

# How economists think about decisions: an introduction to economic decision making

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Structured Decision Making Advanced Practicum

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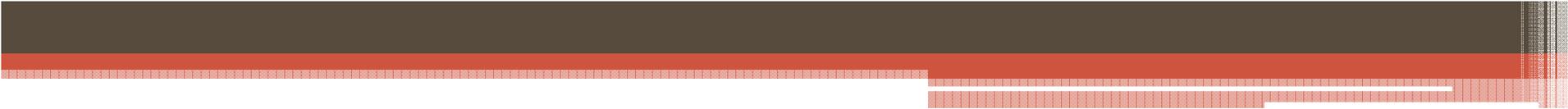


# Overview

- How economists think about decisions
- Links to SDM
- The Market Economy and Market Failure
- What is economic value?
- Non-market goods
- Methods for valuing non-market goods
- Other economic metrics
- Resources

# How do economists think about decisions?

- Do the benefits outweigh the costs?
- Maximize net benefits
- Single objective optimization problem
- Economics is focused on efficiency (maximizing value or bang for buck), not equity (fairness)



Link to SDM

PrOACT

# The Market Economy and Market Failure

- The Market Economy- Self regulating and in theory will lead to maximized social welfare
- Market Failures- Think of market failures as unaccounted for objectives in the free market
- Natural Resource, Environmental, and Ecological Economics generally revolve around market failures

# Why the Market Fails

- Public good: A good that benefits many people, whether or not they have paid for it (**non-exclusive**), and whose benefits to any one individual do not depend on how many others also benefit (**non-rival**).

# Why the Market Fails

- Common Resource / Open Access: A good that many people can consume whether or not they have paid for it (**non-exclusive**) but whose consumption by each person reduces the amount available to others (**rival**).

# Why the Market Fails

- **Externality**: An unintended physical side effect of one economic agent's decisions upon the productivity or satisfaction levels of others

# Types of Goods

	<b>Rival</b>	<b>Non-Rival</b>
<b>Excludable</b>	<b>Private goods</b>	<b>Artificially scarce goods</b>
<b>Non-Excludable</b>	<b>Common resources</b>	<b>Public goods</b>

# Valuing the Environment

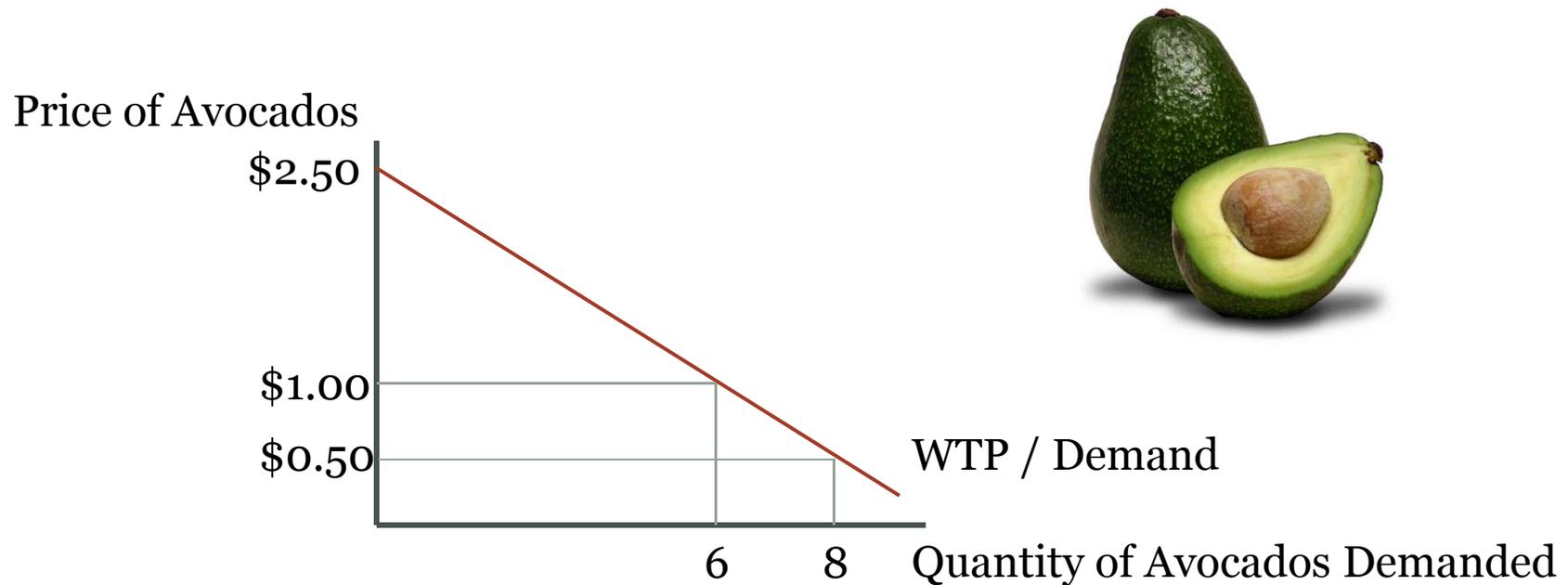
- Economic values are related to changing the quantity or quality of a public environmental good
- Measured as willingness to pay for an increase in quantity or quality of the good (or willingness to accept a decline in quantity or quality)
- Most valuation methodologies revolve around estimating the demand curve for a public good

