Post-Construction Planning and Management Guidelines for Coastalscape Revitalization

Case Studies from the Salish Sea Region

FINAL REPORT

January 2014

Research funded by:

KMI 한국해양수산개발원 KOREA MARITIME INSTITUTE

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Executive Summary

This is the third in a series of reports on coastalscape revitalization projects using case studies from the Salish Sea region encompassing inland waters of Washington State and southern British Columbia. The first report from 2010 focused on the role of government, community participation and the private sector in the initiation of a coastalscape project. The second report, in 2012, examined different methods of evaluation tools applied during the design and planning stages of a project. This final report in the series examines post-construction management efforts of coastalscape revitalization and the implications for future projects.

Post-construction management is divided into three separate yet interconnected components: monitoring (collecting data), assessment (judging the project based upon the data) and management (actions taken in response to monitoring and assessment or other project related reasons). Data collection forms the backbone of effective monitoring, whether it is economic, social or environmental monitoring. However, not all data is relevant and often it is not accessible. Literature reviews of both economic and social data collection within the field of planning and development provide frameworks for the analysis. However, economic indicators such as numbers of jobs created, while useful, are rarely captured in coastalscape development projects. Capturing information for social indicators, such as housing prices, neighborhood population demographics, changes in neighborhood culture or perceived public health and safety, are often even harder to capture and require familiarity with the specifics of a project. The case studies revealed social monitoring tended to focus more on design and less on quality of life for workers and residents. Environmental monitoring forms the most robust form of data collection, in part because of regulatory requirements to do so. And the literature demonstrates the depth of understanding and frameworks for design of environmental monitoring. All case studies reviewed included some form of environmental monitoring. Although lack of financial resources and personnel assigned to collect data limits the amount of monitoring conducted on coastalscape projects.

Case studies of coastalscape projects applied performance evaluations as a form of post-construction assessments. These assessments, based upon data collected during post-construction monitoring focused on the quality of the project and the extent to which project coast were achieved. However, the limited amount of base line monitoring data collected for economic and social indicators from the case studies translated to very few examples of assessments. And the one example of a performance assessment, for Dockside Green, is qualitative rather than quantitative in its analysis. None of the case studies included examples where cost and benefits of a project were tracked and then later assessed. Stakeholders play an important part in social assessments and ideally they should be involved from early on in the design and development of a project. This allows analysis of who has benefited from a project

both for quantitative and qualitative indicators. Relatively few examples of social assessments were found in the Salish Sea case studies. A lack of quantitative data hampered abilities to provide social assessments with meaningful conclusions for management decisions. Interviews and stakeholder focus groups conducted for the Thea Foss project in Tacoma provides the sole example of data collected and then applied to a management decision. As mentioned for monitoring, environmental assessments are well documented and conducted throughout the Salish Sea. These assessment can be categorized as voluntary (information monitored and assessed for scientific interest) and mandatory (information monitored and assessed due to regulatory requirements). Both types of environmental assessments are demonstrated in the case studies.

In coastalscape projects local governments play a primary role conducting performance management and adaptive management actions post-construction. However, community members and private developers also have important roles to play. Community members may have property owners associations by which decisions are made affecting use of property. Developers may only stay involved so long as they have a financial interest in a project. An important model for on-going management is the Thea Foss Development Authority responsible for development and management of public land until full build out of the Thea Foss Development when private property will be managed by homeowners associations and the city of Tacoma will assume management of public open spaces.

An adaptive monitoring framework for coastalscape revitalization projects should follow an approach where monitoring is designed early in the planning process, data (economic, social and environmental) is collected throughout the development and for a certain period of time, and an assessment is conducted and used to implement management approaches. Meanwhile, questions are raised about the efficacy of the monitoring and assessment and form the basis for assessing and designing new approaches for future coastalscape projects.

Planning for successful post-construction management requires sufficient insight and allocation of resources (both human and fiscal) for project completion. A clear goal for monitoring should be established at the outset of planning a project with guidelines for collection of data, economic, social and environmental, to be used for assessment and future management decisions. And community input is necessary to ensure assessment of meaningful social indicators. If conducted properly, post-construction management can positively influence the planning process for new coastalscape revitalization projects to ensure a balance between the social, economic and environmental costs and benefits for a entire community.

Table 1: Summary of research from 2010, 2012, and 2013 concerning coastalscape revitalization.

Publication Date	Title of Report	Main Theme	Outcomes
2010	Elements Leading To Initiation Of Coastalscape Projects	Role of local governments and other stakeholders (alone or in partnerships) in initiating coastalscape revitalization projects.	Three factors influence successful coastalscape revitalization: Government agencies play a strong role in fundraising, planning and building public spaces. The private sector serve as developer and partners with the government. Community members help support efforts of both public and private sector.
2012	Planning Tools To Design Coastalscape Projects	Frameworks are required to shape coastalscape development in order to encourage the design to harmonize human use and the built environment with nature.	Early integration of an evaluation component is necessary to help align the program and coastalscape revitalization project goals, and that evaluation protocols need to be designed for waterfront development to be effective in achieving goals.
2013	Post-Construction Planning and Management Guidelines for Coastalscape Revitalization: Case Studies From The Salish Sea Region	Multiple aspects of post construction management—specifically monitoring, assessment, and management – promote ongoing success of coastalscape revitalization projects.	Resources, both human and fiscal, are key components to ensure post-construction management – monitoring, assessment and management – of coastalscape revitalization. These management elements should become more standardized elements of projects to ensure effective influences on planning of new projects.

I. Introduction and Background

After the plans are finalized and the dust from construction settles, a coastalscape revitalization project begins the long work of ongoing management. Although frequently overlooked, such management strongly influences how a coastalscape revitalization project functions and is perceived in the long term. For example, post-construction management influences how well the goals put forth in the planning process are realized year after year and whether the project is viewed as successful, after the money and time spent on the project has been forgotten.

What can we learn from completed projects' post-construction management to promote the success of future coastalscape revitalization projects? This study will explore multiple aspects of post construction management—specifically monitoring, assessment, and management—using information gathered from the literature and through interviews with regional experts. Where appropriate, the role of the government, scientists, and the community will be addressed. Environmental, social, and economic issues will be addressed throughout the report. Case studies locations in the Salish Sea region that we draw from include Dockside Green (Victoria, B.C.), Port Townsend (Washington), Thea Foss Waterway (Tacoma, Washington), Olympic Sculpture Park (Seattle, Washington), and Olympic Village at Southeast False Creek (Vancouver, B.C.). These case studies represent both completed and partially developed multi-phased coastalscape revitalization projects.

Following our analysis of post-construction management, we will discuss strategies that can be employed during the planning process (pre-construction) in future coastalscape revitalization projects to increase the chance of successful post-construction outcomes. To highlight these opportunities, we will look at the different steps of the planning and management processes from two perspectives: first, how lessons learned from post-construction management could influence the design of new coastalscape management projects and second, how new projects' design can influence the success of their post-construction management. This research will provide a template for "best practices" to be applied to Coastalscape projects where there are environmental, social, and economic considerations that must be integrated into the planning process.

The goal of this section is to provide context for the rest of the report[1]. To accomplish this, we first review the past three years of research on coastalscape revitalization in relation to the current research, then review why governments take on coastalscape revitalization projects (which will be particularly important in the section on post-construction management), and finally provide an overview of the issues discussed in the following sections.

[1] The reader is encouraged to see the 2012 KMI-SMEA joint research project for a review of the pertinent legislative environment for coastalscape revitalization projects in Washington and British Columbia: Dyson, K., Faghin, N., and Leschine, T. 2013. Planning and Management for Coastalscape Revitalization: Case Studies from the Salish Sea. 2012 KMI-SMEA Joint Research Project.

Review of prior work

This new research builds on two previous reports: our 2010 work[2] entitled "Elements leading to initiation of coastalscape projects" and our 2012 work[3] entitled "Planning tools to design coastalscape projects." Both previous reports and the current report provide 'lessons learned' specific to their focus.

Here we briefly review the previous years' work in relation to this report.

In our 2010 work[4] we evaluated factors leading to the *initiation* of coastalscape revitalization using interviews, an online survey, and literature review. This report focused on the role of local governments and other stakeholders (alone or in partnerships) in initiating coastalscape revitalization projects. Other topics discussed included project financing and community involvement. The 'lessons learned' that were shared with us suggested that new projects listen to and collaborate with the community, allow for a lengthy planning and permitting process, and foster partnerships.

The 2010 work focused on the very start of coastalscape revitalization projects, while the current study focuses on what happens to a coastalscape revitalization project after construction. However, hopefully some of the lessons learned from projects in the post-construction stages can help coastalscape revitalization projects in the initiation and early planning phases to succeed.

The 2012 work[5] explored evaluation tools that could be used in the *design and planning* (pre-construction) stages of coastalscape revitalization projects. Interviews and a literature review comprised the methods of the report. A retrospective case study approach allowed us to assess the efficacy of two planning frameworks (Green Shores and LEED ND) and one management approach (monitoring and adaptation) as they apply to coastal revitalization projects in the Pacific Northwest. This report focused on the development of evaluation programs (Green Shores) as well as the use of evaluation and monitoring programs (LEED ND and scientific monitoring) to guide the design of coastalscape revitalization. The 'lessons learned' suggest that early integration of an evaluation component is necessary to help align the program and coastalscape revitalization project goals, and that evaluation protocols need to be designed for waterfront development to be effective in achieving goals.

This 2012 work focused on guiding planning using evaluation programs (like LEED ND and Green Shores), while the current research focuses on post-construction management (including monitoring, assessment, and management decisions) with the eventual goal of improving the success of future coastalscape revitalization projects[6]. One of the case studies used in the 2012 report (the Olympic Sculpture Park) is actually very relevant to the current research. OSP provides an example of post-construction monitoring that was used to assess the efficacy of the project—the monitoring both proved

[2] Dyson, K., Ryu, J., and Leschine, T. 2011. Government and Private Sector Roles in Urban Waterfront Restoration: Case Studies from Puget Sound, Washington. 2010 KMI-SMEA Joint Research Project.
[3] Dyson, K., Faghin, N., and Leschine, T. 2013. Planning and Management for Coastalscape Revitalization: Case Studies from the Salish Sea. 2012 KMI-SMEA Joint Research Project.
[4] Dyson, K., Ryu, J., and Leschine, T. 2011. Government and Private Sector Roles in Urban Waterfront Restoration: Case Studies from Puget Sound, Washington. 2010 KMI-SMEA Joint Research Project.
[5] Dyson, K., Faghin, N., and Leschine, T. 2013. Planning and Management for Coastalscape Revitalization: Case Studies from the Salish Sea. 2012 KMI-SMEA Joint Research Project.
[6] As an aside, while the Green Shores evaluation program was used to evaluate Southeast False Creek after it had been constructed, the evaluation was not used to inform post-construction management. Instead it was used as a test to see if Green Shores could be applied to coastalscape revitalization projects.

the success of the sculpture park and informed a new project, the Seattle Seawall. Observing how well this example worked, particularly in comparison to the issues we observed related to post-construction management in other projects from the 2010 and 2012 reports, led to this 2013 research report.

Review of government motivations and goals for coastalscape revitalization

In our 2010 report we examined some of the common reasons that coastalscape revitalization projects were initiated. These motivations will be important when discussing the assessment aspect of post-construction management; we review them here for later reference.

One common motivation for coastalscape revitalization is to address urban blight. Blight in the waterfront is frequently the result of changes in the shipping industry, which made many existing waterfront structures obsolete and lead to the abandonment of small ports[7]. The presence of abandoned and underutilized land is an economic motivation for coastalscape revitalization. Revitalizing urban blight can increase tax revenues for local governments through property and sales taxes, create jobs, and improve a city's image in the eyes of locals and tourists. Blighted areas can also become areas of focus for drug and gang related activities, and revitalization is seen as a way to eliminate these problems.

Coastalscape revitalization can create public access to the waterfront, and economic opportunities for residents, and other benefits that provide social motivations. When residents are active participants in the coastalscape revitalization process and have the power to shape the final product, there is the potential for the community to benefit.

Finally, these areas are frequently contaminated and provide poor habitat for aquatic species, providing environmental motivations for coastalscape revitalization.

Broadly, coastalscape revitalization is often "seen as a means to turn around years of economic downtown for [cities'] downtowns[8]". The public has realized that "a healthy and lively waterfront [can] be healthy for recreational purposes and also serve as an important economic link to the downtown.[9]" Small towns in particular have been hard hit by the failing fishing and timber economies, as well as the shift from break-bulk to containerized shipping, and are looking towards the development of tourism and attracting different types of industry and business through waterfront revitalization[10]. Coastal cities share similar goals: "redefinition of waterfront's position in the urban context, remaking the urban image, and regeneration of the economy.[11]"

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[7] Bunce, S., Desfor, G. 2007. Introduction to "Political ecologies of urban waterfront transformations." Cities, Vol. 24, No. 4; p. 251-258.
Butuner, B. 2006. Waterfront Revitalization as a Challenging Urban Issue in Istanbul. Waterfront Revitalization as a 42nd ISoCaRP Congress, 2006. Available online at: http://www.isocarp.net/Data/case_studies/792.pdf

[8] Surdyke, J. Scott. 2009. Balance on the urban waterfront: a comparative study of sustainable, mixed-use development in the Pacific Northwest. Unpublished Master of Urban Planning. Department of Urban Design and Planning, University of Washington.

[9] Ash, T. 1994. Waterfront Revitalization: A community-based planning approach in Raymond, WA. Unpublished Master of Marine Affairs Thesis. School of Marine Affairs, University of Washington.

[10] Ibid.

[11] Butuner, B. 2006. Waterfront Revitalization as a Challenging Urban Issue in Istanbul. Waterfront Revitalization as a 42nd ISoCaRP Congress, 2006. Available online at:

These motivations translate into goals for individual coastalscape revitalization projects. Where available, the goals for the projects used as examples in this report are listed below.

In Tacoma, the stated goals for the Foss Waterway include:

- Completing the cleanup of the Foss Waterway,
- Reconnecting the Foss waterway with the downtown grid,
- Improving public access to the shoreline,
- Preserving water-dependent and water-related uses while introducing mixed uses,
- Historic preservation,
- Restoring and reclaiming shoreline habitat,
- Developing a cultural catalyst and tourist attraction[12], and
- Create economic development (largely by developing properties that would contribute to the tax rolls)[13].

In Vancouver at Southeast False Creek, the development followed a number of broader goals set forth[14]:

- Encourage live-work studios that are legal and affordable, while not displacing industrial and business services,
- Include a mix of uses and activities, including places for people of all walks of life to shop, work, and play,
- Provide accessible community based services (including health, recreation, and social programs, child care, libraries, and other services needed by the community),
- Encourage affordable housing,
- Promote cultural heritage and neighborhood character,
- Maintain and improve environmental quality (air, water, etc),
- Develop parks and foster connections to Vancouver's natural setting,
- Provide access around the entire Creek area with pedestrian and bicycle pathways,
- Encourage job growth and attract jobs to neighborhood centers, and
- Involve local businesses and residents in planning.

In Victoria at Dockside Green, goals included remediation of the former landfill (and unofficial dump area for construction waste), foster tourism to replace the waning exports of natural resources, and create a 'new urbanist' development (including people-friendly streets and high-quality public spaces)[15].

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http://www.isocarp.net/Data/case_studies/792.pdf
See also Dyson, Ryu, and Leschine 2011.

[12] Surdyke, J. Scott. 2009. Balance on the urban waterfront: a comparative study of sustainable, mixed-use development in the Pacific Northwest. Unpublished Master of Urban Planning. Department of Urban Design and Planning, University of Washington.

[13] Dyson, K., Ryu, J., and Leschine, T. 2011. Government and Private Sector Roles in Urban Waterfront Restoration: Case Studies from Puget Sound, Washington. 2010 KMI-SMEA Joint Research Project.

[14] City of Vancouver Planning Department. 1999. Southeast False Creek Policy Statement: Toward a Sustainable Urban Neighbourhood and a Major Park in Southeast False Creek. Policy adopted by Vancouver City Council, October 1999. 85pp. Available online at:http://vancouver.ca/docs/sefc/policy-statement-1999.pdf

[15] Buntin, S. & Pirie, K., 2013. *Unsprawl: Remixing Spaces as Places* Nettler, Jonathan, ed., Planetizen Press.

Additionally, the City of Victoria "committed to reviewing new land use proposals from a triple bottom line perspective including environmental, economic, and social criteria.[16]"

In Port Townsend, the main motivation for coastalscape revitalization of an old industrial site into what is now the Northwest Maritime Center was to repurpose derelict property for public use and benefit.

In Bremerton, there were two motivations: first to remediate the blight that plagued the downtown waterfront, and second to make the revitalized waterfront a livable, walk-able space. The city felt that creating public spaces that people of all ages and economic backgrounds can enjoy was very important to successful revitalization[17].

Background on Case Studies

In this report there are five different case studies used to exemplify various aspects of post-construction management. Three of these four examples have been used in prior research. The case studies and their background information are as follows:

Case #1: Thea Foss Waterway, Tacoma, Washington
Case #2: Northwest Maritime Center, Port Townsend, Washington
Case #3: Olympic Village at Southeast False Creek, Vancouver, British Columbia
Case #4: Dockside Green, Victoria, British Columbia
Case #5: Olympic Sculpture Park, Seattle, Washington

Background information on the Thea Foss Waterway (Tacoma) and Northwest Maritime Center (Port Townsend) is available in the 2011 report[18] of our 2010 work. Background information on the Olympic Sculpture Park and the Olympic Village at Southeast False Creek (Vancouver) can be found in our report[19] of our 2012 work.

A new case study used in this research is Dockside Green (Victoria). The following is a brief overview of the background for this project. Located in Victoria's Inner Harbor, Dockside Green[20] is located on a 15 acre former brownfield site and consists of 1.3 million square feet of residential, office, commercial, and light industrial use space. The four parcels that make up the site were purchased by the City of Victoria in 1989 for $1 and named the "Dockside Lands." Located one block from the water's edge (separated from the water by the Point Hope Shipyard), the property's history of intensive industrial use left a legacy of severe contamination. See Figure 1 below.

[16] Stantec. 2007. City of Victoria Sustainable Building Policy Review: Private Sector Development. Technical Report. Available online at:
http://www.victoria.ca/assets/Departments/Planning~Development/Development~Services/Documents/plnsrv_green_inttvs_private_stntc.pdf

[17] Dyson, K., Ryu, J., and Leschine, T. 2011. Government and Private Sector Roles in Urban Waterfront Restoration: Case Studies from Puget Sound, Washington. 2010 KMI-SMEA Joint Research Project.

[18] Dyson, K., Ryu, J., and Leschine, T. 2011. Government and Private Sector Roles in Urban Waterfront Restoration: Case Studies from Puget Sound, Washington. 2010 KMI-SMEA Joint Research Project.

[19] Dyson, K., Faghin, N., and Leschine, T. 2013. Planning and Management for Coastalscape Revitalization: Case Studies from the Salish Sea. 2012 KMI-SMEA Joint Research Project. Note that the 2012 Report is dated January 2013 but will be referred to as the 2012 report.

[20] Unless otherwise noted, this information comes from: Buntin, S. & Pirie, K., 2013. *Unsprawl: Remixing Spaces as Places* Nettler, Jonathan, ed., Planetizen Press.

The City of Victoria conducted an extensive environmental assessment of the site, along with a detailed 'Development Concept' that drew on extensive public visioning and workshops. The outcome was a call for a design with greater density than the site was zoned for and a new-urbanism type community.

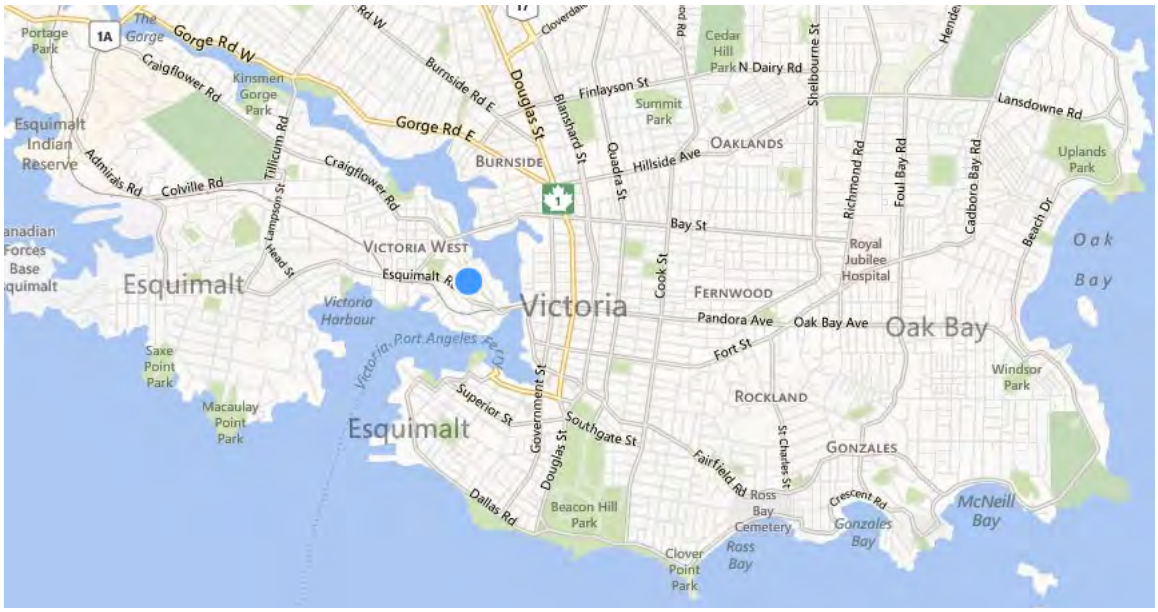

Figure 1: Blue circle marks the location of Dockside Green in Victoria, B.C. Image courtesy Bing Maps.

