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watersmartinnovations.com
A Multi-Benefit Framework for Water Management: Sustainable Landscapes Test Case

Sarah Diringer, Pacific Institute
Lisa Cuellar, CalWEP
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Questions for Today

What are the multiple benefits and trade-offs of water management? Why should I care?

How can businesses evaluate the multiple benefits and costs of a sustainable landscape project?

How can water utilities use multiple benefits to help to advance investment in sustainable landscapes?
Water Management Strategies

- Dams and Reservoirs
- Stormwater Mgmt
- Watershed Protection
- Desalination
- Reuse
- Ag Efficiency
- GW Recharge
- Water Transfers
- Urban Efficiency
Multiple Benefits (and costs) of Water Management

**Water Supply**
- Supply augmentation
- Demand reduction

**Flood Control**
- Total flood volume
- Peak flood volume

**Water Quality**
- Ambient water quality
- Drinking water quality

**Energy**
- Energy for water systems
- Energy for wastewater
- End-use energy demand
- Secondary energy demand
- Energy production potential

**Land and the Environment**
- Air quality (including GHG)
- In-stream flows
- Habitat and biodiversity
- Carbon sequestration
- Extreme events
- Soil health
- Agricultural yields
- Agricultural quality
- Resource recovery

**Risk and Resilience**
- Water supply reliability
- System resilience
- Regulatory compliance
- Reputation

**People and Community**
*Defined by stakeholders*
- Local economy
- Community resilience
- Urban heat island
- Human health
- Recreation
- Educational opportunity
- Local food production
- Community livability and aesthetics
- Water affordability
Why Incorporate Multiple Benefits into Water Efficiency?

Incorporating multiple benefits and trade-offs can help to:

• Broaden support for policies or projects;
• Identify opportunities to share costs among project beneficiaries;
• Minimize adverse and unintended consequences;
• Promote equitable and transparent distribution of benefits and costs; and,
• Optimize the investment of time, money, and other resources.
Proposed Multi-Benefit Framework

Step 1: Define water management goals and project options
What are your water management goals and project options?
Which stakeholders should be at the table?

Step 2: Identify benefits and trade-offs
What are the potential benefits and trade-offs of the project options? Are there additional stakeholders to engage as beneficiaries?

Step 3: Characterize Key Benefits and Trade-offs
What analyses are needed to inform decision-makers?
What are the quantitative or qualitative benefits of the project options?

Step 4: Inform Decision Making
How should this information be communicated to inform decision-making?
Multi-Benefit Test Cases

Sustainable Landscapes on Commercial Properties in southern California

Distributed Rainwater Capture in Austin, Texas

Sustainable Landscapes on Commercial and Industrial Properties in the Santa Ana River Watershed

Heather Cooley, Anne Thebo, Cora Kammeyer, Sonali Abraham, Charles Gardiner, Martha Davis

February 2019
How can business owners evaluate the multiple benefits and costs of a sustainable landscape project?

How can water utilities use a multi-benefit approach to help to advance investment in sustainable landscapes?
Identifying Opportunities and Strategies (Step 1)

Santa Monica garden/garden project
### Identifying Potential Benefits (Step 2)

