Economic Value of Regional Water Supply Planning

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Benefits of Regional Water Supply Planning

Benefits to Utilities

- Deferral and/or downsizing of capital facilities
- Reduced operation & maintenance expenses
- Reduced water purchases
- Enhanced reputation and customer relations
- Avoided wastewater treatment costs
- Reduced energy costs

Benefits of Regional Water Supply Planning

Benefits to Society

- Increased flow of environmental and ecosystem services
- Avoided shortages
  - Avoided regional economic losses
  - Avoided costs of short-term shortage/drought management programs
  - Avoided water use restrictions
    - More stable utility revenue and avoided lost profits
    - Avoided reduced consumer consumption of water

Costs of Regional Water Supply Planning

- **Planning Costs**
  - State level
  - Regional planning
  - Utility level
- **Plan Implementation**
  - Cost of recommended strategies

Case Studies

- **Metropolitan North Georgia Water Planning District** (MNGWPD)
- **Massachusetts Water Resources Authority** (MWRA)
- **Seattle Public Utilities** (SPU)
- **City of Phoenix Water Services Department**
- **Texas Region H Houston-Galveston Metropolitan Area**

Economic Analysis of Regional Water Supply Planning

- Review water supply plans for each region.
- Contact regional planners to clarify and fill in data gaps.
- Monetary values reported in year 2005 dollars, water units in millions of gallons per day (mgd) for consistency.
- Benchmark range of values provided:
  - Total savings per mgd - incremental net benefits over the planning horizon.
  - Benefit-cost ratio – present value of benefits divided by the present value of costs.
  - Annual net benefit per household.

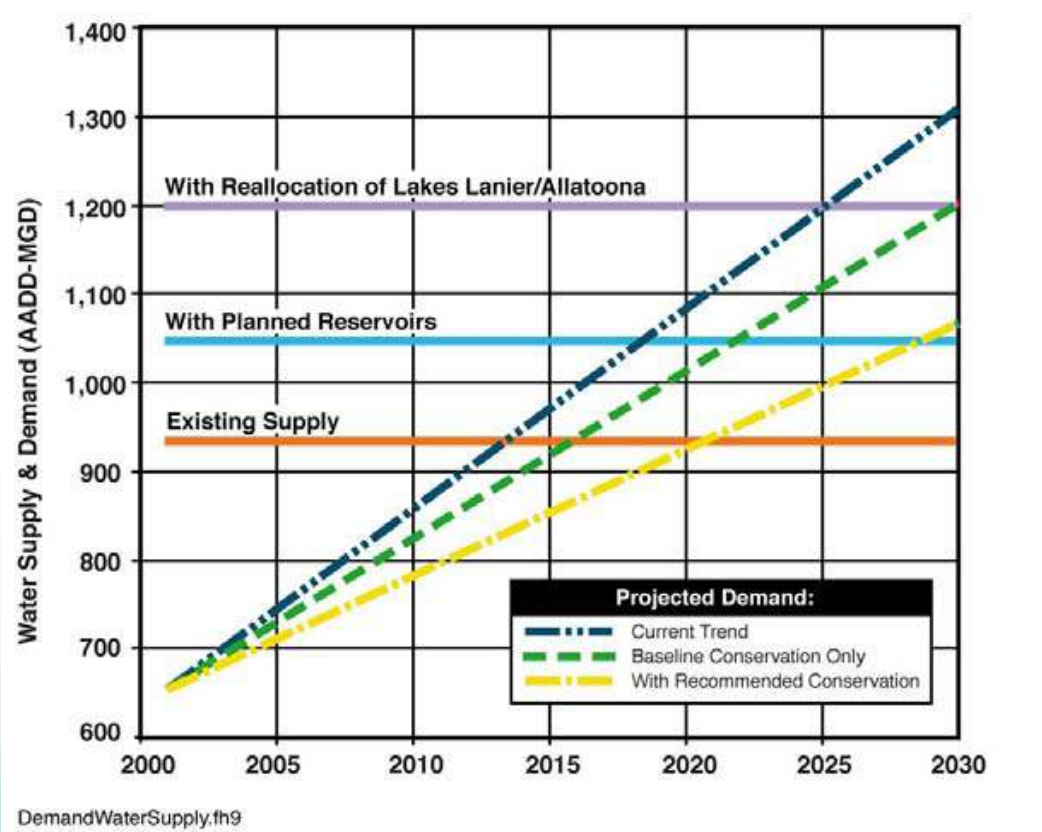
Metropolitan North Georgia
Regional Description