Figure 2: Aerial satellite image of the Dockside Green site (outlined in red), currently about 30% developed. Note that the development is located on the upland side of the Point Hope shipyard. Image courtesy Bing Maps.

Importantly, even at this early stage, it was decided that developers should be chosen based on 'triple bottom line' standards, requiring prospective development teams to consider social, economic, and environmental factors. The request for proposals (RFP) was issued in September 2004, and won by Dockside Green LP, a partnership between Vancouver City Savings (Vancity) and Windmill Developments. Vancity has since bought Windmill's stake in the partnership. Busby Perkins + Will was selected as the architect based on past experience with LEED Platinum projects.

Figure 3: Rendering of the Dockside Green site at full build out looking toward the west. Image by Vancity.

In September 2005, a Master Development Agreement was signed with the City of Victoria. Under the agreement, the property was sold for $8.5 million to Dockside Green Limited, and the developers agreed to build "according to an approved site master plan and design guidelines with an extensive list of amenities, including public spaces and public art, interpretive signage describing the site's history and natural features, shoreline enhancement and trail improvements.[21]" The developer also helped support a dedicated City of Victoria staff member (whose primary focus was to help shepherd the development review), and contributed $400,000 to a Sustainability Center. The site was developed with a strong focus on sustainability; the vision statement reads:

> "Dockside Green will be a socially vibrant, ecologically restorative, economically sound and just community. It will be a distinct collection of beautifully designed live, work, play and rest spaces designed to enhance the health and well-being of both people and ecosystems, now and in the future. [22]"

Currently, the site is approximately 30% developed (see Figure 2). The first neighborhood developed is called "Dockside Wharf" located at the north end of the site, and consists of two condominium buildings, two commercial buildings (mixed commercial use including a bakery and other retail space in addition to office space), a wastewater treatment plant, and greenspace. The development has received the first LEED for Neighborhood Development (ND) Platinum stage two designation[23].

[21] Buntin, S. & Pirie, K., 2013. *Unsprawl: Remixing Spaces as Places.* Nettler, Jonathan, ed., Planetizen Press.
[22] Vancity. 2012. "Dockside Green Annual Sustainability Report 2011."
[23] Compared with the issues in Bellingham, this site is long and narrow avoiding many of the logistical issues Bellingham had with LEED ND. For example, Bellingham was unable to obtain the transportation credit because the site was inaccessible from three sides and roughly square in shape—therefore the site's depth was greater than

Figure 4: The Dockside Green project. Photo courtesy Perkins + Will.

However, the development has not been without issues. Sales slowed during the global economic recession, although unlike other projects in the Salish Sea region, all units built to date have sold. The development goals originally envisioned for the project have not been met, and the developer is now trying to reach a new agreement with the City of Victoria[24]. Images of full buildout are found in Figure 3 and Figure 4.

This report draws on lessons learned from Dockside Green, Victoria B.C., alongside the other Salish Sea case studies, The Foss Waterway in Tacoma, Washington, Northwest Maritime Center, Port Townsend, Washington, Olympic Sculpture Park, Seattle, Washington and Olympic Village at Olympic Village at Southeast False Creek in Vancouver, B.C., to examine the role that post-construction monitoring and evaluation play in coastalscape revitalization projects.

Research Methodology

This report uses the published literature (including technical reports, journal articles, and conference proceedings), and interviews with local professionals. Following Dyson et al (2013)[25], published literature was accessed using Google Scholar, Scirus, and other research oriented search engines. Expert interviews were conducted using the 'elite interview' technique[26]. For a more detailed overview of these methods, please refer to Dyson et al. (2013).

LEED ND's required minimum distance from an existing transit method. The Dockside Green site is long and narrow, and bordered lengthwise by existing transit.

[24] Craigie, Gregor. January 11 2013. The future of Dockside Green. CBC Radio show 'On the Island.' Available online: http://www.cbc.ca/player/Radio/Local+Shows/British+Columbia/On+The+Island/ID/2324866937

[25] Dyson, K., Faghin, N., and Leschine, T. 2013. Planning and Management for Coastalscape Revitalization: Case Studies from the Salish Sea. 2012 KMI-SMEA Joint Research Project.

[26] Dexter, L. 1970. Elite and Specialized Interviewing. Northwestern University Press; Evanston, Illinois.

Interviewed professionals were chosen based on their professional qualifications and were fully informed of the purpose of the interview and asked for their consent in accordance with the requirements of the Human Subjects Review Board at the University of Washington (HSRB Request # 45743).

Interview questions were based on our knowledge of the case studies, feedback received from KMI, and the literature. These questions include:

- What were the initial goals of the project?
- Why did the head government agency (local, county, state etc) initiate the project? Who were key government players in the process?
- What methods (if any) have you used to assess the project post-construction?
    - If so, what metrics were used? Social metrics? Economic metrics? Environmental metrics?
- Was economic development estimated prior to and after completion of the project?
    - Did that include job creation? Were actual job creation data collected during and after project completion?
    - Did that include tax base increase?
- Was environmental impact (improvement?) estimated pre and post construction?
- Were project outcomes as expected? Are there positive benefits (or negative costs) that were not expected? What efforts were undertaken to identify and plan for expected post-construction outcomes?
- What methods (if any) have you used to monitor the project post-construction?
    - If so, what methods were used? How were social, economic, and environmental monitoring addressed?
    - What was the funding source for monitoring?
- What methods (if any) were used to manage the public area of the project post-construction?
    - What role did the government play in post-construction management? What role did the community members play? Project owners? Tenants?
- How have the results (and lessons learned) of post construction monitoring and assessment been acted upon?
- Did public participation occur post-construction as well as pre-construction? How has public feedback to the program been handled? What role has public participation had in guiding the project post-construction?
- Where did you find information about creating a post-construction monitoring/assessment/management program?

These questions were not asked verbatim, but were adapted for each interview and interviewee following the expert interview method.

Overview of Issues to be discussed

The remainder of this report is divided into two sections. The next section forms the bulk of this report, and provides an overview of the use of post-construction management in coastalscape revitalization

projects. Three components of management are highlighted: monitoring (collecting data), assessment (judging the project based on the data), and management (taking actions in response to monitoring and assessment or for other reasons). Environmental, social, and economic (including job creation) aspects of coastalscape revitalization post-construction management are addressed in this section. And examples from the salish sea case studies are used to highlight implications of each of these management components. Different examples are used for economic, social or environmental indicators as appropriate.

The final section of this report discusses lessons learned during post-construction management and how these lessons may be able to influence each stage of new coastalscape revitalization projects. The role of the community in the planning process (e.g. communicative planning) is discussed first to provide context for planning in the United States, and particularly in the Pacific Northwest. With this context, we then discuss the different steps of the planning process, and how they might benefit from insights gained from post-construction management and how these steps influence post-construction management in turn. We conclude with some recommendations for coastalscape revitalization planning and management best practices gleaned from interviews and the literature.

II. Post-Construction Management

The goal for this section of the report is to examine the use of post-construction management in coastalscape revitalization projects. In practice and the academic literature, most attention is on the role and importance of planning better developments[27]. The survey from our 2010 work[28] found that most coastalscape revitalization projects in the Salish Sea region are in the planning phase. However, the majority of a projects' lifespan—with few exceptions—is spent in the post-construction management phase.

Approaches Used to Assess Coastalscape Projects

The three aspects of post-construction management described below—monitoring (collecting data), assessment (judging the project based on the data), and management (taking actions in response to monitoring and assessment or for other reasons)—are inherently interrelated. Monitoring provides the data essential for assessment, which in turn provides information for management decisions. At the same time, what managers deem important issues to assess determines what is monitored and assessed. Therefore, although we separate the three aspects here, the reader should remember that they are inherently connected. This is especially true in an adaptive management framework[29], which focuses on learning and incorporating this knowledge into future management.

Approaches Used to Monitor Coastalscape Revitalization Projects Post-construction

Monitoring provides invaluable data about coastalscape revitalization projects. Both qualitative and quantitative data are useful and relevant[30]. Environmental, ecological, and social monitoring are important (particularly in regards to sustainability), though projects often emphasize only one or two of these.

This report focuses on waterfront revitalization projects post-construction, however in many ways monitoring evades a neat division between pre- and post-construction phases for at least two reasons. First, monitoring usually requires project goals and measureable objectives be developed describing what project leaders/community are seeking to accomplish through the construction of the project. These goals and objectives should reflect processes that can be controlled[31]. Second, defining a problem requires knowledge of baseline data—and so monitoring of some type must precede a revitalization project. Further, knowledge of the problem and the groups impacted translates into efficacy of

[27] Smith CL. Stuck on planning: institutional mapping of activities to restore Oregon coastal ecosystems. Corvallis, OR: Oregon State University, Department of Anthropology Working Paper 99-1, 1999.
[28] Dyson, K., Ryu, J., and Leschine, T. 2011. Government and Private Sector Roles in Urban Waterfront Restoration: Case Studies from Puget Sound, Washington. 2010 KMI-SMEA Joint Research Project.
[29] See e.g. Holling, C.S., editor. 1978. Adaptive Environmental Assessment and Management. John Wiley & Sons., New York. ; Walters, C. 1986. Adaptive Management of Renewable Resources. Macmillan, New York.
[30] Charnley, Susan, Ellen M Donoghue, Claudia Stuart, Candace Dillingham, Lita P Buttolph, William Kay, Rebecca J McLain, Cassandra Moseley, Richard H Phillips, and Lisa Tobe. 2006. "Socioeconomic Monitoring results Volume I: Key Findings." United States Department of Agriculture Forest Service General Technical Report PNW 649 (1).
[31] Sundstrom, Shiloh, Cassandra Moseley, Max Nielsen-Pincus, and Emily Jane Davis. 2011. "Quick Guide to Monitoring Economic Impacts of Ecosystem Restoration and Stewardship." Ecosystem Workforce Program, Institute for a Sustainable Environment.

revitalization: "An important aspect of problem definition is that of specifying target groups and target geographical areas. For policy to maximize cost-effectiveness it is essential that the outputs of policy reach those groups for which it is designed[32]." Broadly speaking then, we can make the following distinction: pre-construction monitoring provides a baseline of site conditions, while post-construction monitoring provides much needed information to managers about the status of their projects. Here, we focus on post-construction monitoring, although pre-construction monitoring is an essential part of before-after study designs examining the impact of a project.

Though the data collected through monitoring creates the basis for project assessment and management, "periodic analysis and interpretation of monitoring data is essential to completing the monitoring task[33]". In fact, the line between monitoring and assessment is particularly blurry:

> "The monitoring of programs and policies is driven very much by the information needs of managers and is often a component of management information systems. However, evaluations also make substantial use of monitoring information and, indeed, the dividing line between monitoring and evaluation is often somewhat blurred[34]."

For this report, our working definition of 'monitoring' is the planning and executing data collection or any measurements of coastalscape revitalization projects.

Why Monitor?

Why should coastalscape revitalization projects commit to monitoring? The motivations vary between projects—some must for compliance with regulations[35] or as a condition of permitting—but a common underlying theme is to understand the impacts of a coastalscape revitalization project. Monitoring "provides a means to address the uncertainty" of predictions made about waterfront revitalization projects[36]. More broadly, monitoring "ensures that management actions meet the prescribed standards and guidelines and that they comply with applicable laws and policies. Monitoring will provide information to determine if the standards and guidelines are being followed, verify if they are achieving the desired results, and determine if underlying assumptions are sound[37]". These observations hold true for assessment (and management) as well.

Indicators and Data Collection

Indicators are the things (trends, facts, etc.) measured in monitoring programs. Indicators are frequently chosen because they relate to the goals and objectives of the coastalscape revitalization project—the

[32] Buntin, S. & Pirie, K., 2013. *Unsprawl: Remixing Spaces as Places* Nettler, Jonathan, ed., Planetizen Press.
[33] Charnley, Susan, Ellen M Donoghue, Claudia Stuart, Candace Dillingham, Lita P Buttolph, William Kay, Rebecca J McLain, Cassandra Moseley, Richard H Phillips, and Lisa Tobe. 2006. "Socioeconomic Monitoring results Volume I: Key Findings." United States Department of Agriculture Forest Service General Technical Report PNW 649 (1).
[34] Buntin, S. & Pirie, K., 2013. *Unsprawl: Remixing Spaces as Places* Nettler, Jonathan, ed., Planetizen Press.
[35] Please see Dyson et al. (2013) for an overview of legislation applicable to waterfront revitalization in the Salish Sea region.
[36] Charnley, Susan, Ellen M Donoghue, Claudia Stuart, Candace Dillingham, Lita P Buttolph, William Kay, Rebecca J McLain, Cassandra Moseley, Richard H Phillips, and Lisa Tobe. 2006. "Socioeconomic Monitoring results Volume I: Key Findings." United States Department of Agriculture Forest Service General Technical Report PNW 649 (1).
[37] Record of Decision quoted in Ibid.

number of jobs, for example, where job creation is a goal[38]. Broadly, "communication is the main function of indicators: they should enable or promote information exchange regarding the issue they address… Indicators always simplify a complex reality[39]." Multiple indicators are often used in monitoring programs, reflecting the diverse goals of a project. Indicators must be chosen based on what managers consider important and what information they will need to carry out later evaluations. However, we must remember that uncertainty is inherent in the use of indicators, as they are "partial reflections of reality, based on uncertain and imperfect models"[40].

The choice of indicators is critical to the direction of management. Monitoring fundamentally shapes management: "what gets measured gets done[41]"—that is, managers can only act on information collected through monitoring, and if something is not measured, it is liable to be overlooked.

The choice of indicators is also one of the largest problems in monitoring. So many indicators have been proposed that choosing which to use for a given project as well as comparison between different revitalization projects has become difficult:

> "Each institution has adopted different indicator systems with the following results: a great disparity of dimensions and indicators without the existence of a global consensus to select them (Wilson et al., 2007); that everyone involved in the process of selecting indicators participates, which happened in only half of the municipalities registered world-wide (ICLEI, 2002); the high degree of arbitrariness revealed by the indicators (Singh et al., 2009); the great differences in the number of indicators (Button, 2002; GTIS, 2004); and the relative importance of the environmental area compared to social and economic areas (GTIS, 2004)… Furthermore, there are nowadays more than 70 tools for evaluating and classifying building projects in the building sector, based on sustainability indicator systems (Fernandez Sanchez, 2008). These indicators also present considerable problems such as: uncertainty and subjectivity when selecting criteria, indicators and dimensions (Hueting and Reijnders, 2004; Seo et al., 2004); the predomination of environmental aspects when evaluating the sustainability of buildings (Saparauskas, 2007); the lack of participation of all the stakeholders involved in the project life cycle (Fernandez Sanchez, 2008); and the number of indicators that generally

[38] Sundstrom, Shiloh, Cassandra Moseley, Max Nielsen-Pincus, and Emily Jane Davis. 2011. "Quick Guide to Monitoring Economic Impacts of Ecosystem Restoration and Stewardship." Ecosystem Workforce Program, Institute for a Sustainable Environment.

[39] Jackson, L. E., J. Kurtz, and W. S. Fisher. 2000. "Evaluation guidelines for ecological indicators." U.S. Environmental Protection Agency Office of Research and Development Report EPA/620/R-99/005.

[40] Meadows, D. 1998. Indicators and Information Systems for Sustainable Development. A report to the Balaton Group published by The Sustainability Institute, Hartland Four Corners, VT.

[41] Brook Spellman and Michelle Abbenante, What Gets Measured, Gets Done: A Toolkit on Performance Measurement for Ending Homelessness (Washington, DC: National Alliance to End Homelessness and Homelessness Research Institute, 2008).
Quoted in Smith, R. Kingsley, GT., Cunningham, M., Popkin, S., Dumlao, K., Gould Ellen, I., Joseph, M., McKoy, D. 2010. "Monitoring Success in Choice Neighborhoods: A Proposed Approach to Performance Measurement." Urban Institute Technical Report.

> should be small and in the existing systems of indicators is very high (Alarcon Nunez, 2005).[42]"

Every coastalscape revitalization project will need to choose indicators relevant to its management needs. Identifying candidate indicators, prioritizing candidate indicators, and finally choosing a set of indicators to monitor can be an arduous task. Fernandez-Sanchez et al. (2010) suggest identifying candidate indicators (prior to project construction where possible) by:

- Reviewing important documentation (including legislation and scientific and technical articles) for required or suggested indicators.
- Surveying multiple stakeholder groups that will be involved with the coastalscape revitalization project at some point during its lifecycle to solicit indicator suggestions. These groups could include engineers, architects, economists, direct and indirect users (social and economic impacts), environmental advocates and scientists, etc.
- Interviewing experts on the project's economic, environmental, and social sustainability aspects along with members of the stakeholder groups above.
- Other techniques include: brainstorming, examining other projects' indicators, and relying on the project teams' previous experience.

In their research, they found that interviews with stakeholders was the "best technique applied to understand accurately the great differences that exist between all actors in construction projects," although getting agreement between stakeholders regarding indicator selection is difficult and may not be feasible. Triangulating indicator selection between these interviews, surveys, and brainstorming sessions—where different members of the same stakeholder groups participate in each method—can minimize error and reveal the most relevant indicators. They suggest using a maximum of 30 indicators for a coastalscape revitalization project—balancing the need to assess multiple project goals with the practicality of data collection and analysis[43].

Indicators must be measureable over time so mangers can track the progress of a coastalscape revitalization project in completing its goals, and come from "accessible, or obtainable, and reliable data sources[44]". When managers need to oversee collecting new indicator data, they will require continued funding and competent scientists to carry out data collection. The methods used to collect data will depend on the type of data, but must be rigorous and internally consistent in order to be useful for analysis.

The next three sections deal with three broad categories of monitoring and indicators: Economic, Environmental, and Social.

[42] Fernández-Sánchez, Gonzalo, and Fernando Rodriguez-López. 2010. "A methodology to identify sustainability indicators in construction project management—Application to infrastructure projects in Spain." Ecological Indicators 10 (6): 1193–1201.
[43] Ibid.
[44] Sundstrom, Shiloh, Cassandra Moseley, Max Nielsen-Pincus, and Emily Jane Davis. 2011. "Quick Guide to Monitoring Economic Impacts of Ecosystem Restoration and Stewardship." Ecosystem Workforce Program, Institute for a Sustainable Environment.

Economic Monitoring

Economic concerns, especially tax revenue, are some of the main reasons why coastalscape revitalization projects are built. As a result, monitoring the economic outcomes of coastalscape revitalization is critical. Economic monitoring can help managers:

- "Understand, articulate, and share the economic impacts of [revitalization] work in your community
- Create economic development goals
- Track progress toward meeting your goals
- Adapt and improve [revitalization] opportunities to better meet your economic development goals
- Increase investment in [revitalization] programs
- Increase your capacity for understanding and promoting the economic impacts of [revitalization][45]".

Economic indicators

Economic monitoring can help projects track changes in jobs and employment impacts:

- Job creation (net gain most useful),
- Job retention,
- Wages,
- Benefits,
- Job quality,
- Volunteer hours,
- Local investment (buying local products, etc.),
- Contracting opportunities,
- Local capture of new jobs (existing residents finding employment),
- Use of municipal infrastructure, utilities (sewer, water, storm etc), and services (school, fire, police etc.),
- Cost of utilities to residents and businesses, and
- Job training opportunities[46].

Some of these could arguably be considered economic or social indicators, and certainly many economic indicators create social impacts.

Economic monitoring can help projects track real estate impacts:

- Amount of money spent on rehabilitation of existing and construction of new buildings,

[45] Ibid; while they were originally speaking about environmental restoration, it is equally applicable to coastalscape revitalization

[46] Sundstrom, Shiloh, Cassandra Moseley, Max Nielsen-Pincus, and Emily Jane Davis. 2011. "Quick Guide to Monitoring Economic Impacts of Ecosystem Restoration and Stewardship."
Vancity. 2010. "Dockside Green Annual Sustainability Report 2009."
Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2011. Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.

- Amount of revenue generated by buildings or plots sold,
- Amount of tax revenue generated,
- Amount of private investment and reinvestment,
- Property values (increase/decrease),
- Construction loans/mortgage money,
- Number of locally-owned businesses[47].

Economic indicators can also track the economic wellbeing of the larger community where the coastalscape revitalization project is located. Examples include local government budgets and operations, debt, and bond ratings[48]. These measures are important as municipalities/counties often take on debt to finance coastalscape revitalization. Their ability to repay debt and secure future loans will impact the communities' future economic outlook. Further, economic indicators can track sales of goods and services from the area of coastalscape revitalization to estimate the contribution to the local economy (e.g. through input/output models).

Coastalscape revitalization projects can have both positive and negative economic impacts on the local economy and stakeholders may be differentially impacted. The economic indicators chosen for monitoring should therefore try to detect potential negative impacts as well as positive impacts. For example, a redevelopment project might increase use of municipal infrastructure and utilities, causing wear to infrastructure and stressing services (schools etc.) and utilities (sewer, water, etc.).

Further, not all indicators for economic monitoring are equally important. Good Jobs First[49] reviewed the monitoring of economic performance requirements for 238 state economic development subsidy programs (economic support from the state to attract employers that can be used in coastalscape revitalization for funding). They were critical of programs with no monitoring requirements as well as those whose requirements only required monitoring capital investment or qualified expenditures. Programs that required monitoring job creation, job retention; job security and job training were reviewed favorably. They also suggested monitoring wages paid by subsidized companies alongside market wage rates to see how they compare—in part to detect negative impacts from revitalization, such as when pay is so low that workers must rely on social programs including food banks.

