

Regional Water Resource Management

Module for ENVR 104 Unifying Concepts

Dept. of Environmental Sciences and Engineering

University of North Carolina at Chapel Hill

Dr. Greg Characklis

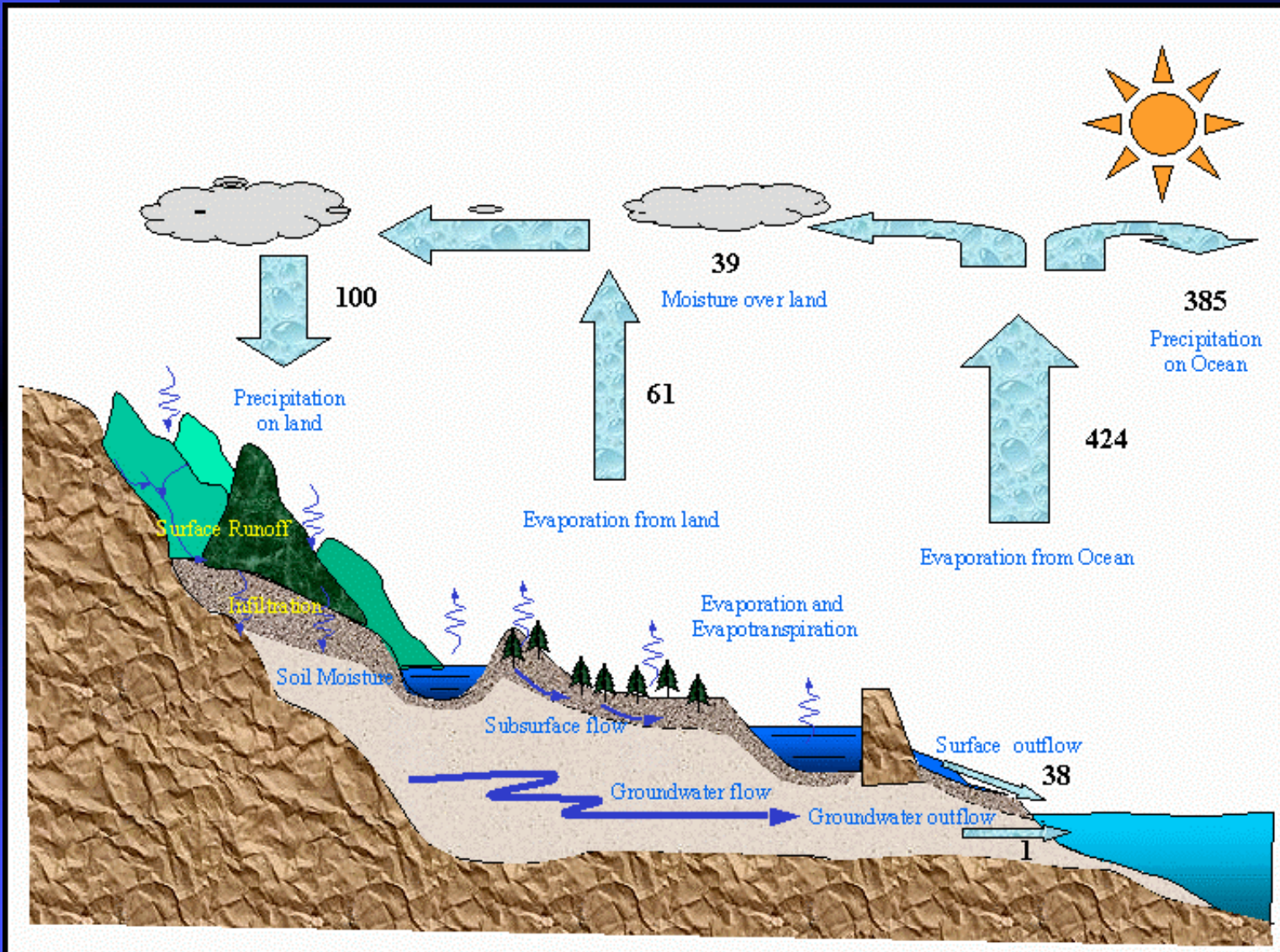
Accounting of Earth's Water Resources

Table 4.1 Estimated world water quantities

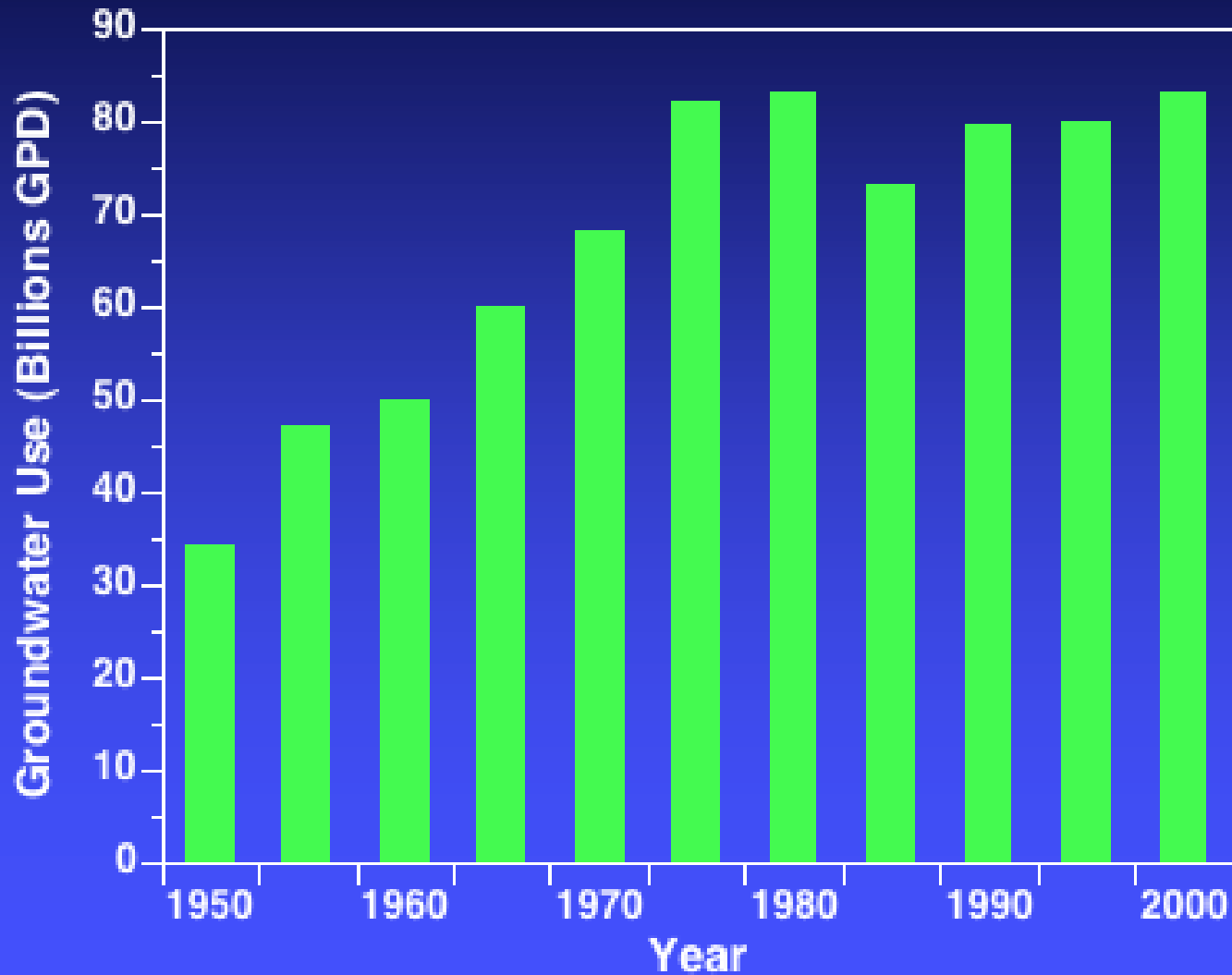
Item	Area (10 ⁶ km ²)	Volume (km ³)	Total water %	Fresh water %	Rates of exchange
Oceans	36.31	1 338 000 000	96.5		3000-30 000 yrs
Groundwater					
Fresh	134.8	10 530 000	0.76	30.1	Days to 1000 yr
Saline	134.8	12 870 000	0.93		
Soil moisture	82.0	16 500	0.001 2	0.05	2-52 weeks
Polar ice	16.0	24 023 500	1.7	68.6	1-16 000 years
Other ice and snow	0.3	340 600	0.025	1.0	
Lakes					
Fresh	1.2	91 000	0.007	0.26	1-100 years
Saline	0.8	85 400	0.006		10-1000 years
Marshes	2.7	11 470	0.000 8	0.03	
Rivers	148.8	2 120	0.000 2	0.006	10-30 days
Biological water	510.0	1 120	0.000 1	0.003	7 days
Atmospheric water	510.0	12 900	0.001	0.04	8-10 days
Total water	510.0	1 385 984 610	100.0		2800 years
Fresh water	148.8	35 029 210	2.5	100.0	