- **2000**
  - Population 4 million
  - Water demand 650 mgd
  - Water supply 933 mgd
- **2030**
  - Population 8 million
  - Water demand 1,081-1,300 mgd
  - Water supply 1,267 mgd

Source:
http://www.northgeorgiawater.com/images/DistrictMap_Web.jpg

Metropolitan North Georgia
Water Planning District

- **Demand could exceed supply by 2030.**
- **Recommend:**
  - Supply development
  - Water conservation
  - Water sharing
  - Water reclamation



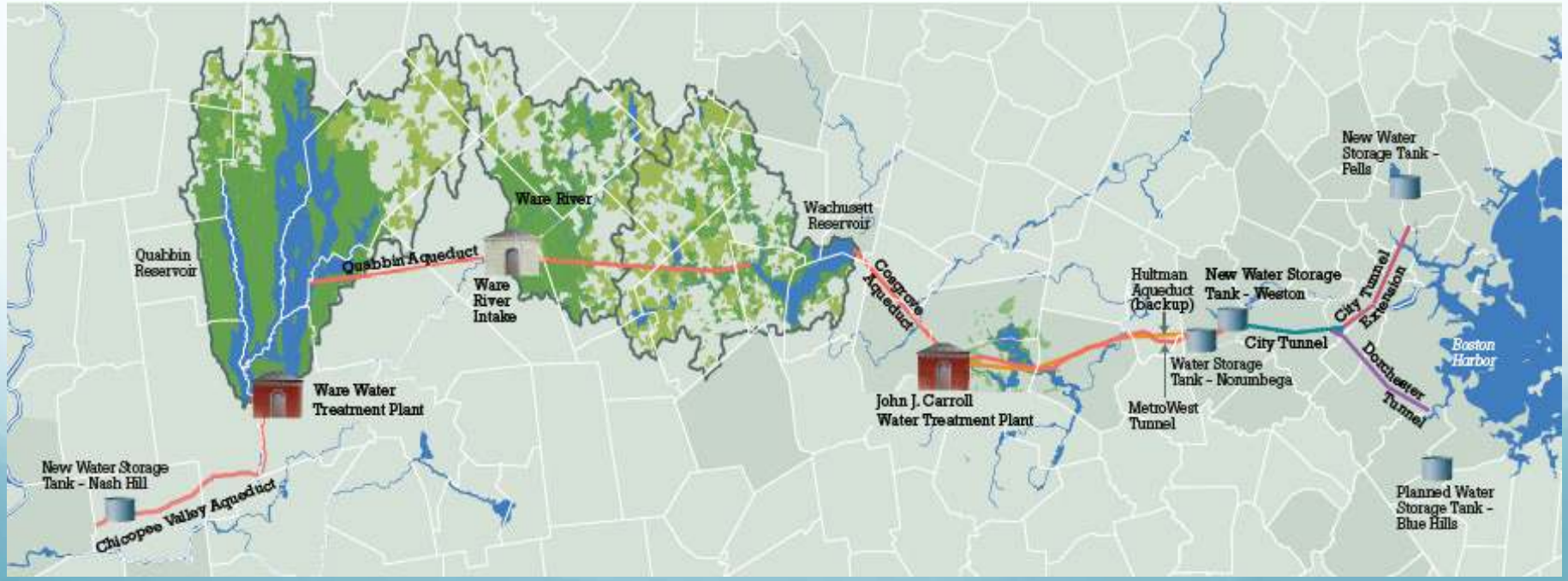
Source: Metropolitan North Georgia Water Planning District Water Supply and Water Conservation Management Plan 2003