#### SITE PHOTOS

- **Area 1B**

#### SITE CONDITIONS

**Area 1**

<table>
<thead>
<tr>
<th>DRAINAGE &amp; GRADING</th>
<th>PLANTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schematic provided? (Y/N)</td>
<td>Turf</td>
</tr>
<tr>
<td>Where does stormwater flow?</td>
<td>(Y/N)</td>
</tr>
<tr>
<td>Visible stormdrains (catch basin)</td>
<td>High water-use plants</td>
</tr>
<tr>
<td>Planter drains</td>
<td>Medium water-use plants</td>
</tr>
<tr>
<td>Swale, concrete</td>
<td>Low water-use plants</td>
</tr>
<tr>
<td>Swale, vegetated</td>
<td>California native plants</td>
</tr>
<tr>
<td>Swale, cobble</td>
<td>Trees</td>
</tr>
<tr>
<td>Hidden / built-in gutters to stormdrain</td>
<td>Visual appearance</td>
</tr>
<tr>
<td>Building gutters to impermeable surface</td>
<td>Overgrowth</td>
</tr>
<tr>
<td>Building gutters to planted area</td>
<td>Healthy growth</td>
</tr>
<tr>
<td>Area drains in hardscape</td>
<td>Wilted</td>
</tr>
<tr>
<td>Soil compacted? (Y/N)</td>
<td>Yellowing</td>
</tr>
<tr>
<td>HARDSCAPE</td>
<td>Dead</td>
</tr>
<tr>
<td>Continuous concrete or asphalt</td>
<td>Brown patches</td>
</tr>
<tr>
<td>Gravel, DG, cobblestone, other</td>
<td>Moss</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRAINAGE &amp; GRADING</th>
<th>MAINTENANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schematic provided? (Y/N)</td>
<td>Use of pesticides? (Y/N)</td>
</tr>
<tr>
<td>Spray</td>
<td>Use of herbicides? (Y/N)</td>
</tr>
<tr>
<td>Drip</td>
<td>Regular manicuring required? (Y/N)</td>
</tr>
<tr>
<td>Rotors</td>
<td>Mulch present? (Y/N)</td>
</tr>
<tr>
<td>Recycled water? (Y/N)</td>
<td>Man-hours spent per week on maintenance (per owner)</td>
</tr>
<tr>
<td>Visible breakage? (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Overwatering (soggy underfoot)? (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Visible ponding? (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Dry spots? (Y/N)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

- Red Apple (Apetenia cordifolia) is invasive in neighboring Los Angeles County. Use with caution.
- No shade trees present over benches.
Quantifying Benefits (Step 3)

Five Themes of Benefits

- Water savings potential
- Energy and GHG savings
- Habitat and Biodiversity
- People
- Risk and Resilience

<table>
<thead>
<tr>
<th>PROPERTY ADDRESS</th>
<th>Area (square feet)</th>
<th>Annual Water Use (gallons)</th>
<th>Annual Water Savings (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AREA 1A: Entry Island 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing landscape</td>
<td>5530</td>
<td>190,630</td>
<td></td>
</tr>
<tr>
<td>Convert spray to drip, decrease runtime</td>
<td>5530</td>
<td>71,486</td>
<td>119,144</td>
</tr>
<tr>
<td>Convert spray to MP rotators</td>
<td>5530</td>
<td>127,087</td>
<td>63,543</td>
</tr>
<tr>
<td>AREA 1B: Entry Island 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing landscape</td>
<td>7500</td>
<td>413,664</td>
<td></td>
</tr>
<tr>
<td>Convert turf &amp; high water use plants &amp; install drip</td>
<td>7500</td>
<td>96,953</td>
<td>316,712</td>
</tr>
<tr>
<td>Replace with rotary nozzles</td>
<td>7500</td>
<td>275,776</td>
<td>137,888</td>
</tr>
<tr>
<td>AREA 2: Main Building Plaza</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing landscape</td>
<td>5000</td>
<td>206,832</td>
<td></td>
</tr>
<tr>
<td>Convert spray to drip</td>
<td>5000</td>
<td>129,270</td>
<td>77,562</td>
</tr>
<tr>
<td>Convert annuals &amp; high water use plants &amp; install drip</td>
<td>5000</td>
<td>64,635</td>
<td>142,197</td>
</tr>
<tr>
<td>AREA 3: Interior Courtyard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing landscape</td>
<td>4000</td>
<td>220,621</td>
<td></td>
</tr>
<tr>
<td>Convert high water-use plants &amp; install drip</td>
<td>4000</td>
<td>51,708</td>
<td>168,913</td>
</tr>
</tbody>
</table>
Informing Decision-Making (Step 4)

- Develop key deliverables for decision makers and stakeholders
- Businesses, homeowners, municipalities/departments

Example: Develop summary table of prioritized outcomes for businesses.

<table>
<thead>
<tr>
<th>Water</th>
<th>Rain garden plus slow release cistern</th>
<th>Rain garden with use of water from cistern</th>
<th>Rain garden and cistern w/ climate-appropriate plants and garden</th>
<th>Rain garden, cistern, and tree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce water use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce stormwater runoff</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Reduce nuisance flooding and water damage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>Reduce energy consumption on-site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land and Environment</td>
<td>GHG concentrations avoided or reduced</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extend baseflow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve soil health</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Increase native habitat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce mosquito breeding locations</td>
<td></td>
<td></td>
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<tr>
<td>Reduce urban heat island effect</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Risk and Resilience</td>
<td>Improved reputation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce risk of water supply shortfall</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meet regulatory targets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People and Community</td>
<td>Improve aesthetics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create or support green jobs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce landscape maintenance time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce lawn mowing and green waste</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Decrease hardware purchasing or maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce fertilizer and pesticide use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Considerations</td>
<td>Total Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cost to Stakeholder</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
The average participant water use savings for single family customers ranged from 7% up to 39%.