# Why measure the economic value of environmental public goods?

- Aids in efficiently allocating scarce resources amongst environmental projects
- Environmental restoration projects compete for funds with other projects, many of which yield easily measureable economic outcomes
- Puts costs and benefits in comparable terms

# Willingness to Pay (WTP)

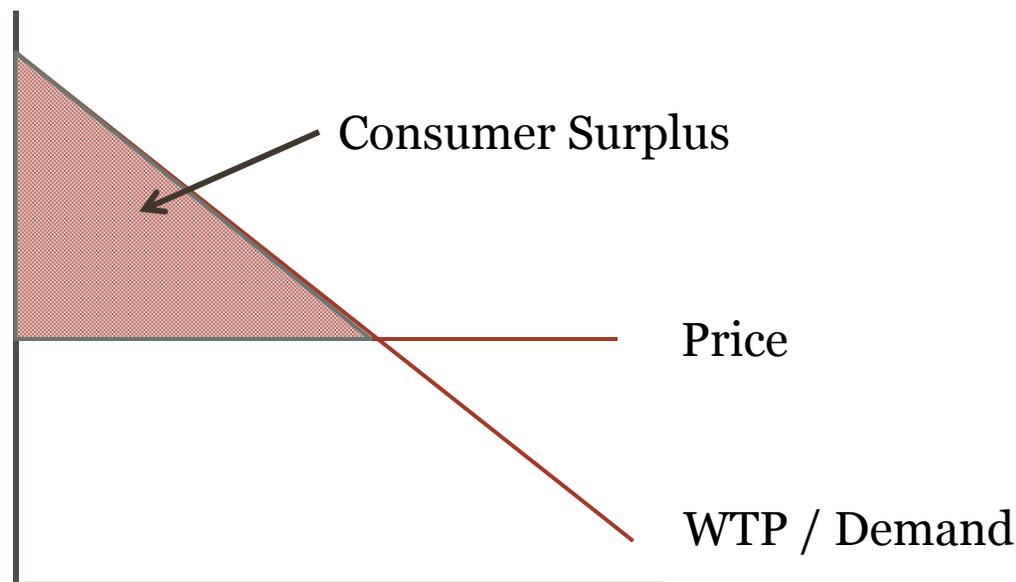
- Definition: The maximum price an individual is willing to pay for a good or service



# Consumer Surplus

~A Proxy for Economic Value

- Individual Consumer Surplus: Net gain to an individual from the purchase of a good
- Total Consumer Surplus: Sum of the individual consumer surpluses of all the buyers of a good