Data collection and monitoring methods

Data for economic monitoring can be collected from a number of sources. Information about building/apartment sales, tax rolls, and records of business licenses in the coastalscape revitalization district/neighborhood can often be gathered from datasets collected and maintained by city or county governments. Information about wages, benefits, and other job data will likely need to be requested from the employers involved.

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[47] Ozdil, Taner Recep. 2006. Assessing the economic revitalization impact of urban design improvements: the Texas Main Street Program. Unpublished Doctor of Philosophy Dissertation. Department of Urban and Regional Science, Texas A&M University.

[48] Merwin, Donna J, and Marjorie Greene. 1977. "Framework for monitoring the social and economic impacts associated with the construction of the Skagit Nuclear Project in Skagit County, Washington." Battelle Human Affairs Research Centers Report PNL-2446.

[49] Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2011. Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.

In practice, the effort expended to track and verify economic monitoring data varies widely. Sometimes effort is based on potential impact; for example, in New York State, monitoring effort is tied to the number of jobs a project claims it will create. As the number of jobs a project is estimated to create increases, additional levels of data verification are required[50] (Figure 5). Other times monitoring programs are non-existent, so managers are unaware of their projects' impact[51].

Project's Estimated Jobs to be Created/Retained	Level of Monitoring Required
Less than 50	Annual auditor confirmation
More than 49, Less than 100	Annual auditor confirmation, plus copy of annual W-2 transmittal sheet
More than 99	Annual auditor confirmation, plus copy of annual W-2 transmittal sheet, plus site visit by Town official to monitor staffing levels.

Figure 5: In New York, the number of jobs a project creates determines the effort required to monitor the number of jobs actually created[52].

Salish Sea examples

In the Salish Sea region, despite the fact that many projects cite economic concerns and job creation as motivating factors for coastalscape revitalization projects, only one project attempted to measure project outcomes in this regard. Here, we discuss examples from the Thea Foss Waterway (Tacoma) and Dockside Green (Victoria).

In Tacoma, the **Thea Foss Waterway** development (as with other coastalscape development projects) creates both short and long term economic impacts. Two of particular interest is job creation and the cost/benefit of the project for the public. Estimates of job creation are requested during the permitting phase or prior to construction, but unfortunately because the Thea Foss Development Authority[53] is so small (two people as of 2013), they don't have the manpower to keep these estimates on record and follow up during or after project completion. Further, they have no formal reporting process (or mandate), so post-construction economic monitoring is very difficult. Collecting information to inform a public cost/ public benefit analysis is likewise beyond their scope.

Dockside Green in Victoria, B.C. produces a periodic[54]report that summarizes their progress towards economic, social, and environmental goals. This by itself is unique, and their triple bottom line approach is commendable. For this assessment, they collect data about:

[50] Town of Bethlehem Industrial Development Agency. 2006. Job Creation and Ongoing Monitoring. Policy Manual Part IV Project Specific Policies and Procedures.
[51] Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2011. Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.
[52] Town of Bethlehem Industrial Development Agency. 2006. Job Creation and Ongoing Monitoring. Policy Manual Part IV Project Specific Policies and Proceedures.
[53] See Dyson, Ryu, and Leschine (2011) for more information.
[54] Dockside Green labels them 'annual' reports however only 2 have been released between 2008 and 2013, one in 2009 and the second in 2011.

- Local businesses that supply products to construction,
- Local businesses that provide environmental technologies for construction (including sewage treatment technologies),
- Job creation under the First Nations Job Initiative,
- Student employment at Dockside Green,
- Employment at the biomass and sewage plant,
- Qualitative use of city infrastructure (quantitative use is not reported).

It is important to note that this is the *only* project that mentions any kind of job creation in post-construction monitoring, assessment, or management documentation.

However, many things are not clear from the reports[55]. For example, the report mentions the names of local (Canadian or British Columbian) that were patronized by Dockside Green, however it makes no mention of how much money was paid to these companies. Even if for business reasons Dockside Green could not release the amount paid to a single company, the total amount of money spent would provide information about the project's economic benefit to the community. Quantified information is generally missing from the report; the only number mentioned is that 17 jobs were created with the First Nations Initiative.

The report also mentions 'collaborating with local learning institutions' as one of the project's goals, however other than listing a number of institutions (i.e. University of Victoria's business class) the report makes no mention of *how* Dockside Green collaborated with these institutions. Similarly, when discussing how Dockside Green is impacting municipal infrastructure the report uses phrases like "expected to reduce" and "produces less waste than typical developments" which are ambiguous terms. No quantitative monitoring information is provided in the report.

It might be that Dockside Green tracks the quantitative variables but does not report them. Unfortunately, this makes the 'Annual Sustainability Report' less transparent and reduces its credibility. Not reporting more quantitative and specific information also obscures how much post-construction economic monitoring is performed by Dockside Green. There is no information collected that would aid in an analysis of the broader social or economic impacts, such as jobs created by on site businesses.

We should note that we specifically asked our interviewees about job creation monitoring. Dockside Green was the only project that collected any data on job creation, and then only for the First Nations Job Initiative—no mention is made of how many temporary (e.g. construction) or long-term jobs were created by the project.

Social Monitoring

Public spaces and other physical public benefits often feature prominently in coastalscape revitalization projects, however there are many other aspects to social monitoring than use of these public amenities. Social and economic indicators/monitoring overlap a great deal and are frequently studied together. Social monitoring can help managers and residents understand:

- Changes in the economic wellbeing of the community,

[55] Unfortunately, representatives from Dockside Green were unwilling to speak with us, and either unwilling or unable to provide additional documentation, so we only have publically available information to draw from.

- Use of new public amenities by visitors and residents,
- Perceptions of neighborhood safety, and
- Changes in neighborhood culture (gentrification, etc.).

Social monitoring is important because it can be used to examine the legitimacy of coastalscape revitalization (if carried out impartially without interest groups impacting results). Citizens of locales contemplating or with completed coastalscape revitalization projects may ask: what are the real reasons and targets for revitalization? Who has revitalization benefited, or for whom are revitalization plans created (residents or corporate/government interests)? What environmental or social impacts has revitalization had or do revitalization plans have? Social monitoring addressing different ways of experiencing and using the coastalscape can help develop and legitimize coastalscape revitalization projects.

Social indicators

Social indicators can be very diverse, as they can reflect many aspects of how people (including residents, visitors, employees, and other stakeholders) interact with coastalscape revitalization projects. Social indicators, where they do not overlap with economic indicators, are often more nuanced than economic or environmental indicators. Many indicators focus on economic wellbeing of the populous, including:

- Percent living under the poverty line,
- Cost of living,
- Economic or industrial diversification (resilience to market changes),
- Household income structure,
- Housing prices (possibly in comparison to income),
- Percent market/affordable/low-income housing,
- Housing occupancy,
- Neighborhood population demographics,
- Unemployment and state of the labor market,
- Boundaries of the 'commuter-shed' (area where commuters are coming from, either to work or shop), and
- Amount of public assistance.

Other indicators focus on the broader social impacts of coastalscape revitalization:

- Changes in traffic through the neighborhood (abandonment of former main streets or traffic jams),
- Usage (# visitors etc.) of new public amenities,
- Changes in neighborhood culture (ethnic, 'neighborhood feel'),
- Impacts on schools, hospitals, and law enforcement (often from additional population),
- Recreational opportunities,
- Neighborhood exposure to toxins (hopefully reduced due to remediation),
- Crime,

- Perceived public health and safety[56].

More sophisticated and organized sets of social indicators exist in the literature. One example is the 'social dimensions of urban waterfront planning' developed by Sairinen and Kumpulainen (2006; Figure 6).

The social dimensions of urban waterfront planning	
Resources and identity	– Main characteristics and strengths of the area – Opinions of the environmental, cultural or historic values – Significance to the visual, social, and cultural identity (city image, community identity)
Social status	– For whom (social, age or ethnic groups) are the housing and service areas planned and built? – Role of social/private housing – Segregation and/or gentrification processes
Access and activities	– Are the waterfront areas accessible to the public? – What kinds of activities are possible? "Water dependency" – Easy or difficult approach to waterfront? – Traffic and parking questions; waterfront routes
Waterfront experience	– Presence of water (sea, lake, river, etc.) – Restorative experiences, importance of visual messages, physical touch, tastes, voices, moving in the space, sense of transition as identification

Figure 6: The social dimensions of urban waterfront planning[57].

As with economic indicators, social indicators for monitoring coastalscape revitalization can indicate both positive and negative impacts. Positive impacts can include reduced crime and increased job opportunities as a result of redeveloping underutilized land. Negative impacts can result (for example) when residents get priced out of the housing market, or when a unique neighborhood culture is destroyed (often due to being dispersed to make way for development, or being priced out). Further, the magnitude and direction (positive or negative) of social indicators may vary based on which stakeholder group is being examined. This is particularly true when comparing stakeholder groups across different income groups.

Choosing social monitoring indicators requires familiarity with the area, as each coastalscape revitalization project addresses or may impact aspects of society unique to the area. Further, different stakeholders view and use the waterfront in different ways, so that the social impacts on each group are different:

> "The degree of water dependency and the possible impacts are dependent on the interests and perspectives of the people involved. First of all, people who use waterside areas for residence, place of work, or recreation are associated with waterside areas for

[56] Merwin, Donna J, and Marjorie Greene. 1977. "Framework for monitoring the social and economic impacts associated with the construction of the Skagit Nuclear Project in Skagit County, Washington." Battelle Human Affairs Research Centers Report PNL-2446.
[57] Sairinen, Rauno, and Satu Kumpulainen. 2006. "Assessing social impacts in urban waterfront regeneration." *Environmental impact assessment review* 26 (1): 120–135.

> housing, industry, commerce, transport, and a variety of leisure and recreational facilities. Secondly, those people who view waterside areas as a public resource are concerned about the quality and use of waterside areas even if they themselves may not directly use or benefit the resource. It is the second group of people who are inclined to use a water-related corridor as a recreational and environmental resource (Craigh-Smith, 1995).[58]"

Managers will need to speak with area residents and leaders, along with other stakeholder groups, to determine what social indicators are particularly important for these local groups.

Further, while social monitoring may measure the outputs of a coastalscape revitalization project (e.g. public space provided), the outcomes are also important. Providing trails, educational opportunities, and other public amenities is important, however how they are actually utilized (or if they are even used) by the community is another matter. There are many public spaces that do not get used because they are too small, too public, not safe, etc.

Data collection and Monitoring Methods

In comparison with economic data, which may be collected by local governments and then used by coastalscape revitalization managers (secondary data), it seems more likely that data for social monitoring needs to be collected by coastalscape revitalization managers (primary data). Collecting primary data from residents could also provide opportunities for community feedback about the project and monitoring process/indicators. Secondary data sources are cheaper to obtain; however data from these sources may not be available at the necessary scales, may be outdated, or be of too poor quality to use in analysis[59]. Social science methods, including surveys and interviews, are particularly useful. These methods can be expensive so managers may want to vary the frequency of data collection (annually instead of quarterly, for example), and monitor more frequently if a significant impact is detected.

Salish Sea examples

As with economic monitoring, there are limited examples of social monitoring in the Salish Sea region[60]. Here, we discuss examples from the Thea Foss (Tacoma) and Dockside Green (Victoria) coastalscape revitalization projects.

At the **Thea Foss Waterway in Tacoma**, the Development Authority took advantage of a period of slow development driven by larger market forces and convened a series of workshops to gather information

[58] Sairinen, Rauno, and Satu Kumpulainen. 2006. "Assessing social impacts in urban waterfront regeneration." *Environmental impact assessment review* 26 (1): 120–135.

[59] Merwin, Donna J, and Marjorie Greene. 1977. "Framework for monitoring the social and economic impacts associated with the construction of the Skagit Nuclear Project in Skagit County, Washington." Battelle Human Affairs Research Centers Report PNL-2446.

[60] Social monitoring seems to be more prevalent in other fields (and perhaps more used during the 70s and 80s than currently) than in coastalscape revitalization. For example, Merwin and Greene (1977) was written for the energy sector, and Wolf (1983) mentions Social Impact Assessment in the context of community development; industrial development; coastal zone management; water resources; energy development; education and manpower; highways and mass transit; parks/forest/wildlands; buildings and housing; health and human services; and toxic substances.

on how the community viewed completed development[61]. With the aid of a consultant (Merrittarch), the Development Authority gathered information from individuals, community organizations, and local businesses; these groups represented business people, residents, developers, groups that organize or would like to organize events using the public spaces at Thea Foss, investors, and even a local 7th grade class and students from UW Tacoma. The objective of the meetings was to determine what the community thought was working or not working about the Thea Foss development completed. Data from this monitoring effort was then assessed and used to guide future development[62]; these aspects are discussed later in this report.

In addition to economic monitoring, **Dockside Green in Victoria** also performed social monitoring. This monitoring effort is reported in the periodic "Annual Sustainability Reports" alongside economic (see previous section) and environmental data. Unfortunately, the description of their social monitoring, while a step in the right direction, suffers from many of the same issues that characterize their economic monitoring.

Social monitoring data collected include:

- LEED ND certification status,
- Number of residents,
- New Urbanist design ideas used,
- Unit types built (condos and townhouses),
- Number of market affordable ownership suites completed,
- Actions taken to work with First Nations,
- Trail systems developed (for 'sense of connectedness'),
- Relationships with community associations ('sense of community'),
- Public amenities provided,
- Suggestions made to improve view corridors and open space (feedback on their master plan),
- Meetings held with developers to encourage innovations in design and sustainability,
- Actions taken to educate youth about sustainability,
- Action (developer will host a barbeque) taken to recognize construction workers.

While it is commendable that the developers are tracking their relationships with First Nations and community groups, this interpretation of social monitoring (and assessment) differs significantly from the examples discussed in the literature. Examples in the literature are largely focused on the quality of life of residents, worker wages and quality of life, along with social justice issues (who does

[61] Thea Foss Waterway Development Authority and Merrittarch (consultant). 2011. Revisiting the Foss Waterway Master Redevelopment Strategy: 2011 Update. Available online at: http://theafoss.com/web2011/MRSsummary.html

[62] Some of the projects discussed in this report have multiple construction phases including Thea Foss in Tacoma, and Dockside Green in Victoria. Since full build out frequently takes 15+ years for this type of project, post-construction monitoring from early phases of the project can be used to inform subsequent phases of the project.

development benefit)[63]. Other examples emphasize being in touch with communities perceptions of the project and developer as a key component of social monitoring[64].

The social monitoring presented by Dockside Green focuses more on the types of design ideas they have incorporated into their master plan (New Urbanist ideas, trail systems, public amenities, etc.). While these are aimed at providing a better living experience, the monitoring doesn't include how residents perceive these amenities. Also missing are how workers are treated and if they are paid living wages—mentioning hosting company barbeques unfortunately doesn't get at these deeper and more important issues.

Overall, social monitoring is not as well developed for coastalscape revitalization in the Salish Sea region as the examples found in the literature. The community 'check-in' performed in Tacoma is the best example of social monitoring for coastalscape revitalization here; they were successful because they were explicitly interested in obtaining the opinions of the community and they surveyed a wide range of stakeholders. Future social monitoring for coastalscape revitalization should also address questions of equity, social justice and the quality of life of workers and residents, in addition to any locally important social issues.

Environmental Monitoring

Environmental monitoring focuses on describing processes and activities that describe environmental quality. Ecological monitoring is a subset of environmental monitoring focusing on living organisms (primarily flora and fauna). For the purpose of this report, "environmental monitoring" is used to refer to both ecological and environmental monitoring. A long history of environmental monitoring with restoration projects (such as wetland restoration) provides many resources for post-construction environmental monitoring. Scientific journals—including the *Journal of Environmental Assessment Policy and Management*, the *Integrated Environmental Assessment and Management* journal, and *Environmental Monitoring and Assessment*—are devoted to publishing articles about environmental monitoring. Since this is a vast field, for this report we focus just on the aspects of environmental monitoring most relevant to coastalscape revitalization.

Environmental monitoring can help managers understand:

- The impact of coastalscape revitalization on the surrounding environment,
- How well new habitat enhancement technologies work, and
- How the ecosystem is responding to environmental cleanup efforts.

The impact of coastalscape revitalization on the surrounding environment may include direct and indirect effects on people's living conditions and environment; plants and animals, water, air, and climate; flora and fauna, biodiversity and natural resources[65]. In the United States and Canada,

[63] Sairinen, Rauno, and Satu Kumpulainen. 2006. "Assessing social impacts in urban waterfront regeneration." *Environmental impact assessment review* 26 (1): 120–135.

[64] Charnley, Susan, Ellen M Donoghue, Claudia Stuart, Candace Dillingham, Lita P Buttolph, William Kay, Rebecca J McLain, Cassandra Moseley, Richard H Phillips, and Lisa Tobe. 2006. "Socioeconomic Monitoring results Volume I: Key Findings." United States Department of Agriculture Forest Service General Technical Report PNW 649 (1).

[65] Sairinen, Rauno, and Satu Kumpulainen. 2006. "Assessing social impacts in urban waterfront regeneration." *Environmental impact assessment review* 26 (1): 120–135.

environmental monitoring may be required by law or as a condition of project permitting. This is particularly true for species of concern (salmon), fish habitat mitigation, and ensuring that contaminants at a site were properly mitigated.

Environmental monitoring also sometimes includes monitoring the performance of green buildings. However, this report is focused on the publically-owned part of coastalscape revitalization, while in the Salish Sea region, buildings are typically owned by private developers. If completed green buildings (LEED certified, e.g.) are owned and managed by the government, numerous resources for green building monitoring exist, including those offered by the US Green Building Council[66]. We refer the reader to these resources and focus on environmental monitoring of public spaces here.

Environmental indicators

Environmental indicators address all facets of the natural environment of the project:

- Air, water, and soil quality,
- Concentrations of key pollutants,
- Presence/absence of key species,
- Population sizes of key species,
- Biodiversity,
- Vegetation type, abundance, and province (native vs. non-native), and
- Ecosystem services provision and quality.

Environmental indicators can also address aspects of the coastalscape revitalization project (built environment) that influence the natural environment:

- Percent impervious surface cover (strongly influences runoff intensity and pollution),
- Water use, reuse, and waste,
- Energy use and efficiency,
- Recycling rates and waste
- Construction waste and recycling rates,
- Pesticide, herbicide, fungicide, etc. use for landscaping and other site management,
- Percent stormwater treated on site,
- Reflection/absorption of solar energy on site (contribution to the urban heat island effect),
- Number and type of street trees, and
- Method of transport and miles traveled by residents and commuters to the site (contributes to global climate change).

Each of these environmental indicators is supported by a significant literature. As with environmental monitoring, there are journals dedicated to environmental indicators including *Ecological Indicators*[67]. Further, there are many variations of each indicator. Biodiversity indicators, for example, are used as general measures of environmental health. Multiple different taxa have been suggested as indicators for aquatic and coastal ecosystems, including fish fauna, woody plants, aquatic and terrestrial herptofauna,

[66] See for example "LEED Stories from Practice Article: Building Management" available online at http://www.usgbc.org/sites/default/files/StoriesfromPractice_BuildingMgmt.pdf.
[67] Ecological Indicators Journal available online at: http://www.sciencedirect.com/science/journal/1470160X/12

benthic invertebrates, birds, and orchids[68]. In the Salish Sea region, percent cover of eelgrass and abundance of juvenile salmon are two frequently used and ecologically relevant local environmental indicators[69].

Different frameworks are used to classify environmental indicators. One is the 'DPSIR' framework, which classifies environmental indicators into five groups that provide information on:

1. **D**riving forces,
2. The resulting environmental **P**ressures,
3. The **S**tate of the environment,
4. **I**mpacts resulting from changes in environmental quality
5. The societal **R**esponse to these changes in the environment (these could be classified as either social or environmental drivers; they are considered social for the purposes of this report).

While this classification system has some issues (needlessly separating human and ecological systems), it is convenient from a policy standpoint[70]. Other authors have suggested that indicators are used "to detect changes in nature… assess the condition of the environment, as early-warning signals of ecological problems, and as barometers for trends in ecological resources[71]."

With so many environmental/ecological indicators for coastalscape revitalization projects to choose from, managers of coastalscape revitalization projects need to have a way to choose the most relevant indicators for their project. Broadly, "in any monitoring program, particular attention should be paid to specifying the questions that monitoring is intended to answer and validating the relationships between indicators and the components of biodiversity they represent[72]."

The U.S. Environmental Protection Agency's Office of Research and Development uses a series of fifteen technical guidelines to evaluate the suitability of an ecological indicator for a monitoring program. These guidelines fall into four phases "conceptual foundation, feasibility of implementation, response

[68] Kati et al. 2004. Testing the Value of Six Taxonomic Groups as Biodiversity Indicators at a Local Scale. Conservation Biology Vol 18 (3) pp 667-675. DOI: 10.1111/j.1523-1739.2004.00465.x
Hodkinson, I. and Jackson, J. 2005. Terrestrial and aquatic invertebrates as bioindicators for environmental monitoring, with particular reference to mountain ecosystems. Environmental Management Vol 35 (5) pp. 649-666.
Moyle, P. and Leidy, R. 1992. Loss of Biodiversity in aquatic ecosystems: evidence from fish faunas. Conservation Biology pp 127-169.
[69] See for example the Port Townsend case study or Toft et al.'s (2004) report titled "Fish Distribution, Abundance, and Behavior at Nearshore Habitats along City of Seattle Marine Shorelines, with an Emphasis on Juvenile Salmonids" Available online at: http://fish.washington.edu/research/publications/pdfs/0401.pdf.
[70] Smeets, E. and Weterings, R. 1999. Environmental indicators: typology and overview. Technical report No. 25. Written by the TNO Centre for Strategy, Technology and Policy, The Netherlands for the European Environment Agency. Project Managers: Peter Bosch, Martin Büchele and David Gee.
[71] Niemi, G., and McDonald, M. 2004. Application of Ecological Indicators. Annual Review of Ecology, Evolyution, and Systematics. Vol. 35 pp. 89-111. http://www.jstor.org/stable/30034111.
[72] NOSS, R. F. 1990. Indicators for Monitoring Biodiversity: A Hierarchical Approach. Conservation Biology, 4: 355–364. doi: 10.1111/j.1523-1739.1990.tb00309.x

variability, and interpretation and utility[73]" meant to highlight strengths or weaknesses of an indicator. The indicator can then be researched further and revised based on this analysis.

