Stakeholder value-linked assessment of remedial options: Portland Harbor Superfund Site Sustainability Project (PHSP)

Sabine E Apitz
SEA Environmental Decisions Ltd
drsea@cvrl.org

Co-Authors:
Amanda McNally, AECOM
Anne Fitzpatrick, AECOM (now Geosyntec Consultants)
Deborah A Edwards, ExxonMobil
David Harrison and Conor Coughlin, NERA Economic Consulting

10th International SedNet Conference; “Sediments on the move” 14-17 June 2017
Palazzo San Giorgio, Genoa, Italy
Willamette River; 11 River Miles in Portland, Oregon, US

USEPA evaluated a range of remediation options

Proposed Remedial Alternatives

- Dredge up to 9 million cubic yards of sediment
- Construction time of 17 years or more
- Cost up to $4 billion

Decision process contentious

All active treatment results in environmental, economic & social impacts on the river and community

Objective was to develop a comprehensive and transparent framework to evaluate and communicate trade-offs
What is Sustainable Remediation?

“the practice of demonstrating, in terms of environmental, economic and social indicators, that the benefit of undertaking remediation is greater than its impact, and that the optimum remediation solution is selected through the use of a balanced decision-making process.” (SuRF – UK)
EPA Region 10 embraced a trade-off perspective in selecting a preferred remedy

- “We've weighted all the different trade-offs: Certainty, cost, time, impact to community, how much of the contamination is addressed through more aggressive actions or not”…

- “…We think we've found the right balance, but we want to hear from people.”

- Cami Grandinetti, EPA Region 10 (June 8, 2016)  

<table>
<thead>
<tr>
<th>Remedial Alternative</th>
<th>Description</th>
<th>Threshold Criteria</th>
<th>Balancing Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Overall Protection of Human Health and the Environment</td>
<td>Compliance with ARARs</td>
</tr>
<tr>
<td>A No Action/No Further Action</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>B Dredge/Cap 95 acres; ENR 100 acres; MNR 3,966 acres; In-situ 7 acres</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>C Dredge/Cap 756 acres; ENR 19 acres; MNR 3,393 acres; In-situ 20,455 CY</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>D Dredge/Cap 231 acres; ENR 66 acres; MNR 1,876 acres; In-situ 254,455 CY; Disposal 5,122,800 CY</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>E Dredge/Cap 231 acres; ENR 20 acres; MNR 3,393 acres; In-situ 254,455 CY</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>F Dredge/Cap 231 acres; ENR 66 acres; MNR 1,876 acres; In-situ 254,455 CY; Disposal 5,122,800 CY</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>G Dredge/Cap 231 acres; ENR 66 acres; MNR 1,876 acres; In-situ 254,455 CY; Disposal 5,122,800 CY</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

How do we balance trade-offs without numbers?  
How do we integrate community values?
5 Remedial Alternatives were evaluated for their sustainability by integrating EPA FS data into innovative tools:

1. **Environmental** Impacts were evaluated using CERCLA-linked Net Environmental Benefit Analysis (NEBA), SiteWise™ and GIS tools

2. **Economic** Impacts were evaluated using dynamic, regional economic impact analysis with state-of-the-art RÉMI Model, stakeholder outreach and cost-effectiveness considerations

3. **Social** sustainability was evaluated using the Sustainable Values Assessment (SVA) Tool to integrate environmental, economic, and social metrics into stakeholder values-based sustainability assessment
Sustainable Values Assessment (SVA) Tool links sustainability metrics to Stakeholder Group Values

- Stakeholder Group (SG) value mapping/outreach
- SG Priorities (unimportant to critical)
- Remedial option metrics (time, volume, footprint...)
- Remedial design (RI/FS or conceptual)

Scoring

Sustainable Values Assessment (SVA) Tool

- Economic Viability
- Social Equity
- Environmental Quality
- *Operable/Inoperable
- *Residential
- *Type Impact

SVA scores

* = acceptable level
What do Stakeholders Value When Considering Remedial Options?

- Values identified for each pillar
- “Translate” technical assessments into key stakeholder issues
- These terms are used to aggregate metrics and assess remedial options in terms of stakeholder values
- This provides a basis for the balancing of disparate risks and benefits

Stakeholder values in terms of **environmental quality**, **economic viability**, and **social equity**
How can we quantify impacts to these values?

