

Hydrogeology

Hydrogeology examines the interrelationships of geologic materials and process of water in other words the study concerned with surface water and origin and relation with the stratigraphy of the earth and ground water movement according to flow water movement law

Hydrology: The science that describes and predicts the occurrence, circulation and distribution of the earth's water.

_There are two principal sides of this science

The global hydrologic cycle: Transfers of water between the land, ocean and atmosphere.

The land phase of the hydrologic cycle: The movement of water on and under the land surface, physical and chemical interactions with earth materials accompanying that movement, and the biological processes that conduct of affect that movement.

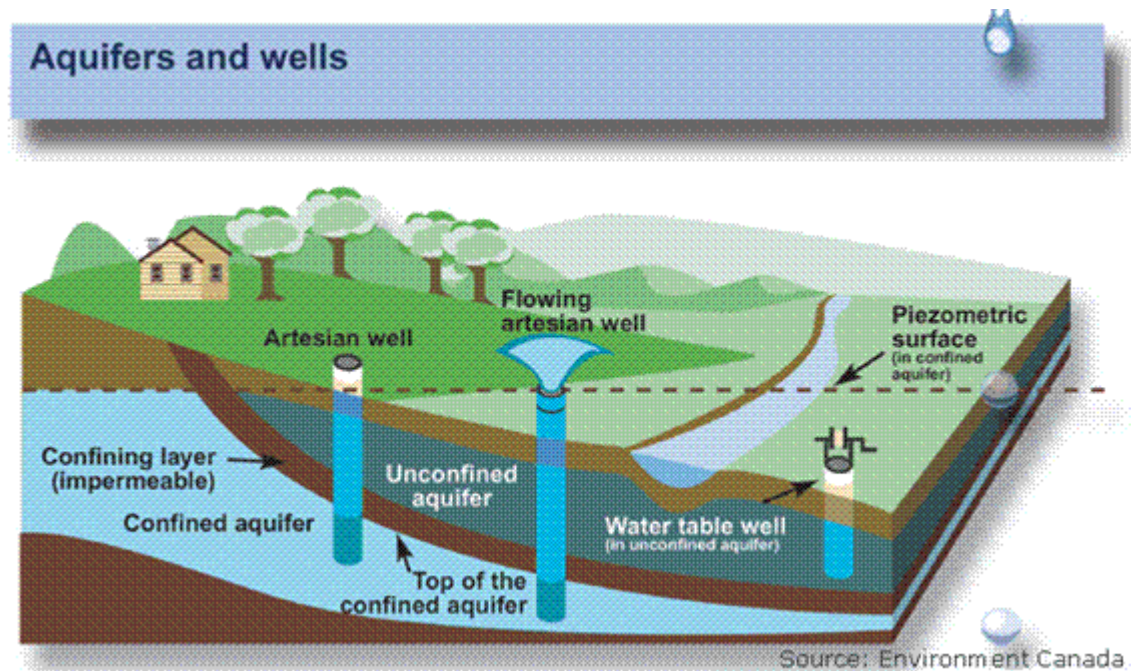
Q: Why study hydrogeology?

Hydrogeology is useful because it studies the movements of water, energy, chemicals, and solid materials underground. Groundwater is not visible from

Hydrogeology

Second stage

the surface, but its presence impacts living creatures, landscapes, and ecosystems.



Hydrology science branches

Chemical hydrology is the study of the chemical characteristics of water.

Ecohydrology is the study of interactions between organisms and the hydrologic cycle.

Hydrogeology is the study of the presence and movement of groundwater.

