Colorado State University

Feasibility Study to Assess the Potential of Urban Water Conservation to Meet Future Demand

Christopher Goemans
Janine Stone
Marco Costanigro
Kevin Reidy

Project Overview

- Objective: develop partnerships with Co water providers to assess "**feasibility**" of future research into the permanency and penetration rates of water conservation savings and measures.
- Tasks:
  - Examine information needs
    - What information do providers need to better inform their conservation planning and data collection?
  - Examine existing provider data
    - What types of data are/aren't currently collected? Why isn't x,y, and z collected?
  - "Demonstration" analysis with select partners

The Process: Why is this important?

Data:

Observations on actual water consumption, survey responses, etc.

Regression/Statistical Analysis:

"The tool" used to analyze the data and estimate policy impacts.

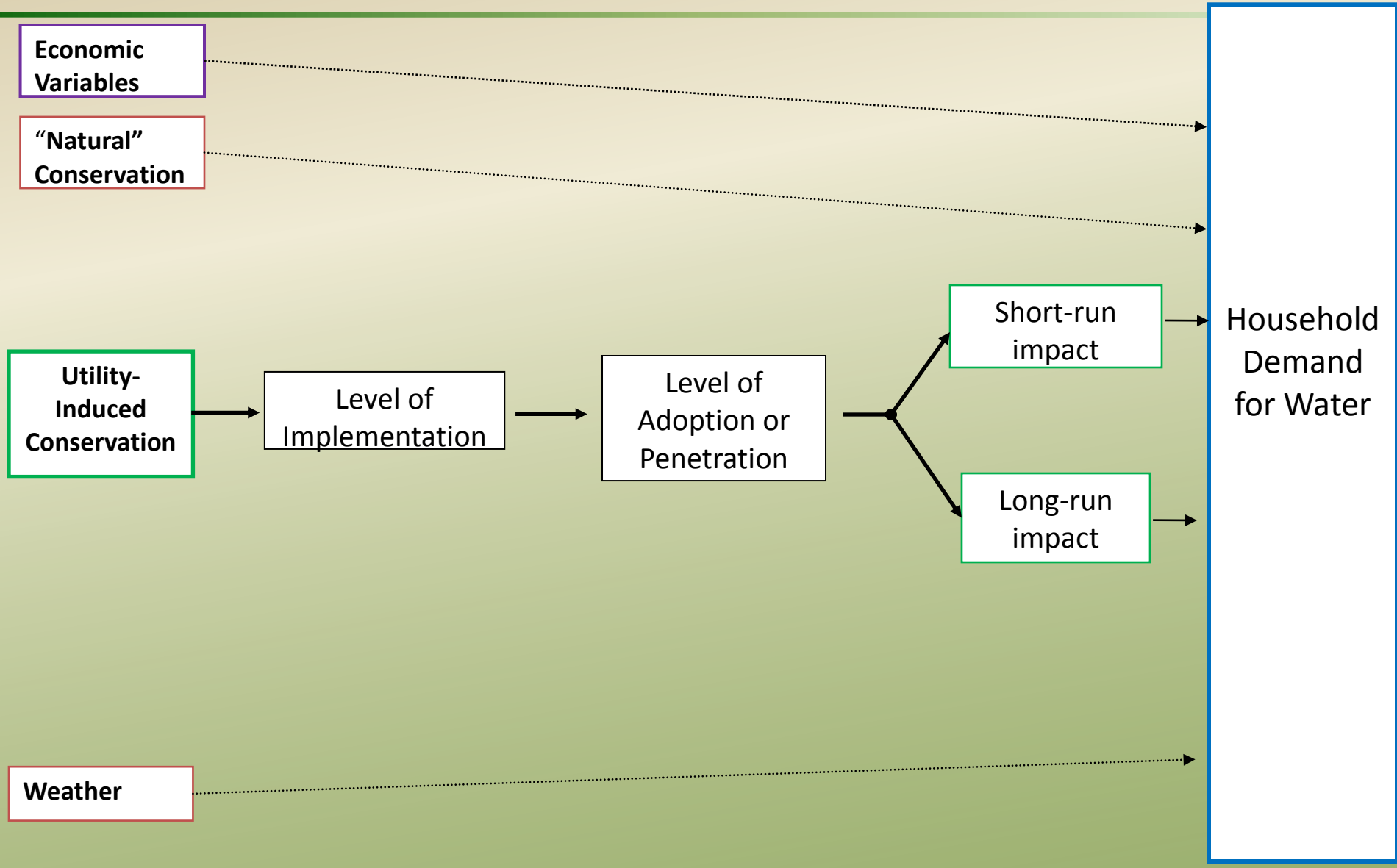
Information:

Knowledge regarding the effectiveness of conservation measures/policies.

Current Approaches to Forecasting Water Demand

- Water Requirements Approach
  - Fixed coefficients of water use per capita, multiplied by, for example, population forecasts
  - Conservation program effectiveness often relies on engineering estimates of savings
- Behavioral Approach
  - Estimate consumer demand function relating actual water use to prices, consumer characteristics, utility policies, weather, etc.

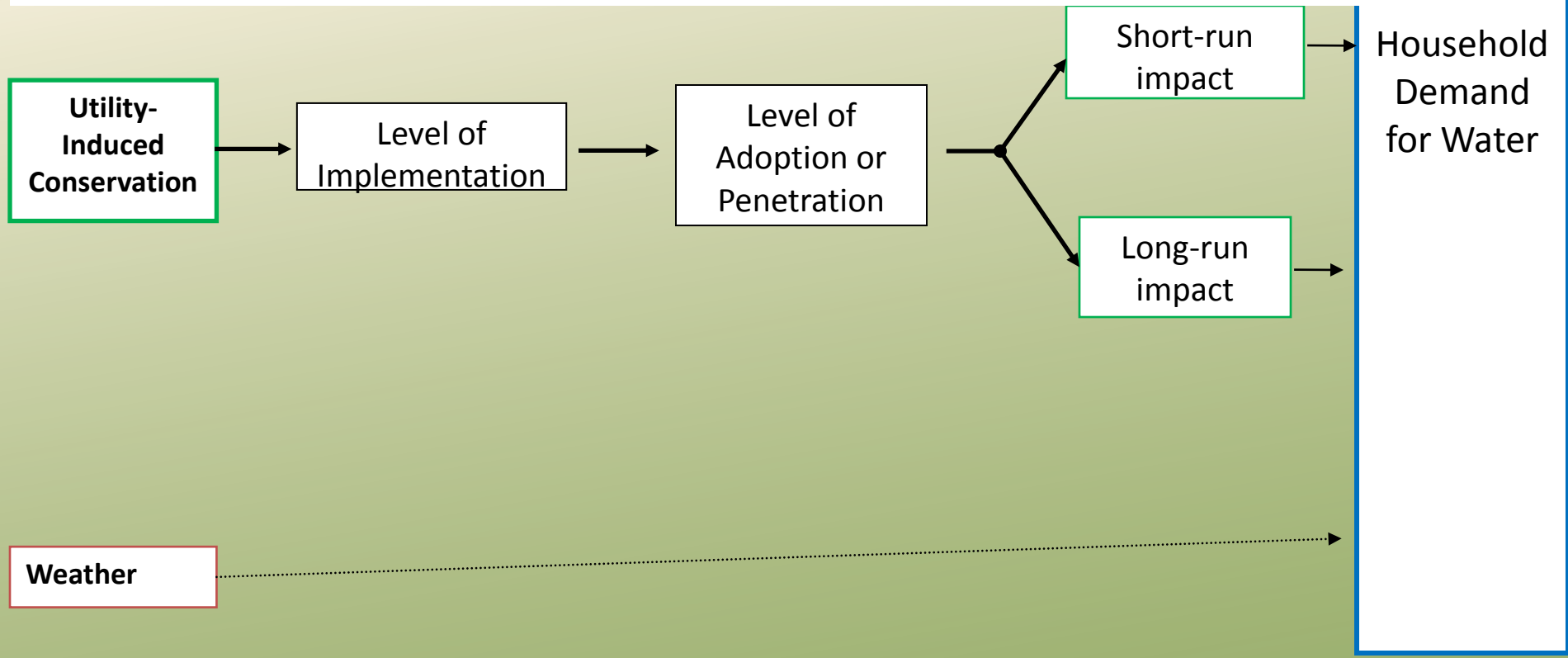
Example: Determinants of Household Water Use