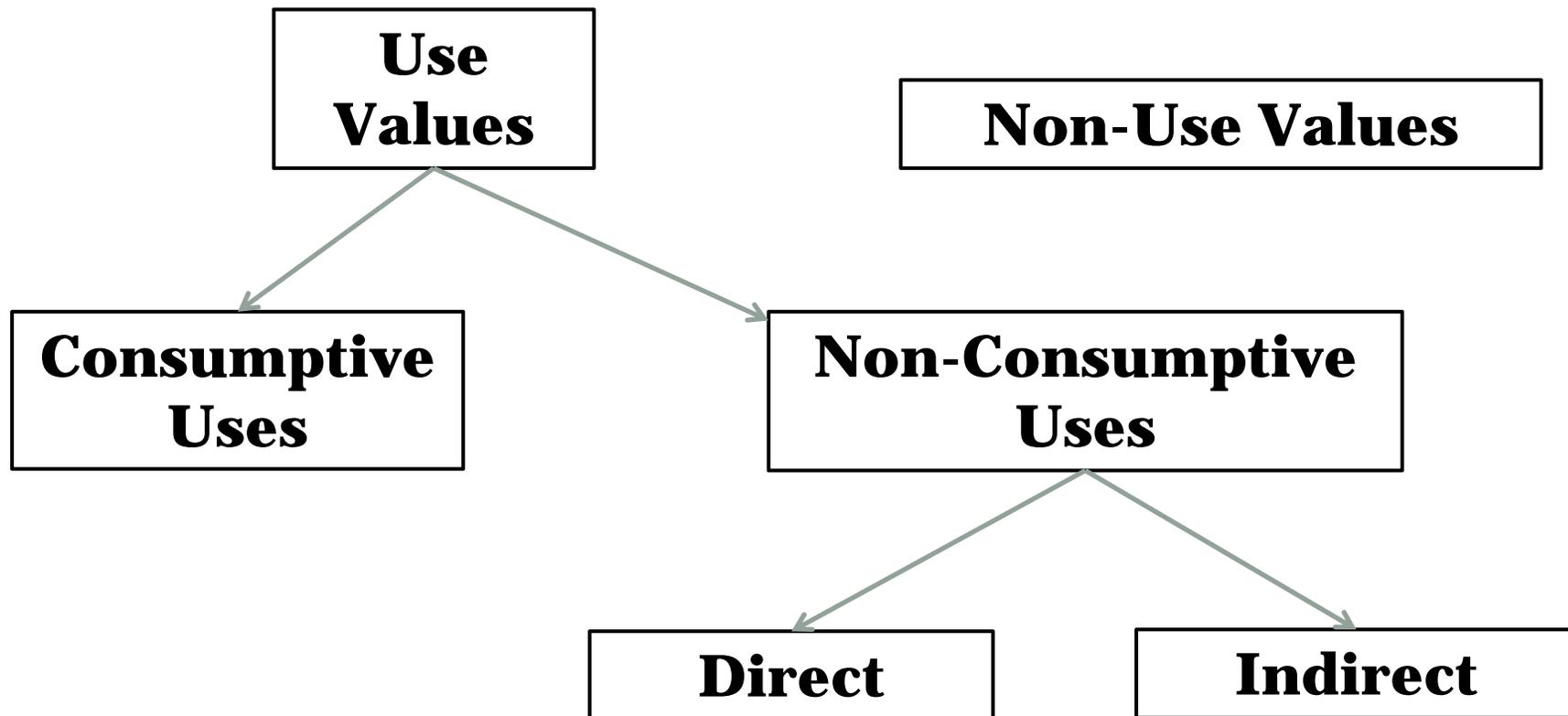


# Economic Benefits (Increases in Economic Value)

- Use Value: Maximum WTP for the direct or indirect use of an ecosystem
- Non-Use (passive) Value: Maximum WTP for the existence of or improvement in an ecosystem, now or in the future

**Economic Value = Use + Non-Use Values**

# Types of Value



\* Adapted from The National Academy of Sciences, 2004. Valuing Ecosystem Services: Toward Better Environmental Decision-Making

# Economic Value of the Environment



# Economic Costs

- Opportunity Cost: the value of the next best alternative
- Often considerably more than the cost of any outlays of money



