Defining the Baseline, Articulating Criteria, Scenario Analysis and More: Analyses to Support Informed Decision-Making


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Overview of Discussion

- Big Picture
- Baseline
- Scenarios
- Key Questions & Criteria
- Scales and Ratings
- Workplan Summary

Today's Objectives

- Understanding:
  - Baseline
- Agreement:
  - Scenarios
  - Problem Statements
  - Questions of Critical concern/Criteria
  - Tasks/Next Steps/Workplan

Share information and stimulate discussion to help move informed deliberations forward

A Big Picture Perspective

1. Define the Problem
   - This is where the “Baseline” fits in
2. Identify Alternatives for Addressing the Problem
   - Alts Fair, professional insight, and beyond
3. Evaluate the Alternatives
   - Applying analyses to systematically address relevant questions and concerns
4. Evaluate how the Alternative(s) perform under the Scenarios
5. Recommend preferred alternatives/approach(es)
   - E.g., Portfolios and Adaptive Management

Defining the Problem: Establishing the Baseline

The baseline is combination of:

- The “status quo” mix of existing water infrastructure and management policies
- Carried forward in time through the planning horizon (e.g., to 2035)

More specifically…

The baseline is:

- The option (alternative) of maintaining the status quo (not making any substantive changes at the Water Department)
- Evaluated against a relevant scenario of the future
  (typically, a “traditional” future scenario)

What does the Baseline tell us?

- The baseline is used to assess how the system performs into the future, if no substantive changes are made

If the Water Department does not make any appreciable changes in demand management or supply enhancement, and manages its resources in the same manner as now….

- How will future supply align with future demands?
- How frequent and severe will future curtailments be?

- What will this mean for the quality of life and economic vitality of the community?
- What happens to the special status fisheries?
- Can we maintain suitable water quality?

Role of the Baseline in the Analysis

- Defines the nature and magnitude of the problem
  - E.g., Demand routinely exceeds supply by X million gallons (seasonality, curtailments)
  - Helps identify what may be important (criteria)

- It serves as the benchmark against which other options are *compared*
  - How much are curtailments reduced if we do Y instead of the status quo?
  - How much will water bills increase if we do Y?

The Baseline is not necessarily Static

- Changes in some infrastructure and operations may occur, due to a variety of potential factors

- For example, declining water quality and elevated DBP formation may require changes to maintain regulatory compliance. E.g.,
  - More aeration and pumping of stored finished water (w/ cost, energy, and carbon impacts, etc.)
  - Possible addition of more advanced treatment processes (e.g., membranes, UV, ozonation)

Step 2:
Identifying Potential Solutions:
Portfolios of Alternatives

- Conservation
- Resource Management and Operational
- New Sources
- Small but Mighty

Definition of Alternative – Any action that increases water availability

Step 3:
Evaluating each Potential Alternative

- Numerous analytic approaches including:
  - MCDS
  - Triple Bottom Line / Benefit-Cost Analysis
  - Others, and *Combinations*
- Regardless of analytic approach applied to evaluate options…