Metropolitan North Georgia Water Planning District

Value of Regional Water Supply Planning ($2005)	
Planning period	2000 - 2030
Water supply planning cost	$10.6 million
Conservation program cost	$245 million
Averted supply costs	$531 million
Water savings	119 mgd
Total savings per mgd	$1.48
Annual net benefit per household	$3.83
B/C Ratio	2.0

Massachusetts Water Resources Authority
Regional Description

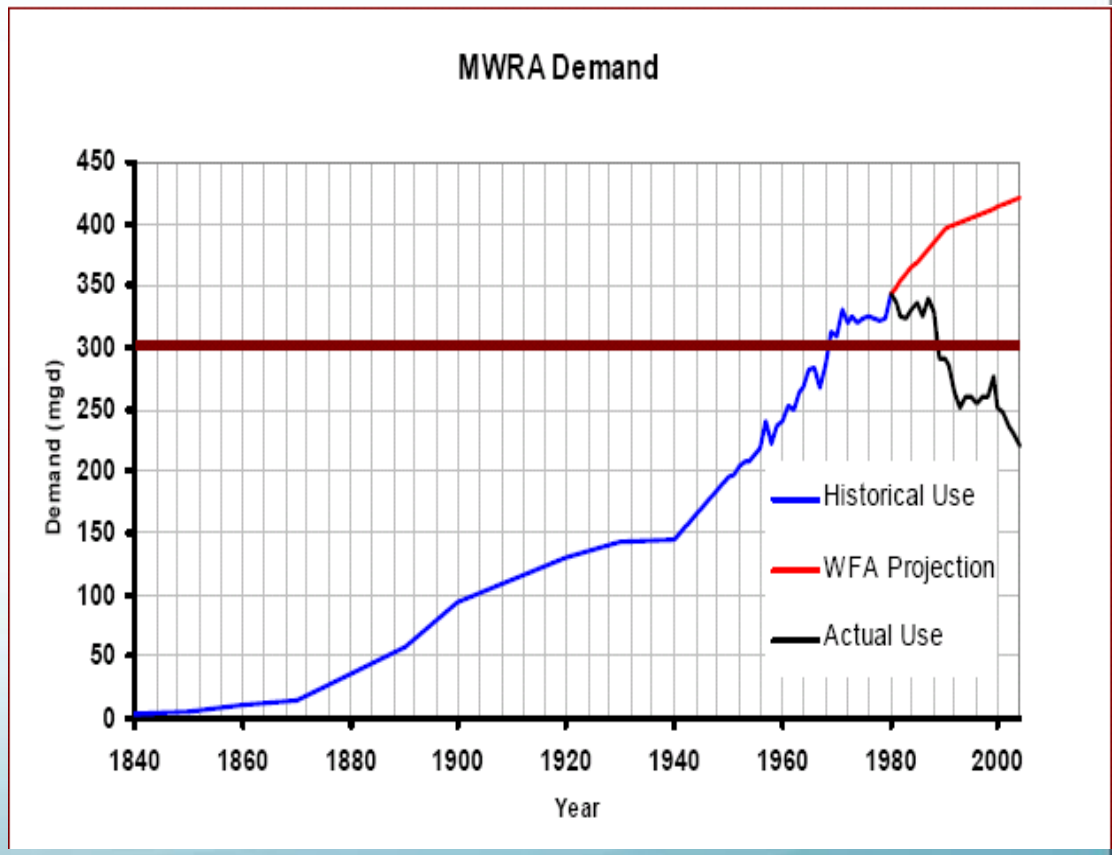
- Water supply 300 mgd
- 1987
  - Population 2.2 million
  - Water demand 336 mgd
- 2000
  - Population 2.5 million
  - Water demand 214 mgd



Source: http://www.mwra.state.ma.us/04water/html/watermapsimple903.jpg

Massachusetts Water Resources Authority
Boston Region

- **Decrease in demand to below system safe yield.**
- **Conservation efforts and infrastructure improvements deferred river diversion plans.**
- **Projected 2020 water demand below 300 mgd.**



Source: Das, Joshua, MWRA "Supply and Demand Management of Greater Boston's Water System (1600s –the present)" 2007