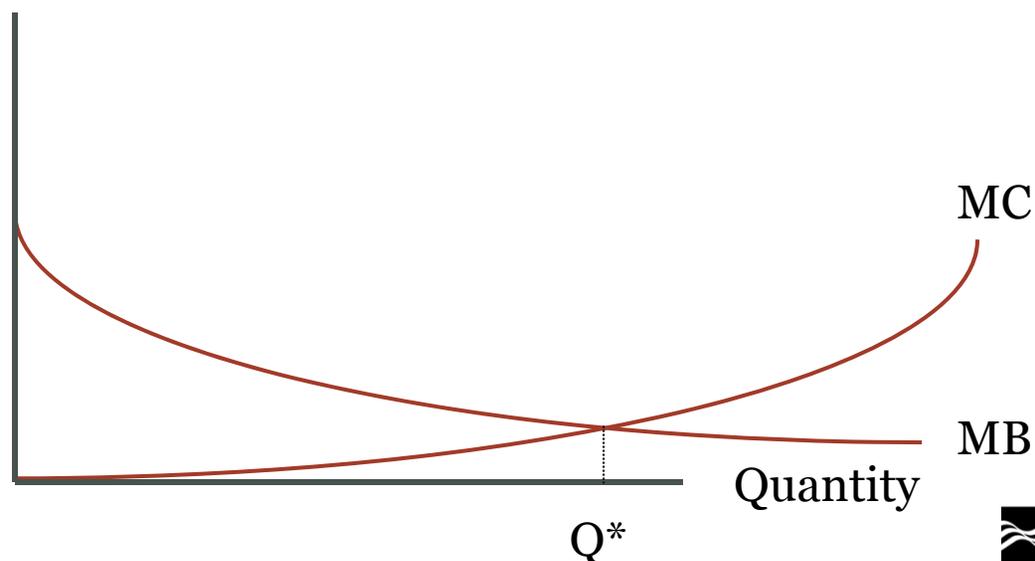
# Net Economic Value and Cost-Benefit Analysis

- Net Economic Value
  - Society's WTP – Economic Cost
- Cost-Benefit Analysis
  - Net present value (NPV) of net economic value
- Challenge: costs are often easier to measure than benefits

# Optimizing - Marginal Analysis

- Can be used to make any “how much” decision
- Optimal quantity is where
  - **marginal benefits = marginal costs**

Marginal benefit,  
marginal cost



# How much of a public good should be provided?

- The level at which the marginal social benefit is equal to the marginal cost
- Marginal social benefit:
  - the sum of each consumer's willingness to pay for one additional unit of the public good
- Marginal social cost:
  - the economic cost of providing one additional unit of the public good

# Example: Recreational Fishing

- The Department of Wildlife manages fishing experiences in Colorado by stocking fish
- Decision: What is the optimal quantity of fish to stock?
- Objective: Maximize net economic value
- Optimal Solution:
  - Marginal benefit of additional stocking = marginal cost of additional stocking