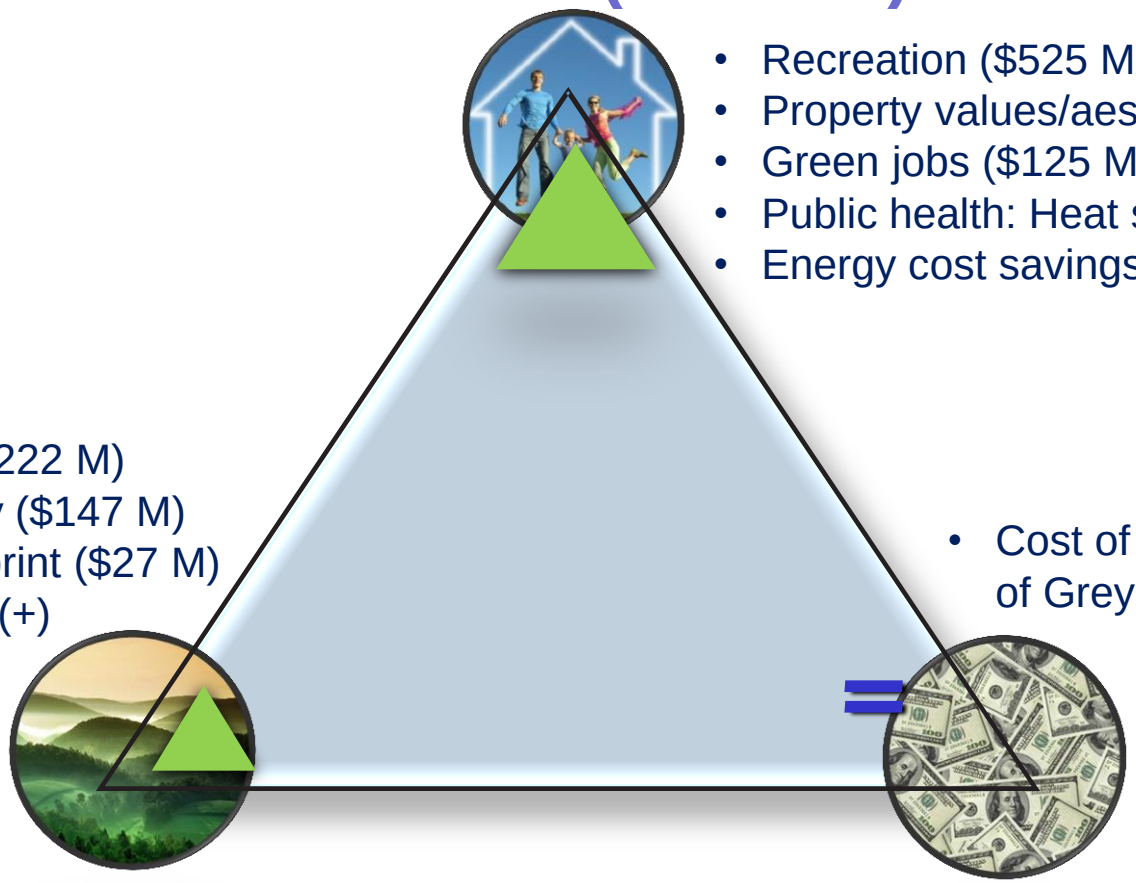
Technically sound, transparent, and objective empirical analyses are essential to supporting good decision-making

Quantitative TBL Demonstrating the Benefit of Philadelphia's Green Stormwater Control

Present Values over 30-year Time Horizon

Social (> $2.3 B)

- Recreation ($525 M)
- Property values/aesthetics ($575 M)
- Green jobs ($125 M)
- Public health: Heat stress ($1.1 B)
- Energy cost savings ($36 M)



- Air quality ($222 M)
- Water quality ($147 M)
- Carbon footprint ($27 M)
- Ecosystems (+)