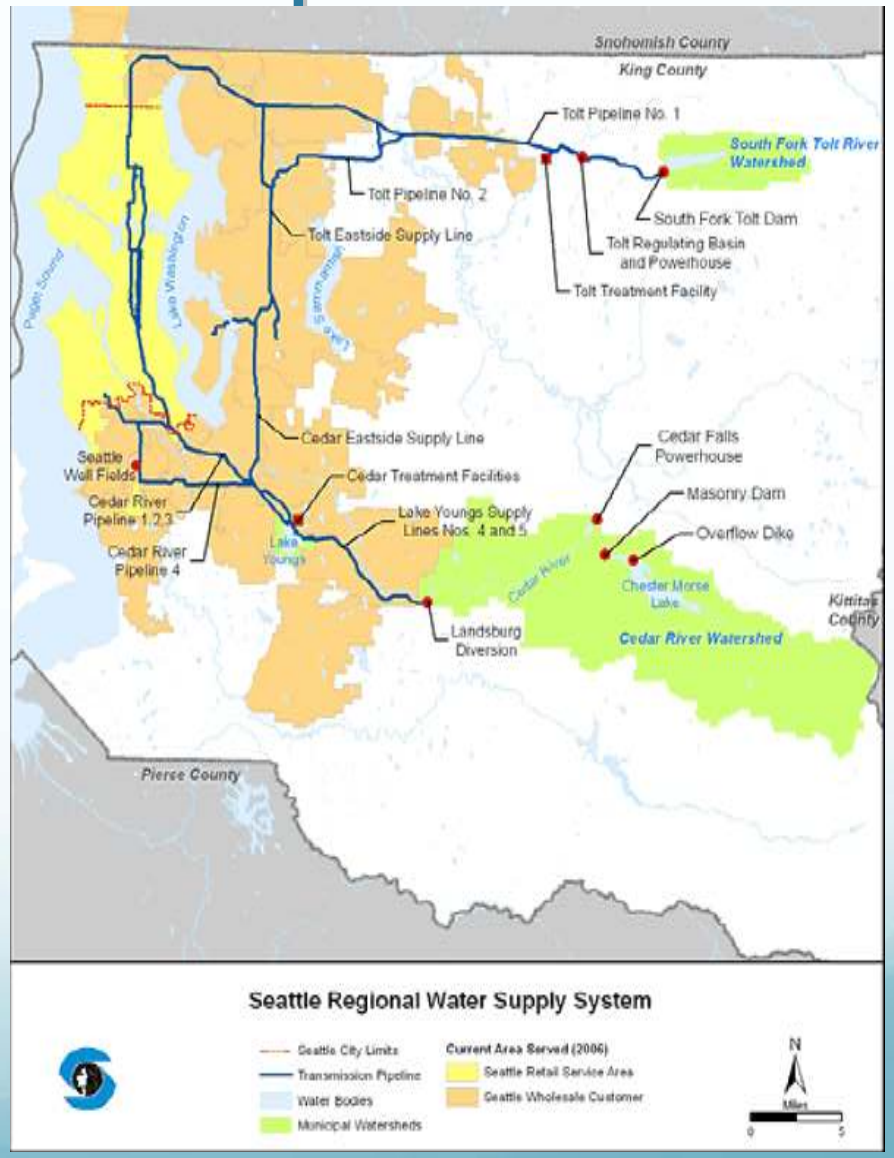
Massachusetts Water Resources Authority

Value of Regional Water Supply Planning

Value of Regional Water Supply Planning ($2005)	
Planning period	1978 - 1990
Water supply planning cost	$2.6 million
Recommended program costs	$443.4 million
Averted costs	$800 million
Water Savings	85 mgd
Total savings per mgd	$3.45
Annual net benefit per household	$28.92
B/C Ratio	1.8

Seattle Public Utilities
Regional Description

- Water supply 171 mgd
- 1990
  - Population 1.1 million
  - Water Demand 168 mgd
- 2000
  - Population 1.2 million
  - Water Demand 148 mgd
- 2010
  - Population 1.3 million
  - Water Demand 134 mgd
- 2030
  - Population 1.6 million
  - Water Demand 129 mgd

