

CE100 Introduction to Civil Engineering

Water Engineering

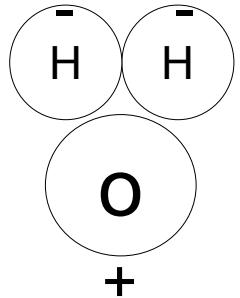
Lecture 7



Water Chemical Properties

☐ Two atoms of hydrogen

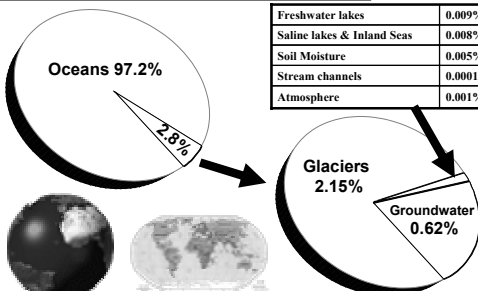
☐ One atom of oxygen



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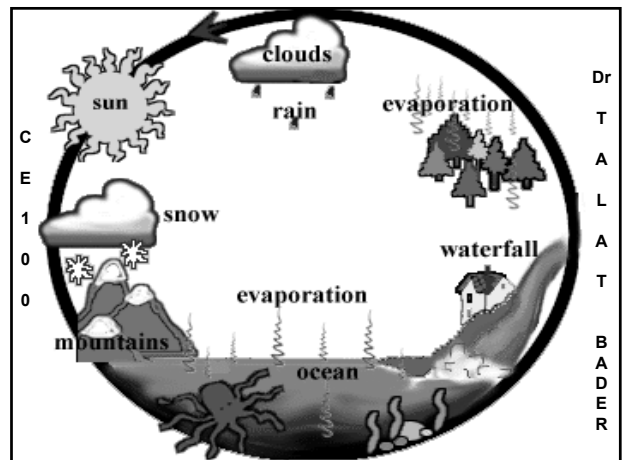
From where is water?

Freshwater lakes	0.009%
Saline lakes & Inland Seas	0.008%
Soil Moisture	0.005%
Stream channels	0.0001%
Atmosphere	0.001%