Adapted from UNESCO, 1978

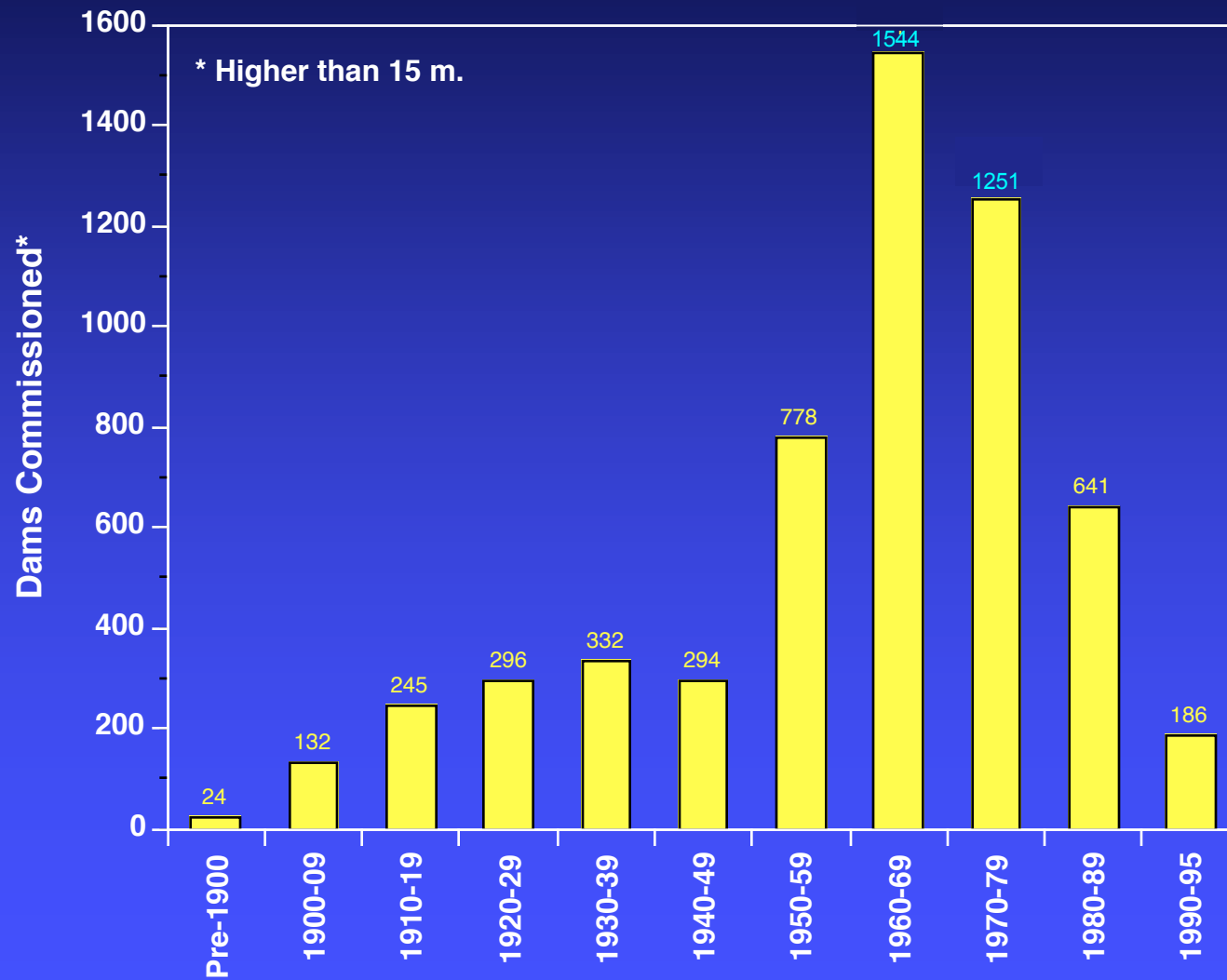
Hydrologic Cycle



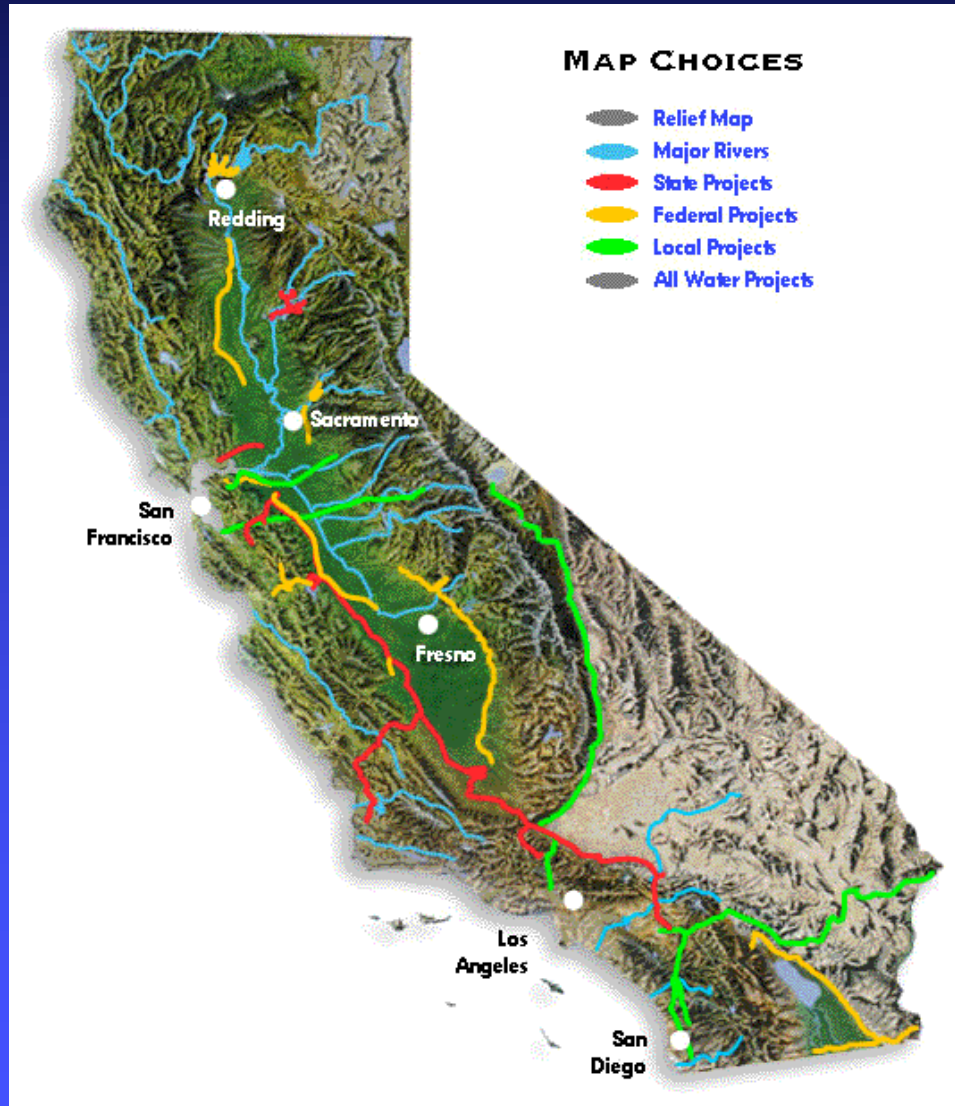
Groundwater Use in the United States