- Cost of Green = cost of Grey CSO control

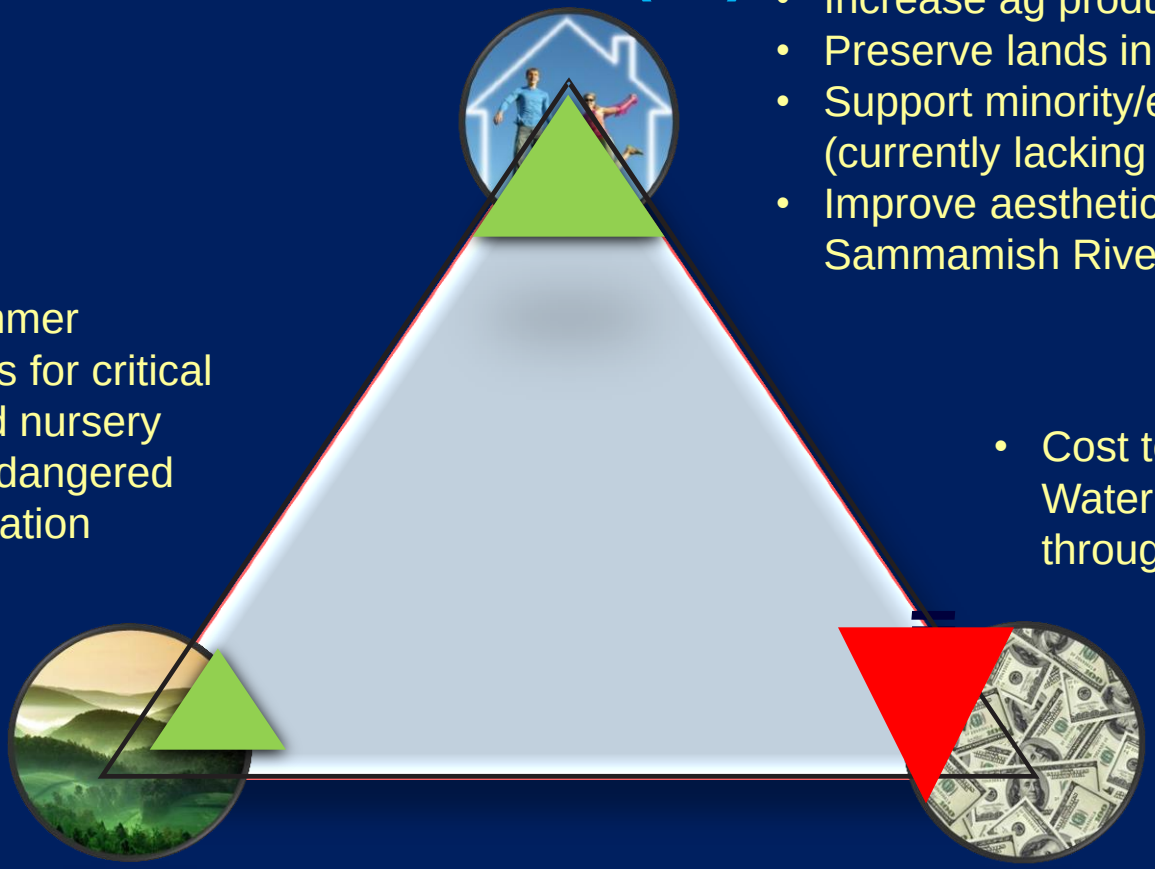
Environmental (> $400 M)

Financial (net $0)

TBL off a Non-Revenue Swap of Reclaimed Water to Retire Surface Rights

SOCIAL (++)

- Increase ag production
- Preserve lands in ag uses
- Support minority/ethnic farmers (currently lacking access to water)
- Improve aesthetics (flows) in Sammamish River



- Enhance summer instream flows for critical spawning and nursery habitat for endangered salmon population

- Cost to provide Reclaim Water not recovered through revenues

ENVIRONMENTAL (++)

