Economic Analysis of Water Supply and Water Quality Benefits

IRWM Round 2

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Each Proposal Must Include

• Cost details for the entire Proposal
• Description of the Proposal’s water supply and water quality benefits by reference to a future without the Proposal
• Quantified estimates of physical benefits, if possible
• Economic benefits analysis, if possible
Required Economic Assumptions

• Must evaluate as a stand-alone proposal
• Include all associated costs
• Not just grant-funded portion
• Benefit-Cost Assumptions
  – Use 50-year analysis period, unless justification provided.
  – Use 6 percent to discount future costs, benefits
  – Show all costs and benefits in year 2006 dollars
  – Real costs or benefits can trend over time
  – Planning horizon analysis if appropriate
Why Use Planning Horizon Annual Analysis?

• Tables are provided for Planning Horizon Annual Analysis
• Average annual values could be used if:
  – Over planning horizon, expected benefits are fairly uniform or random variation due to hydrology (no trend), AND
  – O&M and replacement costs are fairly uniform or random, AND
  – All capital costs incurred up front (not staged)
  – Then, for a 50-year project, NPV of annual benefits and O&M costs is 15.76 times the annual value
• Planning horizon annual analysis is appropriate if capital costs are staged, or if there is a significant trend in benefits or O&M costs over project life
Expected yield is delayed or shows a trend over time, so benefits are delayed or show a trend. Capital cost does not all occur in year zero, and O&M costs are delayed or show a trend.

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Costs to include

- All costs must be included regardless of who pays
- All capital, O&M, and future replacement
- Economic costs include opportunity costs of any resources (land, volunteer labor) committed to the project even if they were purchased in the past
- Opportunity cost is the market value of the resource now
Benefits and Cost Savings

• Economic benefits are 1) the value of water quality or quantity improvements or 2) cost savings, both relative to without-proposal

• Count 1) when
  – Without proposal, no other project would be implemented
  – Benefits are achieved only with the proposal
  – The effect of the proposal is to achieve a physical quality or supply benefit that would not otherwise be obtained

• Count 2) cost savings when:
  – Without proposal, some other project would be implemented instead
  – Benefits are achieved with either proposal or project
  – The effect of the proposal is to avoid a cost
Benefits Hints

• For water supply, usually cost savings. If there is no supply alternative, might claim reduced shortage cost
• Economic impacts such as jobs or income created in construction are not benefits
• **Do not double count**
• Count only one type of benefit or cost savings for each unit of water supply produced
• Can count different types for different conditions
  – Hydrologic conditions: wet year, reduce purchases, dry year, reduce shortage
  – Planning horizon: short run, improve quality, long-run, avoid a future project
Documenting Cost Savings and Benefits

- Describe what would happen (especially costs) in the future without the proposal
- Describe how proposal will be operated to obtain benefits claimed
- Document benefits thoroughly, including future conditions without and with the proposal
  - Past supply planning documents, Board minutes, land use plans
  - Make any past documentation of physical or economic benefits analysis available
Benefits/Cost Savings Tables for Planning Horizon Analysis

• Unit benefit (Table 12)
  – Water sales revenues, only if real supply increase,
  – Avoided water supply purchases, or
  – Benefit or cost savings per unit salinity

• Cost of future projects avoided (Table 13)
  – water supply project
  – water quality project

• Other (Table 14)
  – secondary studies

NOTE: Benefit estimates must realistically reflect what the agency would actually do in absence of proposal
Water Quality Benefits

• Link Project Hydrology to Receiving Water Body
• Identify Water Quality Standards
  – http://www.waterboards.ca.gov/
  – Regional Board
  – Water Quality Control Plan (Basin Plan)
  – Basin Plan Documents
  – Section 3. Water Quality Objectives (standards)
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<th>Specific Conductance (micromhos) @ 77°F</th>
<th>Total Dissolved Solids (mg/l)</th>
<th>Dissolved Oxygen (mg/l)</th>
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Estimate

- Change in Flow
- Reduction in Concentration
- Reduction In Loading
  - Units Per Time Period (X tons of sediment per day)
Water Quality Economic Quantification

- Basin Plan Beneficial Uses (Section 2)

- Water Supply
  - MUN  Municipal and Domestic Supply
  - AGR  Agricultural Supply
  - IND  Industrial Service Supply
  - PRO  Industrial Process Supply
  - GWR  Groundwater Recharge
  - FRSH Freshwater Replenishment
  - NAV  Navigation
  - POW  Hydropower Generation
• Recreation
  – REC-1 Water Contact Recreation
  – REC-2 Non-Contact Water Recreation

• Habitat
  – Comm Commercial and Sport Fishing
  – WARM Warm Freshwater Habitat
  – COLD Cold Freshwater Habitat
  – ASBS Preservation of Areas of Special Biological Significance
  – SAL Inland Saline Water Habitat
  – WILD Wildlife Habitat
  – RARE Rare, Threatened, or Endangered Species
  – MAR Marine Habitat
  – MIGR Migration of Aquatic Organisms
  – SPWN Spawning, Reproduction, and/or Early Development
  – SHELL Shellfish Harvesting
  – EST Estuarine Habitat
  – AQUA Aquaculture
• North Coast Region Beneficial Use Designations
  – Wetland
    • WET  Wetland Habitat
    • WQE  Water Quality Enhancement
    • FLD  Flood Peak Attenuation/ Flood Water Storage
  – Traditional and Cultural Uses of Water
    • CUL  Native American Culture
    • FISH  Subsistence Fishing
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Non-Market Values (Habitat, Recreation, etc.)

– National Ocean Economics Program
  • Non-Market Valuation Studies Database

– Beneficial Use Value Calculator Database (BUVC)
  • Over 3,000 Non-Market Values
  • Sorted by Beneficial Use
Scoring

- The minimum score is 1 point.
- The remaining 4 points scored based on two criteria:
  - NET economic benefits
  - Quality of the economic analysis and documentation
    - Unsubstantiated, deceptive, poor quality, or poorly documented economic analysis can result in the score being reduced.
    - Exceptional documentation can increase score.
Other Expected Benefits

• Types could include:
  – Ecosystem Restoration
  – Flood Control
  – Recreation and Public Access
  – Power Cost Savings or Power Production
  – Other Environmental Benefits

• Same economic principles apply