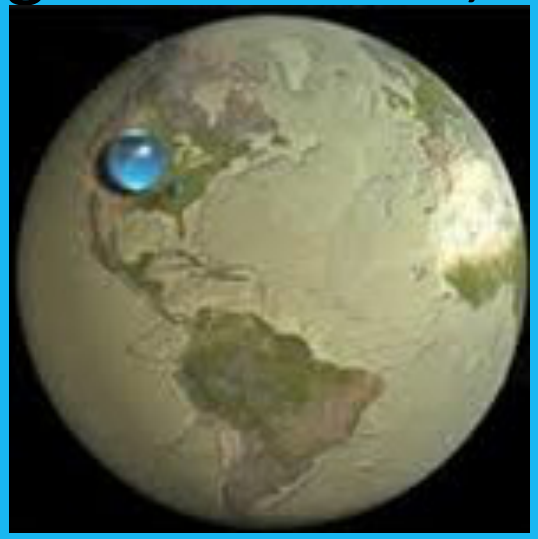
Distribution of water on the Earth

Prof. Anil Kumar
Department of Geology
Patna Science College
Patna University , Patna

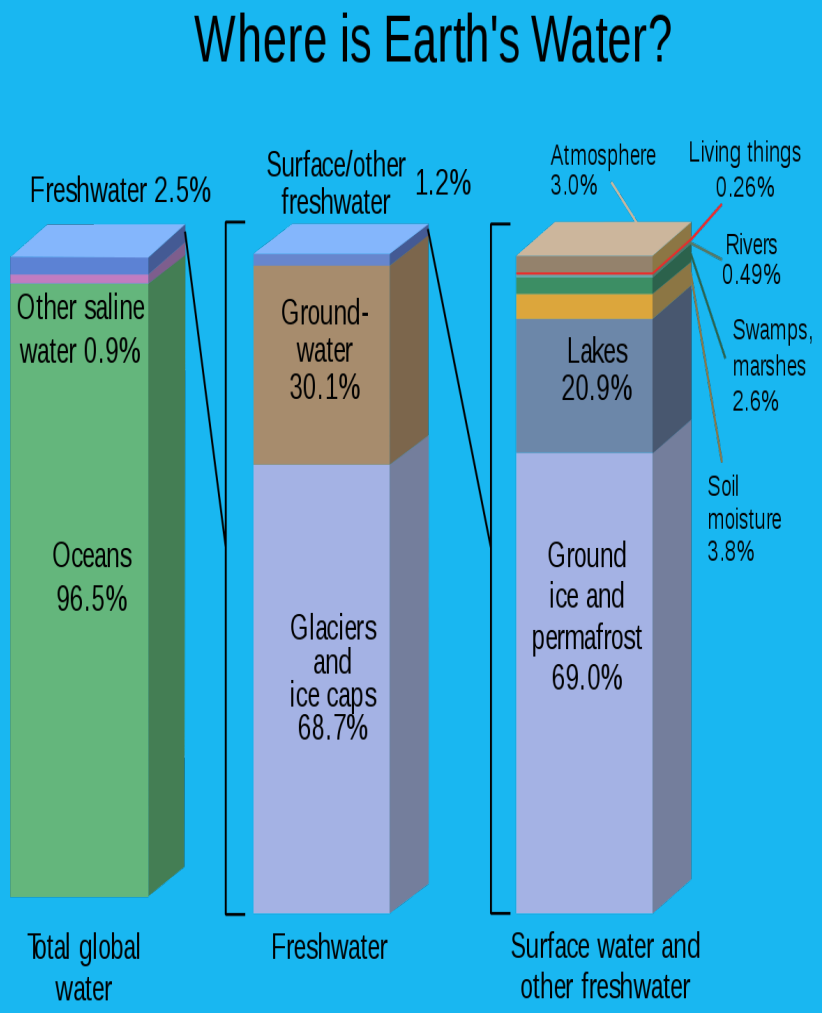
Water exists on, in and above our planet

- The big blue sphere represents the volume of all water in and above the earth .
- The smaller blue sphere represents earth ‘s fresh water in ground water, swamp, river and lakes.



