

# **Economic Value of Regional Water Supply Planning**

*Presented by Margaret Schneemann*

*Water Resource Economist*

*Illinois-Indiana Sea Grant*

*University of Illinois Extension*

*Chicago Metropolitan Agency for Planning*



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**Sea Grant**  
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Agency for Planning

# 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

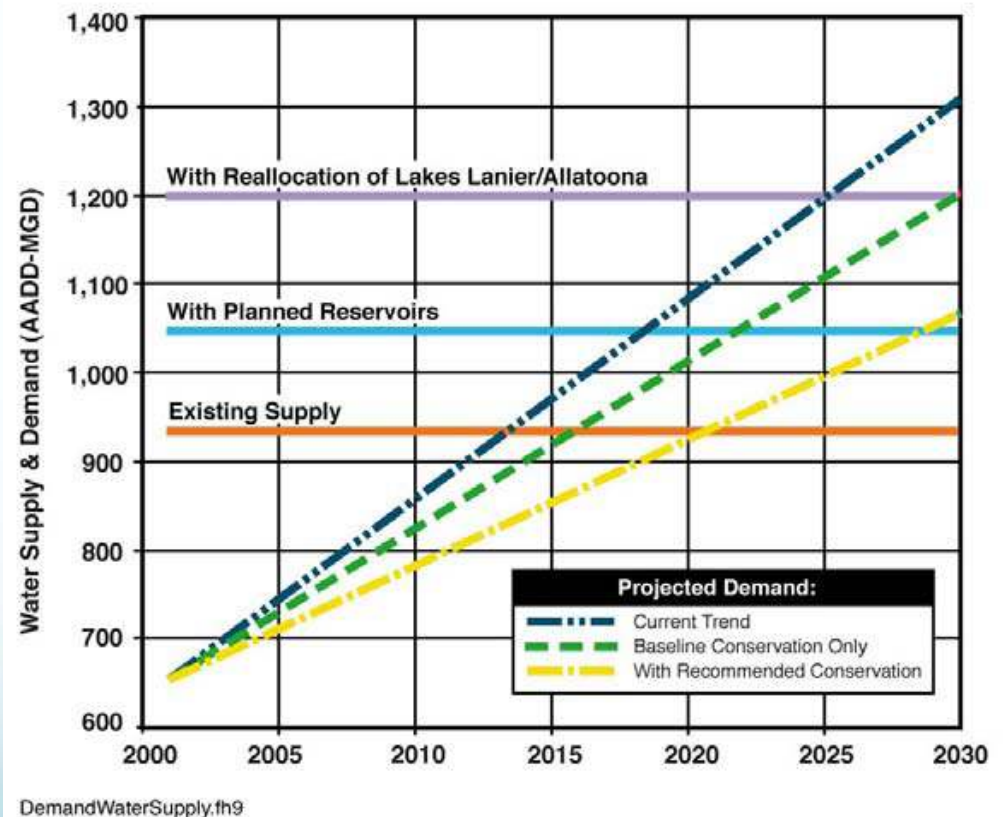
- **2030**

- Population 8 million
- Water demand 1,081-1,300 mgd
- Water supply 1,267 mgd

Source:  
[http://www.northgeorgiawater.com/images/DistrictMap\\_Web.jpg](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