Example: Determinants of Household Water Use

"A reduction in water use occurs when a water management practice is implemented, resulting in a reduction in water use at some time, as compared to the level of water use expected in the absence of the practice (with/without comparison)."

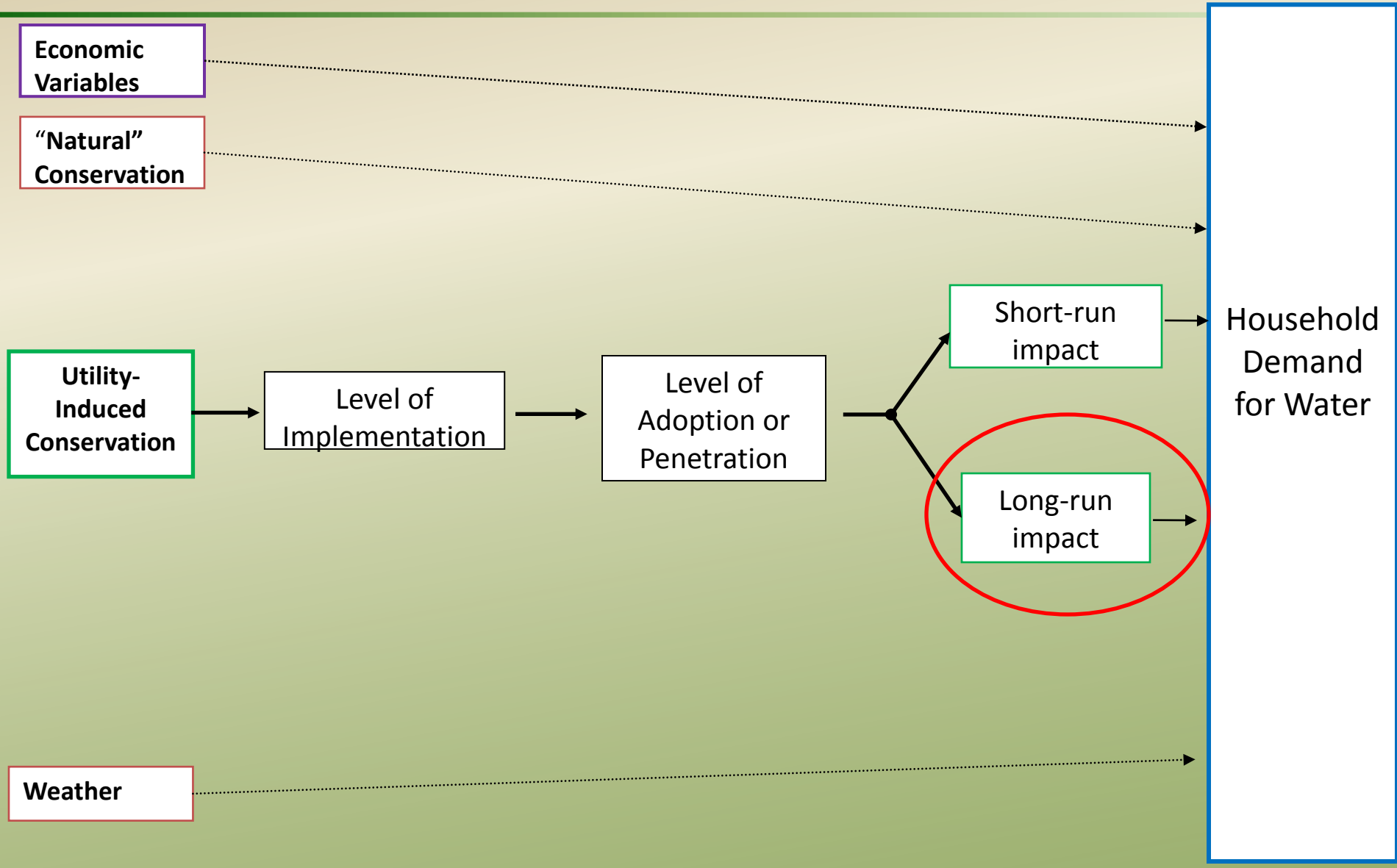
Bauman and Boland (1998; Pg. 16)