**Environmental Quality**

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENV-1a</td>
<td>a. Residual risk, T0</td>
<td></td>
</tr>
<tr>
<td>ENV-1b</td>
<td>b. Downstream risk</td>
<td></td>
</tr>
<tr>
<td>ENV-1c</td>
<td>c. Reliance on controls</td>
<td></td>
</tr>
<tr>
<td>ENV-1d</td>
<td>d. Construction risk</td>
<td></td>
</tr>
<tr>
<td>ENV-1e</td>
<td>e. Residual Risk, T45</td>
<td></td>
</tr>
<tr>
<td>ENV-2a</td>
<td>2a. Nearshore habitat</td>
<td></td>
</tr>
<tr>
<td>ENV-2b</td>
<td>2b. Benthic habitat</td>
<td></td>
</tr>
<tr>
<td>ENV-2c</td>
<td>2c. Shoreline habitat</td>
<td></td>
</tr>
</tbody>
</table>

**Fish & Wildlife**

<table>
<thead>
<tr>
<th>Value</th>
<th>Label</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENV-3a</td>
<td>a. Stakeholder involvement</td>
<td></td>
</tr>
<tr>
<td>ENV-3b</td>
<td>b. Re-use</td>
<td></td>
</tr>
<tr>
<td>ENV-3c</td>
<td>c. Communication of uncertainty</td>
<td></td>
</tr>
<tr>
<td>ENV-3d</td>
<td>d. Archaeological sites</td>
<td></td>
</tr>
</tbody>
</table>

**Resilience**

- Metrics scored in Sustainable Values Assessment (SVA) tool – (-10 to +10 for undesirable to desirable impacts)
- Scored based upon data in EPA FS
Example option metric scores: Acceptable Remedy (SOC-3)
Example option metric scores: Human Health & Safety (SOC-4)
Aggregated Value Scores for Remedial Alternatives

Equal SG weighting

- Benefits
- Risks

- Fish & Wildlife
- Resilience
- Economic Vitality
- Infrastructure
- Quality of Life & Recreation
- Acceptable Remedy
- Habitat
- Low Impact Remedy
- Jobs
- Cost Effectiveness
- Community Values
- Health & Safety
Stakeholder Group Priorities: Finding Balance

- There are a diversity of voices in Portland
- Values and metrics can be weighted based upon the priorities and values of different stakeholder groups (SGs)
- Initial assessment carried out with equal weighting to capture diversity
- We identified an illustrative set of “Representative SGs” to weight based on differing priorities
  - Community meetings and comments, City survey, Business Groups, Tribal Groups
  - Values and metrics were weighted based upon SG inferred values (0-5 for unimportant to critical)
- The intent was not to represent all stakeholders, or to speak for the specific groups, but to illustrate how relative values are affected when differing priorities are considered
Value and metric scores can be weighted based on stakeholder priorities, adjusting scores based upon community preferences.
What do Stakeholders prioritize?

Over 280 stakeholder groups (SGs) were identified, including NGOs, community, government, and business groups.
It all stacks up: clear, clear benefits; increasing costs (regardless of SG)

\[ \text{B} \geq \text{D} > \text{I} \geq \text{E} >> \text{F} \]
This approach provides a much clearer basis for discussion, but is based largely on the same data sources as the EPA table.
Social Sustainability, summary

– Value scoring is sensitive to diverse stakeholder group (SG) priorities, but rankings are robust
  • Provides a community-based social cost-benefit assessment

– Values-linked analysis identified trade-offs and points of contention, providing a systematic, transparent tool for community (and EPA) engagement

– The tool can be used at other sites and can easily integrate new SG inputs based upon surveys, workshops or other inputs

– Approach can be used to collaboratively build in sustainability, finding the community’s “sweet spot”
Sustainable Values Assessment provides a bridge...
Thank You

Contributing authors:

Sabine E. Apitz, PhD, SEA Environmental Decisions Ltd (drsea@cvrl.org)

Conor Coughlin, NERA Economic Consulting (conor.coughlin@nera.com)

Deborah A Edwards, PhD, ExxonMobil (deborah.a.edwards@exxonmobil.com)

Anne Fitzpatrick, LHG, AECOM (now at Geosyntec; AFitzpatrick@Geosyntec.com)

David Harrison, PhD, NERA Economic Consulting (david.harrison@nera.com)

Amanda McNally, PE, AECOM (amanda.mcnamally@aecom.com)