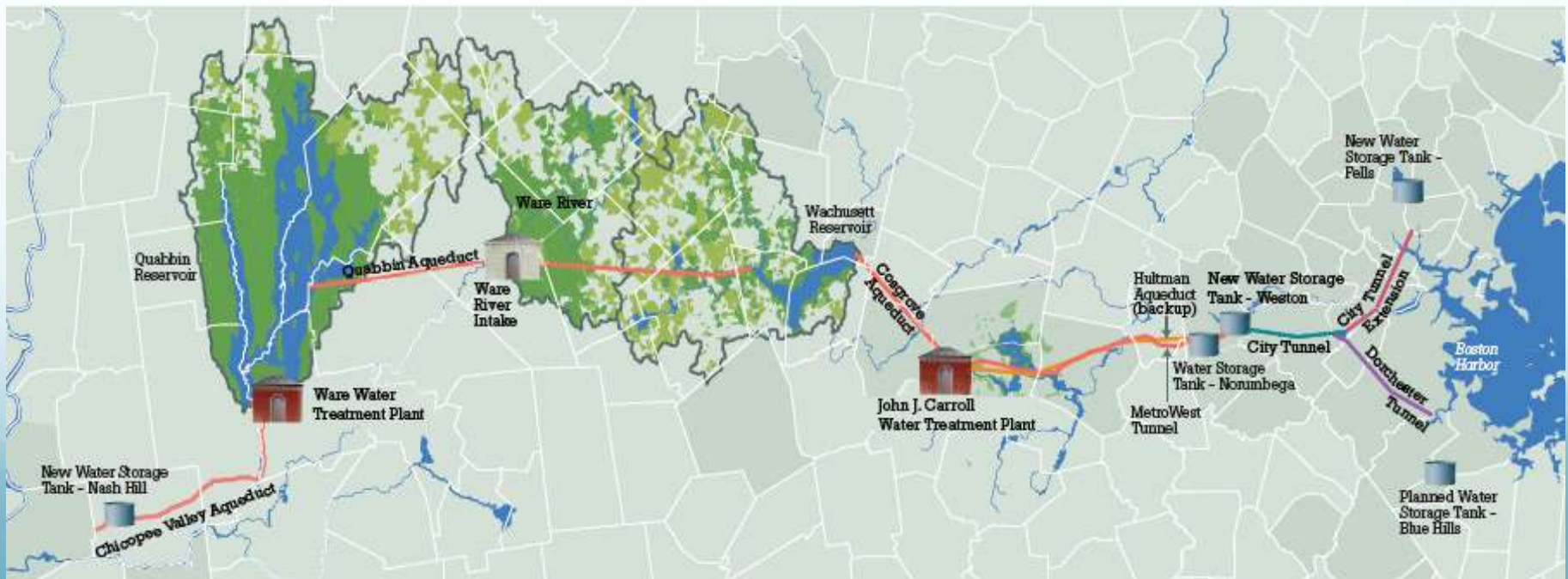


# Metropolitan North Georgia Water Planning District

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

# Massachusetts Water Resources Authority Regional Description

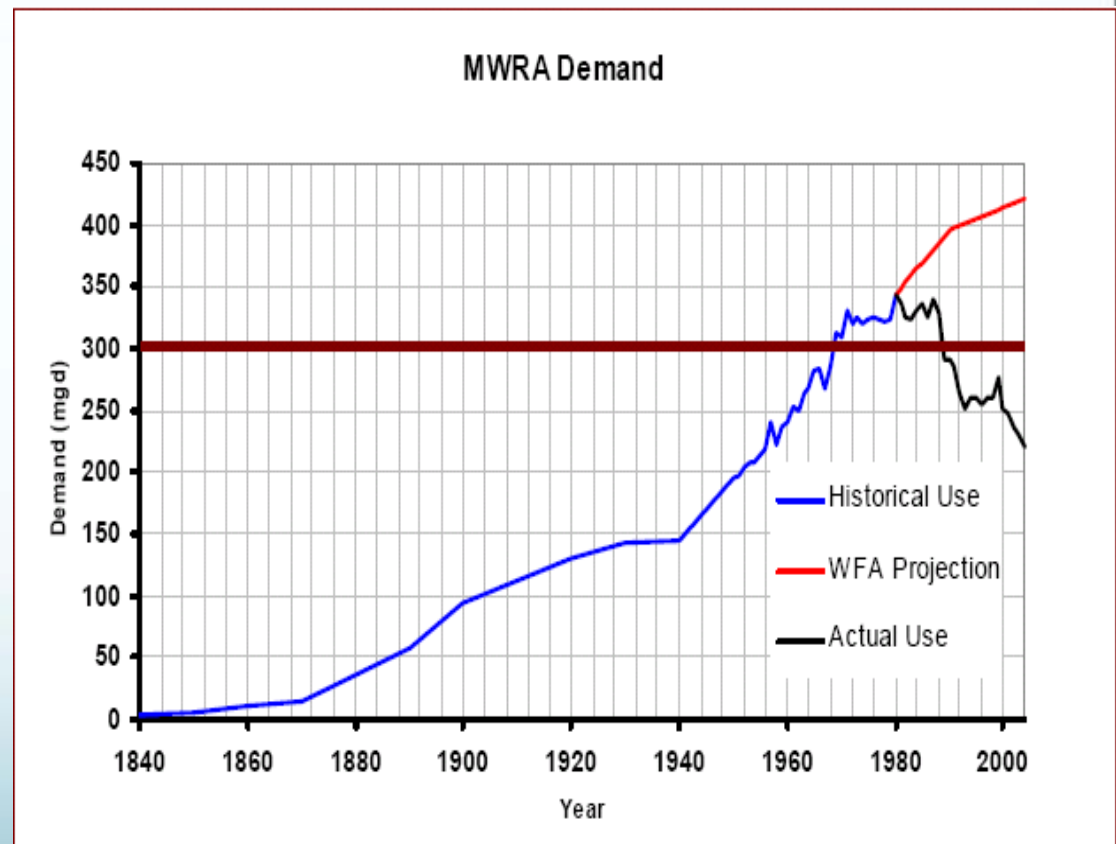
- Water supply 300 mgd
- 1987
  - Population 2.2 million
  - Water demand 336 mgd
- 2000
  - Population 2.5 million
  - Water demand 214 mgd