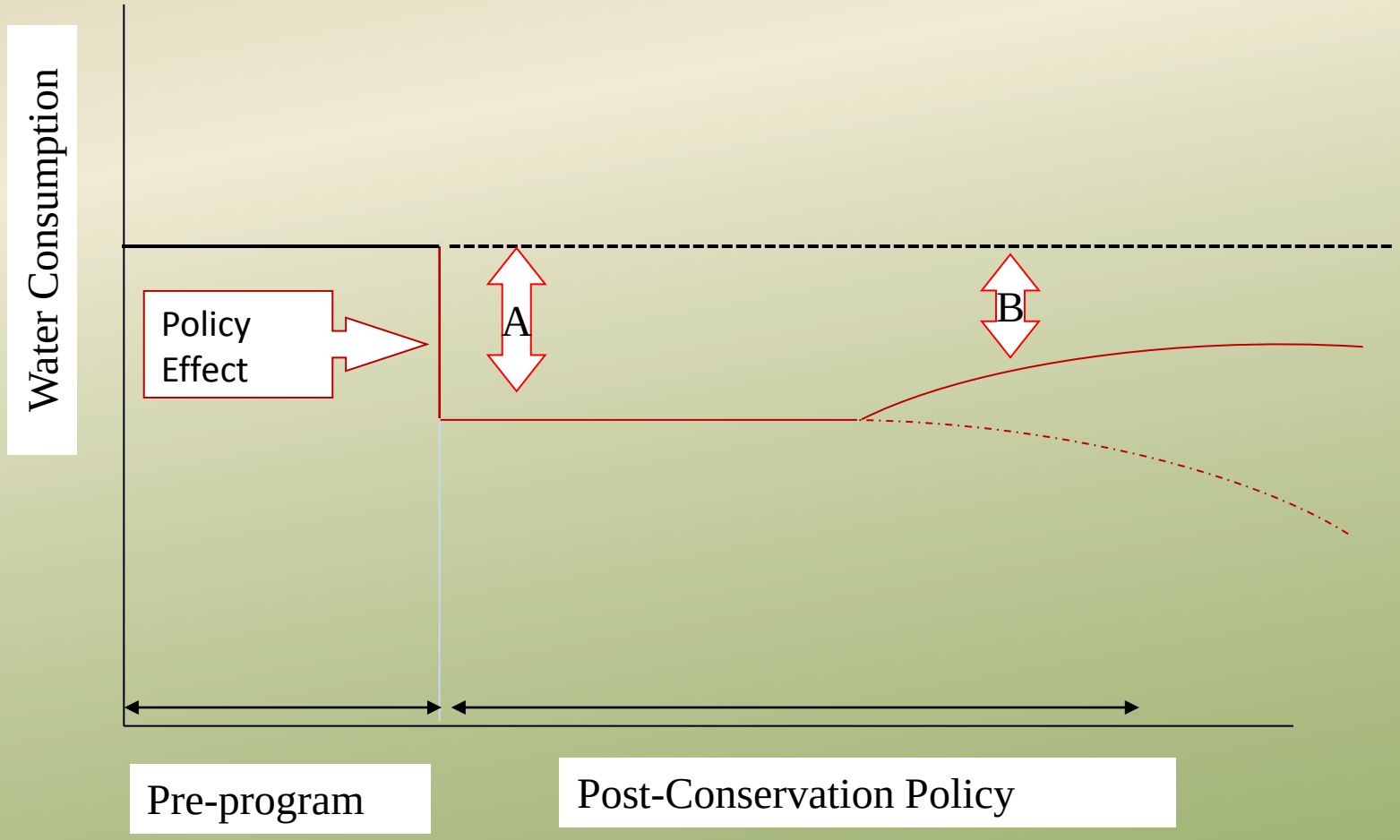
Survey of Select Front-Range Utilities

- One-on-one surveys
  - Big-Picture discussion
    - Types of information needed
