuum pump is used to "pump" water from the two wells; one well is in the unconfined aquifer, the other is in the confined aquifer. Observation wells show the ground water flow patterns as the wells are pumped. Colored water is used to easily demonstrate the water movement patterns. Colored water can also be used to show how contaminants might move within a ground water system. The "contaminants" can be introduced at the surface or injected at three points within the aquifer.

The groundwater flow model can be used to illustrate the following principles:

General information about ground water.

- Ground water often comes from nearby sources.
- Ground water is contained in pore spaces and cracks.
- Ground water flows from high head to low head.
- Ground water can be withdrawn from wells.
- Ground water is part of the hydrologic cycle.
- Ground water is recharged by precipitation.
- Human activities can contaminate ground water.
- Wells can be contaminated by human activities.

Water quality.

- Water quality can vary within an aquifer.
- Contamination may be continuous or intermittent.
- Pollutants travel with the ground water.
- Wells can cause ground water pollution.
- Contaminated ground water can pollute surface water.
- Contaminated surface water can pollute ground water.

Properties of aquifers.

Definition of aquifers.

Definition of water table.

Definition of potentiometric surface.

Definition of artesian aquifers.

Springs may originate in artesian aquifers.

Confining layers usually leak.

Texture of the aquifer materials affects flow rate.

Capillary action may cause upward movement of water.

Characteristics of water wells.

Ground water can be withdrawn from wells.

Observation wells and drinking water wells may differ.

Definition of potentiometric surface.

Flowing wells may result from artesian aquifers.

Definition of cone of depression.

Wells may interfere with each other.

Wells can be contaminated by human activities.

Wells can cause ground water pollution.

The Groundwater Flow Model can be borrowed for classroom use. In order to check out the model you must first take a short quiz on care and use of the model. The first step is to download the "Model Curriculum Guide" and read it carefully paying particular attention to the "Set up and Demonstration" section. When you think you are ready, take the on line quiz. You will be notified via email of your score.