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

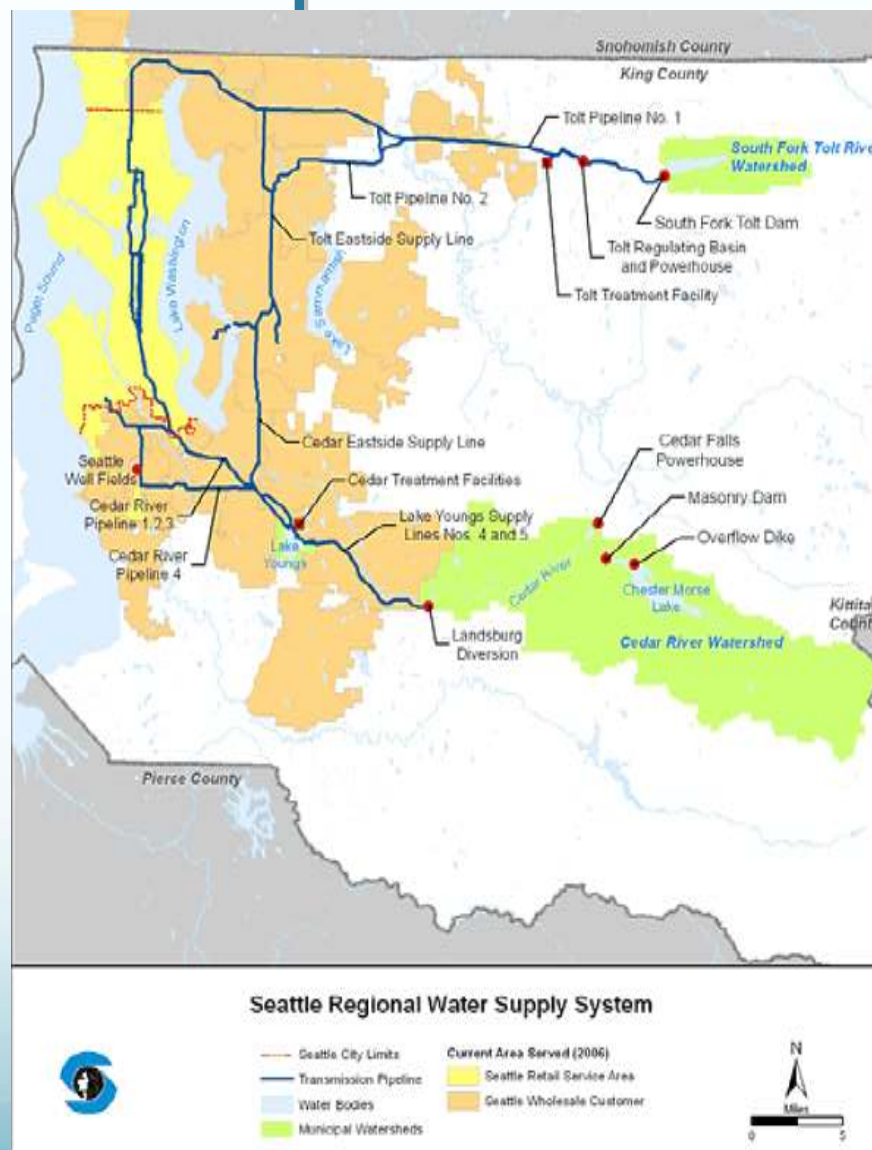
## Value of Regional Water Supply Planning