Water distribution

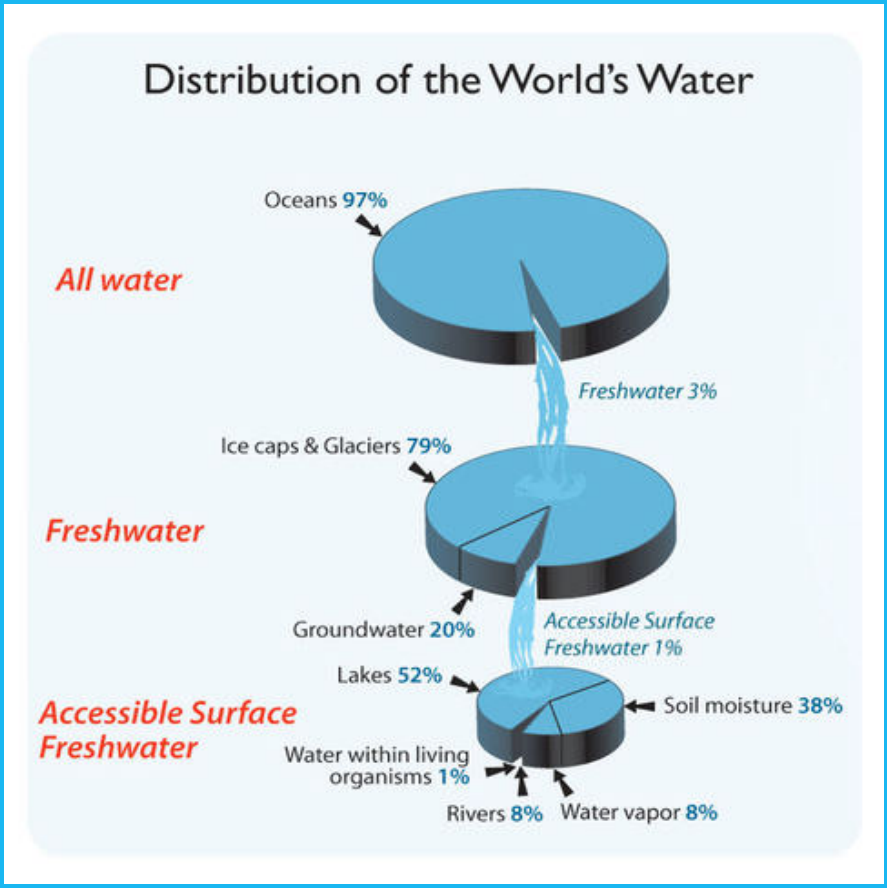
- The **distribution of water** on the **Earth's** surface is extremely uneven. Only 3% of **water** on the surface is fresh; the remaining 97% resides in the ocean. Of freshwater, 69% resides in glaciers, 30% underground, and less than 1% is located in lakes, rivers, and swamps.



- In the first bar, notice how only 2.5% of Earth's water is freshwater - the amount needed for life to survive.
- The middle bar shows the breakdown of freshwater. Almost all of it is locked up in ice and in the ground. Only a little more than 1.2% of all freshwater is surface water, which serves most of life's needs.
- The right bar shows the breakdown of surface freshwater. Most of this water is locked up in ice, and another 20.9% is found in lakes. Rivers make up 0.49% of surface freshwater. Although rivers account for only a small amount of freshwater, this is where humans get a large portion of their water from.

Distribution of world's water

- Most of Earth's water is salty water in the oceans. Approximately 3 percent of Earth's water is fresh.
- **Freshwater** is water that contains little or no dissolved salt. Most freshwater is frozen in ice caps and glaciers.



Fresh water

- On the Earth's surface, there **is much more freshwater stored in the ground** than there is in liquid form on the surface.
- Water from precipitation continuously seeps into the ground to recharge **aquifers**, while at the same time water in the ground continuously recharges rivers through seepage.

Volume distribution of water

Water Source	Water volume in cubic miles	Water volume in cubic	Percent of Freshwater	Percent of Total Water
Oceans, Seas and Bays	321, 000, 000	1, 338, 000, 000	-	95.4% Highest Amount
Ground Ice and Permafrost	71, 970	300, 000	0.86	0.022 Average Amount
Biological Water	268	1, 120	0.003	0.0001 Lowest Amount

In Detail

1) Ocean water — 97.2 percent
2) Glaciers and other ice — 2.15 percent
3) Groundwater — 0.61 percent
4) Fresh water lakes — 0.009 percent
5) Inland seas — 0.008 percent
6) Soil Moisture — 0.005 percent
7) Atmosphere — 0.001 percent
8) Rivers — 0.0001 percent.

(Source: Nace, USGS, 1967 and The Hydrologic Cycle “Pamphlet”, USGS, 1964)

Indian scenario

Surface water resources:

- Water resources including rivers, lakes or fresh water wetlands are known as surface water resources. Precipitation is the natural recharging source for the surface water resources and it also maintain the hydrological cycle. Rivers are the major source of water in India. The utilizable annual surface water in rivers of the country is 690 km^3

Top fifteen river basins in India: Average water flow and utilizable water			
River basins	Average annual water flow (in Km3/year)	Utilizable flow (in Km3/year)	% of total average annual water flow in India
Ganga–Brahmaputra–Meghna Basin	1202	274	61.6
West flowing rivers south of Tapi	201	36	10.3
Godavari	111	76	5.7
Indus	73	46	3.8
Krishna	70	58	3.6
Mahanadi	67	50	3.4
Narmada	46	35	2.3
Brahmni–Baitarani	28	18	1.5
East-flowing rivers between Mahanadi and Godavari	17	Un-assessed	0.9
West-flowing rivers of Kachchh and Saurashtra including Luni	15	15	0.8
Tapi	15	15	0.8
Subarnarekha	12	6.8	0.6
Mahi	11	3.1	0.6
East-flowing rivers between Pennar and Cauvery	10	17	0.5
Rivers draining into Bangladesh	8.6	NA	0.4
Total	**1887**	**649.42**	**96.62**

Source: *Water resources of India, Current Science, Vol. 89, No. 5, 10 September 2005,* by Rakesh Kumar, R. D. Singh and K. D. Sharma

Groundwater resources:

- Water sources like subsurface water or water within aquifers are known as ground water resources. Ground water resource recharge from the precipitation mostly in the monsoon season in India.
- Canal irrigation and other form of irrigation systems also contribute to the recharging of the ground water. The annual potential of natural groundwater recharge from rainfall in India is about 342.43 km^3, which is 8.56% of total annual rainfall of the country. The annual potential groundwater recharge augmentation from canal irrigation system is about 89.46 km^3 (Rakesh Kumar, R. D. Singh and K. D. Sharma).

THANK YOU