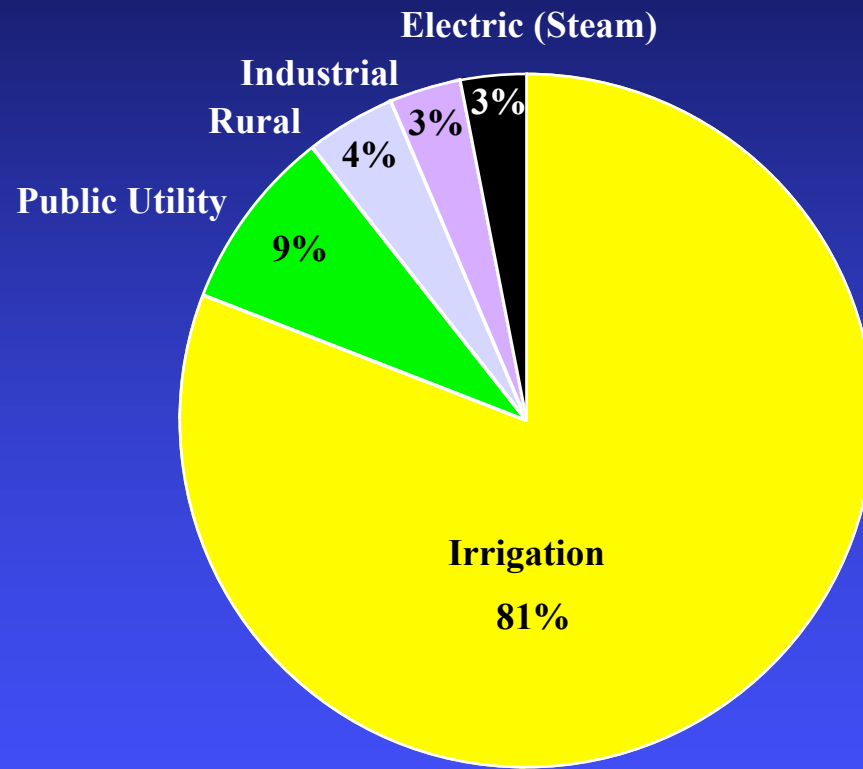
Dam Building in the United States



Water Conveyance Network



Consumptive Water Use in the U.S.