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

# 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



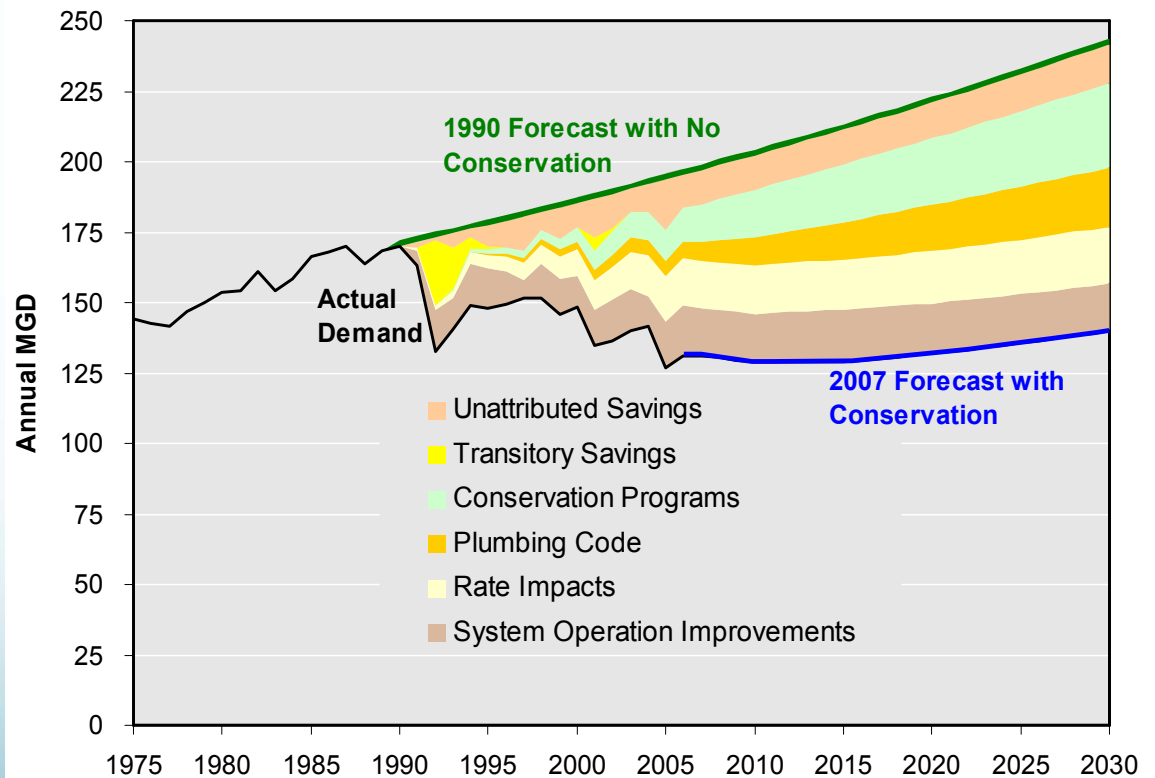
Source: Seattle Public Utilities Water System Plan Public Review Draft 2006