City of Sacramento
Population served: 480,000
Average annual precipitation: 17.0 inches
Program type: Turf removal and replacement
Average participant savings: 29.6 percent

City of Petaluma
Population served: 60,200
Average annual precipitation: 25.0 inches
Program type: Free distribution of mulch
Average participant savings: 13.3 percent

Source: Alliance for Water Efficiency, Landscape Transformation: Assessment of Water Utility Programs and Market Readiness Evaluation, January 2019
Landscape Transformation Elements:

1. Turf Replacement

2. Bioswales and Rain Gardens

3. Permeable Pavement

4. Green Roofs

5. Rain Tanks and Cisterns

Source: Pacific Institute, Sustainable Landscapes on Commercial and Industrial Properties in the Santa Ana River Watershed, February 2019
Characterizing Benefits (Step 3)

Benefits of sustainable landscapes:

- Water
- Energy
- Risk and Uncertainty
- Land and Environment
- People and Communities
Implementing the Multi-Benefit Framework

Benefits

- Non-Traditional Grant ($)
- Co-Finance Projects ($)
- Customer Action
- Return-on-Investment Tools
- Community Based Social Marketing
Characterizing Benefits
People: Property Value

Introduction
Commercial property owners are less likely to take advantage of agency-sponsored landscape transformation rebate and incentive programs than their residential counterparts. The Pacific Institute (2019) suggests that landlords and owners of commercial properties, if made aware of the potential financial gains, including increased rent, associated with sustainable landscapes, might become motivated to make the investment.

As Clements and St. Julian (2013) explain in their publication “The Green Edge: How Commercial Property Investment in Green Infrastructure Creates Value,” the integration of Green Infrastructure (GI) can help property owners save on their utility bills while also reaping “higher rents and property values,” and “increased retail sales” among other environmental and social benefits. Primary research conducted by Laverne and Winson-Geideman (2003) found “landscaping with a good aesthetic value added approximately 7 percent to the average rental rate of a building” for 85 commercial office buildings in Cleveland, OH. Wolf (2003) analyzed 270 survey responses from city dwellers within revitalized business districts and found that the presence of trees within a commercial retail setting were associated with a willingness to travel more often, as well as farther and longer to patronize businesses. Those same respondents were also willing to stay at the commercial space longer and pay more for parking. Finally, the same study reported a 12 percent increase in willingness to pay for goods when the retail space contained vegetated streetscapes. Kaplan (2007) analyzed nature preferences from 49 surveyed employees of 41 businesses along a

Primary Resources


Characterizing Benefits
People: Property Value

Quantitative Findings

- Ward et al. (2008) found that the installation of Green Infrastructure within select Seattle neighborhoods helped increase property values between 3.5% and 5%.

Qualitative Findings

- Kaplan (2007) found that the most satisfied employees from 41 businesses in Ann Arbor, MI were those who had an outdoor view. These same individuals, “appreciated that they could see birds and other animals, the general appearance of the area outside, as well as the number and size of trees.”

- Manicured lawns at the place of employment “had no bearing on participants’ satisfaction with any aspect of the natural environment, or its general appearance.”
Tools and Resources for Water Managers

• Pacific Institute’s Reports & Multi-benefit Resource Library (over 150 primary resources)
  ➢ https://pacinst.org/multiplebenefits

• CalWEP’s Sustainable Landscaping Benefits Resource Page
  ➢ www.CalWEP.org/landscapingbenefits
  ➢ Benefit Cut-Sheets (Water, Energy, People & Communities)

• ROI Landscape Transformation Calculators:
  ➢ City of Santa Rosa’s Landscape Water Management ROI Calculator (end-user: water and landscape professionals)
  ➢ River Friendly Landscaping Benefits Calculator (end-user: property owners)
Key Take-Aways and Next Steps

• Opportunity for landscape transformations on commercial properties
• Commercial customers care about additional benefits
• Pacific Institute and CalWEP are developing resources for engaging with businesses