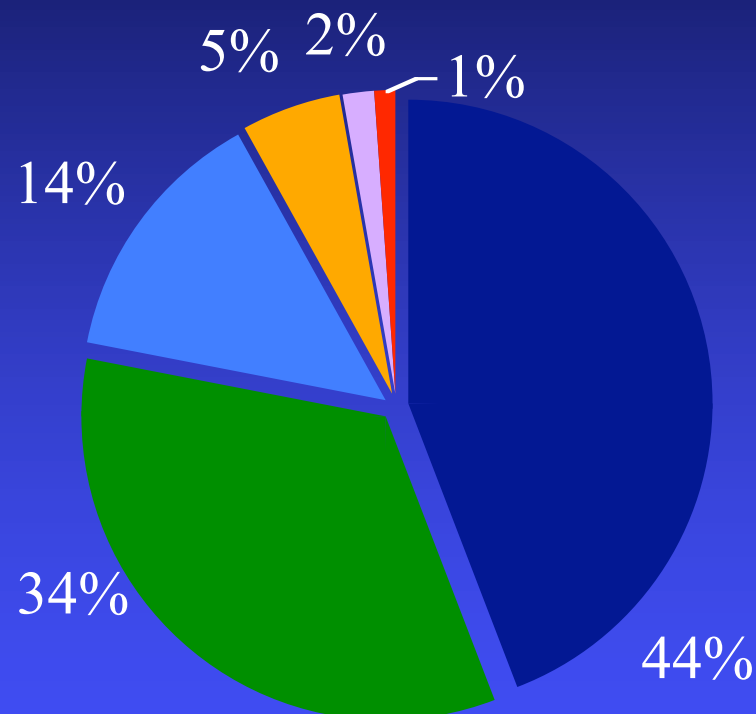
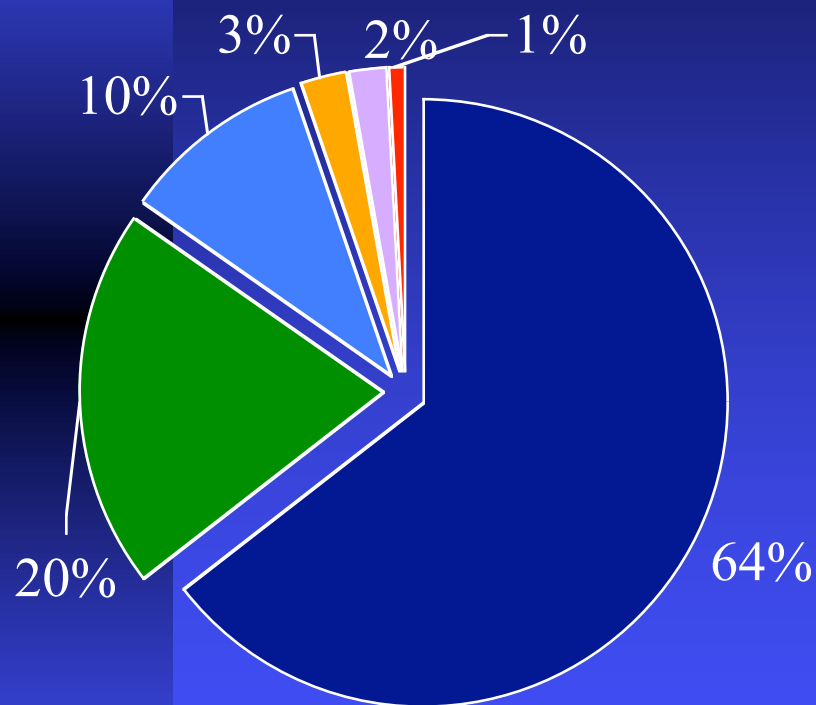


Redistribution of Water Over Time

(State of Texas)

1995

2050



Flow of Water