# 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.

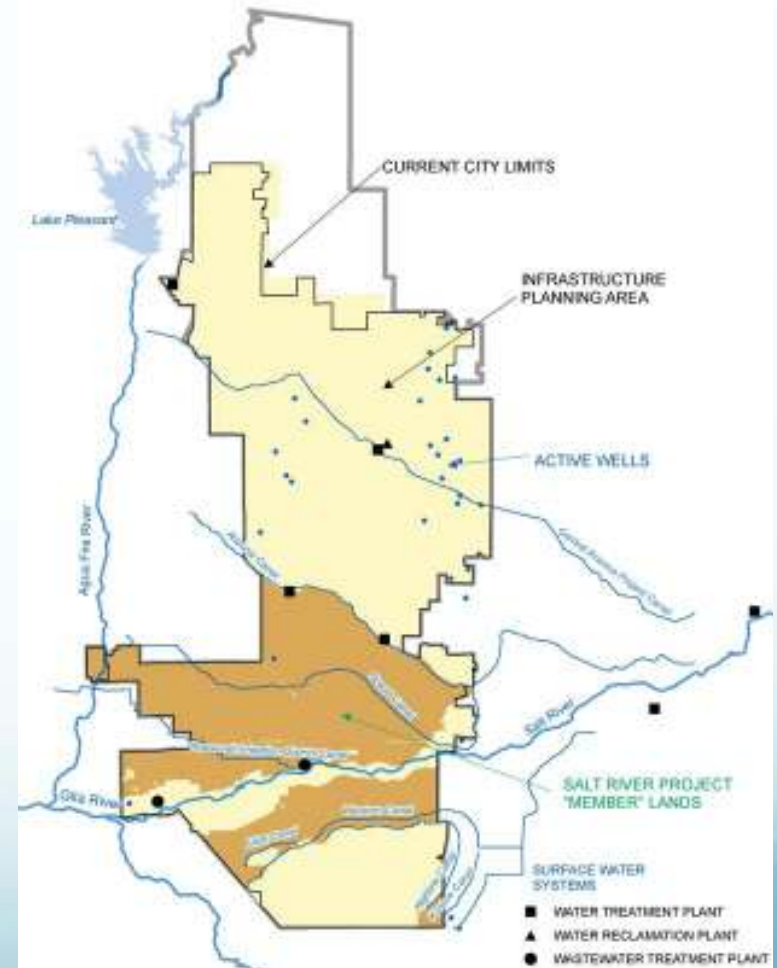
# Seattle Public Utilities

## Value of Regional Water Supply Planning

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

# 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

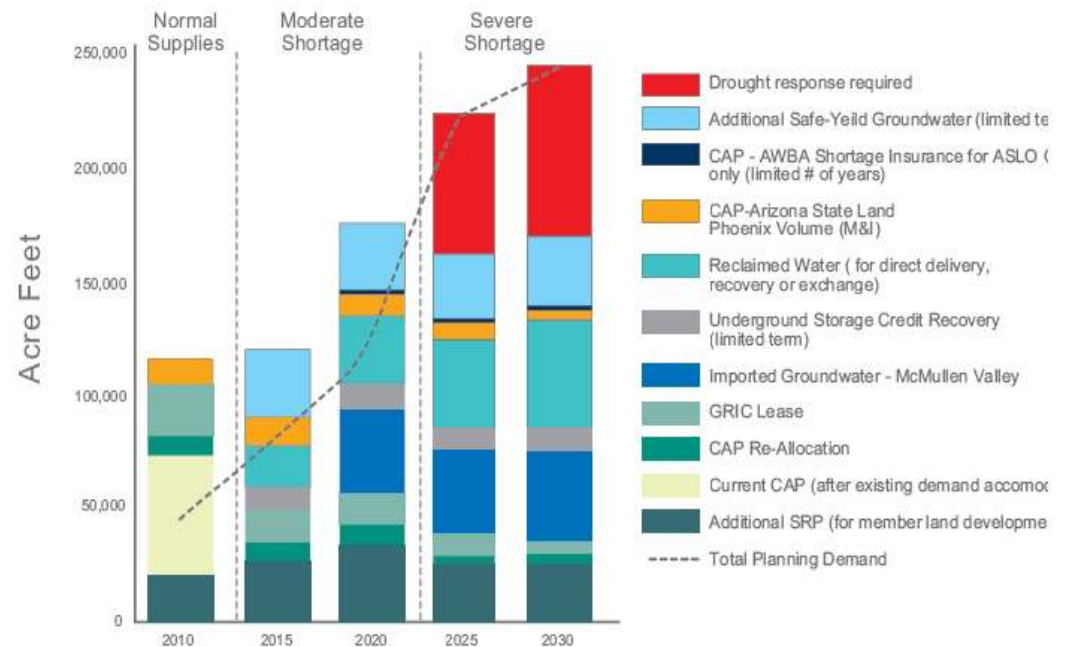


Figure 5-6. Hypothetical "stacking" of supply options.