The fifteen guidelines falling under the four phases are:

- Phase 1: Conceptual Relevance
    - Guideline 1: Relevance to the Assessment (indicator responsive to assessment question and management decisions)
    - Guideline 2: Relevance to Ecological Function (indicator linked to ecological function)
- Phase 2: Feasibility of Implementation
    - Guideline 3: Data Collection Methods (well documented methods preferred)
    - Guideline 4: Logistics (how costly and time consuming?)
    - Guideline 5: Information Management (set requirements for data processing etc.)
    - Guideline 6: Quality Assurance (to ensure validity)
    - Guideline 7: Monetary Costs (implementation costs often limiting)
- Phase 3: Response Variability
    - Guideline 8: Estimation of Measurement Error (variability in human/instrument performance and between field crews)
    - Guideline 9: Temporal Variability (within a field season)
    - Guideline 10: Temporal Variability (between years)
    - Guideline 11: Spatial Variability (within a reporting unit)
    - Guideline 12: Discriminatory Ability (how well can the indicator discriminate differences)
- Phase 4: Interpretation and Utility
    - Guideline 13: Data Quality Objectives (and how they relate to sample size etc.)
    - Guideline 14: Assessment Thresholds (to delineate acceptable and unacceptable ecological conditions)
    - Guideline 15: Linkage to Management Action (indicator only useful if it provides info to quantify success of past decisions)[74]

While this is a rather idealized way to develop indicators, it creates a set of indicators whose use can be defended. Further, although these guidelines were developed to evaluate ecological indicators, this approach could work for environmental, social, or economic indicators as well.

Data collection and monitoring methods

Environmental monitoring is supported by a well-developed scientific literature, and is closely aligned with the scientific method in practice. Many of the methods used to collect data for post-construction monitoring of coastalscape revitalization projects are the same as those used in the environmental sciences. Site selection, frequency of sampling, timing of sampling and other sampling design questions need to be addressed for every environmental monitoring study.

[73] Jackson, L., Kurtz, J., and Fischer, W. 2000. Evaluation Guidelines for Ecological Indicators. U.S. Environmental Protection Agency Office of Research and Development. EPA/620/R-99/005

[74] Jackson, L., Kurtz, J., and Fischer, W. 2000. Evaluation Guidelines for Ecological Indicators. U.S. Environmental Protection Agency Office of Research and Development. EPA/620/R-99/005.
Don't know if they've made any significant changes to this method since its publication in 2004.

Data collection for water, air, and soil quality monitoring (most frequently for pollutants) is a well-developed field[75]. Guidance for coastalscape revitalization programs to develop their own monitoring programs is available through governmental agencies[76]. Automated sampling stations can be purchased by coastalscape revitalization projects to collect air and water quality data. A professional biological or environmental consulting firm is frequently retained by coastalscape revitalization projects to monitor biological populations as ecological monitoring requires skill and training to successfully design and carry out a valid monitoring program.

Participatory environmental monitoring programs, where the community helps identify indicators and citizen volunteers are trained to collect environmental monitoring data, are becoming more popular. Frequently the monitoring programs are designed so that monitoring data is easier to collect and are also overseen by experts. Participatory monitoring provides an avenue for the community to become involved in post-construction monitoring, assessment, and management of the coastalscape revitalization program[77].

Finally, environmental monitoring is frequently mandated by law—particularly with soil and water quality or fish habitat—though voluntary monitoring programs do exist. Even when environmental monitoring programs are mandated, there can be significant issues collecting sufficient data. For example, the length of monitoring programs tends to be short (less than 4 years on average), and there is not always compliance with monitoring requirements[78].

Salish Sea examples

Environmental monitoring is perhaps the most ubiquitous type of monitoring in the Salish Sea region, in part due to permitting and regulatory requirements. The Salish Sea experience provides multiple insights into the difficulties inherent in carrying out environmental monitoring, as well as the benefits that come with successful monitoring. Examples from Port Townsend, Dockside Green (Victoria), Olympic Sculpture Park (Seattle) and Thea Foss waterway (Tacoma) follow.

In Port Townsend, pre- and post-construction environmental monitoring was planned for the new dock built as part of the Northwest Maritime Center coastalscape revitalization project[79]. The new dock replaced a derelict oil dock (233 ft / 71m long) that was used to bring in shipments of oil for heating the homes of Port Townsend. The two primary objectives for the dock replacement were to restore

[75] See for example:
- Chapman, D. V. (Ed.). 1996. Water quality assessments: a guide to the use of biota, sediments and water in environmental monitoring (p. 626). London: E & Fn Spon.
- Barrenetxea, G., Ingelrest, F., Schaefer, G., Vetterli, M., Couach, O., & Parlange, M. 2008. Sensorscope: Out-of-the-box environmental monitoring. In Information Processing in Sensor Networks, 2008. IPSN'08. International Conference on (pp. 332-343). IEEE.

[76] Resources available through the US EPA: http://www.epa.gov/airquality/montring.html; http://water.epa.gov/type/watersheds/monitoring/index.cfm

[77] Fraser, E., Dougill, A., Mabee, W., Reed, M., and P. McAlpine. 2006. Bottom up and top down: Analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management. Journal of Environmental Management Vol. 78 (2) pp 114-127.

[78] Lindenmayer, David B, and Gene E Likens. 2010. "The science and application of ecological monitoring." Biological Conservation 143 (6): 1317–1328.

[79] See Dyson, Ryu, and Leschine (2011) for some background information on the Northwest Maritime Center.

nearshore habitat functions, particularly for threatened fisheries resources[80] and to provide the Northwest Maritime Center with a usable dock for their marine nautical programming.

The primary environmental concern at the time was eelgrass habitat (*Zostera marina*), which provides habitat for juvenile salmon and other organisms. Eelgrass growth is impacted in the short term by dock construction and in the long term by dock shading. Shading impacts from the old dock severely damaged the adjacent eelgrass beds—although nearby eelgrass beds were healthy, pre-construction monitoring determined that eelgrass beds were highly fragmented or nonexistent adjacent to and underneath the dock[81]. Analysis based on shading models and eelgrass habitat surveys indicated that shading from the old dock was the root cause of eelgrass loss.

In addition to pre-construction monitoring of the eelgrass beds, a team of scientists evaluated different technologies (including a metal halide light, tubular skylight, and deck prisms) in situ by installing them in the old dock. The goal of this research was to determine if the technologies, installed in the new dock, would allow enough light to reach the seafloor and support eelgrass beds; the end goals was to "create a model for combining emerging dock design technologies with eelgrass transplantation to return an altered marine habitat to a close approximation of its condition prior to disturbance" (2004 grant proposal). The final dock design called for:

- 38 steel piles (replacing 84 creosote-treated wood piles) to reduce shade, contaminants, and turbulence,
- Lengthening the dock (to 289 feet / 88m) in order to "move the greatest area [the dock platform] of the overwater structure beyond the depth of the eelgrass,"
- Reorienting the dock platform to minimize shading
- Using metal grating in specific locations to reduce impediments to fish passage (fish are very sensitive to light/dark boundaries caused by dock shading and will frequently wait 8+ hours until night before transiting under a dock. Grating can soften these boundaries and if installed across the width of a dock may help fish transit under the dock without waiting), and
- Installing stainless steel panels to reflect light under the dock.

This design work was funded by the National Oceanic and Atmospheric Administration's (NOAA) Community-based Restoration Program (CRP). The grant also funded the dock engineering, eelgrass mapping, and preparation for the eelgrass transportation. The preparation included creating a research plan for the eelgrass restoration which called for planting approximately 4,300sqft (390m^2) of eelgrass adjacent to and underneath the new dock in 2004, then monitoring eelgrass abundance for three to five years.

In May of 2004, construction on the $1.5 million, 290-foot-long high-trestle pier (and accompanying floating dock) was finished. The constructed dock followed most of the design recommendations, however no grating was added to transmit light to the seafloor. Only the reflective steel panels were installed, and it is unclear if the developers followed the design teams' recommendation for using high-nickel steel to resist corrosion in the marine environment.

[80] Diefenderfer, H., Susan Sargeant, Amy Borde, and Ronald Thom. 2005. Northwest Maritime Center Eelgrass Restoration Project, Port Townsend, Washington: First-year Monitoring Report, 2004. PNWD-3560 Limited Distribution report prepared for the Northwest Maritime Center under contract 42546A by Battelle.
[81] Ibid.

Subsequently, a second CRP grant funded eelgrass plantings under and around the newly constructed dock. The ecological goal of this stage of the Northwest Maritime Center revitalization project was to restore historic eelgrass beds and habitat connectivity. 50 student and adult volunteers from the community worked together with scientists from Battelle Marine Sciences Laboratory to plant 5,040 shoots of eelgrass over a 228m^2 area[82]. The eelgrass was donated by the Washington Department of Transportation from eelgrass cultures growing at Battelle.

Funding from this second grant also helped fund an initial (3 month) post-construction monitoring survey in August 2004 examining the abundance of and growing conditions for the newly planted eelgrass. This initial survey also helped develop the methods (including site selection) for the proposed three year post-construction management.

While three months is "premature for assessment of the long-term trajectories of development of eelgrass… it does provide early indications of the establishment of plants and indications of factors potentially influencing their survival and development.[83]" Researchers found that the planted eelgrass had begun to establish at the site, and the transplant survival rate was approximately 35%. This is low compared to successful plots, where 50% survival is expected. Higher eelgrass survival was observed in the deeper water portions of the restoration site, including around and under the new dock. In shallower water, increasing macroalgae cover suggested that the poor eelgrass survival rate was due to competition from macroalgae.

Later in 2004, a third grant for three years of post-construction monitoring of the dock and the newly planted eelgrass was approved by NOAA's CRP. This funding would support the scientific monitoring and compliment private funding from individuals, businesses, and other project partners supporting education efforts and the non-scientific components of monitoring. The proposal sought funding to measure the photosynthetically available light (PAR) under the dock to determine how well the reflective steel panels worked as well as for underwater eelgrass and algae surveys. Research would be carried out by high school students (PAR readings) in conjunction with professional ecological scientists (PAR and seagrass survey dives). Results would provide information for adaptive management of the Port Townsend eelgrass restoration as well as information about the efficacy of dock shading mitigation techniques for coastalscape revitalization projects in other locations. In the words of the ecological monitoring team:

> "With the dock now redesigned and reconstructed, and the historic eelgrass meadow successfully transplanted, the central objective of this third and final project phase is to monitor eelgrass performance and dock impacts and provide restoration research data. Through monitoring, we aim to answer critical questions that will help determine best practices for future construction of overwater structures and help improve the success of future eelgrass restoration efforts throughout Washington State and beyond[84]."

[82] Diefenderfer, H., Susan Sargeant, Amy Borde, and Ronald Thom. 2005. Northwest Maritime Center Eelgrass Restoration Project, Port Townsend, Washington: First-year Monitoring Report, 2004. PNWD-3560 Limited Distribution report prepared for the Northwest Maritime Center under contract 42546A by Battelle.
[83] Ibid.
[84] Battelle scientists. 2004. A community-based demonstration project for restoring eelgrass beds in Puget Sound, Phase III: Evaluating effects of technologies and natural competitors on eelgrass meadow restoration. NOAA CRP Project Narrative.

However, while the grant was approved, the money for this grant was never received. Multiple factors could have contributed to the failure of funding, but the exact reason is unknown. The team made multiple other attempts to secure funding, but these grant applications were rejected.

In subsequent years, new lessons learned in Port Townsend and elsewhere have underscored the need for post-construction monitoring. Other research groups have found shading impacts on brown algae, in addition to eelgrass, where previously deeper water algae were thought to be less susceptible to shading impacts. Since the Port Townsend dock was lengthened to reduce impacts on eelgrass, the bulk of the dock is built over brown algae. Therefore the dock may be unintentionally impacting these algae, however without post-construction monitoring it is impossible to know. In addition, at least one of the steel panels has fallen off of the dock into the eelgrass beds. The steel panel installation did not follow the recommendations of the design team (high nickel content steel attached using wooden braces), and may have been lower quality steel attached with bolts which corroded. However, with no funding to perform a post-mortem examination of the steel panel to determine the cause of failure and its impacts on the eelgrass, Port Townsend and other projects will not have the opportunity to learn from this incident.

The experience in Port Townsend highlights a number of issues facing post-construction management. First, despite community involvement and support, and the collaborative[85], iterative, progressive design of the dock, without funding allocated to post-construction monitoring the success of the dock is almost completely unknown. In effect, the $1.5 million spent on the project (experiment) will not help similar projects in the future, since the innovative design aspects of the dock (including remain untested. On the positive side, the strong community involvement and education elements of the dock project persisted (funded through avenues outside of NOAA). The community involvement and education about the importance of seagrass led to a successful program encouraging boaters to anchor outside of the range of the seagrass.

Environmental monitoring at **Dockside Green** in Victoria, B.C. is primarily focused on energy and resource use efficiency, stormwater management, and sewage treatment. Much of the monitoring information is reported in general, qualitative terms or consists of modeled estimates (e.g. modeled energy savings). It is assumed Vancity and managers for Dockside Green have more complete information to track the performance of the stormwater treatment plant and sewer treatment plant that are not reported in publically available documents. For example, municipalities are typically required to document that they meet water quality requirements (e.g. fecal coliform) in order to release water. However, the Dockside Green report does mention where certain efforts have failed (e.g. living walls were removed due to lack of plant growth) which is useful to other projects.

At **Olympic Village in Southeast False Creek,** Vancouver, B.C., Habitat Island was created as compensatory habitat under Section 35 of the Fisheries Act[86]. Along with creating compensatory habitat, the developers were required to fund monitoring to "assess the form and function of the compensatory

[85] Many stakeholders were involved in the design, including Washington Department of Natural Resources, environmental scientists from Battelle, and civil engineers.
[86] See the Environmental Assessment section for more information about the Act and its requirements.

fish habitats and their success as fish habitat[87]." The monitoring was required to examine the physical stability of the compensatory habitat and inventory macro-organisms[88].

The monitoring methods were approved by the Department of Fisheries and Oceans (who oversee the Fisheries Act) in late 2008. To gather data about the intertidal community, nine reaches were sampled—four on the eastern shoreline of the site, three on the compensatory habitat island, and two reference sites. At each reach, one transect was established perpendicular to the shoreline, and a 1m x 1m quadrat was placed at high, middle, and low intertidal zones. The percent cover of sessile invertebrates and macro-algae were estimated visually, and were identified to the lowest taxonomic level. Motile species in the quadrats were noted, but their density was not estimated.

An assessment of fish utilization at the site was also conducted, and was timed to coincide with when juvenile salmonids were most likely to be present in False Creek. Four sampling sites were chosen to assess fish presence, including two at the compensatory habitat and two in reference areas; these sampling sites were followed through time and sampled in each year. In shallow areas, a pole seine was used to collect fish, while in deeper areas a beach seine was used. Fish were identified to species, enumerated, and measured (fork length) and then returned to the sampling area.

Overall, the environmental indicators used for analysis included percent coverage by intertidal organisms and fish species present. The environmental assessment of these indicators is discussed in the 'Environmental Assessment' section below.

The **Thea Foss Waterway** in Tacoma, WA is subject to the required monitoring for the Commencement Bay Superfund site (CERCLA). The cleanup objective for the Thea Foss site (as described in Section 10 of the 1989 Record of Decision) states that: "the selected remedy is to achieve acceptable sediment quality in a reasonable time frame." "Acceptable sediment quality" is defined as "the absence of acute or chronic adverse effects on biological resources or significant human health risks[89]." To determine if this objective was met, biological test requirements and sediment chemical concentrations (Sediment Quality Objectives) were established. Monitoring both the sources (terrestrial soils) and sediments (aquatic) was required to determine how effective the control measures applied to the sources to prevent recontamination from terrestrial sources were.

Monitoring at the Thea Foss began in 2006[90]. Monitoring activities include Natural Recovery sampling (detection of compounds in areas that were allowed to de-toxify without intervention), examining the effects of the tide on groundwater levels, examining the slope cap at low tide, sampling the capped areas, inspections (including species presence and abundance and habitat quality) of the added habitat enhancements, inspections of the confined disposal facility (CDF) sites for leaks, collecting baseline data for the CDF, and conducting sediment profile imaging. In addition, public comment was sought regarding

[87] Section 7.3 of the authorization; Golder Associates. 2009. Annual Summary Report (2008): Southeast False Creek Compensatory Habitat Monitoring Program. Submitted to the City of Vancouver Southeast False Creek Project Office. Technical Report #06-1421-001/1100.
[88] The accompanying assessment of monitoring data is discussed in the Environmental Assessment section.
[89] United States Environmental Protection Agency Region 10. 2009. Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
[90] More detail in Ibid., p 105.

both the five year review process and the cleanup process itself. This is a very brief overview; more information can be found in the EPA's report[91].

A wide variety of monitoring data is collected on economic, social, and environmental/ecological indicators in the Salish Sea region. As demonstrated in Figure 7 below, environmental monitoring is much more prevalent than social or economic monitoring. This information is critical to observing project trends and assessing coastalscape revitalization projects. Yet monitoring efforts are hampered by lack of resources (both funding and personnel, as in the cases of Port Townsend and the Thea Foss jobs monitoring) and by lack of statistical rigor or quantitative data collection (as in the case of Dockside Green's sustainability monitoring). Mandated monitoring fares better on both counts, as funding and personnel must be found to support these efforts, and environmental regulations often require monitoring and collection of quantitative data. The mandated monitoring at the Thea Foss waterway is probably the best-documented and most extensive monitoring program reviewed in this study of coastalscape revitalization projects. Similarly, though without statistics, the mandated monitoring at Olympic Village and Habitat Island in keeping with the Fisheries Act provides data for useful quantitative insights. The quality and type of data collected through monitoring has a large impact on the quality of the assessment, as seen in the next section.

Indicators	**Case 1** Thea Foss	**Case 2** NW Maritime	**Case 3** Olympic Village	**Case 4** Dockside Green	**Case 5** Olympic Sculpture Park
Economic	-	-	-	X	-
Social	X	-	-	X	-
Environmental	X	X	X	X	X

Figure 7 – Monitoring Indicators from Salish Sea Case Studies.

Approaches Used to Assess Coastalscape Revitalization Projects Post-construction

Assessment is a broad term[92] defined in this report as the process of analyzing indicators (statistically or not) by comparing them to targets/estimates, combining them into indices, or by other means to reach a judgment. Assessment can be an ongoing process (yearly report) or a one-time effort (e.g. one/three/five year reports). Since assessment relies on indicator data collected through monitoring (also either one time or an ongoing effort), assessment and monitoring are inherently deeply connected. In this section we detail some of the approaches to assessment seen in the literature first broadly and then specific to economic/social/environmental assessment. We then use this literature to provide a framework for describing examples of economic, social, and environmental assessment efforts in the

[91] Ibid.

[92] We use the term assessment here as synonymous with evaluation. Different fields sometimes have specific differences between assessments and evaluations; for example the U.S. Fish and Wildlife service points out that 'biological assessments' are defined in regulation, while evaluation is a more general term (http://www.fws.gov/midwest/endangered/section7/pdf/BAGuidance.pdf). While we do not follow these distinctions here, if looking into the literature more closely it is worth becoming acquainted with any distinctions specific to that field.

Salish Sea region. Throughout this section, we focus on assessment of publically owned aspects of coastalscape revitalization projects[93].

Why are post-construction assessments conducted for coastalscape revitalization? Different projects have different motivations, and frequently more than one for performing assessments; "Evaluations are conducted to insure program accountability, detect management errors, provide information to inform decisions about whether to expand, contract, terminate or modify a program, or test innovative program interventions. They are also conducted to respond to legal requirements and to provide information for program advocacy.[94]" Assessments can also be used to adjust monitoring efforts (for example by suggesting new information that would be useful for future assessments) and to reflect on project goals (for example, a goal may never be achievable or may be the wrong goal for needs of the local community). Determining if a project has been 'successful' is another motivation for assessment.

There are three broad categories for assessment:

1. Performance evaluation,
2. Management capacity assessment, and
3. Outcomes evaluation.

Following Lowry et al. (1999), "performance evaluations address the quality of project implementation, and the degree to which project goals are achieved. Management capacity assessments are conducted to determine the adequacy of management structures and governance processes as these relate to generally accepted international standards and experience. Outcome assessments evaluate the impacts of a coastal management initiative upon coastal resources and the associated human society(s).95" These three broad categories contain many more specific types of evaluation (see Figure 8).

[93] Resources for assessing private property, including buildings, can be found elsewhere in the literature.
[94] Lowry, Kem, Stephen Olsen, and James Tobey. 1999. "Donor evaluations of ICM initiatives: what can be learned from them?" *Ocean & Coastal Management* 42 (9): 767–789.
[95] Ibid.