    - Data
  - Colorado Springs, Aurora, Denver Water, Westminster, Fort Collins

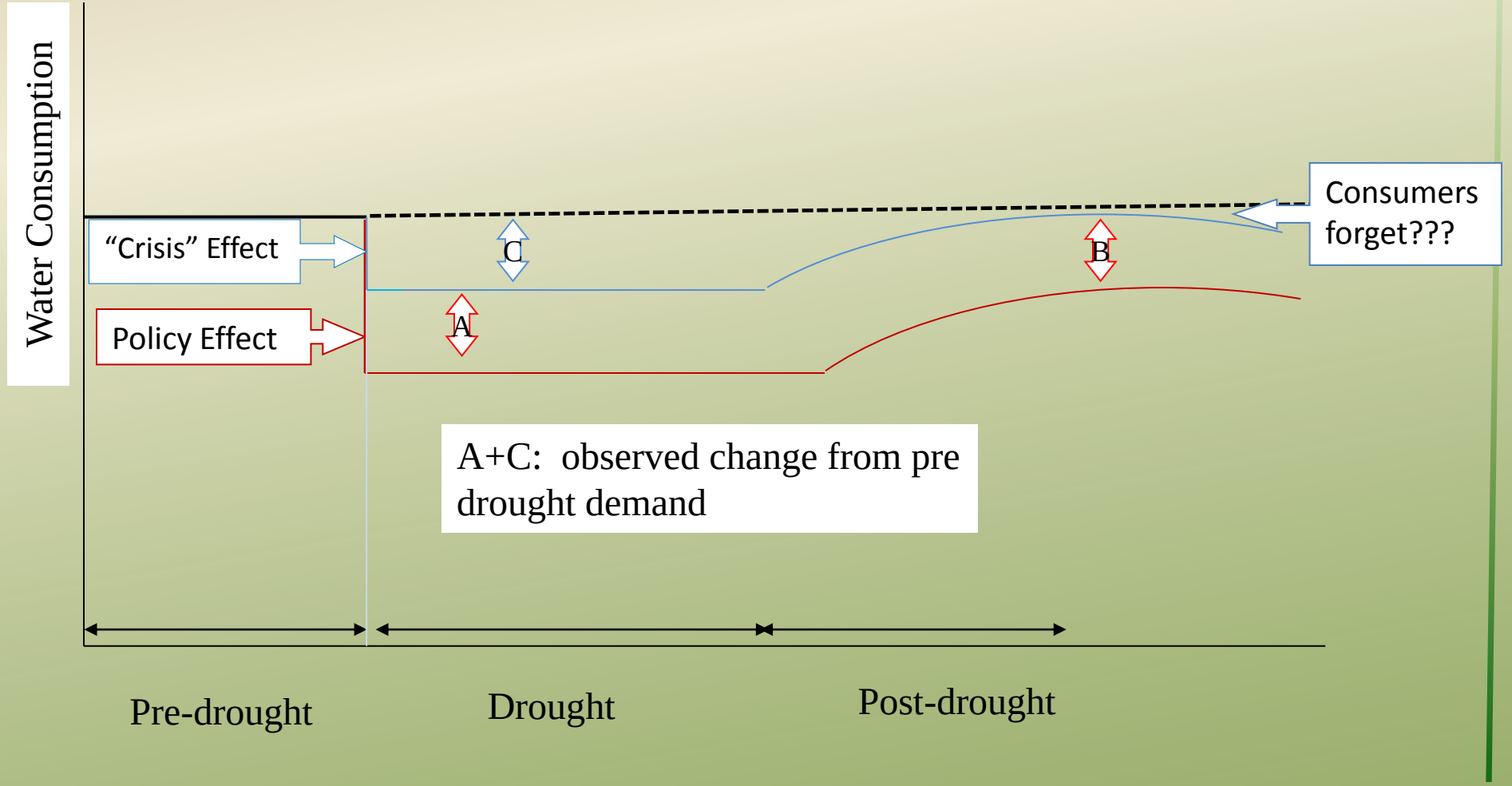
Example: Determinants of Household Water Use