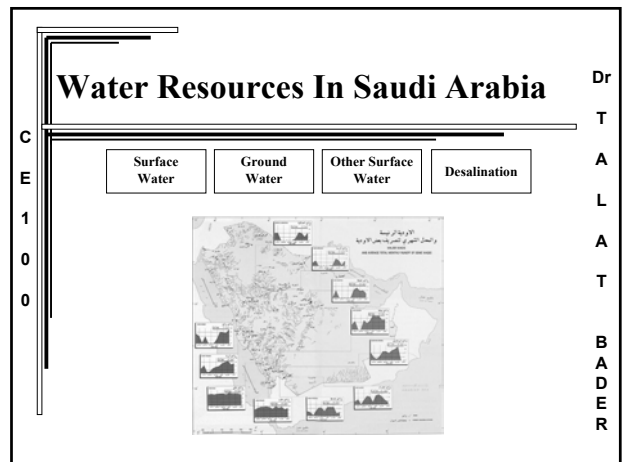
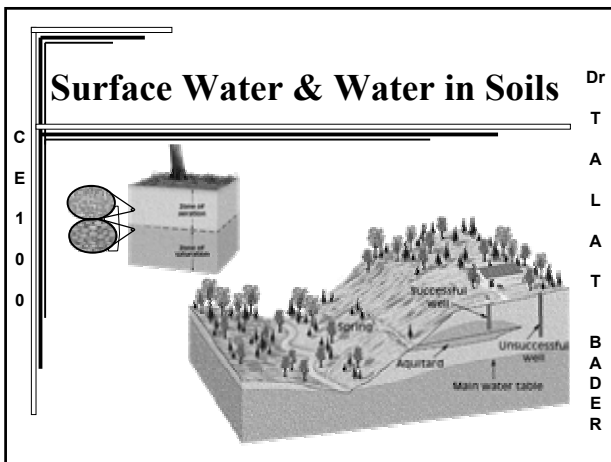
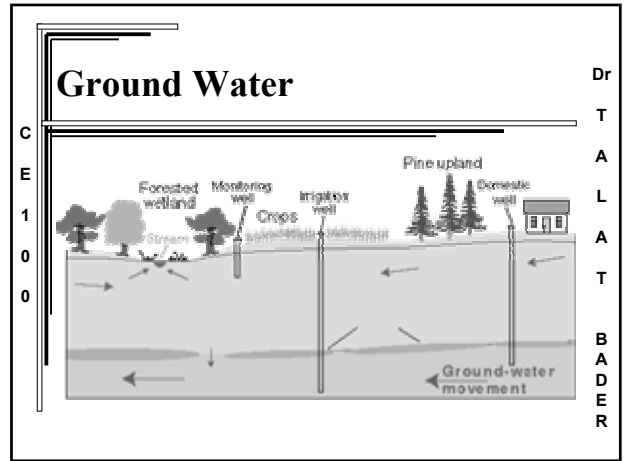
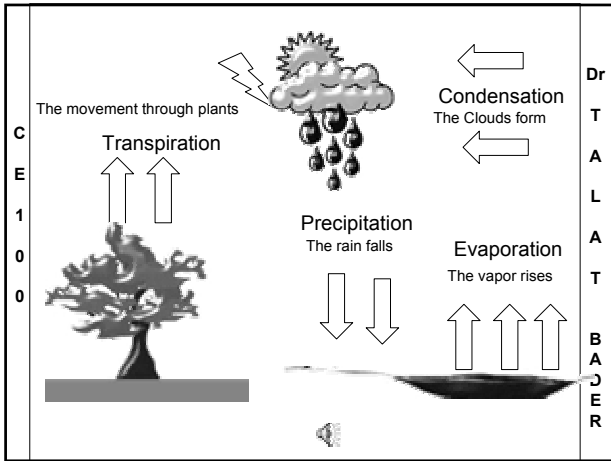


Non-ocean Component

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Water Resources In Saudi Arabia

Surface Water

Ground Water

Other Surface Water

Desalination



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Targeted National Water Balance during the Six Development Plant

Water Demand & Supply	1993-1994 1414- 1415H X 10 ⁶ m ³	1998-1999 1419- 1420H X 10 ⁶ m ³	Average Annual Growth (%)
Water Demand			
•Municipal & Industrial Purposes	1,800	2,800	9.2
•Agriculture	16,400	14,700	(2.2)*
Total Demand	18,200	17,500	(0.8)*
Water Supply			
•Surface Water & underground water liable for renewal	2,500 14,836	3,000 13,040	3.7 (2.6)*
•Underground water (non-renewable deep)	714	1,550	10
•Desalinated water	150	310	15.6
•Reclaimed treated sewage water			
Total Supply	18,200	17,500	(0.8)*

>(xx) Negative average growth
 >Decrease in the amount used from non-renewable resources from 14,836 to 13,040 = (-2.6%)

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Water Demand & Supply

- The Demand for water in Saudi Arabia is about 17 billion meter cube per year is needed.
- Where are we going to get this amount of water?
- From Desalination about 0.5 billion m³/year
- From Surface water about 2 billion m³/year
- This total about 17 - 2.5 = 15 billion m³/year from where Ground water !!!!
- If we look at the total amount of precipitation over the Kingdom of Saudi Arabia then we can say we really have a problem?????????

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Do we have Water Resources Problems

- Limited water, limited rain, no surface water.
- Increase in demand of water
- Not enough specialists to set up scientific system to solve water problem.
- Not enough information, data to help plan for the future.
- Many people do not think of water as a valuable source.

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Water Resources Engineering

- There is demand for water resources engineers for the following reasons:
 - Water Projects can't be cut.
 - Demand will keep Increase.