Selected types of evaluation

Focus or type of evaluation	Defining questions or approach
Accreditation focus	Does the program meet minimum standards for accreditation or licensing?
Causal focus	Use rigorous social science methods to determine the relationship between the program and resulting outcomes
Cluster evaluation	Synthesize overarching lessons and/or impacts from a number of projects within a common initiative or framework
Collaborative approach	Evaluators and intended users work together on the evaluation
Comparative focus	How do two or more programs rank on specific indicators, outcomes, or criteria.
Compliance focus	Are rules and regulations being followed?
Context focus	What is the environment within which the program operates politically, socially, economically, culturally, and scientifically? How does this context affect program effectiveness?
Effectiveness focus	To what extent is the program effective in attaining its goals? How can the program be more effective?
Efficiency focus	Can inputs be reduced and still produce the same level of output or can greater output be obtained with no increase in inputs?
Effort focus	What are the inputs into the program in terms of the number of personnel staff/client ratios, and other descriptors of the levels of activity and effort in the program?
Formative Evaluation	How can the program be improved?
Goals-based focus	To what extent have program goals been attained?
Implementation focus	To what extent was the program implemented as designed? What issues surfaced during implementation that need attention in the future?
Inputs focus	What resources (money, staff, facilities, technology, etc.) are available and/or necessary?
Logical Frameworks	Specify goals, purposes, outputs, and activities, and connecting assumptions specifying indicators for each, and the means of verification.
Mission	To what extent is the program or organization achieving its overall mission? How well do outcomes of departments or programs within an agency support the overall mission?
Outcomes evaluation	To what extent are desired client/participant outcomes being attained? What are the effects of the program on clients, participants or environmental quality?
Participatory evaluation	Intended users, usually including program participants and/or staff, are directly involved in the evaluation.
Summative evaluation	Should the program be continued? If so, at what level? What is the overall merit and worth of the program? What are the program's impacts and the likely causal relationships among program activities and observed outputs and outcomes.

Source: [13, pp. 192–194].

Figure 8 - Types of Evaluation from Lowry et.al

Using these definitions, most of the post-construction assessments performed by coastalscape revitalization projects in the Salish Sea are **performance evaluations**, focusing on the quality of waterfront revitalization projects and the extent to which project goals are achieved. The sustainability reports released by Dockside Green in Victoria, for example, list a project goal and then use monitoring data to determine if the development has met that goal.

The dominance of the performance evolution method is also observed generally, and performance evaluations are often used to maintain standards of accountability and quality controls well as

determine if a project's promised outputs have been (or are likely to be) achieved[96]. Discussions of project "success" often stem from program evaluations[97]. Many performance evaluations are noted in the literature, usually using the evaluation to point out what has worked for a project so that others can learn from their experience (e.g. Almeida 2012[98]). Some authors seem to recognize project evaluation as the only form of assessment, for example, Buntin and Pirie (2013[99]) defines evaluation as:

> "Evaluation is a key tool in gauging the extent to which policies and initiatives are effective and efficient in terms of meeting aims. Evaluation provides a basis for judging whether… implementation is resulting in the designed out-comes in the required time‑scale. The specific aims are: to check the progress of a project or programme against specified targets in a systematic and transparent manner, to inform the review or revision of the original targets and actions, and to arrive at a judgment overall of the outputs of the scheme and the added value (or additionally) it brings.
>
> However, the performance evaluation type of assessment has a few weaknesses. First, "it assumes that plans and programs are based on well-understood management concepts and technologies with predictable, measurable outcome." Additionally, "the goal achievement approach is insufficiently sensitive to the realities of program planning and management" and "de-emphasizes or ignores the forces that originally shaped a project's goals[100]." Project success in achieving goals is also dependent on the particular stakeholder, and for projects with many stakeholders the goals may be in conflict with one another rendering success (or unqualified success) impossible to achieve[101]. Finally, comparing a project's outcomes to its goals does not address whether the project goals are the right normative framework for the project. More generally, ethics is a major component left out of project reviews and projects' definition of success[102]. External reviews may be more likely to discuss the normative and ethical framework of the project and offer critique.

Management capacity assessments are "conducted to determine the adequacy of the project or program design including management structures and governance processes as these relate to generally accepted international standards and experience." Generally, program managers trying to strengthen their programs undertake management capacity assessments to find ways to "improve program design

[96] Ibid.
[97] E.g. de Wit (1988) suggests that: "the project is considered an overall success if the project meets the technical performance specification and/or mission to be performed, and if there is a high level of satisfaction concerning the project outcome among key people in the parent organization, key people in the project team and key users or clientele of the project effort."
See: de Wit, A. 1988. Measurement of project success. Project Management Vol 6 No 3.
[98] Almeida, Diana. 2012. "Montijo: Best practices in waterfront renewal." *Journal of Urban Regeneration and Renewal* 5 (3): 212–223.
[99] Buntin, S. & Pirie, K., 2013. *Unsprawl: Remixing Spaces as Places* Nettler, Jonathan, ed., Planetizen Press.
[100] Lowry, Kem, Stephen Olsen, and James Tobey. 1999. "Donor evaluations of ICM initiatives: what can be learned from them?" *Ocean & Coastal Management* 42 (9): 767–789.
[101] de Wit, A. 1988. Measurement of project success. Project Management Vol 6 No 3.
[102] Mishra, Piyush, GS Dangayach, and ML Mittal. 2011. "An Ethical approach towards sustainable project Success." *Procedia-Social and Behavioral Sciences* 25: 338–344.

and implementation, and to make adjustments to the internal workings of a project or program and to the coastal management strategies and practices that the project or program is promoting." This assessment type might be useful for large coastalscape revitalization projects like Tacoma and Victoria with long build-out timelines. However as far as we know no coastalscape revitalization project in the Salish Sea region has used management capacity assessments.

The final category of assessments is **outcomes evaluation**, which assesses the impacts of a coastalscape revitalization project on the local environment and community. While possibly the most rigorous assessment type, outcomes evaluation is also the most difficult because of monitoring and study design requirements. First, to perform outcomes evaluation pre-construction monitoring is needed to determine baseline conditions. Quasi-experimental research designs, including monitoring control plots, are also needed to tease apart the impacts of the coastalscape revitalization versus other drivers such as the broader economy (e.g. the 2008 recession) or large scale climate patterns (e.g. Pacific Decadal Oscillation). However these are almost never incorporated into coastalscape revitalization projects, and "the absence of adequate baseline information combined with the absence of control sites has led to a reliance in existing outcomes evaluations upon descriptive information and on the perceptions of evaluators and key informants on the success and quality of a project's efforts." Overall, "Rigorous impact evaluations are typically considered too complex and expensive. They require control groups, large data sets on a range of indicators, and substantial expertise in data manipulation and analysis.[103]"

These observations reflect the experience of Salish Sea coastalscape revitalization projects; very little pre-construction monitoring is completed to collect baseline data, particularly for economic and social assessment. Environmental assessment is more likely to use an outcomes evaluation. Examples of environmental outcomes evaluation in the Salish Sea region include the Olympic Sculpture Park and Seattle Seawall pilot study[104] in Seattle. The Port Townsend eelgrass restoration and dock design assessment is an attempt to conduct an environmental outcomes evaluation, however this effort was stymied due to lack of funding for post-construction monitoring.

Regardless of the type of assessment performed, the quality of the assessment is important if management decisions—for the assessed project, another coastalscape revitalization project, or for investment etc. decisions—are based on the assessment outcomes. Potential issues with assessments include performing the assessment without adequate data (for example if a monitoring plan was not conceived early enough), or performing the assessment too early in the data collection process (not enough time to detect the effects of a project[105]). When assessments are conducted using scientific methods (for analysis and data collection), managers can use scientific/statistical quantifications of assessment quality. However, this is not always possible; therefore managers need to be explicit and transparent about potential faults with an assessment and defend the rationale for making the management decision. For contentious projects a management decision is more vulnerable to legal challenge if rigorous methods are not used for the assessment and monitoring.

[103] Lowry, Kem, Stephen Olsen, and James Tobey. 1999. "Donor evaluations of ICM initiatives: what can be learned from them?" *Ocean & Coastal Management* 42 (9): 767–789.
[104] Noted below; or see Dyson, Faghin, and Leschine 2012 for an in-depth discussion.
[105] Charnley, Susan, Ellen M Donoghue, Claudia Stuart, Candace Dillingham, Lita P Buttolph, William Kay, Rebecca J McLain, Cassandra Moseley, Richard H Phillips, and Lisa Tobe. 2006. "Socioeconomic Monitoring results Volume I: Key Findings." United States Department of Agriculture Forest Service General Technical Report PNW 649 (1).

Managers of coastalscape revitalization projects should be encouraged to both perform project assessments (and requisite monitoring) and share those results with government entities, stakeholders, other scientists, and other managers[106]. This is particularly true in adaptive management frameworks, where previous projects can help inform future projects. Managers may also want to compare coastalscape revitalization projects across different cities or countries. If this is the goal, qualitative comparisons may be more useful due to limits of available data (comparative quantitative information is difficult to obtain, particularly when comparing dissimilar projects[107]). The Money for Something report used this approach by creating a normative framework (multicriteria analysis) with which all of the tax incentive programs were judged[108].

In the following sections, we will discuss aspects of economic, social, and environmental assessments relevant to coastalscape revitalization using examples from the literature and the Salish Sea region.

Economic Assessment

Many methods for conducting economic assessments of coastalscape revitalization projects exist in the literature. These methods have grown out of the need to determine the economic impacts of projects on construction workers and post-construction employees, on the local government's finances and tax rolls, and at broader economic scales (statewide, e.g.). However, it is interesting to note that many economic assessments are performed before a project is built; post-construction analysis is not always performed to verify the pre-construction estimates.

Here, we discuss a number of methods appropriate for examining the economic impact of coastalscape revitalization projects at different scales found in the literature (focusing on papers concerning redevelopment and redevelopment on former industrial site where possible). We also highlight examples of economic assessments performed by Salish Sea coastalscape revitalization projects.

Jobs impacts

One reason that economic assessments are performed is to see if coastalscape revitalization projects in fact create (and maintain) the number of jobs (and salaries) that were claimed in the pre-construction phases[109]. Projects may receive large tax breaks or other incentives in return for bringing jobs to an area, and for public accountability it is important that managers find out if these jobs have been created as promised. The Good Jobs First[110] analysis[111] found that while many states performed quantitative

[106] Sundstrom, Shiloh, Cassandra Moseley, Max Nielsen-Pincus, and Emily Jane Davis. 2011. "Quick Guide to Monitoring Economic Impacts of Ecosystem Restoration and Stewardship." Ecosystem Workforce Program, Institute for a Sustainable Environment.

[107] Judd, B. and Bill Randolph. 2006. Qualitative Methods and the Evaluation of Community Renewal Programs in Australia: Towards a National Framework. Urban Policy and Research, Vol. 24 (1) pp 97-114. Available online at: http://www.be.unsw.edu.au/sites/default/files/upload/qualitativemethods.pdf

[108] Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2011. Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.
Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2012. Money Back Guarantees for Taxpayers: Clawbacks and other Enforcement Safeguards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.

[109] This is actually a form of economic analysis, focused ONLY on jobs.

[110] For reference, Washington State's job creation incentive programs ranked very poorly—47th out of 50 states.

economic assessments, most only addressed the number of jobs created, and did not address jobs, wages, and health benefits. What they considered the best method for post-construction economic assessments focused on job creation were programs that quantitatively required (and then measured):

- that some number of jobs be created,
- that subsidized projects remain operational for a minimum period,
- that determine if employers provide healthcare coverage, and pay a portion of the premium,
- that wage standards for the jobs linked to market rates, and
- that determine companies/sites to create new jobs and not just move jobs between locations.

Following through on an investment of public funds by monitoring and assessing projects can be used to promote the responsible use of public funds.

Economic and Fiscal Analysis

Another reason to use economic assessment with coastalscape revitalization projects is to determine the economic impact on the local area. This approach is frequently used for pre-construction assessment when understanding the public cost/benefit dynamic is important to making decisions about whether to finance (or co-finance) coastalscape revitalization projects[112]. However, the approach can and should be used post-construction to a) verify the predications of a pre-construction estimate and b) examine the public benefit of a coastalscape revitalization project (with the understanding that some benefits cannot be translated into dollars) to understand what is working or not working about the project.

Different approaches to calculating different aspects public cost and benefit exist. Economic impact studies estimate the impact of employment and earnings from a coastalscape revitalization project on the local economy. Fiscal impact studies estimate the impact of a coastalscape revitalization project on the government's (local/central/etc) revenue and expenses. Cost-Benefit analyses attempt to fully evaluate both economic and fiscal costs and benefits of a coastalscape revitalization project. Most analyses use some form of an input-output analysis, including RIMS II, IMPLAN, or REMI's Policy Insight model[113] (though see Baleiras et al. 2003[114]). Any competent economic consulting firm should be able to complete these analyses for a coastalscape revitalization project, and should be a neutral third party[115],[116].

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[111] Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2011. Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.

[112] Baleiras, Rui Nuno, Rui Sousa Monteiro, and Ana Balcão Reis. 2003. "Tax dividend evaluation of major urban renewal projects." *Finland: University of Jyväskylä*.

[113] Input-output models use multiplier effects to estimate the impact of a project on local economic and fiscal categories, such as full time equivalent jobs. The three general models listed here are adapted to reflect the location being reviewed.

[114] Baleiras, Rui Nuno, Rui Sousa Monteiro, and Ana Balcão Reis. 2003. "Tax dividend evaluation of major urban renewal projects." *Finland: University of Jyväskylä*.

[115] Chervin, S. and Reuben Kyle. 2009. Economic and Fiscal Impact Analyses: A primer for local governments in Tennessee. Research Brief published by the Tennessee Advisory Commission on Intergovernmental Relations. Available online at: http://www.state.tn.us/tacir/PDF_FILES/Other_Issues/econ_fiscalimpacts.pdf

[116] E.g. Anderson Economic Group, HR&A Advisors, etc.

A project's impacts (direct[117], indirect[118] and induced[119]) can be categorized in a number of ways, but perhaps most important is to determine if the effect is permanent or temporary:

> "The former [permanent effects] increase the real value of capital in the economy forever and thus have a lasting impact upon output. Real estate rents, in site and in adjacent areas, capitalise the social net benefits of the renewal project. Temporary effects change the economy during a limited time span. Most of them come out of resource acquisition by the developer, and may include expenditure on planning, compulsory purchases, decontamination, demolition, and construction.[120]"

While one-time capital expenditures provide a short term lift, "the long-term economic lift a project brings in the form of increased tax revenues, higher property values and indirect spending stimulated by a revitalized property. That economic lift is further sustained by job creation from the site that often surpasses previous employment levels on these "blighted" properties.[121]" It is usually these long term impacts that are important to local areas, as they can provide a source of sustained income.

Additionally, as with all economic analyses there are tangible (museums, marinas, parks, etc.) and intangible (external image of the city, self-esteem of residents) benefits of coastalscape revitalization projects. Intangible benefits cannot be reliably quantified, though they may be described qualitatively.

Baleiras et al. (2003)[122] used 'Tax Dividend Evaluation' (Figure 8), a type of fiscal impact study, to examine the impact of a project on local and federal (central) government tax revenues. They attempt to calculate the economic value of the diffuse public benefit arising from the project, which could then be compared with public money spent on the project. They argue that urban renewal is not likely to improve the general productivity of the region and will likely result in rearranging businesses on the landscape instead of starting many new ones[123]. Increases in tax revenues are likely the major source of public benefit.

To make the calculations, they "propose a two-step approach. Firstly, we estimate the macroeconomic effect of the (autonomous) expenditure increase, including the reactions on output, consumption and other relevant variables. Secondly, we turn to tax elasticities (which measure the automatic reaction of

[117] Direct impacts are the initial increase in hiring (and wages paid) and spending on goods as a result of the project.
[118] Indirect impacts are a result of the new businesses at a coastalscape revitalization site buying goods from other local businesses (including construction materials).
[119] Induced impacts are impacts from employees at a site spending the money they earn at the site. For example, a construction worker at a coastalscape revitalization project buys a cup of coffee from a local coffee store. The money he uses to buy that coffee becomes revenue for the local store.
[120] Baleiras, Rui Nuno, Rui Sousa Monteiro, and Ana Balcão Reis. 2003. "Tax dividend evaluation of major urban renewal projects." *Finland: University of Jyväskylä*.
[121] See also: Anderson, B. 2010. Economic Vitality and Environmental Cleanup in Washington State: Qualitative and Quantitative Case Study. Washington Department of Ecology Publication no. 10-09-046.
[122] Baleiras, Rui Nuno, Rui Sousa Monteiro, and Ana Balcão Reis. 2003. "Tax dividend evaluation of major urban renewal projects." *Finland: University of Jyväskylä*.
[123] This may or may not be true depending on the scale of analysis. It is more likely to be true for a larger scale of analysis (e.g. county) than for a smaller scale (e.g. project only). They do make a good point and call our attention to the difference between completely new jobs (would never have existed save for this project) and jobs that are simply reshuffled (the construction worker who move between projects).

public revenues to macroeconomic fluctuations) to determine the effect of those reactions on public revenues." Figure 9 highlights the important variables for this approach[124]. This method could be adapted to whatever taxes are locally important, and may need to include a 'state' recipient government level in addition to 'local' and 'central.'

Table 1—Economic effects and possible tax dividends

Effect	Length	Recipient government	Public revenue
Asset appreciation			
Stock accumulation and rent increase in the IA	Permanent	Local	Prop. Tax and others
		Central	T_i and others
	Temporary	Local	Licences, Real-estate Sales Tax, and others
Rent increase in adjacent districts	Permanent	Local	Prop. Tax and others
		Central	T_i and others
	Temporary	Local	Cap. Gains on local govern. property
		Central	Cap. Gains on central govern. property
Expenditure			
Master developer	Temporary	Central	T_{i_1}, T_C, T_I, and T_{SS}
Private developers	Temporary	Central	T_{i_2}, T_C, T_I, and T_{SS}
Tourists	Temporary	Central	T_{i_3}, T_C, T_I, and T_{SS}

Table 2—Revenue categories and their bases

Revenue Category	Macroeconomic Base
Direct taxes on households	Employment and compensation of private sector employees
Direct taxes on companies	Gross operating surplus
Indirect taxes	Private consumption
Social security contributions	Compensation of private sector employees

Figure 9 - Methods for determining economic impacts

Figure 9 contains an example of how to evaluate revenue from a public project. "Table 1" illustrates the economic effects and possible tax dividends arising from a coastalscape revitalization project. Table two explains different revenue categories, which are listed in Table 1 under "Public revenue." In Table 1, TH are direct taxes on households, TC are direct taxes on companies, TI are indirect tax proceeds, and TSS are social security contributions. Licenses include construction permits and fees, etc.

While the 'tax dividend evaluation' focused on public revenue (fiscal analysis) exclusively, the Department of Ecology in Washington State used an Economic & Fiscal Impact Model[125] to analyze redevelopment projects on brownfields (former industrial sites). One of their case studies is the Thea Foss waterway project. This example is a more traditional cost-benefit analysis, and is built on the IMPLAN input-output model[126].

[124] Baleiras, Rui Nuno, Rui Sousa Monteiro, and Ana Balcão Reis. 2003. "Tax dividend evaluation of major urban renewal projects." *Finland: University of Jyväskylä*.
[125] Developed by E.D. Hovee & Company, LLC.
[126] Model calculates net present value (NPV). For full methods see: Anderson, B. 2010. Economic Vitality and Environmental Cleanup in Washington State: Qualitative and Quantitative Case Study. Washington Department of Ecology Publication no. 10-09-046.

Their analysis of the Thea Foss Waterway in Tacoma illustrates the output from an input-output based economic and fiscal impact model (**Error! Reference source not found.**). However, there are a few potential issues with the analysis. For example, the analysis was done prior to completed development and so is a pre-construction rather than post-construction estimate of economic impacts. The Thea Foss area is approximately 40% complete; full build out (which these figures assume) is at least a decade away depending on market conditions. Additionally, it is not clear when the 20-year timeframe for analysis began; if it began in 2010 then the full build out assumption is reasonable.

Table 2-1 Economic Impact Modeling—Washington Brownfields Reuse, Tacoma Thea Foss Waterway Projects, Tax Revenues by Type

STATE AND LOCAL TAX REVENUE ITEM	Rate Applied	Unit of Measure (U/M)	Calculated As	Annual Taxes @ Build-Out	Cumulative NPV - 20 Years	Comments
One-Time Tax Revenues						
Real Estate Excise Tax (REET)	1.78%	of transactions	$251,015,625	-	$4,235,150	Initial property purchase and condo sales
Sales Tax on Construction	8.4%	of construction	$299,265,168	-	$23,827,750	Estimated from construction budget
Subtotal One-Time Taxes				-	**$28,062,900**	
Ongoing Tax Revenues						Annual revenues estimated in 2009 $$
Business and Occupation Tax	0.986%	of gross volume	$50,120,700	$494,270	$7,064,080	State rate weighted by business type
Incremental Property Tax*	$11.6206	per $1,000 TAV	$370,000,000	$4,299,620	$51,514,220	Calculated on property value @ buildout
Real Estate Excise Tax (REET)	1.78%	of transaction	$48,744,400	$867,650	$12,400,350	From condo + commercial resales
Sales Tax w/On-Site Business	8.4%	of taxable sales	$25,442,700	$2,031,110	$30,544,380	On retail and other taxable businesses
Other Taxes (if applicable)	4.0%	added w/lodging	$5,304,000	$212,160	$2,728,950	Not applied with options considered
Marine State and Local Taxes		Pro rata estimate		$99,330	$1,378,260	Estimate from BST/Bellingham analysis
Subtotal Annual Tax Revenues				**$8,004,140**	**$105,630,240**	
Net Present Value (NPV)					**$133,693,140**	One-time + ongoing over 20 years

Discount Rate Applied	5.5%	assumed cost of public borrowing / opportunity cost	
Inflation Rate	3.0%	assumed rate applied to market value and taxable retail sales	
Cap on Annual TAV Appreciation	1.0%	on property tax increases	Property, sales and B&O tax sources
Residential Turnover Rate	15.0%	annual homeowner sales	
Commercial Turnover Rate	5.0%	annual sales of on-site commercial property	

* Note: Annual tax at build-out is based on full collections without property tax abatement.

