

Hydrological Cycle (Chow et al. 2010)

- ▶ Water on the earth exists in a space known as hydrosphere that extends approximately 15 km up into the atmosphere and 1 km down in the lithosphere.
- ▶ In this space water circulates through maze of paths forming the hydrological cycle, which is the central focus of the hydrology.
- ▶ Hydrological cycle's many processes occur simultaneously and it has no starting and end.
- ▶ As shown in figure 1, water evaporates from the land surface and ocean to become part of the atmosphere. Water vapor is transported and lifted in the atmosphere till it condenses and precipitates on the oceans and land.

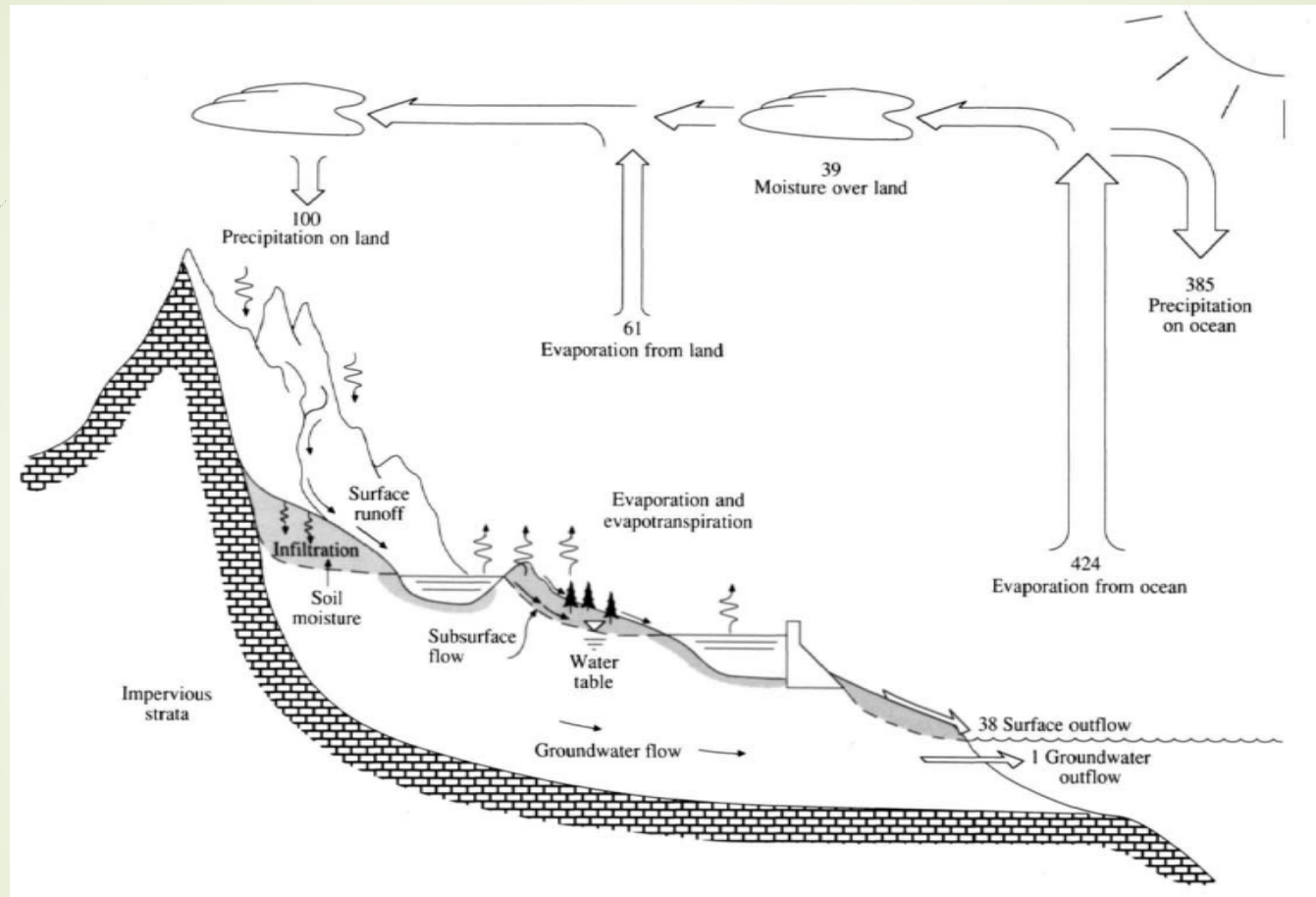


Fig. 1 Hydrological Cycle (Chow et al., 2010)

TABLE 1.1.1
Estimated world water quantities

Item	Area (10 ⁶ km ²)	Volume (km ³)	Percent of total water	Percent of fresh water
Oceans	361.3	1,338,000,000	96.5	
Groundwater				
Fresh	134.8	10,530,000	0.76	30.1
Saline	134.8	12,870,000	0.93	
Soil Moisture	82.0	16,500	0.0012	0.05
Polar ice	16.0	24,023,500	1.7	68.6
Other ice and snow	0.3	340,600	0.025	1.0
Lakes				
Fresh	1.2	91,000	0.007	0.26
Saline	0.8	85,400	0.006	
Marshes	2.7	11,470	0.0008	0.03
Rivers	148.8	2,120	0.0002	0.006
Biological water	510.0	1,120	0.0001	0.003
Atmospheric water	510.0	12,900	0.001	0.04
Total water	510.0	1,385,984,610	100	
Fresh water	148.8	35,029,210	2.5	100

Table from World Water Balance and Water Resources of the Earth, Copyright, UNESCO, 1978.

Fig. 2 Estimate World Water Quantities (Chow et al., 2010)

- Precipitated water may be intercepted by vegetation, become overland flow on the ground surface, infiltrate into the ground, flow as subsurface flow through the soil and discharges into streams in the form of streamflow.
- Much of the surface runoff and intercepted water returns to the atmosphere via evaporation. The infiltrated water may percolate deeper to recharge the groundwater, later emerging in springs or seepage into streams to form the surface runoff and finally flowing to the sea or evaporating into the atmosphere as the hydrological cycle continues.

- ▶ Figure 2 denotes estimated quantities of water on the earth in various forms. Around 96.5% of earth's water is in the oceans.
- ▶ If earth were an uniform sphere, then water would have cover earth to a depth of around 2.6 km. Of the remaining, 1.7 % is in the form of polar ice, 1.7% is in the form of groundwater and only 0.1% water is available in the surface and atmospheric water systems.
- ▶ The driving force of the surface water hydrology i.e. atmospheric water system i.e. atmospheric water system consists only 12900 km^3 of water which is less than one part in 100000 of all the earth's water.

- Out of earth's total freshwater, two-third is polar ice and majority of the remainder is groundwater going upto a depth of 200 to 600 m. Only 0.006 % of freshwater is consisted in the rivers. Biological water fixed in the tissues of animals and plants is about 0.003 % of freshwater, which is equal to half of the water volume contained in the rivers.
- Although water content in the surface and atmospheric water systems is less, large quantities of water flows through it yearly.
- Figure 1 shows chief components in units relative to annual land precipitation volume of 100. It can be found that, evaporation from the land surface consumes 61% of total precipitation volume, remaining 39% forming runoff to the oceans majorly as surface water.
- Evaporation occurring from oceans constitutes approximately 90% of atmospheric moisture.