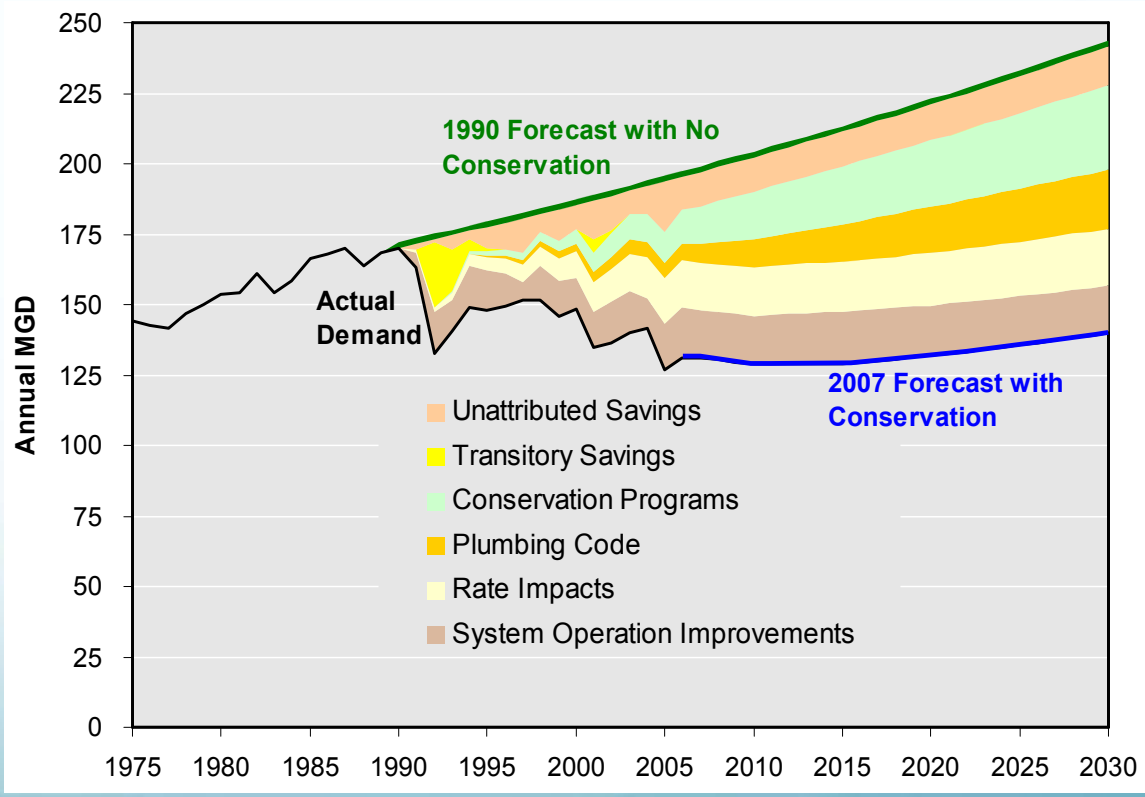


Source: Seattle Public Utilities Water System Plan Public Review Draft 2006

Seattle Public Utilities
Water System Plan

Conservation efforts have extended the water supply for 50 years. No new supply sources needed until after 2060.

- **1990s: water conservation programs decrease consumption 171 to 150 mgd.**
- **2007: conservation commitment for 2011-2030 with 15 mgd savings.**