Short versus Long-run Program Effectiveness



Short versus Long-run Program Effectiveness: Accounting for Drought



About 70-75% of the observed customer reductions were due to changes that customers made in their conservation behavior and water management operations. It is much less clear the extent to which these changes will persist over the long-term, because it depends in part on customer's continuing perception of water crises as well as customer's price sensitivity to rate trends.

Actual Quote

About 70-75% of the observed customer load reductions in 25 summer 2001 were due to changes that customers made in their conservation behavior and energy management operations. It is much less clear the extent to which these changes will persist over the long-term, because it depends in part on customer's continuing perception of electricity or other energy crises (e.g., oil embargoes, high gasoline prices or lengthy gas lines) as well as customer's price sensitivity to retail rate trends.

Goldman, et al (2002). California customer load reductions during the electricity crisis: Did they help keep the lights on?

Survey of Select Front-Range Utilities

- One-on-one surveys
  - Big-Picture discussion
    - Types of information needed
    - Data
  - Colorado Springs, Aurora, Denver Water, Westminster, Fort Collins
- **Informal** internet survey
  - Looking for program specific information
    - Pricing policies (levels and type of rate structure)
    - Indoor rebate programs (adoption and effectiveness)
    - Outdoor rebate programs (adoption and effectiveness)
    - Education programs
    - Voluntary and Mandatory restrictions
    - Non-utility factors
  - Sent out to CTAG members and a few others

Example Questions

Section 1: Program Specific Priority Information Needs

For each of the classes of policies listed below, please indicate, on a scale of 1 (least pressing) to 10 (most pressing), for which programs additional information is most needed.

1. Household responsiveness to changes in price.
(note: this includes both how people respond to changes in price and the type of price structures)

	1	2	3	4	5	6	7	8	9	10
Least Pressing	○	○	○	○	○	○	○	○	○	

16. "Expected savings from existing and planned pricing policies are reflected in current forecasts of water demand."

	1	2	3	4	5	
Do Not Agree	○	○	○	○	○	Strongly Agree

17. "A lack of information on the effectiveness of price is one of principal barriers preventing additional increases in price."

	1	2	3	4	5	
Do Not Agree	○	○	○	○	○	Strongly Agree

18. "A lack of information on the effectiveness of price is one of principal barriers preventing our utility from incorporating expected savings into long run plans."

	1	2	3	4	5	
Do Not Agree	○	○	○	○	○	Strongly Agree

“Demonstration” Analysis

- Survey Data
  - 1997-2010
  - Not connected to billing records
  - Objectives
    1. Identify “classes” of customers; conservation oriented or not
    2. Characterize outdoor water use knowledge and decision making
    3. Characterize change in 1 and 2 from 2007 to 2010

- Billing Record Data
  - Crisis Effect
    - Google News data
  - Long-run estimates of program effectiveness
    - “Drought Shadow”
  - Total Bill, Average Price, Rate Structure

Questions? Comments?

- Contact Information:

Email: cgoemans@colostate.edu

Phone: (970) 491-7261