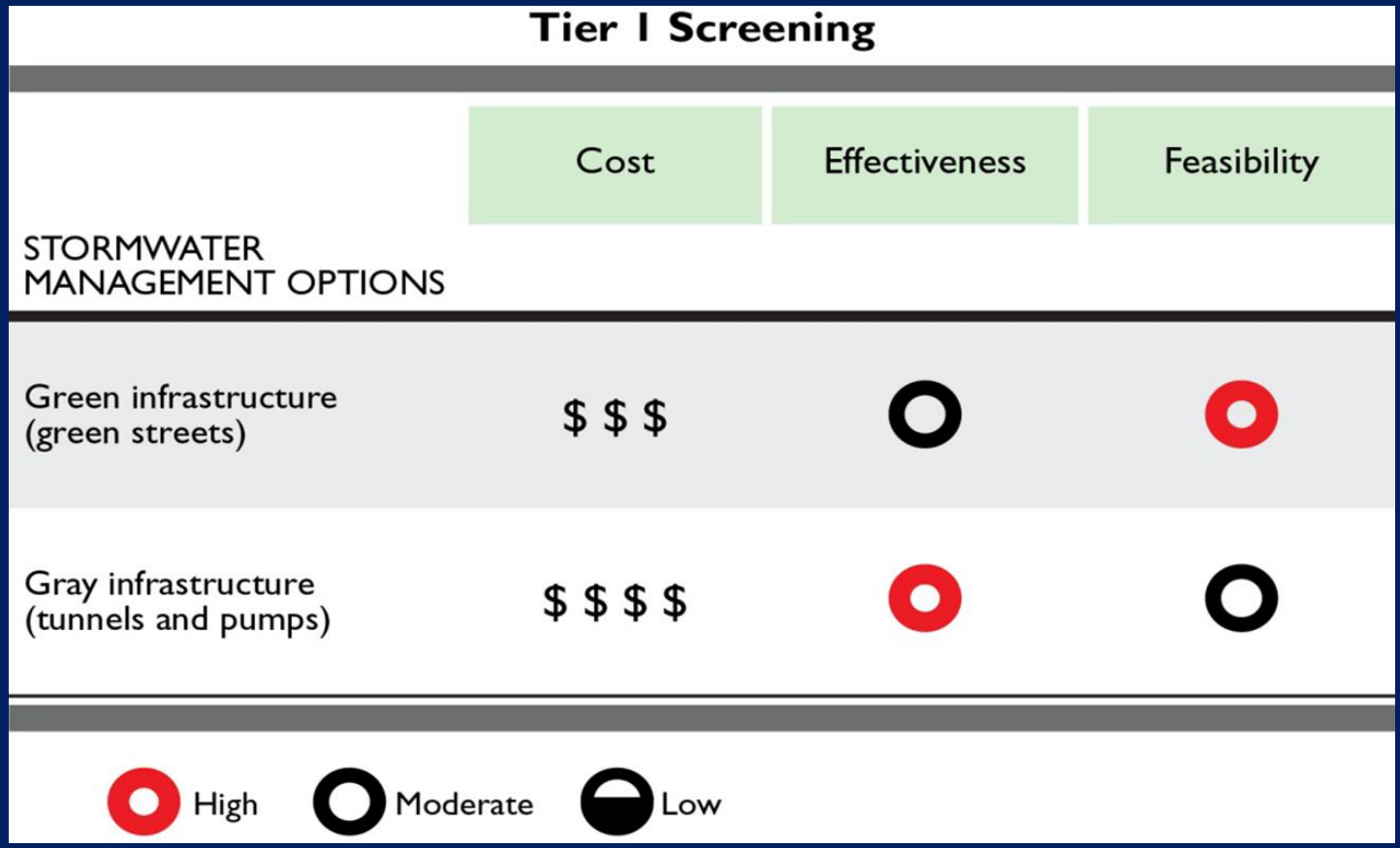
FINANCIAL

MCDS Elements

- Problem Statement
- Criteria
- Scales (developed for each criteria)
- Ratings (scores assigned from scales)
- Weights
- Scores

Separate technical analyses are valuable for developing empirically-based scales and ratings

“Consumer Reports” Style MCDA Results



Baseline

- Definition:

The baseline is the status quo alternative in terms of the Water Department's current resource system and management, carried forward in the future.

- Have we reached a common understanding?
- Questions?

Some Objectives for Using Scenario Analysis

- Identify no- and low-regrets options
- Preserve options
- Build flexibility

Adaptive Management

- Identify tipping points
- Monitor relevant parameters
- Recognize key timing for decision points

Scenario Discussion Objectives

- Agreement:
  - Problem Statements
  - Questions of Critical Concern/Criteria
  - Tasks

Scenarios

Going from Visioning to Problem Statements

If the future looks like x, *then* the anticipated level of water demand is y

Need Alternative Portfolio A to meet the city's water supply needs

Current Scenario Set

- **Traditional Scenario**
- **Enhanced Traditional (best case) Scenario**
- **Climate Change Scenario**
- **Economic Change Scenario**
- **Fish and Regulatory Scenario**
- **Sustainable Santa Cruz Scenario**
- **Worst Case Scenario**

Traditional Scenario

Problem Statement

If the population grows to x by 2040 then we need y supply by 2040

Stated as a Criterion:

Traditional supply-demand alignment criterion

Scale:

Millions of gallons per year

Traditional Scenario

Problem Statement

If the population grows to x by 2040 then we need y supply by 2040

Q of C Drivers:

1. What is the Population change between now and 2040?
2. What is the water demand for this population?

Traditional Scenario

Work plan – where & how answering

- Take from most recent UWMP
- Uses population projections from the Monterrey Bay Area Governments

Traditional Scenario

Sub-criteria:

1. Q of C: What are the frequency and severity of curtailments that are acceptable?

   Criterion: Curtailment frequency and severity

   Scale: Curtailments no more than once every 10 years at Tier 2, and once in 15 years at Tier 3

Supply Demand Alignment

- Demand values come from Scenarios
- Supply values come from Alternative Portfolios

Agreement on approach and next steps for Traditional Scenario?

