



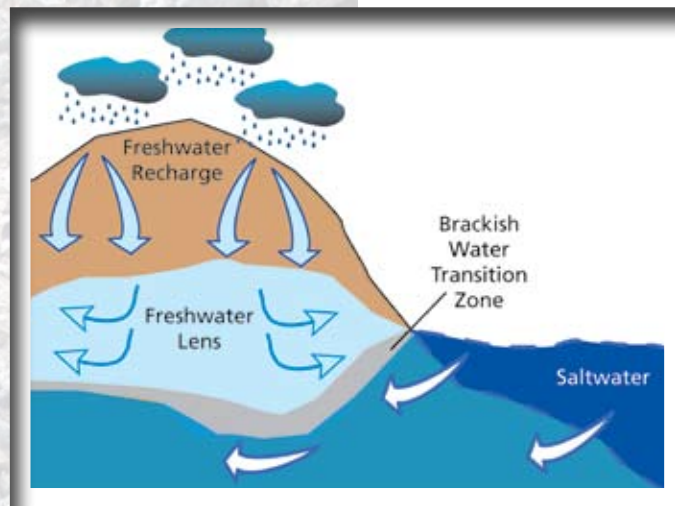
Groundwater Dynamics Monitoring

Network Parks Where Groundwater Dynamics is Monitored

- ▲ Kaloko-Honokōhau National Historical Park (KAHO)
- ▲ American Memorial Park (AMME)

Importance: Sustaining Life on Land

Groundwater characteristics reflect the interaction of fresh groundwater from the land and saltwater from the ocean. The source of fresh groundwater in tropical oceanic islands is precipitation. The fresh groundwater forms a lens-shaped body underlain by salty water from the ocean. Freshwater flows from inland areas where most recharge occurs and the lens is thicker, to coastal areas where the lens is thinner. Groundwater discharges into springs, streams, and the ocean. Depressions in the land surface at the coast expose the top of the freshwater lens and form surface-water bodies such as wetlands, lakes, ponds, anchialine pools, and springs. If the freshwater lens decreases, saltwater may encroach landward to fill the void. This can result in a reduction of the water table, the loss of wetland habitat, and an increase in salinity of coastal surface-water bodies. Because the biotic and ecological integrity of these coastal surface-water bodies and ecosystems (coastal strand flora, wetlands, fishponds, streams, and anchialine ponds) are intimately tied to water levels and water quality, they are also tied to the dynamics of groundwater. Consequently, the ecosystems that rely on coastal ground- and surface-water bodies are sensitive to changes in the groundwater system. Terrestrial plants with limited salinity adaptations, particularly coastal strand flora, can be adversely affected by salinity increases in groundwater as can the flora and fauna of wetlands, fishponds, streams, and anchialine ponds.



Oceanic island groundwater flows.

Long-Term Monitoring

The proposed groundwater monitoring program consists of periodic measurements of groundwater levels, temperature, and specific conductance (a measure of salinity) in selected wells in the parks. These wells penetrate below sea level and into the transition zone (between salt and freshwater) or through most of the thickness of the freshwater lens. This is the area where monitoring is more likely to show changes that may affect park resources. Of particular interest is a rise in the underlying saltwater. The groundwater will be measured by deploying automated electronic sensors and data loggers. Instruments will be calibrated and downloaded quarterly.

Monitoring Objectives

- ▲ Identify the present condition
- ▲ Determine trends and the rate of change
- ▲ Determine and document the periodicity and magnitude of long and short-term cyclical variations

Management Applications

- ▲ Early detection of groundwater trends before they affect other natural resources
- ▲ Develop mathematical models to understand groundwater trend cause and effect relationships
- ▲ Assist park resource management in understanding other park resources



Field crews taking groundwater measurements at wells.



Network website: <http://science.nature.nps.gov/im/units/pacn/>

Resource website: http://science.nature.nps.gov/im/units/pacn/monitoring/vs_groundwater.cfm