# Valuing Ecosystem Services

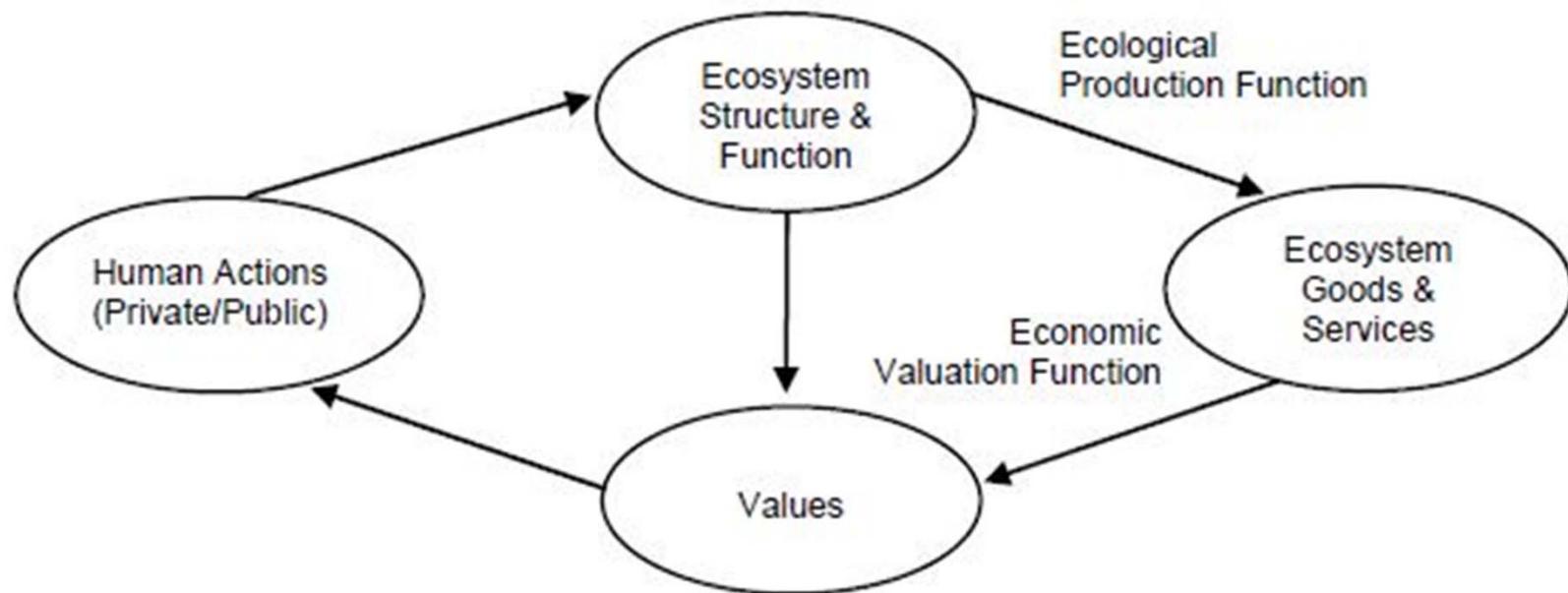
- “Until the economic value of ecosystem goods and services is acknowledged in environmental decision-making, they will implicitly be assigned a value of zero in cost-benefit analyses, and policy choices will be biased against conservation.”

~The National Academy of the Sciences

# Economic Value and Ecosystem Services

- Ecosystem Services: provisioning, regulating, supporting, cultural
- Measuring value: What services are created by a project and how much is society willing to pay for those services?
  - WTP for new ecosystem services
  - WTP for improved ecosystem services
  - WTP to avoid further loss or degradation of ecosystem services

# Relating Ecosystems to Economic Value



Source: National Academy of Sciences, 2004, Valuing Ecosystem Services: Toward Better Environmental Decision-Making

## Example: NYC Drinking Water

- Catskills-Delaware watershed → 90% City's water
- The City enjoyed pristine water without filtration
- 1980's: Catskills watershed was rapidly suburbanized and water quality diminished
- Cost of new filtration system  
= \$4-6 billion+\$250 million annually to operate
- Cost of preserving ecosystem services (water filtration) in the watershed was far less

# Valuing Non-market goods

- Measuring WTP or WTA a change in quantity or quality of non-market goods
- Revealed preference methods: based on real decisions
  - Travel cost method
  - Hedonic pricing method
- Stated preference methods: based on hypothetical decisions
  - Contingent valuation method

# The Travel Cost Method



- The essential idea is to estimate consumer surplus from “demand for access”
- Good for estimating use-values
- Example: The value of a recreational fishing site
  - Think of a fishing trip as a good, then the law of demand applies
  - Demand curves can be developed and used to estimate consumer surplus

# The Hedonic Pricing Method



- Used to estimate economic values for environmental services that directly affect market prices
- The basic premise is that the price of a marketed good is related to its characteristics
- Example: The value of open space
  - The selling price of a house is related to the characteristics of the house
  - Develop a function that relates property values to property characteristics, including the distance to open space