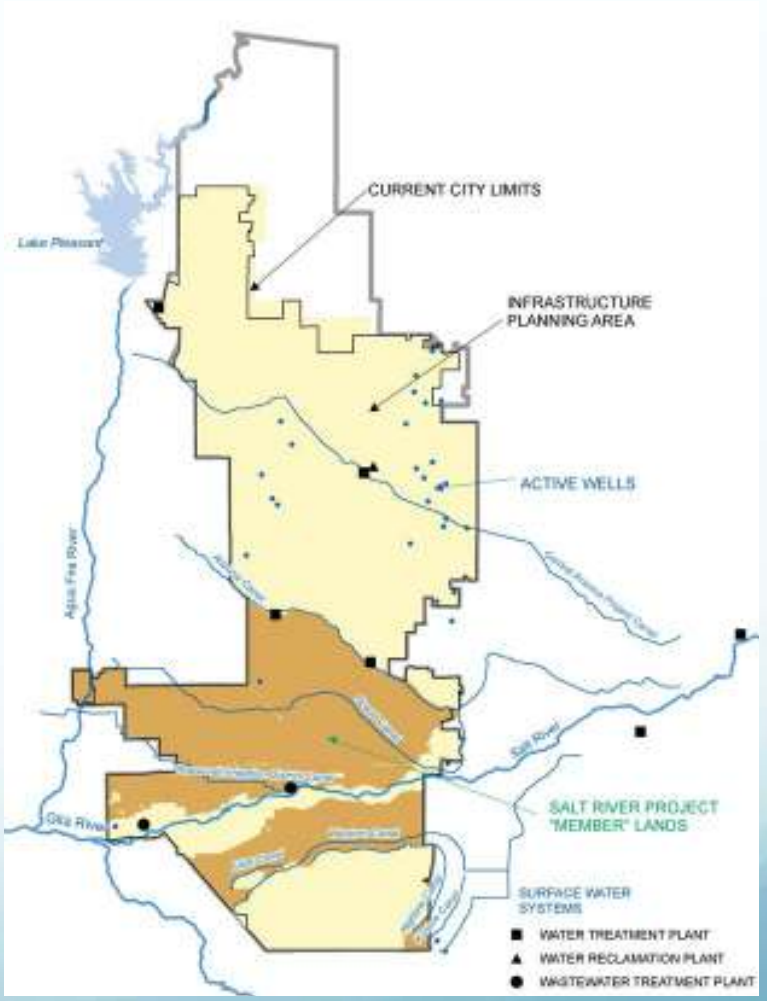
Source: Dietemann, Al. Seattle Public Utilities 2008.

Seattle Public Utilities
Value of Regional Water Supply Planning

Value of Regional Water Supply Planning ($2005)	
Planning period	1990 - 2012
Water supply planning cost	$4 million
Conservation program cost	$79 million
Averted supply costs	$174 million
Water Savings	61 mgd
Total savings per mgd	$1.06
Annual net benefit per household	$6.95
B/C Ratio	2.1

Phoenix Water Services Department
Regional Description

- 2005
  - Population 1.4 million
  - Water Demand 314 mgd
  - Water Supply 368 - 381 mgd
- 2020
  - Population 2 million
  - Water Demand 419 - 467 mgd
  - Water supply 279 - 436 mgd



Source: City of Phoenix Water Resources Plan Update 2005

Phoenix Water Services Department
Water Resources Plan

Phoenix has sufficient water supplies to meet expected demand in the majority of future scenarios.

- **Stacking of supply options by cost-effectiveness**
- **Water conservation program**
  - water pricing reform
  - indoor residential water conservation
  - industrial and commercial water conservation
  - plant and turf irrigation efficiency
  - water-efficient landscaping