Hydroinformatics is the adaptation of information technology to hydrology and water resources applications

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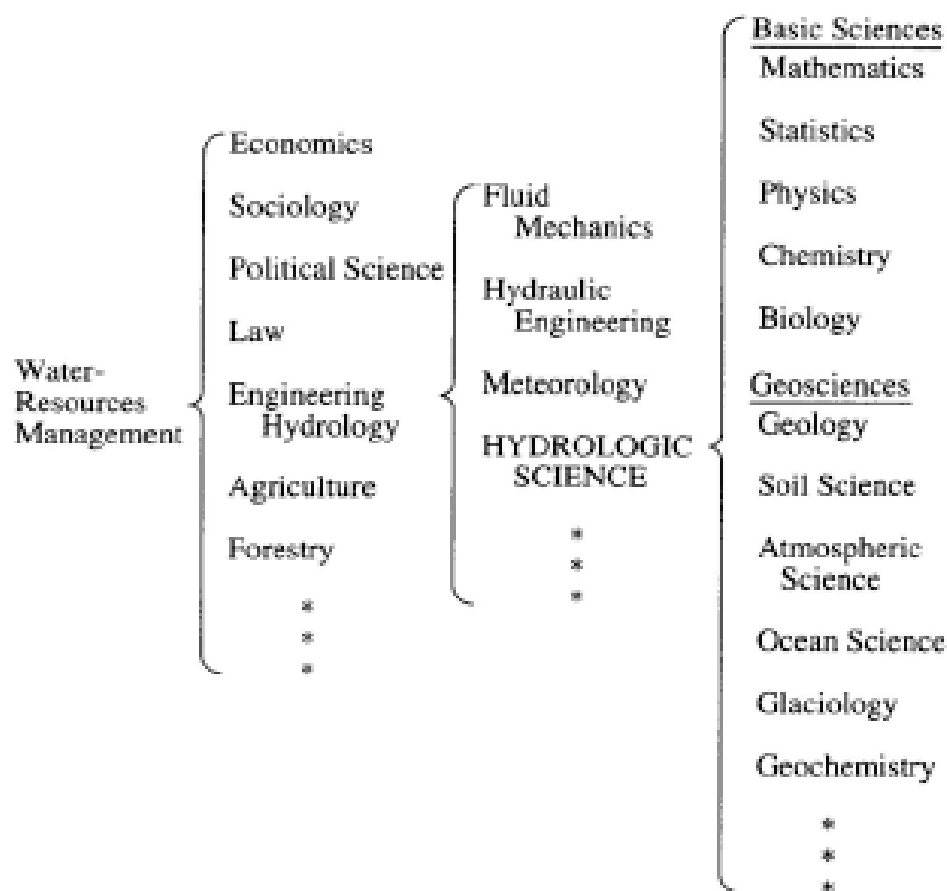
Isotope hydrology is the study of the isotopic signatures of water.

Surface hydrology is the study of hydrologic processes that operate at or near Earth's surface.

Drainage basin management covers water storage, in the form of reservoirs, and floods protection.

Water quality includes the chemistry of water in rivers and lakes, both of pollutants and natural solutes

The figure below shows position of hydrologic science in the spectrum of basic sciences to water resource management.



Scope of Hydrogeology

- 1: Groundwater occurrence and availability**
- 2: Groundwater flow and transport**
- 3: Aquifer characterization**
- 4: Groundwater quality**
- 5: Groundwater management**
- 6: Interaction between surface water and groundwater**

What does a hydrogeologist do?

- Design and construction of water wells for drinking water, irrigation and other purposes;
- Study how much groundwater is available to sustain water supplies to prevent groundwater depletion and adverse impacts on natural baseflows to rivers and wetland ecosystems;
- Study water quality to ensure that it is fit for its intended use;
- Clean up of groundwater pollution;
- Construction dewatering schemes to help with groundwater problems associated with mining;
- Schemes to harness geothermal energy through groundwater-based heat pumps.

Properties of water

- *Freezing point: 0°C (273.16 K)
- *Boiling point: 100°C at sea level pressure
- *Density of water at 0°C: about 1000 kg m⁻³
- *Density of ice: about 917 kg m⁻³
- * Water can act as both acid and base, which means that it is amphoteric in nature.
- * Water has a very strong hydrating tendency
- * Surface tension, water has an unusually high surface tension of 71.99 mN/m at 25 °C which is caused by the strength of the hydrogen bonding between water molecules. This allows insects to walk on water
- *Capillary action, because water has strong cohesive and adhesive forces, it exhibits capillary action. Strong cohesion from hydrogen bonding and adhesion allows trees to transport water more than 100 m upward

Important References

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