Table 2-2 Economic Impact Modeling—Washington Brownfields Reuse, Tacoma Thea Foss Waterway Projects, Tax Revenues by Jurisdiction

TAX REVENUE ALLOCATIONS BY JURISDICTION	Annual Taxes @ Build-Out	Cumulative NPV - 20 Years	Comments
ESTIMATED ONE-TIME TAXES			
State of Washington		$21,483,630	Sales tax and REET
City		$4,026,280	Sales tax and REET
County		$567,340	Sales tax on construction
Transit		$1,701,980	Sales tax on construction
Other		$283,670	Pierce Zoo and Parks
Total One-Time Taxes		**$28,062,900**	Sales tax on construction + REET
		-	
ESTIMATED ANNUAL REVENUES			
State of Washington	$3,414,550	$45,857,500	Property, sales and B&O tax sources
City	$1,580,450	$23,002,630	Property and sales tax
County	$436,580	$5,348,270	Property and dedicated sales tax
Port	$67,660	$810,640	Property tax
Schools	$1,776,720	$21,287,080	Property tax
Public Transit	$152,660	$2,181,790	
Regional Library	-	-	Property tax
Other Special Districts	$476,190	$5,764,070	Property tax—EMS
Marina State and Local Taxes	$99,330	$1,378,260	Based on BST analysis
Total Ongoing Tax Revenues	**$8,004,140**	**$105,630,240**	Property, sales and B&O tax sources
TOTAL NET PRESENT VALUE (NPV) (One-Time + Ongoing Revenues)		**$133,693,140**	One-time + ongoing revenues

Notes: Annual taxes assuming no property tax abatement.

Table 2-3 Economic Impact Modeling—Washington Brownfields Reuse, Tacoma Thea Foss Waterway Projects, Economic Multiplier Benefits

ECONOMIC INDICATOR	Direct Impact	Economic Multiplier	Multiplier Impact*
Construction Impacts			
On-Site Employment	2,285	1.71	3,911
Total Payroll	$135,076,933	1.60	$216,142,800
Average Annual Wage	$59,100	-	$55,300
Business Revenue	$391,765,200	1.55	$607,236,100
Ongoing Operations			
On-Site Employment	1,036	1.47	1,524
Total Payroll	$43,724,200	1.60	$69,955,200
Average Annual Wage	$42,200	-	$45,900
Business Revenue	$101,133,830	1.55	$156,977,500

*Note: Calculated as sum of direct, indirect, and induced effects.

Figure 10: Results from input-output model based economic and fiscal analysis performed by the Department of Ecology regarding the Thea Foss Waterway coastalscape revitalization project[127].

[127] Anderson, B. 2010. Economic Vitality and Environmental Cleanup in Washington State: Qualitative and Quantitative Case Study. Washington Department of Ecology Publication no. 10-09-046.

Overall, the study suggests that the Thea Foss site will "generate a Net Present Value of $133.7 million in local and state taxes over a 20-year period, assuming a full build-out of the site" with the City of Tacoma's portion being approximately $27 million over that period (unknown how much the City has invested; although the Development Authority is supposed to be self-funded based on land sales). The report estimates that the State of Washington will receive $67.3 million in tax revenues with an investment of $30.4 in MTCA funds[128].

It is worth discussing the potential issues with input-output models; these models are sensitive to the values used to seed the model and are therefore easily manipulated. Potential issues with input-output model estimates include:

1. "Assumption that land or property provided by a local government (generally as part of an incentive package) has no value. While many distressed areas of a city or county may contain properties that have low current market values, it is unlikely that the value is zero.
2. Assumption that nothing else will ever occur in the absence of the new investment or project; there are always alternative uses of real and fiscal resources.
3. Estimates supplied by promoters, such as estimated expenditures per visitor per day, that are unsubstantiated (voodoo numbers or rabbit-out-of–a-hat numbers) or exaggerated in favor of the event or project. Such numbers often drive the balance of the analysis. They must be substantiated by legitimate surveys or comparable data that supports the estimates of spending for the likely demographic that will be attracted to the venue.
4. An absence of a discussion of the methodology used to distinguish between the total impact of a project—on the total region or state or even several states—versus the local impact of a project; the total impact will always be greater than the impact on a single limited local area.
5. An absence of a clear distinction between the initial construction phase of a project and the later operational years of the project. Impacts (income, taxes, sales) in the future must be discounted to the present to ensure legitimate evaluations. Remember that a dollar received next year is not worth the same as a dollar received or spent today.
6. Assumptions that new employees will all locate in the area being analyzed, and therefore spend their income in the same area and pay taxes in the target area.
7. Assumptions that all or most visitors to a proposed sports or recreation venue will come from outside the local area and therefore their spending will not be offset by reductions elsewhere in the local area.
8. Any analysis that neglects, deliberately or not, to estimate the additional local government expenditures resulting from the new project—such as additional expenditures for education (new pupils in new households created by new employees), safety (police and fire), roads, library, recreation, etc.)—is suspect.
9. The use of suspect multipliers. Any multiplier in excess of 2 should be initially suspect. In fact, in the absence of supporting evidence to the contrary the conservative assumption would be a multiplier of one. A range of values for multipliers is more reasonable with a resulting range for the economic impacts. Unfortunately, exaggerated multipliers are common in many impact studies.

[128] Anderson, B. 2010. Economic Vitality and Environmental Cleanup in Washington State: Qualitative and Quantitative Case Study. Washington Department of Ecology Publication no. 10-09-046.

10. An absence of detail on the model used to produce the economic and fiscal impacts or the data used in the model.[129]"

Conducting post-construction economic assessments is particularly important to provide a reality-check to optimistic predictions created prior to project construction. As an illustration, pre-construction projections for power plants incorporated input-output multipliers of 1.6 and 2.5. Evaluations of facilities after construction found that half of the multipliers were below 1.2—2 additional jobs created instead of 15[130].

With this background, we now discuss some examples of economic assessment from the Salish Sea area.

Salish Sea examples

The economic assessment performed by **Dockside Green (Victoria, B.C.)** as part of their sustainability report is a qualitative performance evaluation[131]. There is no explicit economic or fiscal analysis (quantitative or qualitative) reported, though elements of these analyses are present. For example, the sustainability report highlights which local companies were suppliers of sustainable products for project construction (a temporary direct economic effect), but does not describe the extent (amount of money paid) of the impact. Further, other important economic effects (temporary indirect/induced and long-term direct/indirect/induced) are not mentioned.

This raises a number of questions, including 'what is economic sustainability?' and 'how do we measure and assess economic sustainability?' Dockside Green's report shows that their answers are 'by keeping money local and reducing utility costs' and 'qualitatively.'

Yet there are many things that could be learned by undertaking a more traditional quantitative economic or fiscal analysis. For example, how much money are developers spending on the local economy? What is the impact on local jobs and tax revenue? Do the jobs provide a livable wage (definitely part of being economically and socially sustainable!)? Further, a sustainability framework (triple bottom line) was used to evaluate project proposals for the Dockside Green site; for future projects in Victoria and elsewhere that wants to adopt a triple bottom line strategy it would be valuable to see how sustainability promises were translated into action. How much accountability can public agencies require once they sell land to a developer? Finally, quantitative analysis also ideally forces managers to examine their assumptions underlying economic assessments. For example, should we make a distinction between money spent on sustainable technologies or resources vs. unsustainable ones? How much does spending money on local companies impact the local economy?

It is also worth noting that not all economic assessment questions are necessarily worth answering. One of Dockside Green's economic goals is to reduce utility costs for its residents. However, Dockside Green has been criticized for not providing adequate affordable housing. How important is it to reduce utility costs for those who can afford $400k condos?

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[129] Chervin, S. and Reuben Kyle. 2009. Economic and Fiscal Impact Analyses: A primer for local governments in Tennessee. Research Brief published by the Tennessee Advisory Commission on Intergovernmental Relations. Available online at: http://www.state.tn.us/tacir/PDF_FILES/Other_Issues/econ_fiscalimpacts.pdf

[130] Freudenburg, William R. 1986. "Social impact assessment." *Annual review of sociology*: 451–478.

[131] The only exception that is not an estimate is that the First Nations Job Initiative has resulted in 17 jobs.

The bottom line is that there is a difference in what can be learned from less rigorous qualitative analyses and more rigorous quantitative (or even well done qualitative) analyses. The Dockside Green qualitative analysis unfortunately does not tell us how the project is impacting the local economy in a meaningful way, nor (quite frankly) was it designed to provide this information. As a result, it comes off as a mildly informative publicity piece instead of a well-considered report about sustainability. Whether the public sector should be content with any move towards sustainability, or if it should push for increased transparency and more rigorous analysis is not a question we can answer here.

Yet, Dockside Green is still a step ahead of many other locations in terms of economic assessments. In Tacoma, the **Thea Foss Waterway** has not been able to complete an economic assessment of the impacts because—as with economic monitoring—they lack the staff to do it. One of the main goals of the Thea Foss development was to put blighted properties back onto the tax roll, which suggests that economic and fiscal analysis could provide beneficial feedback (using a project evaluation or outcomes evaluation framework) for the City of Tacoma.

While no one is tracking the costs and benefits of the project as phases are built. They do require developers to contribute to the public benefit as a condition of selling the land. Developers are required to waterproof the bottom of the buildings (final step in pollution remediation) and provide financing for the esplanades and continued maintenance of the public areas. The City's tax base increases as more buildings are built and rehabilitated. On the costs side (forgone revenue), the public provides tax abatements; these are crucial to attracting development financing to smaller cities like Tacoma. Many of the pieces of information exist, though others would need to be collected, yet they have not been assembled and analyzed. However, the Department of Ecology did perform an economic and fiscal analysis in 2010 based on estimates of how the project will perform when complete[132].

The lack of formal economic assessments of coastalscape revitalization projects in the Salish Sea hinders cities' ability to determine projects' economic health and sustainability, reduces public transparency, and also creates more uncertainty for cities considering new coastalscape revitalization projects. However, the timing for large scale projects with multiple phases (Thea Foss, Dockside Green) is driven by larger market forces, including how fast new condos can be brought onto the market before reaching saturation. Financing for building construction (particularly an issue with the Thea Foss Waterway model of selling individual plots to developers) has become very difficult to obtain after the 2008 recession and is impacting the rate of development along with the terms of development the city needs to offer. Comparing estimates in timing and economic returns with reality could provide a useful check for the excitement that usually accompanies proposals of new development.

Social Assessment

Social assessments are frequently combined with economic assessments[133], as the economic health of the community and its residents is often a critical component of their social health. Like economic assessments, there are many methods that have been developed for social assessments. However, there

[132] Anderson, B. 2010. Economic Vitality and Environmental Cleanup in Washington State: Qualitative and Quantitative Case Study. Washington Department of Ecology Publication no. 10-09-046.

[133] E.g. see Charnley, Susan, Ellen M Donoghue, Claudia Stuart, Candace Dillingham, Lita P Buttolph, William Kay, Rebecca J McLain, Cassandra Moseley, Richard H Phillips, and Lisa Tobe. 2006. "Socioeconomic Monitoring results Volume I: Key Findings." United States Department of Agriculture Forest Service General Technical Report PNW 649 (1).

is not the same framework for classifying social assessments that exists for economic assessments (e.g. economic vs. fiscal analysis). Here we discuss a number of different approaches to social assessments discussed in the literature that were developed for urban renewal projects like coastalscape revitalization. Examples of social assessment from the Salish Sea region follow.

The importance of stakeholders

Social assessments are essentially trying to determine if a coastalscape revitalization project is successful in addressing local social issues, ideally to the satisfaction of all stakeholders. One common element for all of the social assessments described here is that multiple stakeholders need to be engaged in the social assessment for it to accurately reflect how the coastalscape revitalization project is performing. Managers, politicians, business leaders, or other stakeholders that are in favor of the project are likely to present a positive and upbeat view. How citizens, residents, and at risk groups view the coastalscape revitalization project is likely to be a more balanced assessment. For example, by surveying multiple stakeholder groups, researchers in Providence, RI were able to determine that citizens and the government viewed the economic prospect of the city through different lenses: citizens were not as optimistic about employment prospects as promoters of economic growth (city managers, businesses, etc.)[134].

This finding echoes those in the project management and success literature; definitions of project success in the 21st century have become stakeholder focused with project success dependent on fulfillment of short term goals, and involvement of stakeholders (owners, sponsors, community) in addition to the competence of the project manager. What makes achieving success difficult is—as in Providence—different groups have different success criteria. These criteria may not align (e.g. Figure 11) and may even be contrary to one another[135].

Analysis of success factors across stakeholder groups.

Success factor theme	Project manager	Client	Sponsor	Owner	Executive	User etc.	Project team
1. Cooperation/collaboration/consultation/communication	1	1		1		1	1
2. Time	1	1	1			1	
3. Identifying/agreeing objectives/mission	1				1		1
4. Stakeholder satisfaction (quality)	1	1				1	
5. Makes use of finished product/acceptance		1				1	1
6. Cost/budget	1	1				1	
7. A project manager competencies and focus	1		1				
8. The project delivering the strategic benefits	1		1				
9. Top management support/executive commitment	1				1		

Figure 11: Stakeholders may not always agree on what constitutes success. From Davis (2013).

Which stakeholder groups are important will vary depending on the location of the coastalscape revitalization project. For example, large coastalscape revitalization projects are frequently targeted at tourists, investors, and potential (high-income) residents[136]. In addition, existing residents across different socio-economic and demographic categories are also important. However, identifying

[134] Orr, Marion, and Darrell M West. 2002. "Citizens' Views on Urban Revitalization The Case of Providence, Rhode Island." *Urban Affairs Review* 37 (3): 397–419.
[135] Davis, Kate. 2013. "Different stakeholder groups and their perceptions of project success." *International Journal of Project Management*.
[136] Doucet, Brian, Ronald Van Kempen, and Jan Van Weesep. 2011. "Resident perceptions of flagship waterfront regeneration: the case of the Kop van Zuid in Rotterdam." *Tijdschrift voor economische en sociale geografie* 102 (2): 125–145.

important stakeholder groups is only the first step; to rigorously perform a social assessment the groups must all be asked their opinions and have the answers listened to. Too often scholars make an argument—in this case, that outwardly focused projects are harmful to cities and low income residents—without asking the groups affected[137].

Ideally, these stakeholder groups are involved in the design of the coastalscape revitalization project and contacted for post-construction social monitoring, assessment and management to express their views on the completed project (or work in progress, for multi-phase projects like the Thea Foss Waterway in Tacoma). Overall from a social assessment perspective,

> "revitalization involves much more than positive press clippings and leadership cheerleading. For cities really to turn around, the ordinary person on the street must share those conclusions and support the changes in the city… It is not enough just to improve service delivery, construct new buildings, or issue policy edicts. Civic leaders must successfully address community concerns such as race relations. In addition, improving the spirit of a community demands that difficult matters be addressed and that people of different back- grounds feel good about the character of their community, There must also be a sense of collective ownership and a sense of inclusion, Technocratic approaches to city governance are not sufficient to turn around a city in the minds of ordinary citizens.[138]"

Social assessment methods

Social Impact Assessment (SIA) is perhaps the most widespread and oldest[139] social assessment method currently in use. SIA is frequently compared to (and often used alongside) Environmental Impact Assessments, such as those required by the National Environmental Policy Act of 1969 (NEPA) in the United States and promoted by the Canadian Environmental Assessment Act of 2012 (CEAA 2012). While EIAs are concerned with impacts on the environment, SIA are about 'people impacts,' that is how individuals', families', and communities' needs are being met (or not met) where they live[140]. There are also Economic and Social Impact Assessments, however those are not discussed here[141].

A Social Impact Assessment:

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[137] Doucet, Brian, Ronald Van Kempen, and Jan Van Weesep. 2011. "Resident perceptions of flagship waterfront regeneration: the case of the Kop van Zuid in Rotterdam." *Tijdschrift voor economische en sociale geografie* 102 (2): 125–145.

[138] Orr, Marion, and Darrell M West. 2002. "Citizens' Views on Urban Revitalization The Case of Providence, Rhode Island." *Urban Affairs Review* 37 (3): 397–419.

[139] Social impact assessment became a field in the 1960s (see Pollnac, R., Susan Abbott-Jamieson, Courtland Smith, Marc Miller, Patricia Clay, and Bryan Oles. 2006. Toward a Model for Fisheries Social Impact Assessment. Marine Fisheries Review Vol 68 (1-4). Available online at: http://aquaticcommons.org/866/1/Pollnac_Toward.pdf); or possibly in the 1970s (see Freudenburg, William R. 1986. "Social impact assessment." *Annual review of sociology*: 451–478.)

[140] Wolf, Charles P. 1983. Social Impact Assessment: Methodological Overview. In *Environmental Impact Assessment*, 253–279. Springer.

[141] Alam, K., John Rolfe, and Peter Donaghy. 2006. Economic and social impact assessment of water quality improvement. Australasian Journal of Regional Studies, Vol. 12 (1). Available online at: http://www.anzrsai.org/system/files/f8/f4/f23/f24/o84/7Alam%20and%20others_Final_.pdf

> "includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment.... SIA is best understood as an umbrella or overarching framework that embodies the evaluation of all impacts on humans and on all the ways in which people and communities interact with their socio-cultural, economic and biophysical surroundings[142]."

The bottom line question for SIA is 'who has benefited and who has lost from the implementation of a coastalscape revitalizaiton project?' A SIA is not normative, and it "cannot prescribe what social values 'ought' to be… any more than expert judgment generally can be said to reflect public preference. It can only attempt to determine what the equity impacts [are].[143]"

While SIAs are most frequently performed in anticipation of development that might have social impacts[144], they are also useful when used post-construction to assess—and influence the management of—completed projects. SIA is interested in changes in:

- "people's way of life – that is, how they live, work, play and interact with one another on a day-to-day basis;
- their culture – that is, their shared beliefs, customs, values and language or dialect;
- their community – its cohesion, stability, character, services and facilities;
- their political systems – the extent to which people are able to participate in decisions that affect their lives, the level of democratisation that is taking place, and the resources provided for this purpose;
- their environment – the quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety, and their access to and control over resources;
- their health and wellbeing – health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity;
- their personal and property rights – particularly whether people are economically affected, or experience personal disadvantage which may include a violation of their civil liberties;
- their fears and aspirations – their perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children[145]."

SIAs are a multi-method approach that can utilize interviews, surveys, and other qualitative and quantitative approaches to data collection[146]. They are also interdisciplinary; while drawing heavily on

[142] Esteves, A.M. and Frank Vanclay. 2010. Social Impact Assessment. IAIA Impact Assessment Wiki: http://www.iaia.org/iaiawiki/sia.ashx#Definition_13

[143] Wolf, Charles P. 1983. Social Impact Assessment: Methodological Overview. In *Environmental Impact Assessment*, 253–279. Springer.

[144] In some cases, the definition of a SIA specifies that it be used in a prospective rather than retrospective manner; see Freudenburg, William R. 1986. "Social impact assessment." *Annual review of sociology*: 451–478.

[145] Esteves, A.M. and Frank Vanclay. 2010. Social Impact Assessment. IAIA Impact Assessment Wiki: http://www.iaia.org/iaiawiki/sia.ashx

the social sciences, environmental and economic impacts have indirect social impacts (e.g. on employment)[147].

Public involvement in the SIA process should occur at every step[148], and can provide an avenue for collecting data on specific SIA variables. As with any type of social assessment, different stakeholders use and view the waterfront in different ways, so the social impacts on each group are different: "the social impact assessment of urban waterfront planning examines the different ways of experiencing and using the edges of seas, lakes or rivers and understanding their qualities for the community[149]."

Multiple SIA frameworks have been developed and used in specific fields (including fisheries[150], water quality[151]) and with different communities (including native communities[152]), however we have not found a SIA developed for coastalscape revitalization. Research around SIAs and urban renewal were fairly prevalent in the 1960s[153], yet few papers are published today on the subject[154]. There is a need for social science researchers along with urban planners and designers (with input and feedback from local residents) to adapt SIA to the unique needs of coastalscape revitalization projects.

Some social assessments draw on a variety of established evaluation techniques to form the base of their analysis. In Hong Kong, a group of researchers created a sustainable urban renewal design assessment framework (including social sustainability) based on Exploratory Factor Analysis[155] and existing scoring systems. The 'sustainable urban renewal design' being assessed consisted of one central goal (sustainable urban renewal), three objectives (economic, environmental, and social sustainability) and 17 design elements (Figure 11). These 17 design elements were the target of the assessment. The design elements were chosen out of a larger pool of 30 using Exploratory Factor Analysis[156]. While their

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[146] Wolf, Charles P. 1983. Social Impact Assessment: Methodological Overview. In *Environmental Impact Assessment*, 253–279. Springer.
[147] Ibid.
[148] Ibid.
[149] Sairinen, Rauno, and Satu Kumpulainen. 2006. "Assessing social impacts in urban waterfront regeneration." *Environmental impact assessment review* 26 (1): 120–135.
[150] Pollnac, R., Susan Abbott-Jamieson, Courtland Smith, Marc Miller, Patricia Clay, and Bryan Oles. 2006. Toward a Model for Fisheries Social Impact Assessment. Marine Fisheries Review Vol 68 (1-4). Available online at: http://aquaticcommons.org/866/1/Pollnac_Toward.pdf)
[151] Alam, K., John Rolfe, and Peter Donaghy. 2006. Economic and social impact assessment of water quality improvement. Australasian Journal of Regional Studies, Vol. 12 (1). Available online at: http://www.anzrsai.org/system/files/f8/f4/f23/f24/o84/7Alam%20and%20others_Final_.pdf
[152] Edward W. Gondolf, Stephen R. Wells. 1986. Empowered native community, modified SIA: The case of Hydaburg, Alaska, Environmental Impact Assessment Review, Volume 6, Issue 4. Available online at: http://www.sciencedirect.com/science/article/pii/0195925586900302
[153] For example Fried 1963, and Gans 1962 are cited in Freudenburg, William R. 1986. "Social impact assessment." *Annual review of sociology*: 451–478.
[154] Hong Kong seems to be fairly active, however; see e.g. http://hub.hku.hk/handle/10722/52833 and http://www.ura.org.hk/en/schemes-and-policies/redevelopment/social-impact-assessment.aspx
[155] Lee, Grace KL, and Edwin HW Chan. 2010. "Evaluation of the urban renewal projects in social dimensions." *Property Management* 28 (4): 257–269.
[156] Exploratory Factor Analysis is a method used to examine the underlying structure of a set of variables. It should only be used when the researcher has no a priori hypothesis.
See e.g. Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. American Psychological Association.

design elements will not work in many locations (e.g. in environmental sustainability, no mention is made of air/water/soil quality or ecosystem functions/biodiversity), their approach to creating an assessment could be adapted to other coastalscape revitalization projects.

