

Today's Scenario Agenda

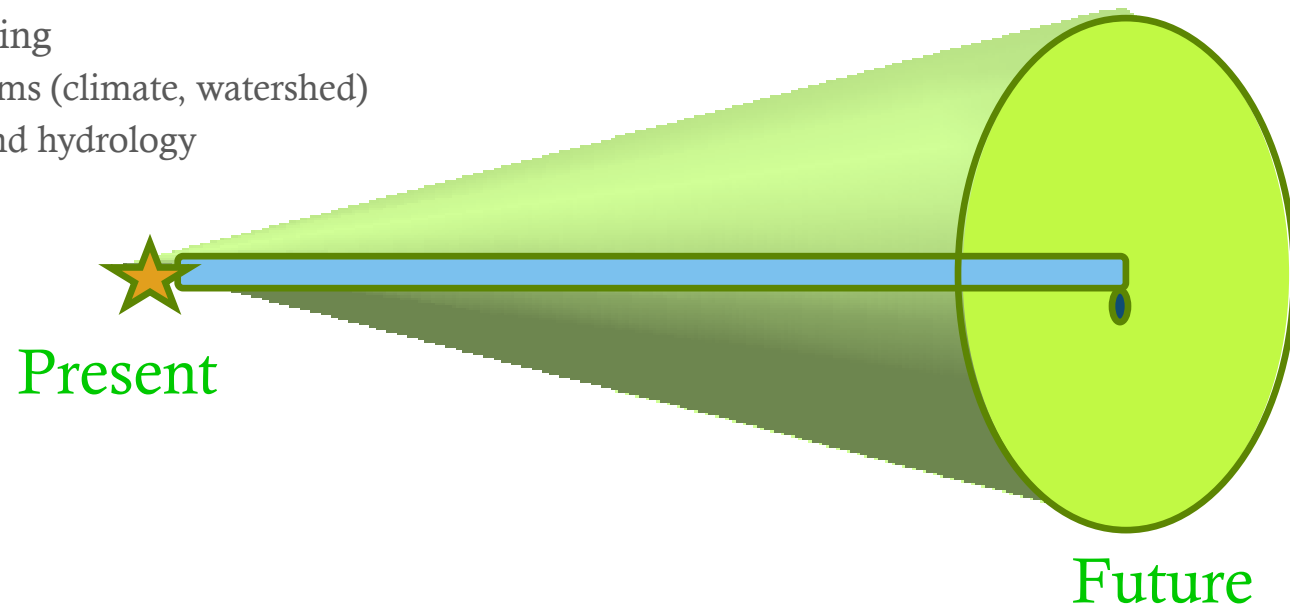
- ◆ How does Scenario planning fit?
- ◆ Elements of Scenarios
- ◆ What are the Visions/Problems – Scenarios - of the future that WSAC wants to plan for?
- ◆ What are the questions of critical concern – criteria - for each scenario?
- ◆ What are the research needs:
 - ◆ What do we know we will need?
 - ◆ What else do you want Stratus to tee up?

What does Scenario Planning bring to the Decision Making Process?

A way to examine large uncertainty about future

Cone of Uncertainty

- ◆ Traditional long-term planning
 - ◆ Assumes stationary systems (climate, watershed)
 - ◆ Uses recorded weather and hydrology times series
- ◆ New planning methods
 - ◆ 100's of possible climate scenarios
 - ◆ Many sources of uncertainty in addition to climate change
 - ◆ Robust over optimal



Why Use Scenario Planning?

- ◆ Traditional planning – one scenario – is inadequate to address our uncertain future
- ◆ Climate is not the only uncertainty – population growth, land use planning, transportation, and economy are others
- ◆ Scenario planning is a great tool for facilitating group planning
- ◆ Scenario planning provides a great structure for thinking more broadly and long-term
- ◆ The planning *process* is more important than the outcomes generated

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

Some Observations from July Scenario Exercise re Baseline

- ◆ Some fairly draconian images of the City emerged from small group exercise
- ◆ Discussions acknowledged that the City's water future looks more challenging than "an occasional 1977."
- ◆ Water quality challenges also likely to be exacerbated
 - ◆ Treatment challenges and upgrades could possibly increase energy use and carbon footprint....