- Problem Statement
- Drivers
- Work plan

Enhanced Traditional Scenario

Problem Statement

If the population grows to x by 2040 and we have plausible but minimal climate change impacts and x additional regulatory requirements are needed then we need y supply by 2040

Stated as a Criterion:

Enhanced Traditional supply-demand alignment criterion

Scale:

Millions of gallons per year

Enhanced Traditional

- Drivers - Q of C - that define/drive Demand and Supply
  1) Climate Change
  2) Fish Flows
  3) Other known additional Regulatory Requirements

Enhanced Traditional

- Driver – CC: How will CC affect water supplies – i.e. extraction availability?

  1) Climate Change

  Low end of plausible range:

  - changes in T & P
  - hydrologic changes
  - System performance

- Criterion – Supply Demand Alignment

Enhanced Traditional

- Drivers – CC: How will CC affect water demands:
  - Ecosystem
  - Human

- Criterion – Supply Demand Alignment

Enhanced Traditional

Drivers - Q of C

2) Fish Flows – How will in-stream flow regulations for fishery management affect supply – extraction availability?

Criterion: Supply Demand Alignment

3) Other Regulatory Requirements – Are there other known changes in the regs coming up that should be included?

Enhanced Traditional

Work plan – where & how answering

- CC - Further discussion of CC tasks in CC Scenario
- Fish – Tier 3/2
- Other Regs – Working with Water Dept. to identify

Agreement on Enhanced Traditional?

- Problem Statement – do we have the correct set of Drivers – CC, Fish, Other Regs
- Work plan

Brief Overview

- **Climate Change Scenario**
- **Economic Change Scenario**
- **Fish and Regulatory Scenario**
- **Sustainable Santa Cruz Scenario**

Climate Change

Problem Statement: What is the demand we need to meet as the climate changes? What are the changes in supply?

Criterion: Climate Change Supply Demand Alignment

Drivers - Q of C – What are the:

1. Changes in Supply availability?
    - Changes in T & P
    - Hydro changes
    - System changes

Climate Change

- Work plan

1. Bound Plausible changes

(Stratus, Shawn Chartrand, Gary Fiske)

- Identify plausible changes in T & P using GCM data provided by Cal Adapt
- Project hydrologic in-stream flow changes (Hydrologic in-stream flow model - Shawn)
- Project changes in extraction availability, system performance (*Confluence* model - Gary)

Climate Change

- Work plan Objectives:
  - Bound the problem
  - Identify drivers for further evaluation

- Work plan: initial results:
  - October meeting

Climate Change

Drivers - Q of C – What are the:

1. Changes in Demand requirements?
    - Ecosystem
    - Human

Work plan?

Climate Change

- Drivers - Q of C – What are the:
    3. Changes in extreme event severity & frequency
        - Sea level rise
        - Wildfire
        - Droughts
    4. Other

Climate Change

- Work plan
  2. Risk Profile Matrix (Stratus, Water Dept.)
     - Frame risks associated with CC (probabilities and consequences)
     - Place in context of other risks

Climate Change

- Additional work areas?

Economic Change Scenario

- Problem Statement: If the future economic situation looks like x then we need Portfolio y
- Criterion: Economic Change Supply Demand Alignment
- Scale: millions of gallons per year

Economic Change Scenario

- Problem Statement: If the future economic situation looks like X, then we need Portfolio Y

- Drivers - Q of C –
  - What is X? and the Demand for X
  - What is it about X you want to plan for?
  - How do curtailments hurt the economy – what frequency and severity equal X economic impact

Economic Changes Scenario

Work plan

1. Impact of current drought on the economy
   - Focus on green and hospitality
   - Efficiency measures – how well implemented?
   - Curtailments – reduction in water consumption by business area

Objective: Identify the adverse impacts curtailments have on local businesses

Timing: end of Recon

Economic Changes Scenario

Work plan

- Econometric Demand Forecast model
  - Price of water
  - Household income
  - Climate factors

Objective: Develop more accurate and insightful demand forecasts (not just population)

Timing: Initial scoping underway – results ?