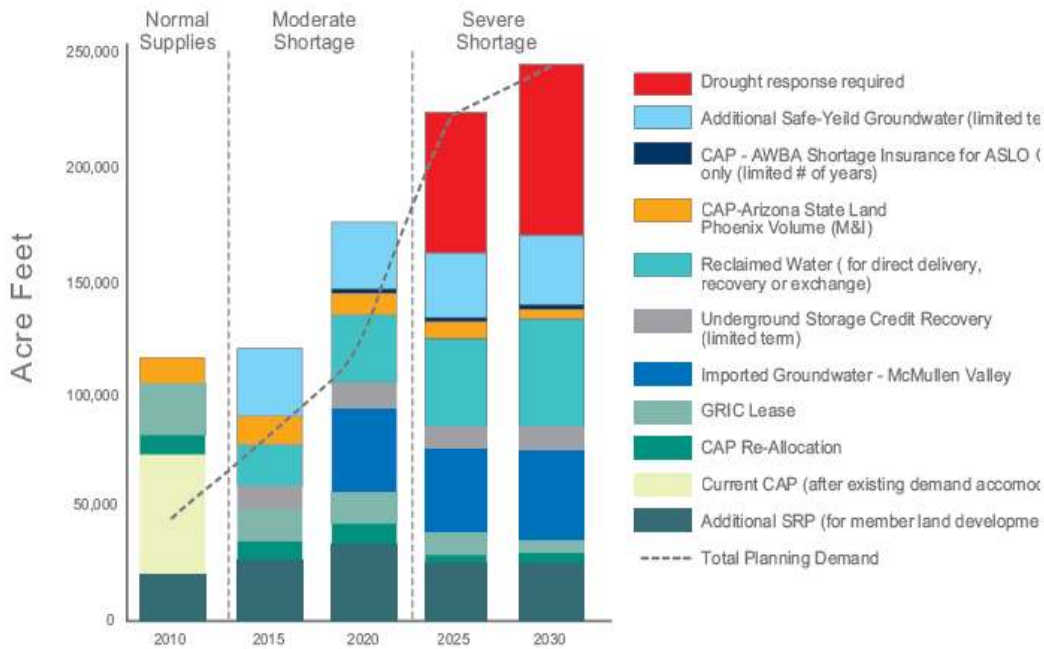


Figure 5-6. Hypothetical "stacking" of supply options.

Source: City of Phoenix Water Resources Plan Update 2005

Phoenix Water Services Department

Value of Regional Water Supply Planning

Value of Regional Water Supply Planning ($2005)	
Planning period	1986 – 2005
Water supply planning cost	$1 million
Conservation program cost	$41.5 million
Averted supply costs	$183 million
Water Savings	80 mgd
Total savings per mgd	$1.32
Annual net benefit per household	$10.32
B/C Ratio	4.3