# The Contingent Valuation Method

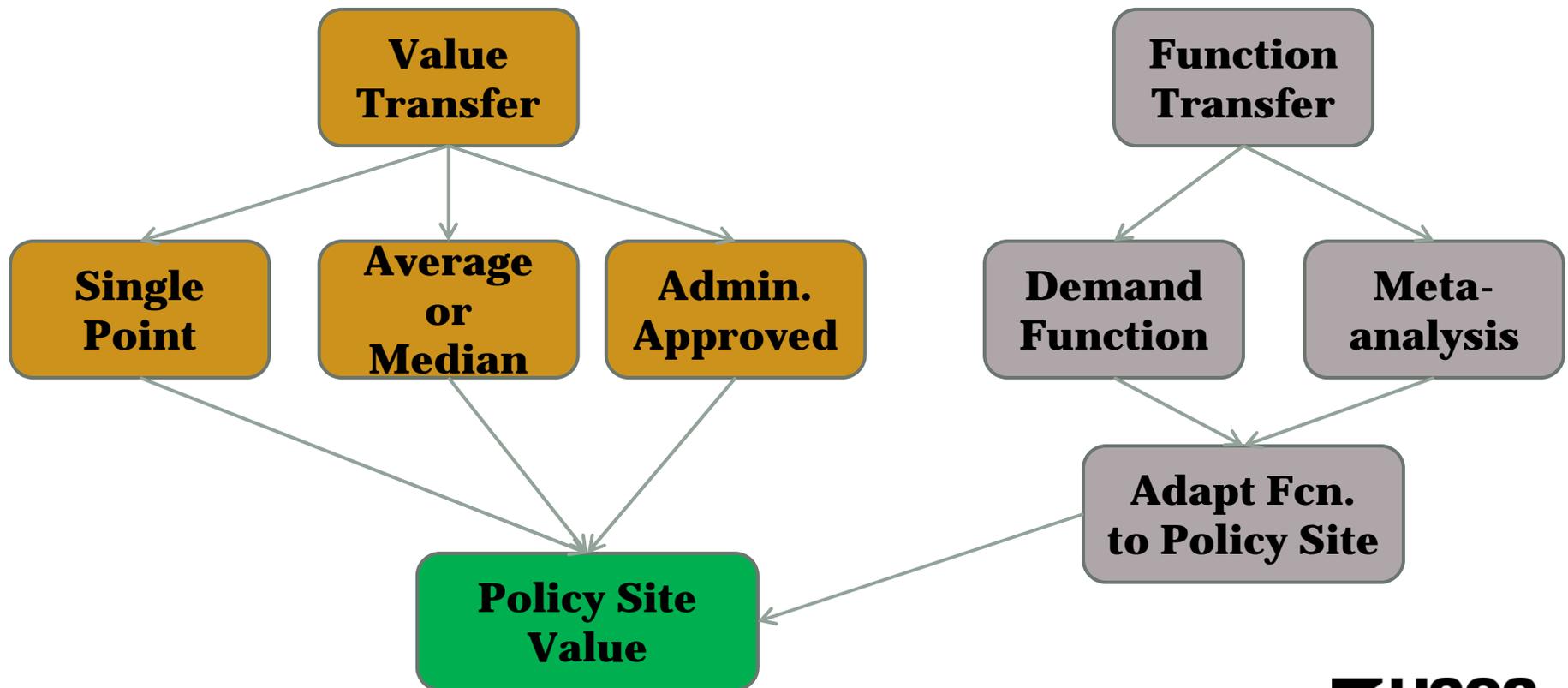
- A survey-based valuation method based on the notion of a hypothetical market
- “Contingent” because people are asked to state their WTP contingent on a hypothetical scenario and description of an environmental service
- Advantage: captures non-use values
- Disadvantages: Possible biases and distrusted by some
- Example: The value of preserving an endangered species

# The Contingent Valuation Method

1. Define exactly what is being valued
2. Design the survey
3. Conduct the survey
4. Statistical techniques are used to estimate demand curves and average WTP values
5. Average WTP values extrapolated to the relevant population to estimate total economic benefits

# Benefit Transfer

- Application of WTP value from other study(ies)



# Benefit Transfer Toolkit

Provides resource managers/planners with a tool to estimate:

