STEAM Approach to Investigating the Hydrologic Cycle

Handout 6: Prior Knowledge

Hydrology definitions

- Hydrologic cycle: the sequence of conditions through which water passes from vapor in the atmosphere through precipitation falling upon land or water surfaces and ultimately returns into the atmosphere as a result of evaporation and transpiration.

- Precipitation: the process of liquid or frozen water in the atmosphere falling back to the Earth. It may be in the form of rain, snow, hail, rime, hoarfrost, or fog drip.

- Evapotranspiration: the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants.

- Condensation: the process by which water vapor becomes liquid; the opposite of evapotranspiration.

- Infiltration: the process by which water on the ground surface enters the soil.

- Runoff: the flow of water occurring on the ground surface when excess rainwater, stormwater, meltwater, or other sources, can no longer rapidly infiltrate in the soil.

- Conceptual model: a schematic description of a system, a theory, or a phenomenon that is based on a scientist's experience, education, understanding, intention and attitude. It is used to inform the development of a quantitative model and helps to determine what is known about a topic.

- Physical model: a constructed copy of an object that is designed to represent that object. It can be scaled (with same proportions) so that it is smaller or larger than the real object of study.

- Mathematical model: a quantitative approximation of the physical world. Such models are constructed based on conservation principles and/or empirical observations.

- Computational (numerical) model: a computer simulated quantitative approximation of a mathematical model.

- Hydrologic budget: a hydrological tool used to quantify the flow of water in and out of a system.

- Hydrologic budget equation

$$\Delta S = P - ET + GW_{in} - GW_{out} + Q_{in} - Q_{out}$$

Where ΔS is the change in storage, P is precipitation into, ET is evapotranspiration out of, GW_{in} is groundwater into, GW_{out} is Groundwater out of, Q_{in} is surface water into, Q_{out} is surface water out of the control volume.