What does Triple Bottom Line
bring to the Decision Making
Process? **Articulation**

EPWU Triple Bottom Line

(Present Values over 50-Year Period 2011-2060)

Social (> \$2.4M)

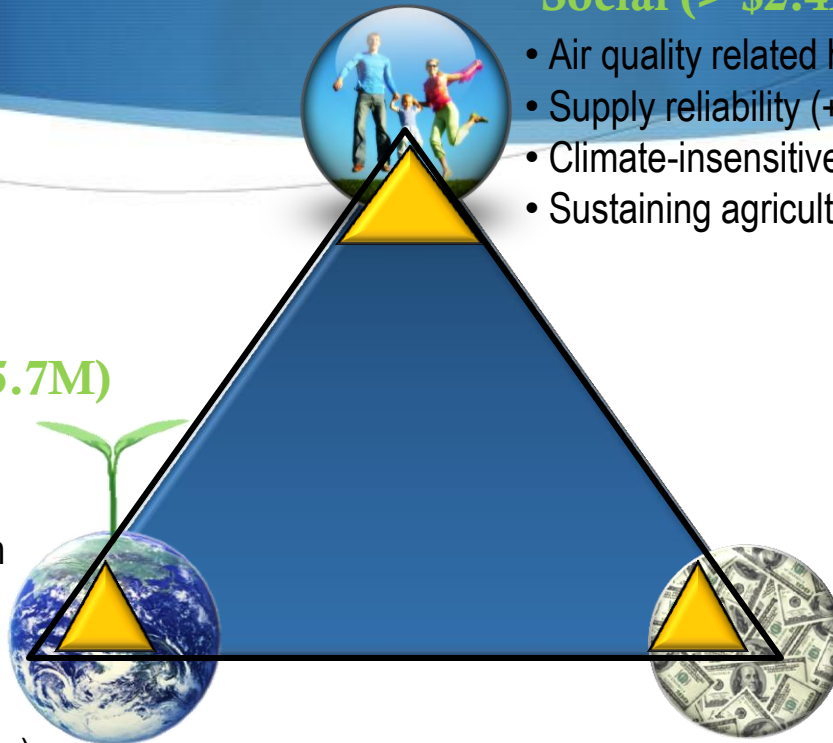
- Air quality related health risk reduction (\$2.4M)
- Supply reliability (+)
- Climate-insensitive supply source (++)
- Sustaining agricultural communities (+)

Environmental (> \$15.7M)

- Carbon footprint reduction (\$15.77M)
- Energy savings 3.6M MWh
- Air quality (+)
- Groundwater quality (+)
- Surface water (+)
- Carbon footprint of piping (+)

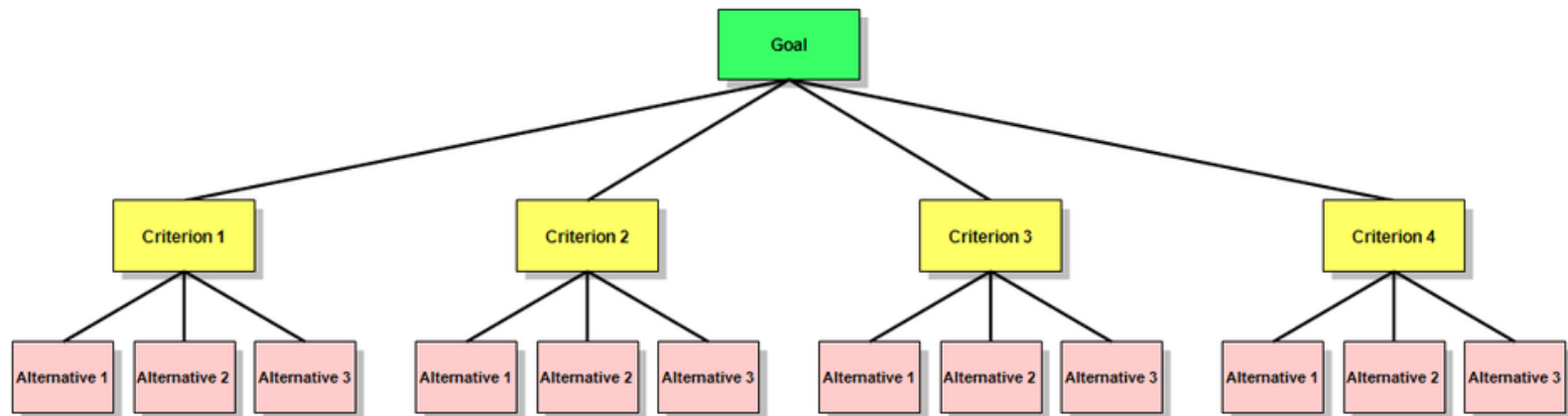
Financial (\$967M)

- 74% cost saving to supply water to all EPWU customers



What does the Multiple Criteria Decision Analysis bring to the Decision Making Process?