- Economic value of:
  - wildlife-based recreation activities
  - Species
  - Habitats
  - Open space
- Visitor use on National Wildlife Refuges and state lands

Total Economic Value = Average WTP x Population Size

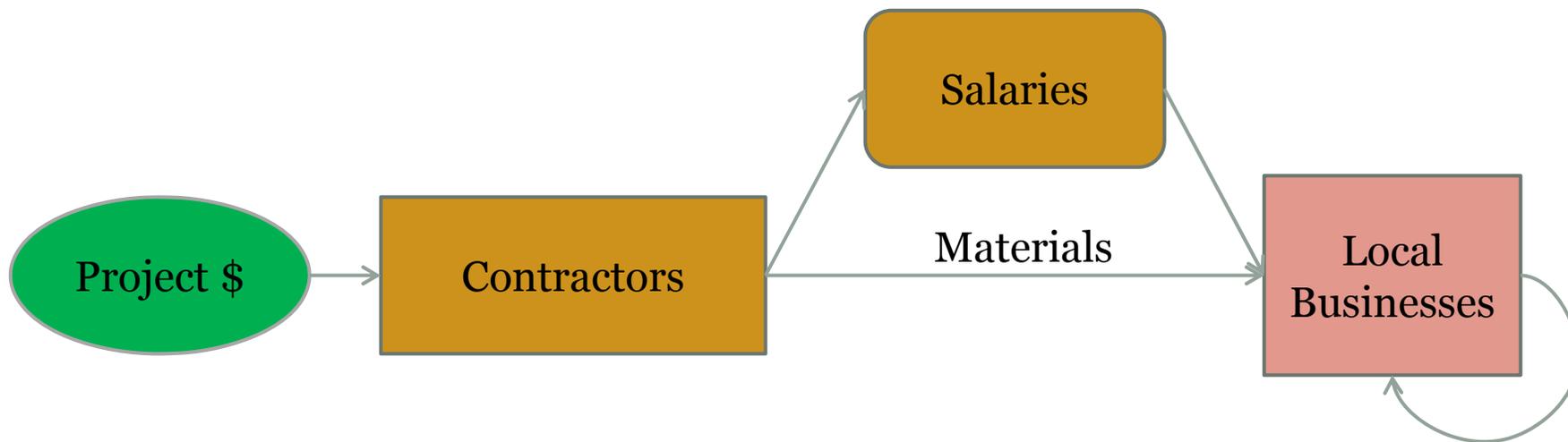


# Economic Impacts

- Another economic metric
- Measures changes in economic activity from a local/regional perspective
- Measures jobs, income, and value added to a local economy
- Based on economic multiplier effects from iterative spending of dollars in a local economy
- This is a popular metric, but it is not a metric of economic value