Source: City of Phoenix Water Resources Plan Update 2005

# Phoenix Water Services Department

## Value of Regional Water Supply Planning

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

# Texas Region H - Houston Region

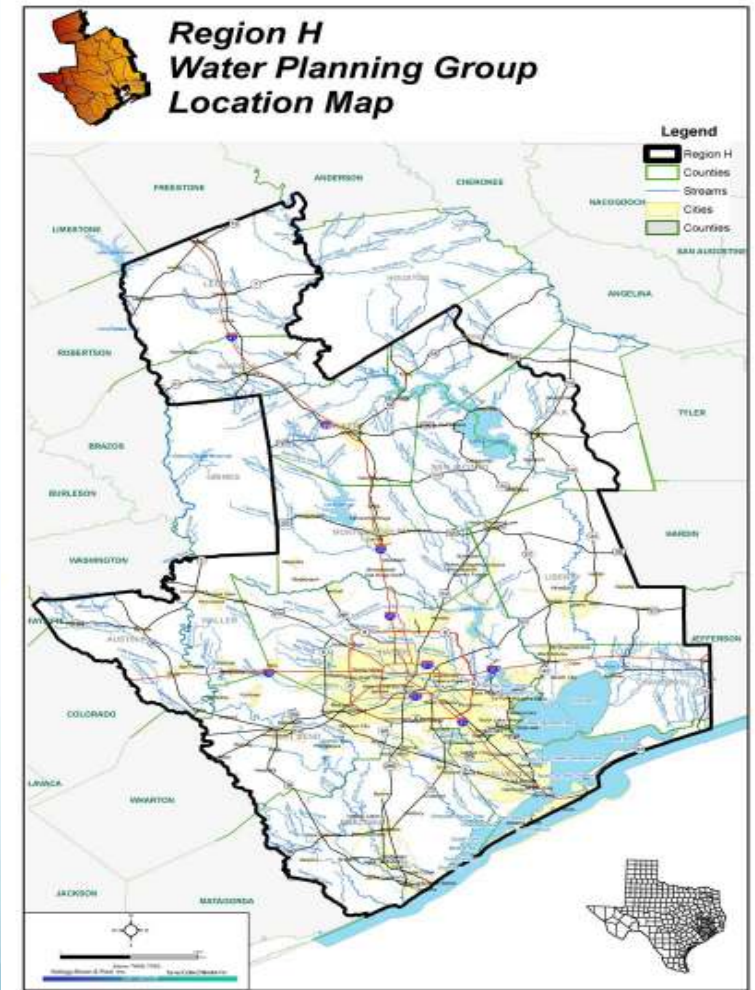
## Regional Description

### 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

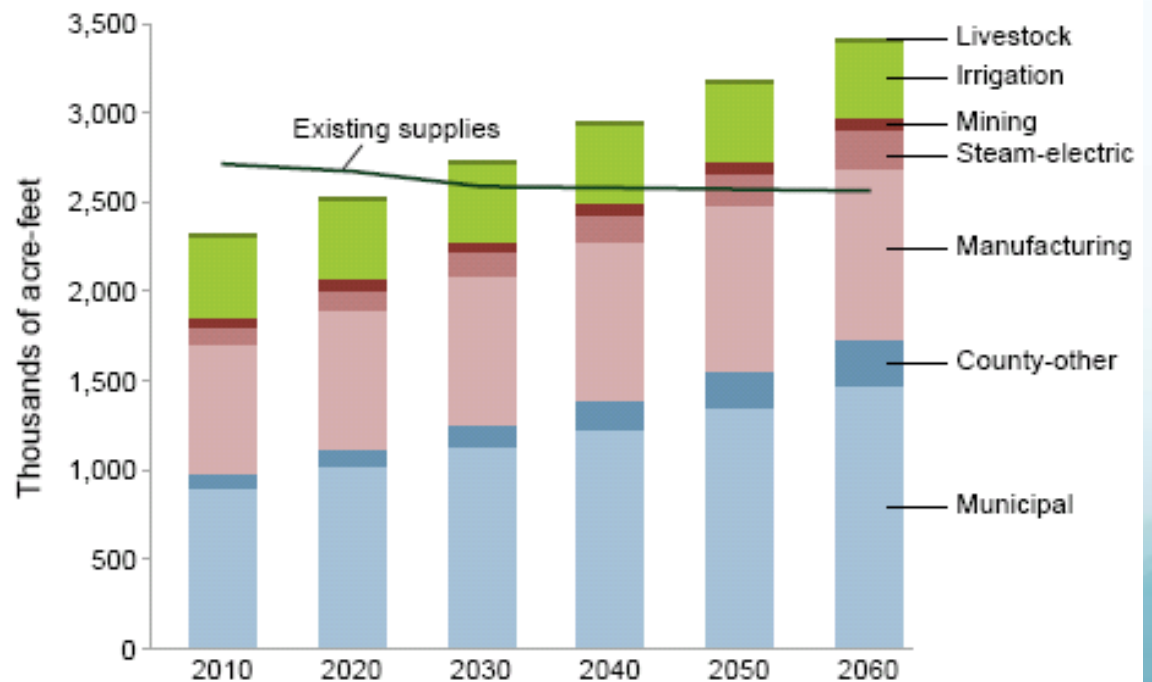
# Texas Region H

## 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

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

# Value of Regional Water Supply Planning

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