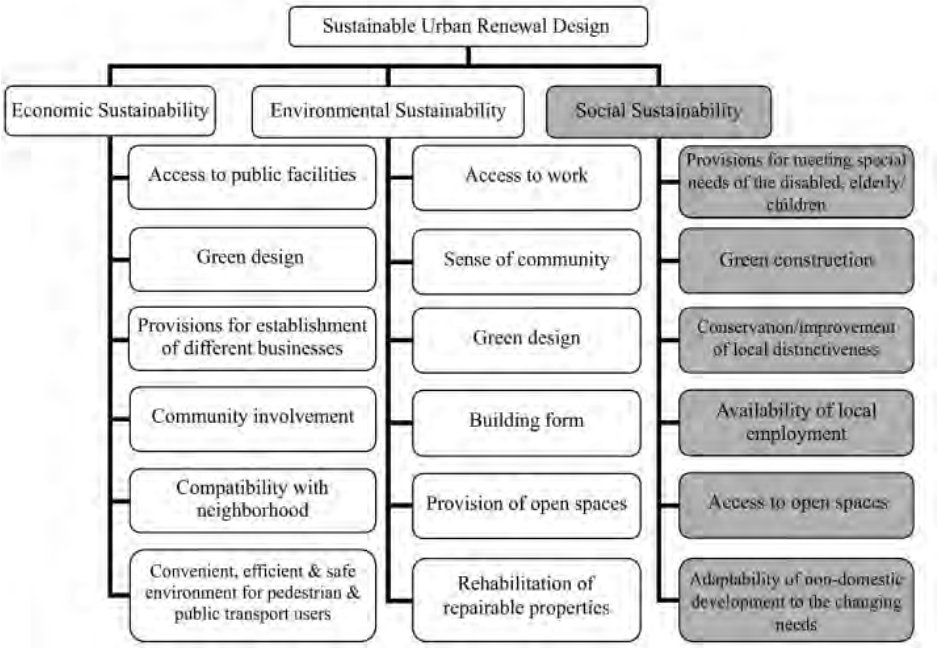

Figure 12: Framework of sustainable urban renewal model from Lee and Chan (2010)[157]. Their social assessment was based on indicators derived from the six social sustainability design criteria (shaded).

Their evaluation framework had two main components: the indicators (monitoring) and a scoring system. The indicators were based on significant aspects of the design elements ("Provisions for meeting special needs…" etc., listed in shaded cells under Social Sustainability, Figure 12). They suggested that indicators should:

> "be significant in reflecting the major characteristics of individual design criteria. They should be relevant to the local conditions, emphasizing the aspects related to urban renewal and social equity in Hong Kong. The indicators should be meaningful, credible, conceptually sound and scientifically/theoretically valid. They should be capable of representing important concerns, and reflecting the interests and views of different stakeholders. The indicators should be reliable, clear, simple, unambiguous and easily and readily understandable to everyone including the layman without specific knowledge. They should be based on the information of known quality which is readily available, easily accessible and technically feasible to collect, or can be obtained at a

Interestingly, Maccallum, R. C. (1990) ["The need for alternative measures of fit in covariance structure modeling". *Multivariate Behavioral Research*, 25(2), 157-162.] suggests that the results are best when each factor has 3-5 variables. Since the 17 used here were based on a pool of 30, this criteria was not met.

[157] Lee, Grace KL, and Edwin HW Chan. 2010. "Evaluation of the urban renewal projects in social dimensions." *Property Management* 28 (4): 257–269.

reasonable cost and in a fair period of time. The way of measuring the indicators should be reproducible and the measurement results should be repeatable.[158]"

They settled on a mix of quantitative and qualitative indicators for use in their assessment (Figure 13).

Design criteria	Indicators	Categories: Quantitative	Categories: Qualitative
1. Provisions for meeting special needs of the disabled, elderly or children (PSN)	Types of provisions for disabled, elderly and children	✓	
	Adequacy of accessible design and special facilities		✓
2. Green construction (GBC)	Incorporation of environmentally friendly practices	✓	
	Quality of environmentally friendly practices		✓
3. Conservation/improvement of local distinctiveness (CLD)	Appreciation of local characters		✓
	Uniqueness of renewed area		✓
4. Availability of local employment (ALE)	Number of jobs created per 1000 m^2	✓	
	Quality of jobs created		✓
5. Adaptability of non-domestic development to the changing needs (ADN)	Capability to cope with future changes	✓	
	Degree of adaptability		✓
6. Access to open spaces (AOS)	Average walking distance to the nearest open space	✓	
	Ease of access to open spaces		✓

Figure 13: 12 Indicators derived for six socially sustainable design criteria. Quantitative and qualitative indicators used in Lee and Chan (2010).

They then created a scoring system for each indicator. The researchers used a combination of points allocation for the quantitative indicator categories (how many provisions for the disabled, elderly and children from a list were included in the design from a list of possible provisions). For the qualitative indicators, they used a Likert scale to assign points based on agreeing (5 points) or disagreeing (1 point) with a statement about the qualitative indicator (Figure 14). It is essential to engage multiple stakeholders, particularly for assigning points to the qualitative statements, including managers, community groups, residents, and the researcher performing the assessment.

[158] Lee, Grace KL, and Edwin HW Chan. 2010. "Evaluation of the urban renewal projects in social dimensions." *Property Management* 28 (4): 257–269.

Description of indicators	Points allocation
1. Provisions for meeting special needs of the disabled, elderly or children	
(a) Types of provisions for disabled, elderly and children Which design(s) as shown below is/are incorporated in the renewal project? (i) Public areas providing enhanced provisions for access for the disabled persons (ii) Public areas with provisions specially designed for the children/the elderly (iii) Provision, other than in public areas, specially for children, e.g. child care centre (iv) Provision, other than in public areas, specially for the elderly, e.g. residential care home for the elderly (v) Provision, other than in public areas, specially for the disabled persons, e.g. rehabilitation centre for people with disabilities	Either 1 design = 1 point Any 2 designs = 2 points Any 3 designs = 3 points Any 4 designs = 4 points All or above = 5 points Points allocated on a scale of 1 - 5 (1-strongly disagree; 5-strongly agree)
(b) Adequacy of accessible design and special facilities What do you think about this sentence "Accessible design and adequate facilities are provided for the people, regardless of age and physical abilities after urban renewal."?	
2. Green construction	
(a) Incorporation of environmentally friendly practices Which practice(s) as shown below is/are incorporated in the renewal project? (i) Providing device(s) to reduce consumption of non-renewable energy (ii) Providing device(s) to reduce consumption of fresh water (iii) Adopting measure(s) to reduce consumption of non-green construction materials (iv) Adopting measure(s) to reduce generation of solid/liquid wastes (v) Using environmentally friendly/pollution free material(s), product(s)/equipment(s)/construction methods generally (vi) Using prefabricated/pre-casting or off-site construction element(s) in substantial amount	Either 1 practice = 1 point Any 2 practices = 2 points Any 3 practices = 3 points Any 4 practices = 4 practices Any 5 practices or above = 5 points
(b) Quality of environmentally friendly practices When comparing this renewal project to other project(s) in similar scale, what do you think about the following sentences? Less non-renewable energy is consumed here. (Yes = 1 and No = 0) Less fresh water is consumed here. (Yes = 1 and No = 0) Less demolition and construction wastes are generated here. (Yes = 1 and No = 0) More renewable natural resources are used here. (Yes = 1 and No = 0) More environmentally friendly/pollution free construction materials/products are chosen here (Yes = 1 and No = 0) More prefabricated/pre-casting or off-site construction elements are used (Yes = 1 and No = 0)	Sum = 1 = 1 point Sum = 2 = 2 points Sum = 3 = 3 points Sum = 4 = 4 points Sum ≥ 5 = 5 points
3. Conservation/improvement of local distinctiveness	
(a) Appreciation of local characters Thinking about the area after urban renewal, which statement(s) as shown below can describe your feeling? (only consider the positive aspects) (i) Structures with special architectural features/reflecting local culture/characteristics are retained (ii) Unique businesses/industries are conserved (iii) Distinctive townscape is reinforced (iv) New attractive landmarks are built (v) New distinctive image/atmosphere is created in harmony with the surrounding environment	Either 1 statement = 1 point Any 2 statements = 2 points Any 3 statements = 3 points Any 4 statements = 4 points All or above = 5 points Points allocated on a scale of 1 - 5 (1-strongly disagree; 5-strongly agree)
(b) Uniqueness of renewed area what do you think about this sentence "the area after urban renewal has its own characteristics and positive identity"?	

(*continued*)

Description of indicators	Points allocation
4. Availability of local employment	
(a) Number of jobs created per 1000 m^2	>0-100nos. = 1 point >100-200nos. = 2 points >200-300nos. = 3 points > 300-400nos. = 4 points > 400nos. = 5 points
(b) Quality of jobs created What do you think about the following sentences? urban renewal (1-strongly disagree; 5-strongly agree) There is a proper mix of low value and high value jobs (1-strongly disagree; 5-strongly agree) There is a proper mix of temporary and permanent jobs (1-strongly disagree; 5-strongly agree) The salary of the jobs is reasonable/acceptable (1-strongly disagree; 5-strongly agree)	Sum <5 = 1 point 5 ≤ Sum ≤8 = 2 points 8 < Sum ≤12 = 3 points 12 < Sum ≤16 = 4 points Sum >16 = 5 points
5. Adaptability of non-domestic development to the changing needs	
(a) Capability to cope with future changes Which design(s) as shown below is/are incorporated in the renewal project? (i) Open plan internal design (ii) Demountable system partition/non-load bearing internal partition (iii) Structural framing building with minimum load bearing wall (iv) Flexible design of building services provisions/availability of standby public utilities (v) Outdoor spaces reserved for multi-functional purposes	Either 1 design = 1 point Any 2 designs = 2 points Any 3 designs = 3 points Any 4 designs = 4 points All or above = 5 points Points allocated on a scale of 1 - 5 (1-strongly disagree; 5-strongly agree)
(b) Degree of adaptability What do you think about this sentence "The non-residential portion of the redevelopment is easily/readily allowed for future expansion, improvement and modification involving structural and non-structural alterations"?	
6. Access to open spaces	
(a) Average walking distance to the nearest open space	>1000 m = 1 point > 750-1000 m = 2 points > 500-750 m = 3 points > 250-500 m = 4 points < 250 m = 5 points
(b) Ease of access to open spaces Thinking about the nearby open spaces you are LIKELY to go and considering the factors like distance, comfort and safety, which statement shown below best describes your situation? (i) I have considerable difficulty gaining access to all places (ii) I have difficulty gaining access to most places (iii) Occasionally, I have difficulty gaining access to some places (iv) It is relatively easy for me to gain access to most places (v) I can easily gain access to all places	Select (i) = 1 point Select (ii) = 2 points Select (iii) = 3 points Select (iv) = 4 points Select (v) = 5 points

Figure 14: Assessment used in Lee and Chan (2010), including descriptions of the indicators used and the points assigned to each. This approach is similar to a multi-criteria decision analysis.

This framework is similar to a multi-criteria analysis, except that multiple options are not being compared.

Using this method of creating a social assessment allows managers to tailor the assessment to their needs and adapt the assessment to locally (and globally) important issues. However, any system which where points are assigned imposes a normative framework on the analysis, as points are given based on what is perceived as a desirable outcome. While this is not inherently good or bad, whoever creates an assessment framework needs to be mindful of the choices they are making and what ideals being promoted and disincentivized in the framework.

Other social assessment methods are developed for particular situations. For example, the 'Public Accessibility of Riverfront' and associated 'Comprehensive Index of Public Accessibility of Riverfront' (PAR and CIPAR respectively) were developed to evaluate river environmental and accessibility improvements. The PAR idea encourages river rehabilitation projects to consider accessibility to realize ecological and social benefits. The CIPAR was created for use in riverfront planning and to assess the efficacy of rehabilitation of a section of the Suzhou Creek Rehabilitation Project in Shanghai, China (Figure 15). A point system was also created to score each of the indicators, so that researchers could compare the different stream reaches.

The Comprehensive Index of Public Accessibility of Riverfront.

Sub-index	Corresponding dimensions	Indicators	Description and reference
Spatial accessibility	Spatial openness	Width of open belt	ISC, the Index Stream Condition, an index for broad scale management of waterways in Australia (Ladson et al., 1999)
		Transportation types	Motor, bicycle, and pedestrian trails
		Vulnerable groups' accessibility	Appropriate trail for children and the disabled
Visual accessibility	Visual corridor	Bank height	Design Regulation for Flood Control Engineering in an Urban Area (CJJ50-92)
		Riverfront building height	Singapore River Planning Area: Planning Report 1994
		Guide system	Existence of riverfront guide
Corridor continuity	Natural corridor	Ratio of vegetation coverage	Percentage of riverfront vegetation
		Water-oriented settings	Design of typical riverfront bank
		Spatial continuity of corridor	Blockage of trails along riverfront
Amenity	Activity and comfort	Facility diversity	Number of facility types
		Comfortable experience	Sanitation and lighting
		Safety	Population who do not inhabit along the riverfront but pass through the riverfront

Figure 15: The Comprehensive Index of Public Accessibility created for use in the Suzhou Creek Rehabilitation Project in Shanghai, China[159].

Social assessments are a critical part of post-construction project management. Continued support from the community is essential for perceived project success and creating long term satisfaction with projects. Managers need to look at their particular needs based on their local community, and determine if a widespread (e.g. SIA), specialized, or newly created method of social assessment is right for them.

Salish Sea examples

Despite the importance of social assessments, there are relatively few performed in the Salish Sea region with coastalscape revitalization projects.

Dockside Green (Victoria, B.C.) performed a project evaluation qualitative social assessment, alongside similar economic and environmental assessments. However, there are no methods or indication residents were involved in determining which indicators were important or with gathering data. Unlike SIA then, it is not an assessment with extensive public involvement. Like CIPAR and the system devised

[159] Che, Yue, Kai Yang, Ting Chen, and Qixin Xu. 2012. "Assessing a riverfront rehabilitation project using the comprehensive index of public accessibility." *Ecological Engineering* 40: 80–87.

in Hong Kong, the social assessment framework created by Dockside Green is specific to the project; unlike these frameworks, the Dockside Green framework does not use a quantitative or point-scoring system. This limits the assessment to simple reporting about progress towards the goals created during the design of Dockside Green.

The Dockside Green social assessment is also hampered by the lack of quantitative data. For example, one goal is to "create a mix of unit types to attract a wide range of ages." Their assessment of this goal is limited to reporting on the buildings' suite mix, which doesn't really address the goal; the assessment would benefit from an analysis of resident/user demographics. Further, an independently performed (e.g. led by local university professors or an outside consulting firm) may be better able to objectively analyze the project's progress towards social goals.

The Dockside Green social assessment does address a number of local issues including affordable housing and relationships with community organizations. Importantly, the report mentions both what has been successful and unsuccessful. For example, the development feels its relationship with the Vic West Community Association is strong. The report also notes that the master plan for Dockside Green—which, like Thea Foss, is being developed in phases giving developers the opportunity to adjust later phases based on feedback—has been altered based on feedback from the Community Association. On the other hand, the development has had ongoing difficulty satisfying the affordable housing requirements in the Master Development Agreement. Originally 46 affordable units—including two and three bedroom units for families—were planned for purchase by the Capital Region Housing Corporation who would then sell them to households earning between 35,000 and 47,000 CAD per year. However, only 26 units have been built, all studio or 1-bedroom apartments, and the developer is continuing to work on plans to satisfy the original requirements. Their willingness to assess both positive and negative outcomes lends respectability to Vancity's assessment, however quantitative analysis (or more in depth and systematic qualitative analysis) would improve the rigor and allow for others to better learn from their experience.

In Tacoma, the **Thea Foss Development Authority** conducted a social assessment[160] to determine how stakeholders felt about the development direction of the Thea Foss Waterway. As mentioned in the 'social monitoring' section, many stakeholder groups (including community members and developers) were interviewed and asked what they felt was working and not working about the development strategy.

The data collected through these interviews seems to have been analyzed by visually observing trends and which issues were commonly mentioned. No more specific methodology was reported[161]. Additionally, this assessment most closely resembles a management capacity assessment ("conducted to determine the adequacy of management structures and governance processes as these relate to

[160] Economic and financial feasibility assessment was suggested as well, however these have not been carried out yet to our knowledge. These assessments are to include for example: preparing a feasibility analysis of projected development scenarios, providing a financial feasibility Excel model, and creating a 6 year budget projection.
[161] Exact quote is: "From the information gathered, we were able to visually see the 'hot button' issues that affect the Foss and were able to prioritize our directions accordingly." Merrittarch. 2011. Revisiting the Foss Waterway Master Redevelopment Strategy: 2011 Update. Available online at: http://cms.cityoftacoma.org/cityclerk/Files/CouncilCommittees/Handouts/2012/EDHandouts/ED_20120131handouts.pdf

generally accepted international standards and experience[162]"), logical given that the Thea Foss Development Authority took advantage of a market lull to perform this evaluation to make sure that their development strategy was on the right track.

The assessment was focused on how to help the Thea Foss area (and community) thrive, rather than on provision of affordable housing, etc. As a result, the recommendations of the assessment are largely management actions (see the management section). However, some of the results that came out include:

- Stakeholders appreciate authentic waterfront uses, and think the Thea Foss Waterfront should celebrate, not shun, history.
- Users have trouble finding their way around. The Thea Foss would benefit from improved maps, signage, and points of interest to encourage exploration by visitors and residents.
- Developers are frustrated with perceived redundant processes when submitting development proposals, and would like City Planning to be more supportive of commercial zoning changes. These are difficult to get because of the SMA's focus on water-dependent uses.
- Multiple stakeholders emphasized the need to create a diversity of uses (retail, restaurants, housing, offices, parks, etc.) for the waterfront to be vibrant and sustainable. This reinforces the mixed-use development strategy of the 1999 Redevelopment Strategy.

The assessment did not individually highlight feedback from different groups of stakeholders (but instead looked at common feedback), so it is hard to know how residents living in Thea Foss feel about the development.

Overall, coastalscape revitalization projects infrequently use social assessments. Those that do have focused on qualitative methods; however the Thea Foss assessment utilized interviews, workshops, and extensive discussions to create a broad based engagement with stakeholders where the Dockside Green assessment has not. The purpose of social assessments differed as well. While Dockside Green's assessment was a reporting or accountability tool, the assessment performed by the Thea Foss Development Authority focused on positioning the development to succeed based on stakeholder's experience to date.

Environmental Assessment

Environmental assessments address environmental quality (air, water, and soil), ecological health (ecosystem services, species composition, etc.) and other factors of ecological sustainability[163]. Environmental assessments are frequently labeled 'voluntary' or 'mandated' when they are required by law or as a condition of permitting. Based on personal observation, most post-construction[164] environmental assessments are mandated. As exploring mandated environmental assessments requires an overview of the accompanying legislation (not necessarily the literature), we use Salish Sea examples to illustrate different types of mandated monitoring.

[162] Lowry, Kem, Stephen Olsen, and James Tobey. 1999. "Donor evaluations of ICM initiatives: what can be learned from them?" *Ocean & Coastal Management* 42 (9): 767–789.
[163] The two evaluation frameworks—LEED ND and Green Shores—discussed in Dyson et al. (2012) are environmental assessments intended for use in the planning stages of development.
[164] Other terms seen in the literature include post-development, auditing,

Timing of Environmental Assessments

A common trend in both the literature and our experience in the Salish Sea is that the majority of environmental assessments are focused on the decision-making (pre-construction) stage. A paucity of information exists about post-construction/development environmental assessments. To illustrate this, a search of the journal *Environmental Monitoring and Assessment* for 'post-development' returned only 6 results, a search for 'post-construction' only 14, and a search for 'ex-post' only 8. More articles (113 in *Environmental Monitoring and Assessment*) have addressed 'audits' of environmental impact predictions; these articles are largely related to audits of environmental impact assessments (EIA, EIS, EA, etc.). The *Journal of Environmental Assessment Policy and Management* has also released a call for papers for a special issue focused on the ex-post evaluation of impact assessment[165].

Environmental Impact Assessments (EIA), including Environmental Impact Statements in the United States and Environmental Assessments in Canada, are perhaps the most prominent example of ex-ante environmental assessments internationally and in the Salish Sea region. Though not required by law, a small but significant literature has grown around follow-up evaluations of projects' EIAs[166]. Suggestions for EIA follow-up evaluations are incorporated in the 'best practices' section later in this report.