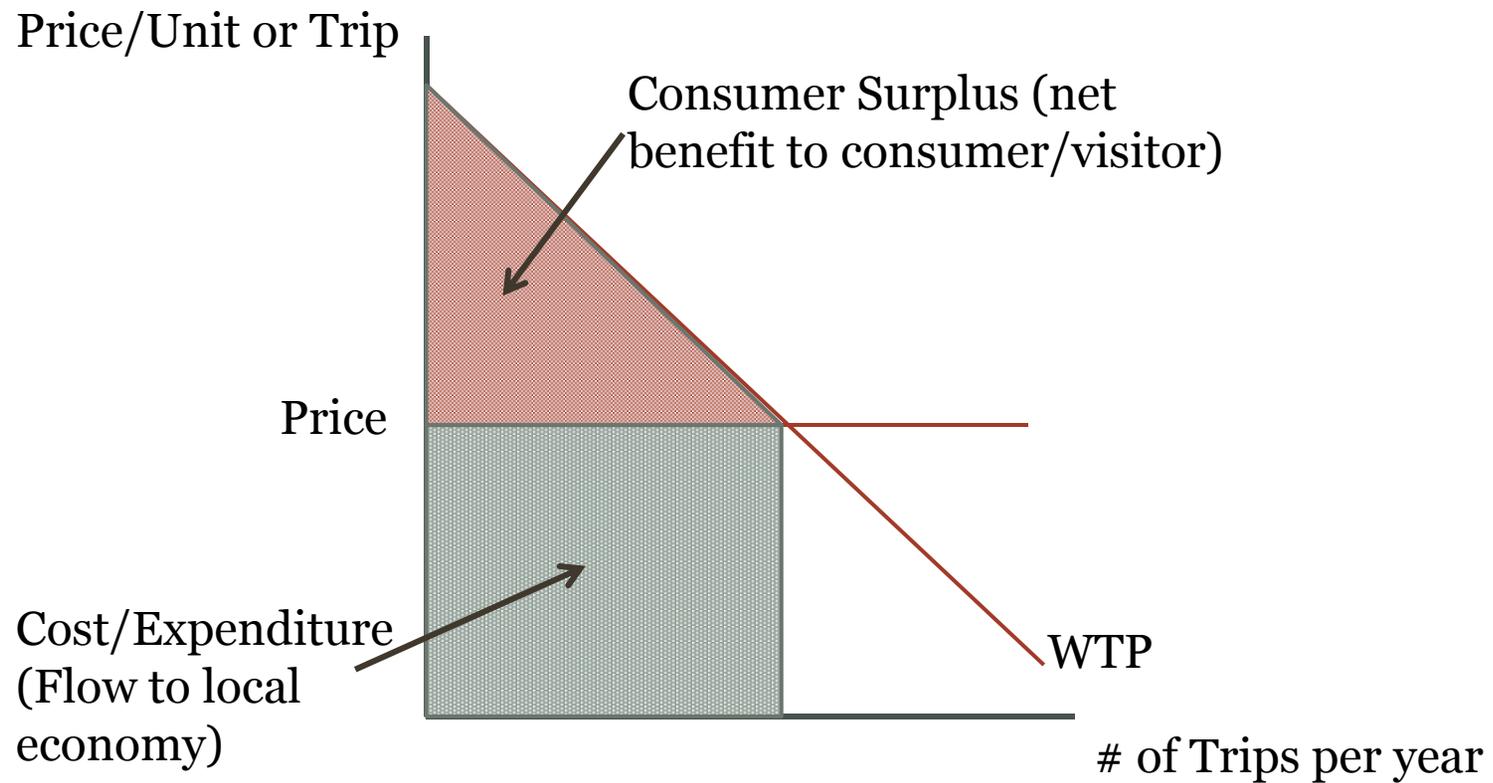
# The Economic Impacts of the Truckee Restoration Project

- \$18.9 million project



	<b>Direct</b>	<b>Indirect</b>	<b>Total</b>
Jobs	15	22	37
Income	\$1.5 MM	\$1.2MM	\$2.7MM

# Economic Impact analysis versus Cost-Benefit Analysis



# Economic Impact analysis versus Cost-Benefit Analysis

## Economic Impact Analysis

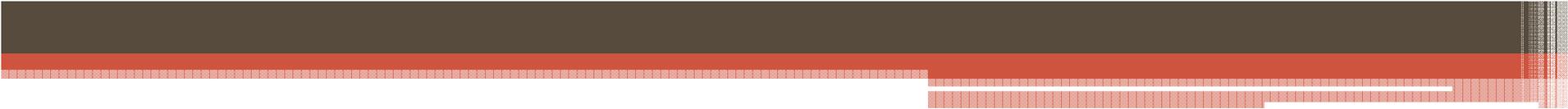
- Local job and income changes
- Direct spending + indirect or multiplier effects
- National viewpoint: transfer of economic activity

## Benefit Cost Analysis

- Focused on WTP
- Benefits = consumer surplus
- Costs = opportunity costs
- Objective is to maximize net benefits
- Can represent a national perspective

# Resources

- **Benefit Transfer Toolkit**
  - Currently available at Defenders of Wildlife
  - Coming soon: to be updated by USGS
- **ASPN (Assessing Socioeconomic Planning Needs)**
  - USGS, BLM, NPS, USFS
  - Web-based decision tool for identifying and prioritizing social and economic issues to be addressed
  - Identifies applicable methods and analyses



Questions?