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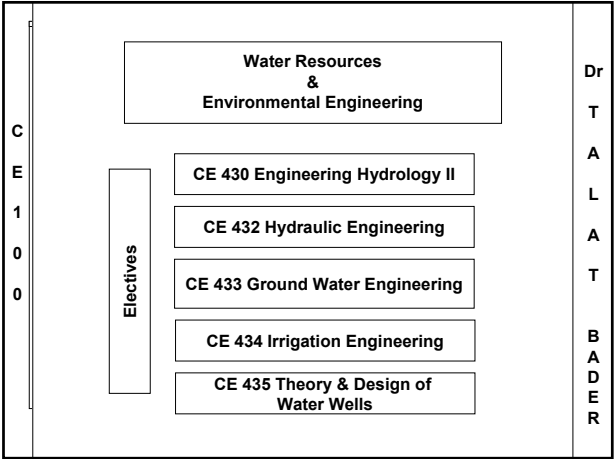
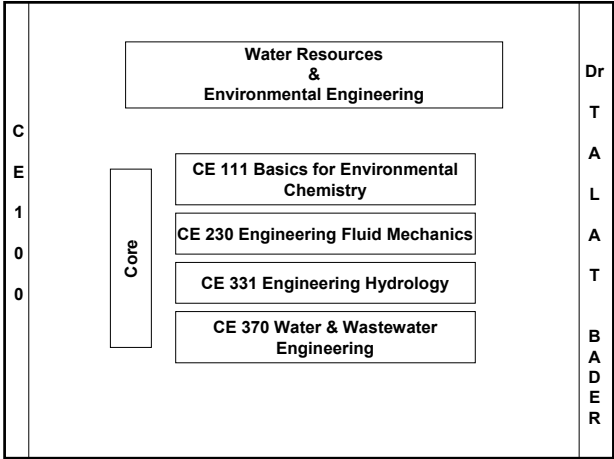
Water is needed?

- Water is needed more than ever before for the following reasons:
 - Development in medicine increased population.
 - Increased standard of personnel cleanness.
 - Industrial expansion.

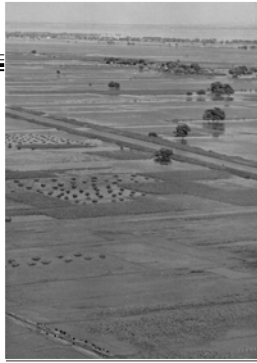
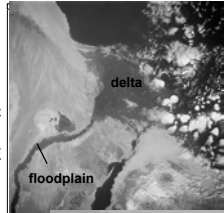
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C E 1 0 0	Future Challenge to Water Resources Engineering	Dr T A L A T B A D E R
	• Reclamation of wastewater.	
	• Develop water saving methods.	
	• Develop new irrigation practices.	

C E 1 0 0	Water Resources & Environmental Engineering	Dr T A L A T B A D E R
	<u>Core</u>	
	• CE 111 Basics for Environmental Chemistry (3-3-3)	
	• CE 230 Engineering Fluid Mechanics (3-3-3)	
	• CE 331 Engineering Hydrology (3-3-3)	
	• CE 370 Water & Wastewater Engineering (3-3-3)	
	<u>Electives</u>	
	• CE 430 Engineering Hydrology II (3-0-3)	
	• CE 432 Hydraulic Engineering (3-0-3)	
	• CE 433 Ground Water Engineering (2-3-3)	
	• CE 434 Irrigation Engineering (2-3-3)	
	• CE 435 Theory & Design of Water Wells (2-3-3)	



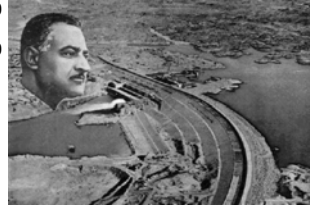
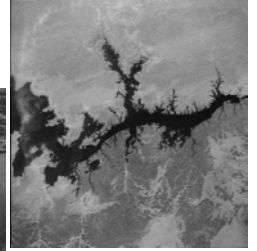
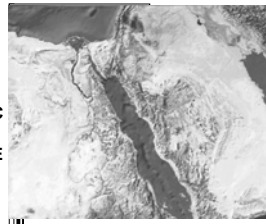
The Nile flood plains



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**Flood control:
The High Aswan dam,
lake Nasser and the Nile
river**



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