A means of bringing it all together –
examining what happens if the future looks
like x and WSAC selects Alternatives Y and Z



RECON Needs for Scenario

- ◆ Identify the visions/problems (Scenarios) WSAC wants to examine?
- ◆ Develop a set of criteria to consider based on the questions of critical concern
- ◆ Identify the kinds of ratings that can be used for each set of criteria
- ◆ Establish how WSAC will answer the questions posed as criteria— what are the analytic needs and subcontract needs?

What WSAC can do with Alternatives as part of Scenario Planning

- ◆ Look at each scenario individually
- ◆ Identify the alternative(s) that can be used to meet each Scenario – **Supply-Demand Alignment Criteria**
- ◆ Examine how alternative(s) perform across scenarios - **Robust Criteria**
- ◆ Have a context for developing rating scales and weights
- ◆ Identify drivers, tipping points and sign posts

Scenario Elements -Examples

- A. Vision/Problem Statement**
- B. Measure of Success**
- C. Alternatives**
 - A. Technical Criteria**
- D. Criteria - Questions of Critical Concern about this Vision**
 - ◆ Financial
 - ◆ Social
 - ◆ Environmental
 - ◆ Other
- E. Technical Research Needs**
- F. Technical Support Needs**

RECON: What scenarios does WSAC want to examine

- A. Baseline
- B. Santa Cruz Economy Thrives – No Need to Commute
- C. Maximizing Fish Health and Productivity
- D. Plan for Climate Change
- E. Santa Cruz – A Garden Community
- F. Worst Case Scenario?
- G. Other(s)

Santa Cruz Economy Thrives – No Need to Commute

Vision: What the Santa Cruz community will look like in 25[?] years if the Water Supply Advisory Committee (WSAC) selects supply alternatives that ensure that adequate and reliable water is available to support a sustainable, locally based economy.

OBJECTIVE – Understand the effects of water supply and curtailment on economic activity and employment opportunities

RECON: How can water supply be used to stimulate local employment opportunities

Maximizing Anadromous Fish Health and Productivity

Vision: Santa Cruz water needs over x years are driven by-stream flows fish needs.

Objective: Identify how fishery needs drive the choice of Alts

RECON: Develop understanding of fish flows needs, what level of need is represented in HCP, etc.

Climate Change

Vision: *Santa Cruz is a leader in preparing for the plausible range of climate changes*

Objective: Understand the implications of long-term climate change trends and the changes in extreme events

RECON: Understand the relationship between changes in P, T, ET and in-stream flows and the implication of those changes on system extractions – it is not linear!

Santa Cruz – A Garden Community

Vision: *Santa Cruz water supply supports gardens, parks, sports fields and public and private recreation*

Objective: What supply level and frequency and severity of curtailments allows planted vegetation to thrive

RECON: Identify what frequency and severity of curtailments – as well as baseline supply levels – are necessary to ensure that vegetation in parks, gardens, sports fields, etc – don't die.

Worst Case Scenario

Vision: Does WSAC want to look at this?

Objective: Understand the Compounded challenges –e.g. worst case from each scenario?

RECON: Identify what compounding challenges WSAC wants to examine

Other Scenario Ideas

Scenario Elements – Examples Baseline

- A. Vision/Problem Statement**
- B. Measure of Success**
- C. Alternatives**
- D. Questions of Critical Concern about this Vision**
 - ◆ Financial
 - ◆ Social
 - ◆ Environmental
 - ◆ Technical
 - ◆ Other
- E. Technical Research Needs**
- F. Technical Support Needs**

Crucial role of Baseline!

Everything is in relationship to the Baseline

A. Vision Statement:

What Santa Cruz will look like if no changes are made – no additional management alternatives are implemented

B. Measure of Success Example – **Supply Demand Alignment Criterion**

RECON: Establish how much water supply (MGY) in what time frames (winter versus summer, other?) with what frequency and severity of shortages

Slide 54a and 55a carried forward in time

B. Measure of Success – Supply Demand Alignment Criterion

RECON:

- ◆ Identify the assumptions used in the baseline?
- ◆ Identify which assumptions are drivers

B.Measure of Success – Supply Demand Alignment Criteria

RECON Ratings Example:

- 5 Supply fully meets Demand 100% of the time and there are zero curtailment
- 4 Supply fully meets Demand at least 85% of the time and curtailments do not exceed 20% more than once every 5 years
- 3 Etc....

