

# Understanding Our “Water Ways”: Applying Economic Concepts to Water Usage

Claire Loup

Economic and Financial Education Representative  
Federal Reserve Bank of Atlanta, New Orleans Branch

## Why Water?

- Natural resource becoming an increasingly prevalent source of economic, social, and political dilemmas
- Water Shortages and Surpluses:
  - Impact Daily Life, Generation of Power, Industrial Operations, and Economic Activity
  - Create Conflicts- competition for scarce resource
  - “Water Wars”
- Present and future of Louisiana, Mississippi, and Gulf Coast region rest on sound management of natural resources
- Effective resource management involves complex economic and environmental trade-offs.

## Our "Water Ways"

- **ASSUME** and **CONSUME** water as if it were plentiful and unlimited
- Do not view water as a "typical" resource- - it's natural and the need is unique
- Believe that water will never be truly scarce – it is essential for our survival
- Disregard the news in the headlines and spend little - if any-time reflecting on our "water ways"
- Survey estimates for water usage per person per day range from **65-100 gallons**

## Water Reality

- Water is Becoming Increasingly **Scarce**- Increased Importance in Present and Future
  - Drought-Insufficient Supply of Water
  - Population Growth and Urban Development - Increased demand on water supply systems
    - Golf courses – Greens vs. Green
    - 16,000 courses in U.S. (Average Usage: 312,000 gallons/day)
    - Palm Springs- 57 courses and a desert-  
1 course - 1 million gallons/day = American family of 4 in 4 years
  - Decreased supply, increased demand leads to competition for scarce resources
    - Las Vegas Water Battle – "Craps vs. Crops"
  - Solutions – Rationing, Conservation, Storing Water, New Technologies
  - Disputes – Legal disputes, Fighting ("Water Wars")

# Water Reality

- How much we must pay (**opportunity cost**) in money, time, convenience, etc., shapes behavior and consumption of water
- Changing consumption of water, requires change in incentives
- Price is key incentive
- Current costs for obtaining water are quite low  
Price is low, Easy access to supply

# Water Reality

**Price** is shaped by the interaction of supply and demand

Determinants of demand:

- Price
- Substitute Goods
- Complementary Goods
- Income
- Tastes and Preferences
- Expectations of Future Prices

Limited Supply, Increased Demand - Prices Rise

Law of Demand: As prices rise, demand decreases

Law of Supply: As prices rise, supply increases

\* Opportunity Cost- Incentive to buy/Incentive to supply

# Water Reality

Determinants of **demand**:

- Price- **Cost of water is low and generally constant**
  - **Price of water is low:**
    - Primarily the expense of distribution- High fixed cost, falling marginal cost
    - Feeds perception of an abundant supply -- Low opportunity cost for additional unit of water
    - Expectation that future availability and prices won't change
- Substitute Goods – **Cannot always substitute water with soda**
- Complementary Goods – **Few complementary goods**
- Income- **Water is Not a typical normal or inferior good**
- Tastes and Preferences – **Tastes may change; Need for water does not**
- Expectations of Future Prices– **Expectation that prices will remain low and supply will high**

# Water Reality

- **Supply** as a determinant of behavior
  - Supply – Easy access; Just turn on the faucet!
  - When access to supply changes, the demand and price people are willing to pay change
    - (e.g. outdoor trip, outdoor festival in August)

# Water Reality

- Currently: **No incentive to conserve**  
People consume water as if its supply will never be depleted, because it is priced as such
- If prices increased (or better reflected **marginal cost**), people's behavior would likely change:

## **Water Quantity:**

Running the hose, Watering lawns, Washing cars, Using low-flush toilets, Limiting time in the showers, Washing laundry, etc.

## **Water Quality:**

Use of treated v. untreated water

# People Respond to Incentives in Predictable Ways

- "Tuscon, Arizona was able to reduce average daily demand for water by 27 percent in 1977, using a combination of **water prices** increases and other forms of **rationing**" (Anderson & Wentworth, 1997, p.338)
- Economists Bruce Beattie and H.R. Foster (1980, p.444-45) studied six regions of the United States and found that a **10 percent increase in the price** of urban residential water **reduced consumption** between 3.75 and 12.63 percent.
- "If **water costs farmers more, they will use less** on any particular crop, they will shift to different irrigation technology or water application practices and they will change cropping patterns (Bailey, 1995, p.283-284)

## Property Rights Shape Behavior

- Property rights are *well-defined*
  - Clear limitations and privileges of ownership
- Property rights are *exclusive*
  - Owner can keep others from using property
- Property rights are *transferable*
  - Property can be transferred/sold to another owner
- Property rights are *enforceable*
  - Laws/authorities uphold rights, punish violations
  - Property rights are defined by laws; U.S. water laws vary with region

## Private Ownership or Lack Thereof

- **PRIVATE GOOD**
  - Exclusive: Prevent other's use
  - Rival: Prevent simultaneous use
  - Example: Car, clothing, toy, food
- **PUBLIC GOOD**
  - Non-Exclusive: No right to exclude others
  - Non-Rival: Simultaneous consumption is possible
  - Example: Lighthouse, National Defense, National Weather Service
- **COMMON GOOD**
  - Common-Pool Resources
  - Non-Exclusive- No right to prevent others from consumption
  - Rivalrous- Consumption by one can impact or prevent another from consuming good
  - Example: **Water**, Fish, Hunting Game

## WATER WARS

- Lack of private property rights
  - Inefficient market, lack of transferability
  - Example: Gardener v. Non-gardener
- Lack of consistent, clearly defined rights and laws
  - Difficulty with enforcement
  - Disputes

## Tragedy of the Commons

Common ownership of water → Tragedy  
– Disregard, Misuse, Abuse, Overuse of Public Property

- Shared costs among users
- "Over-Consume"-- Assume plentiful supply
- Failure to apply private-property standards

Examples: Trash in Public Park v. Backyard  
Public Lake v. Private Pool

## Externalities

- Economic side effects from production or use of a good
  - NEGATIVE
    - Negative consequences of production and use
      - ❖ Dumping wastes in river- Downstream?
      - ❖ Water run-off from sprinklers, parking lots
    - Costs of usage are not captured
  - POSITIVE
    - Benefits gained by others
      - ❖ View of a beautiful lake (Aesthetic, Financial)

## Closing Thought

[A] private property regime makes people responsible for their own actions in the realm of material goods. Such a system therefore ensures that people experience the consequences of their own acts. Property sets up fences, but it also surrounds us with mirrors, reflecting back upon us the consequences of our own behavior. -- Tom Bethell *The Noblest Triumph*, (New York: St. Martin's Press, 1998), p. 10.

## Scenario

- Suppose that following a natural disaster that destroyed the water system of a large city, producers of bottled water contributed a convoy of trucks full of water to the citizens of the city.
- Predict what would happen, how people in the city would behave, if the water was a common resource.

## Scenario

- Suppose that following a natural disaster that destroyed the water system of a large city, producers of bottled water contributed a convoy of trucks full of water to the citizens of the city.
- Predict what would happen and how people would behave if the water was given to a local fast food restaurant to sell, under the condition that the owner donate 95% of the money to charity.

# Scenario

- Property rights and the Role of Incentives
- If the water is common property, people will take as much as they think they *might* need or want. There is no incentive to take less and strong incentives to take more – you don't know if any will be left if you need some later.
- The result is that the water will quickly run out and few people will get any. If the water is sold, people will face an opportunity cost and will purchase less. More people will get water and water will be used for only its most valuable uses.