Texas Region H - Houston Region

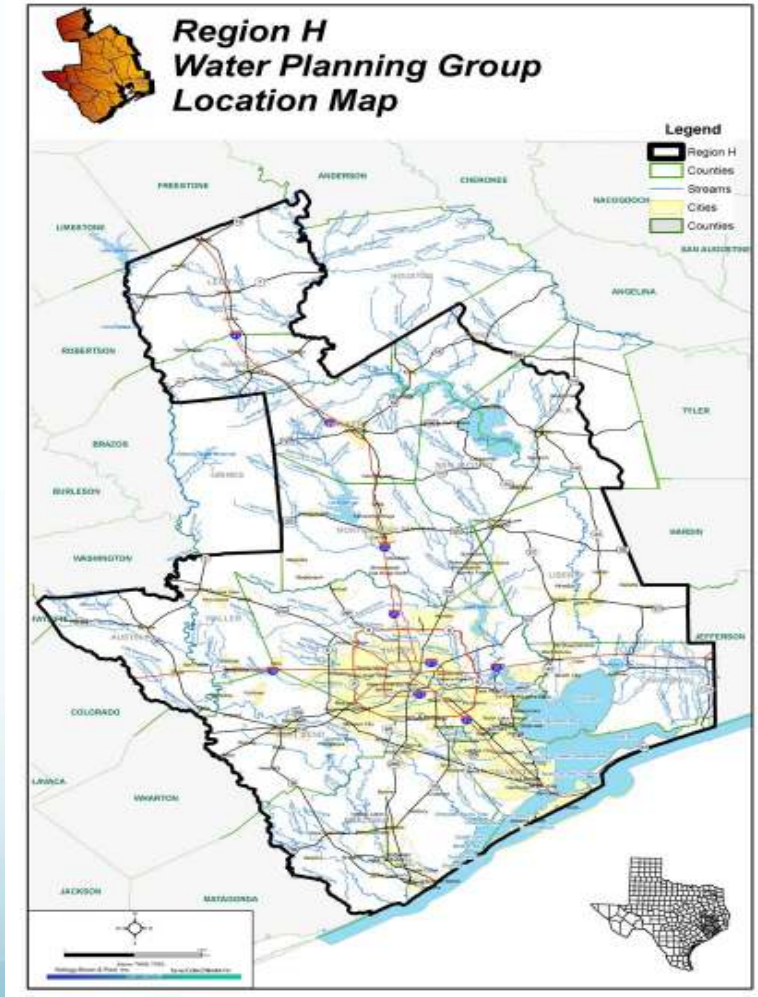
Regional Description

2000

- Population 4.8 million
- Water Demand 1,864 mgd
- Water Supply 2,365 mgd

2060

- Population 10.9 million
- Water Demand 3,046 mgd
- Water Supply 2,288 mgd



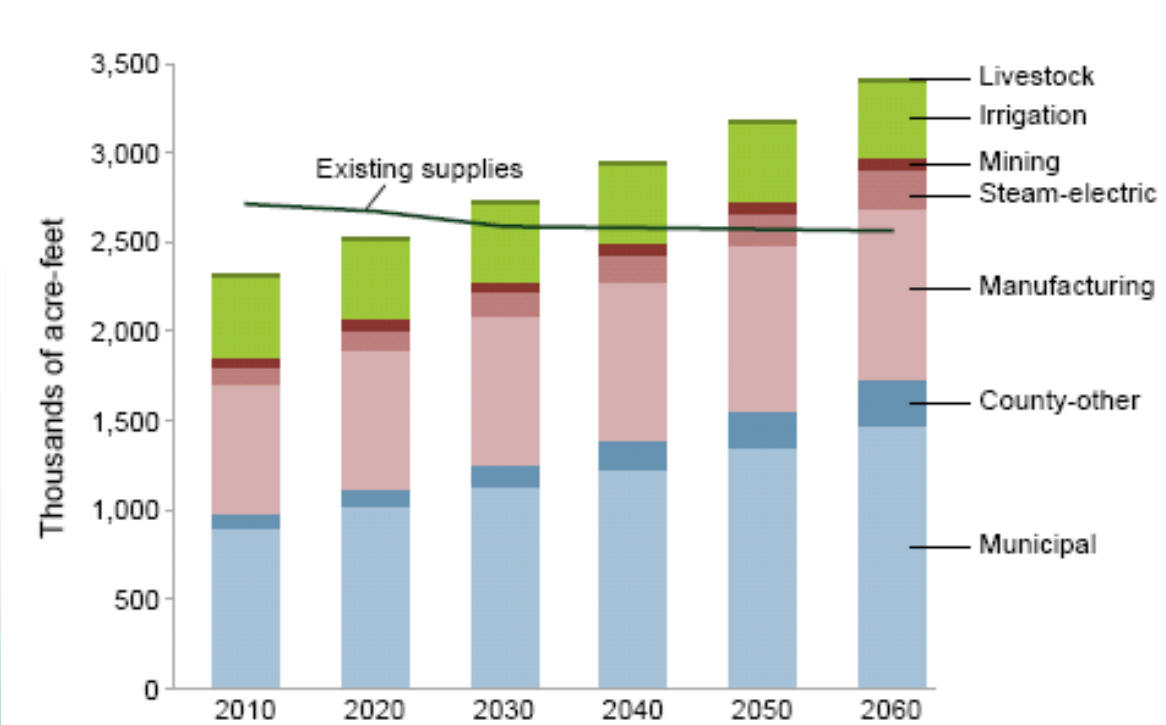
Source: 2006 Texas Region H Water Plan

Texas Region H
Houston Region

City of Houston conservation program cut demand 7.3% through 2006.

Declines in groundwater supply will necessitate increased use of surface water.

Demand rising through 2060.



Source: 2006 Texas Region H Water Plan

Texas Region H Houston Region
Value of Regional Water Supply Planning

Value of Regional Water Supply Planning ($2005)	
Planning period	1998 – 2060
Water supply planning cost	$4.8 million
Program implementation cost	$5,329 million
Averted costs of unmet water needs	$9,000 million
Water Savings	160 mgd
Total savings per mgd	$10.33
Annual net benefit per household	$14.44
B/C Ratio	1.7

Value of Regional Water Supply Planning

	Total savings per mgd	Annual Net benefit per household	B/C Ratio
Atlanta	$1.48	$3.83	2.0
Boston	$3.45	$28.92	1.8
Seattle	$1.06	$6.95	2.1
Phoenix	$1.76	$10.32	4.3
Houston	$10.33	$14.44	1.7
Median	**$1.76**	**$10.32**	**2.0**