C: Alternatives – Baseline - no new Alts

In all other scenarios this is where we place the set of Alts that WSAC wants to consider

Same criteria apply to the individual Alts in all scenarios –

But the ratings and weights may vary across scenarios

C: Alternatives – Baseline - no new Alts

Technical Criteria Examples:

- ◆ **Supply Criterion** – how much supply will this Alternative deliver
- ◆ **Reliability Criterion** – ability to provide consistent yields over time
- ◆ **Feasibility Criterion**- implementation feasibility?
 - ◆ Current feasibility
 - ◆ Future feasibility
- ◆ **Political Acceptability Criterion**–
- ◆ **Good Governance Criterion**
- ◆ **Cost Criteria**
 - ◆ Implementation Cost Criterion
 - ◆ O & M Cost Criterion
- ◆ **Adaptive Capacity Criteria**

Alts Technical Needs

We will need engineering support to answer the questions – address the technical criteria

D: Questions of Critical Concern about BASELINE Scenario Criteria Examples

Examples: Financial Criteria

- 💧 **Water Department Cost Criterion:** What additional costs is the utility already committed to – e.g. changes in treatment due to changes in water quality
- 💧 **Ratepayer Cost Criteria:** What is the impact on the utility – bonds, rates, etc. – of not adding any new supplies?
- 💧 **Water Department benefit Criteria:** What are the financial benefits to the Water Department associated with this scenario, if any?

Questions of Critical Concern –Criteria Baseline

Example: **Social/Community Criteria**

- ◆ **Economic Curtailments Criteria:** What is the impact on the city and regional economy – with a focus on Soquel Creek
- ◆ **Affordability Criteria** –What is the impact on low-income households of expected rate changes?
- ◆ **Growth Criteria-** What are the implications for the levels and patterns of population growth and development?

Baseline

Example: Environmental Criteria

- ◆ Carbon Footprint Criteria
 - ◆ Energy amounts and sources criterion
 - ◆ Carbon Offsets criterion
- ◆ Fish Flow Criterion:
- ◆ Ecosystem and Habitat Criterion: What else is the city already doing related to the ecosystem and habitats

Baseline

Technical Research Needs

- a) Is the list of questions of concern – **criteria** - sufficient for RECON? What changes and additions does WSAC want?

Technical Support Needs

- ◆ IRP Input

Baseline

Technical Research Needs

- b) **Supply-demand alignment criteria** –what are the assumptions concerning: demands, fisheries, climate change, etc.

RECON:

Technical Support Needs –

- ◆ Access to City and the city's consultants who understand the current water system, assumptions, etc.
- ◆ Engineering Assessment of possible changes in water treatment needs

Climate change shifts the water cycle

Santa Cruz is a leader in adapting to climate change

Technical Research Needs

- What is the Plausible range of changes in the water cycle due to long-term changes in temperature, precipitation and Sea Level Rise?
- What is the plausible range of changes in extreme events – droughts, extreme precipitation events, extreme heat events, flooding, wildfire, marine storms?
- What are the implications of these changes on the city's water system – flow changes do not equal changes in supply

Climate change shifts the water cycle Santa Cruz is a leader in adapting to climate change

Technical Support Needs

RECON:

Use **Stratus** – further Plausible ranges

Use **Shawn Chartrand** to examine how flows may change

Use **Gary Fiske** to examine how changes in flows translate into changes in extraction levels (yields)

AWWA Webinar

***HAVE YOU HEARD ABOUT THE LATEST IN
CLIMATE CHANGE?***

September 3, 2014

11:00 a.m. - 12:30 p.m. MDT

Santa Cruz Economy Thrives – No Need to Commute

Vision: What the Santa Cruz community will look like in 25[?] years if the Water Supply Advisory Committee (WSAC) selects supply alternatives that ensure that adequate and reliable water is available to support a sustainable, locally based economy.

RECON: What is the planning horizon WSAC wants to use?

Technical Research Needs

What is the impact of water supply reliability and curtailments on economic vitality and employment opportunities?

Economic Analysis

Technical Support Needs

Stratus and David Mitchel – regional economic modeling

Remaining Scenarios

RECON: Need to work remaining scenarios Each scenario discussion will provide context and examples for:

- ◆ Refining criteria – and identifying analytic needs for the Real Deal
- ◆ Developing ratings and weights