Work the Problem

- Problem Statement – *if then*
- Criterion – Supply Demand Alignment
- Q of C about Supply & Demand
- Tasks to develop answers
- Q of C drivers
- Criteria and Sub- criteria
- Scales
- Work plans

Present the Problem

- Problem Statement – *if then*
- Criterion – Supply Demand Alignment
- Q of C about Supply & Demand
- Tasks to develop answers
- Q of C drivers
- Criteria and Sub- criteria
- Scales
- Work plans

Crosswalk to Remaining Work Plan Items

- Key Q of C, criteria, scales, scenarios – drive the work plan
- Most of these Work Plan elements primarily relate to Alts
- Not comprehensive!

Workplan: Current Objectives

- Initial work plan items intended to provide initial scoping
  - What do we know now?
  - What key questions/issues remain?
  - Ideas for what to examine in more depth (if anything).
- Timing: intent is for scoping in Recon, to identify possible follow-on work in Real Deal

Organized by Known Research Needs for Some Alternatives

- Demand Management/Conservation
- Water Storage
- Groundwater Supplies and Management
- Water Reuse

- Other alternatives to be added

Criteria-related Work Plan Items

- Energy requirements and carbon footprint
- Lifecycle costing
- Technical feasibility
- Potential yields (or water savings)

1. Conservation, Demand Management, Improved Forecast

- Assessing Impact of Current Drought
  - Question of Concern: How much do curtailments hurt the community?
- Potential for Additional Conservation
  - Q of C: How much more can be saved? At what total cost? Borne by whom
- Econometric Demand Forecasting
  - Q of C: What are future demands? How may the be impacted be pricing? climate?
- Work Plan: Maddaus Water Management

2. Climate change

- Discussed earlier, in context of scenarios

3. Energy Requirements & Carbon Footprint

- Q of C: How much net energy and GHG emissions change across key Alts?
  - Status Quo - Baseline
  - Exchanges (pipes, pumps, treatment)
  - Desal, reuse, conservation, etc.

- Possible inquiry: Opportunities for Green Energy and Meaningful Carbon Offsets

- Work Plan: scoping with John Rosenblum

4. Fishery Flow Requirements and Impacts on Yields

- Discussed earlier, in context of scenarios

5. Water Storage
(inter-annual and inter-seasonal)

- On-stream storage (Loch, and elsewhere?)
  - What if we manage Loch Lomond differently? How might this align future supply and demand? How does this change risks?
  - Work Plan: Gary Fiske, *Confluence* model

- Groundwater – ASR
  - Can water be placed, stored and retrieved from any of the regional aquifer systems?
  - Work Plan: Pueblo Water Resources

6. Groundwater Supplies and Management

- Viability of North Coast wells
  - Is this a feasible option? What are the potential yields and water quality?
  - Work Plan: Brown and Caldwell

- Seawater intrusion at Coastal Wells
  - What are the risks? What might be feasible to reduce the probabilities and/ or consequences?
  - Work Plan: HydroMetrics (checking COI)

7. Water Recycling

- How much reclaimed water is available?
  - What is the potential yield?
  - Work Plan: Water Dept, and Brown and Caldwell
- Potable Reuse:
  - What are the options (IPR, DPR)? How do they compare to other alts? What are the public health implications and perceptions?
  - Work Plan: Stratus, George T (White Paper)
- Nonpotable Reuse (NPR):
  - What are the possible demands and costs?

8. Lifecycle Costing and Technical Performance

For all the relevant alts: What do they really cost? What do they yield? How reliable are they?

- Initial implementation costs (capital, land, permitting, etc.)
- Operation and maintenance costs
- Periodic replacement costs
- Yields across seasons, weather, years, etc.

- Work Plan: Brown and Caldwell, drawing on existing studies where feasible

Enrichment Series

- David Mitchell – this Friday at 1 pm
  - Postponed!
- Other possible topics and speakers
  - Maddaus, on Conservation
  - Trussell, on Treatment Technologies (or Potable Reuse)
  - Others