Voluntary Environmental Assessment

'Voluntary' environmental assessments used during project planning phases (such as LEED) may have a post-construction performance validation component. When referring to green buildings, these assessments are called 'post-occupancy evaluations.' This type of evaluation is beyond the scope of this paper, since they are usually the responsibility of a private building owner or developer. However, in the case of publically owned buildings, it is important to note that 'environmental' evaluation frameworks (such as LEED ND) often focus on energy and water use (indicators for resource use) instead of ecological health. While these are important for sustainability, they are not sufficient. Hofer (2009)[167] evaluated three different sustainability evaluation frameworks (LEED ND, sustainable urban landscapes site design manual for BC communities, and Sustainable Sites Initiative), and concluded that all three did not adequately address ecological markers. While indicators for resource use are "useful for tracking resource throughput," they are "weak in establishing best or exemplary practice if their targets are not based on ecological productive and assimilative capacity." In other words, "being more efficiently unsustainable is not the same as being sustainable.[168]" Green Shores avoids this problem because it was explicitly designed for the benefit of the marine ecosystem of the Salish Sea (although a post-construction follow up is not required; Figure 16).

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[165] See here: http://www.worldscientific.com/page/jeapm/callforpapers-special01

[166] Useful literature reviews include:
Tomlinson, P. and Samuel Atkinson. 1987. Environmental audits: A literature review. Environmental Monitoring and Assessment. Vol 8 (3). Available online at: http://link.springer.com.offcampus.lib.washington.edu/article/10.1007/BF00404267;
Arts, J., Paula Caldwell, and Angus Morrison-Saunders. 2001. Environmental impact assessment follow-up: good practice and future directions—findings from a workshop at the IAIA 2000 conference, Impact Assessment and Project Appraisal, 19:3, 175-185. Available online at: http://www.tandfonline.com.offcampus.lib.washington.edu/doi/pdf/10.3152/147154601781767014

[167] Hofer, Nancy Dee. 2009. An Evaluation of Neighbourhood Sustainability Assessment Frameworks Using Ecosystems Characteristics and Principles of Systems Resilience as the Evaluation Criteria.

[168] Ibid.

Comparison of LEED and GREEN SHORES Rating Systems as applied to Shore Development

Credit Category	LEED – New Construction	LEED – Neighbourhood	Green Shores
Waterfront Building Siting	Not addressed	Limited	Included
Critical/Sensitive Habitat	Optional Credit	Optional Credit	Prerequisite
Coastal Processes	Not Addressed	Not addressed	Included
Stormwater Management	Discharge quantity and quality	LID Methods	LID Methods
Innovation/Education	Included	Included	Included
Building Efficiency (energy, water)	Included	Included	Not included

Figure 16: Comparison of LEED, LEED ND, and Green Shores. Green Shores stresses credits pertaining to coastal habitat, while omitting building efficiency credits[169].

Other voluntary environmental assessments occur outside of existing frameworks like LEED. In the context of coastalscape revitalization in the Salish Sea region, we have observed that this type of voluntary assessment accompanies new waterfront development techniques, is carried out by trained scientists (consultants or university professors), and is funded by grant monies. The planned ecological monitoring and assessment at the Northwest Maritime Center dock in Port Townsend, WA, is one example[170]; scientists at Battelle were engaged to determine how new dock building techniques impacted eelgrass, however the planned grant monies from NOAA did not materialize and so the monitoring and assessment were stalled. The post-construction monitoring and assessment of Olympic Sculpture Park detailed in Dyson et al. (2013)[171] is another example; scientists from University of Washington were engaged to monitor and assess the performance of a habitat bench and pocket beach with funding from the City of Seattle, King County and other parties[172]. These question-driven

[169] Emmett, B., Gretchen Harlow, John Harper, John Readshaw, Harriet Rueggeberg, Nicole Faghin, Katrina Hoffman, and Jim Brennan. 2009. Green Shores: A voluntary rating and certification program for sustainable shore development. Poster presentation at the 2009 Puget Sound Georgia Basin Ecosystem Conference; Washington State Convention & Trade Center Febuary 8-11. 2009. Available online at: http://depts.washington.edu/uwconf/psgb/proceedings/papers/p1_emmet.pdf

[170] Though permitting the project was likely made easier because they had a plan for pre- and post-construction monitoring and assessment.

[171] Dyson, K., Faghin, N., and Leschine, T. 2013. Planning and Management for Coastalscape Revitalization: Case Studies from the Salish Sea. 2012 KMI-SMEA Joint Research Project.

[172] Specifically: Seattle Public Utilities City of Seattle, WRIA 9, King Conservation District, Estuary and Salmon Restoration Program, Washington Department of Fish and Wildlife.

monitoring and assessment programs can provide important information about ecological functioning at the site that can be applied (with caution) to other sites in the region[173].

Mandated Environmental Assessments

Multiple regulations in force in the Salish Sea region require follow-up monitoring and assessments. Here, we review two such examples that are indicative of the challenges faced by coastalscape revitalization projects, which occur along the waterfront and (frequently) on former industrial land.

In the **Thea Foss Waterway in Tacoma**, environmental monitoring and assessment focused on sediment quality and contamination is being carried out as part of the larger Commencement Bay Nearshore/Tideflats Superfund Site compliance assessment. The Comprehensive Environmental Response, Compensation and Liability Act (1980) requires that Superfund response actions provide for long-term protection of human and environmental health[174].

The entire superfund site encompasses 10-12 square miles of shallow water, shoreline, and adjacent uplands. Contaminants from the sites' industrial past include arsenic, lead, zinc, cadmium, copper, mercury, and organic compounds (including polychlorinated biphenyls—PCBs). Site cleanup was addressed through:

> "1) site use restrictions to reduce potential human health exposure to site contamination, particularly ingestion of contaminated seafood,
> 2) source control to prevent recontamination of sediments and meet Applicable or Relevant and Appropriate Requirements (ARARs),
> 3) natural recovery for marginally contaminated sediments that are predicted to achieve acceptable sediment quality within a reasonable timeframe,
> 4) sediment remedial action to address sediments containing contamination that is expected to persist for unacceptable periods of time, using in-place capping, dredging/confined aquatic disposal, dredging/nearshore disposal, and dredging/upland disposal, and
> 5) source and sediment monitoring to characterize the effectiveness of source controls and identify if additional actions are necessary, to ensure that all necessary remedial actions have been undertaken in each problem area, and to evaluate the effectiveness of the components of the remedy (including disposal sites and habitat mitigation/restoration areas), in achieving the sediment quality objectives and in relation to habitat function[175]."

Sediment caps were installed over contaminated sediments in the water, and soil caps were installed to contain source pollutants on upland areas (). Buildings developed along the Thea Foss waterway are required to install waterproofing in the basement to provide the final cap[176]. Both private and public parties involved in the Thea Foss uplands, nearshore, and tideflats are subject to further remedial

[173] The Seattle Seawall project also fits this pattern, although they are using monitoring and assessment to address questions about project design. Hopefully once the seawall is completed, environmental monitoring and assessment will be conducted to track the ecological development of the completed seawall.
[174] More information: http://www.epa.gov/superfund/cleanup/postconstruction/index.htm
[175] USEPA Region 10. 2009. Third Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington. Technical Five-Year Review Report. Approved by Lori Cohen, Acting Director.
[176] For a full list of controls, see: http://www.epa.gov/region10/pdf/sites/theafoss/asource.pdf

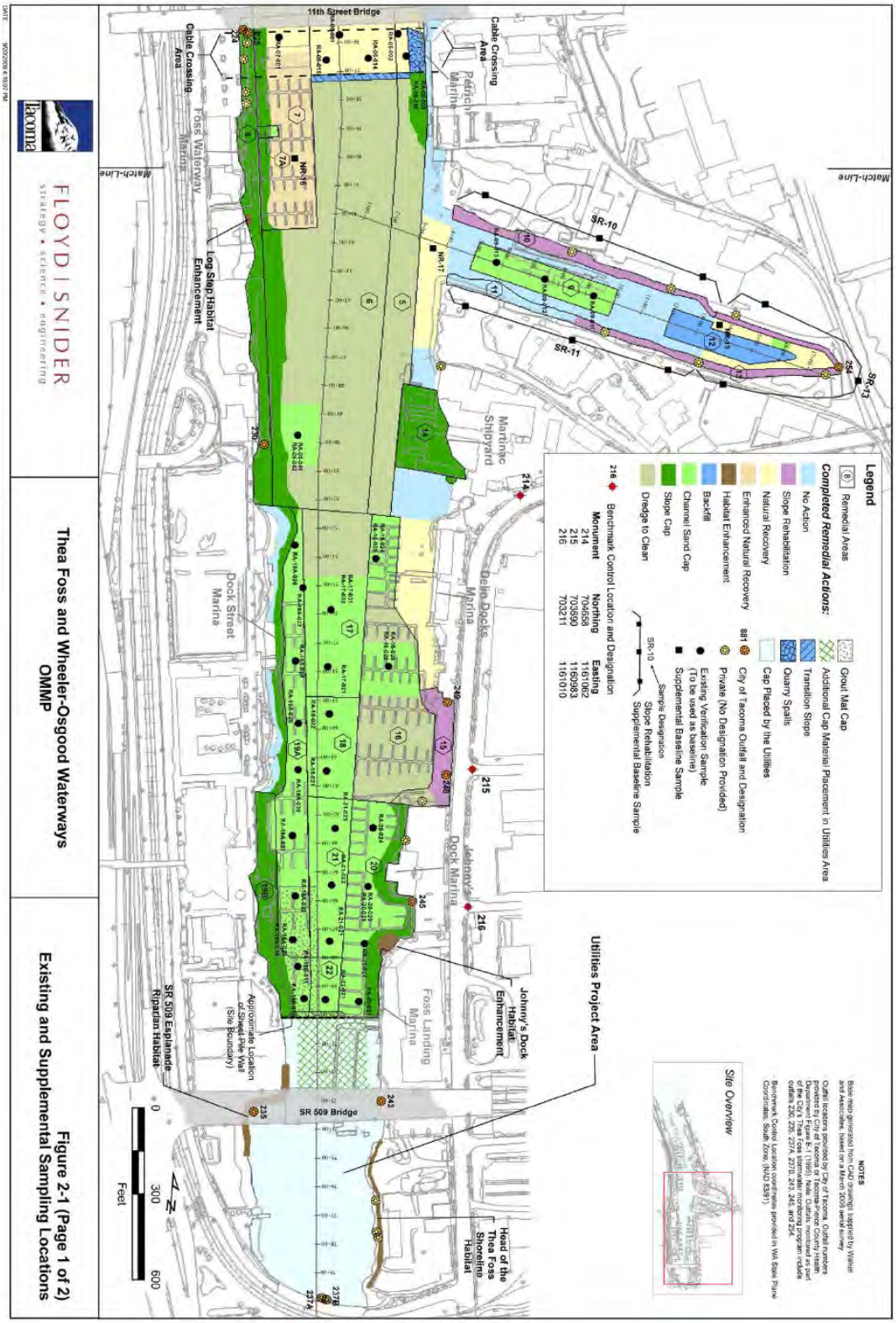
actions as required by the U.S. Environmental Protection Agency. The City of Tacoma and the Tacoma Public Utilities are responsible for collecting post-construction sediment quality data.

In 2009, the third five-year review report for the Commencement Bay Nearshore/Tideflats area was released[177]. The purpose of these reports is "to determine whether the remedy at a site is protective of human health and the environment. In addition, Five-Year Review reports identify issues or deficiencies found during the review, if any, and recommendations to address them." The report contains an assessment of monitoring data and recommendations for future management actions. It found that the source controls installed (the caps) do not appear adequate to prevent recontamination of the Thea Foss Waterway. The review states, "the remedy at the Thea Foss and Wheeler-Osgood Waterways currently protects human health and the environment because sediment remedial action significantly reduced sediment concentrations and most of the required institutional controls are in place to protect the integrity of the sediment cap. However, in order for the remedy to be protective in the long-term, additional source control activities need to be identified and implemented to reduce the extent of recontamination in the waterway and the USCG institutional control needs to be completed to help protect the long-term integrity of the sediment cap.[178]"

Therefore, as a result of this environmental analysis, the City and other involved parties will need to continue to monitor and evaluate sources of phthalates and PAH to nearshore and tidal sediments, finish implementing a 'no anchor' zone to protect the sediment cap in water (the USCG institutional control referred to above), and look for other ways to prevent pollution in upland soil and groundwater from contaminating the sediments of the Thea Foss.

[177] USEPA Region 10. 2009. Third Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington. Technical Five-Year Review Report. Approved by Lori Cohen, Acting Director.
[178] Ibid.

Figure 17 - Thea Foss Waterway Sampling Locations



The **Olympic Sculpture Park in Seattle, WA** was also heavily contaminated with petroleum products as a result of the site's 75 year history as a Unocal petroleum transfer and distribution center. A compliance monitoring program for the site was developed to ensure that human health and the environment are protected, confirm cleanup construction was successful, and confirm the long-term efficacy of clean-up[179]. As of August 2013 the site was still on the Washington Hazardous Sites List at Rank 4 out of 5, where 5 is of least concern[180].

Post-construction monitoring and assessment are also mandated to ensure that created habitat replacements are functioning as intended. The **Olympic Village development in Southeast False Creek, Vancouver, B.C.**, monitoring of Habitat Island was required for compliance with Canada's Fisheries Act.

Section 35[181] of the Fisheries Act prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat. Any work (including coastalscape revitalization) resulting in HADD is a contravention to Subsection 35(1); the remedy is to seek a Subsection 35(2) Authorization, which authorizes the HADD. Without this authorization, a project resulting in HADD may face fines up to $1,000,000 and/or up to 6 months in jail[182].

The Olympic Village project reconfigured the shoreline, which destroyed some existing (though degraded) fish habitat by filling a portion of the former Canron embayment with clean material, and hardening the shoreline (steel sheet-piles and architectural granite blocks). To obtain an authorization, the development was required to construct fish habitat compensation[183], which is why Habitat Island

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[179] Aspect Consulting, LLC. April 14, 2004. Engineering Design Report for Phase I Remediation. Technical Report Prepared for: Museum Development Authority and Seattle Art Museum. Project No. 020118-001-04.

[180] See: https://fortress.wa.gov/ecy/publications/publications/1309042b.pdf; It is called "Unocal Seattle Market Lower" and "Unocal Seattle Marketing Term"

[181] Section 35.

(1) No person shall carry on any work, undertaking or activity that results in the harmful alteration or disruption, or the destruction, of fish habitat.

(2) A person may carry on a work, undertaking or activity without contravening subsection (1) if

(a) the work, undertaking or activity is a prescribed work, undertaking or activity, or is carried on in or around prescribed Canadian fisheries waters, and the work, undertaking or activity is carried on in accordance with the prescribed conditions;

(b) the carrying on of the work, undertaking or activity is authorized by the Minister and the work, undertaking or activity is carried on in accordance with the conditions established by the Minister;

(c) the carrying on of the work, undertaking or activity is authorized by a prescribed person or entity and the work, undertaking or activity is carried on in accordance with the prescribed conditions;

(d) the harmful alteration or disruption, or the destruction, of fish habitat is produced as a result of doing anything that is authorized, otherwise permitted or required under this Act; or

(e) the work, undertaking or activity is carried on in accordance with the regulations.

R.S., 1985, c. F-14, s. 35; 2012, c. 19, s. 142.

[182] The legislation was significantly altered November 25, 2013 in favor of development interests. See Sundell, Lawson and Lauren Cook. Significant Amendmdents to Fisheries Act in force on November 25, 2013. Available online at: http://www.lexology.com/library/detail.aspx?g=6b603186-f511-4c64-a461-8b91bcca356d

[183] Authorization No. 05-HPAC-PA2-000-000120; Golder Associates. 2009. Annual Summary Report (2008): Southeast False Creek Compensatory Habitat Monitoring Program. Submitted to the City of Vancouver Southeast False Creek Project Office. Technical Report #06-1421-001/1100.

was constructed[184]. Monitoring the compensatory fish habitat was also required under the authorization; the purpose of the monitoring program was to assess the form and function of the compensatory fish habitat as well as their success as fish habitat[185]. Scientists from Golder Associates Ltd. carried out the initial habitat monitoring of Habitat Island between 2008 and 2013; monitoring was skipped in 2009 as the site was occupied by the Vancouver Olympic Committee for the 2010 Olympic Games[186].

Three environmental assessments for the site were conducted every year. First, a physical stability assessment was performed, based on a visual examination, which evaluated erosion and sloughing of intertidal and foreshore material. In the most recent assessment (2012), no sloughing or erosion was observed at Habitat Island[187].

Second, data collected from seining is used to assess fish utilization at the site. No statistical tests were performed, however the number of individuals and species were compared across sites and years using bar graphs. The most recent assessment found four juvenile Pacific salmon species: Chinook salmon, Chum salmon, Sockeye salmon, and Pink salmon. All but the Pink salmon were found at Habitat Island in addition to one of the reference beaches. Other species included three-spine stickleback (*Gasterosteus aculeatus*), staghorn sculpin (*Leptocottus armatus*), and gunnel (*Pholis spp*.). While Habitat Island (East) had the highest total number of fish regardless of species caught, it also had the lowest species richness as only four species were observed.

Finally, an intertidal community assessment is performed using the percent cover data. Again, no statistical tests were performed, but the percent cover was compared across sites and years using bar graphs. The assessment examined:

- Percent cover of bare rock (substrate): since construction, the amount of bare substrate at Habitat Island has decreased indicating that organisms are colonizing this intertidal area.
- Macrophyte (macro-algae) cover: multiple species of green and brown algae are now found on Habitat Island, and at the reach with highest richness on Habitat Island 4-5 species were observed in each intertidal zone.
- Sessile Invertebrate cover: Mussels (Mytilus spp.) and barnacles (Balanus glandula) are the most abundant, and were present at all locations in 2012. A new colony of Bryozoa was first observed in 2012
- Motile Species observed: gastropods, crabs, mites, amphipods and isopods were all observed either at Habitat Island or the reference site, and richness has remained consistent since 2010. Richness at the reaches varies from 1-2 species to 3-4 species in each intertidal zone.

[184] Habitat Island is a rocky island planted with native vegetation and landscaped with vertical snags. More information about Habitat Island can be found in Dyson et al. (2013).
[185] Golder Associates. 2009. Annual Summary Report (2008): Southeast False Creek Compensatory Habitat Monitoring Program. Submitted to the City of Vancouver Southeast False Creek Project Office. Technical Report #06-1421-001/1100.
[186] Monitoring efforts are summarized in the 'Environmental Monitoring' section above. More in depth information on the monitoring design can be found in the 2012 annual summary report, etc. (there are three others)
[187] Golder Associates. 2012. Annual Summary Report (2008): Southeast False Creek Compensatory Habitat Monitoring Program. Submitted to the City of Vancouver Southeast False Creek Project Office. Technical Report #12-1421-0014.

Researchers noted that since 2010, the percent cover of intertidal organisms has increased at Habitat Island and along the waterfront at the Olympic Village.

These examples of voluntary and mandated assessments in the Salish Sea region provide insight into the economic, social, and environmental/ecological conditions of coastalscape revitalization projects post-construction. (See matrix of assessment case studies in Figure 18 below). There are however significantly more assessments that occur during the design and planning phases of coastalscape revitalization projects. Many Environmental Impact Assessments (including EISs), cost-benefit analyses, Social Impact Analyses, etc. are performed at this stage and used to evaluate potential impacts of different coastalscape revitalization project designs. We feel significant improvements in the quality of decision-making and coastalscape revitalization design could be made if post-construction monitoring and assessments were used to verify the predicted impacts and test new designs. This information would be very useful both to new coastalscape revitalization projects and the management of assessed projects.

Indicators		**Case 1** Thea Foss	**Case 2** NW Maritime	**Case 3** Olympic Village	**Case 4** Dockside Green	**Case 5** Olympic Sculpture Park
Economic		-	-	-	X	-
Social		X			X	-
Environmental	Voluntary		X			X
	Mandated	X		X		X

Figure 18 - Assessment Indicators from Salish Sea Case Studies

Approaches used to Manage Coastalscape Revitalization Projects Post-Construction

It is during the post-construction management of coastalscape revitalization projects that the results of the monitoring and assessment phases influence the built environment. Good, relevant assessments are critical to management—"Assessment results are what managers have to manage[188]." Management needs for information in turn shape what is monitored and assessed. For this report, our working definition of monitoring is any actions taken after construction of a coastalscape revitalization project is constructed (post-development or post-construction), based on assessment and monitoring efforts. Here, we discuss the role of post-construction management on coastalscape revitalization projects in the Salish Sea region, and more broadly of urban projects with sustainability goals in the literature, with particular attention to the role of the government and community.

[188] Wolf, Charles P. 1983. Social Impact Assessment: Methodological Overview. In *Environmental Impact Assessment*, 253–279. Springer.

There are three operational stages of project management: ex ante (design), in itinere (implementation), and ex post (post-construction management). Here, we are concerned with ex post management (Figure 19ase).

Operational stages of project management.

Time phases	Project phases	Description
Ex ante	*Model definition*	– creation of the strategic map – determination of objectives – selection of indicators (dimensional parameters of performance that represent individual objectives)
In itinere	*Model check*	– alignment of the model to the local system
	Model implementation	– implementation of the model – collection and comparison of results
Ex post	*Results assessment*	– assessment of result performances in terms of variance from the target – measurement of the effectiveness and efficiency of the related strategic approaches adopted (SWOT analyses, cost-benefit analysis, etc.)
	Improvement strategies	translation of information obtained in the previous phases (areas of uniformity, main critical issues and success factors) into strategies to achieve improvements: – in the internal system (the project) – in the external system (the territory)

Figure 19: Operational stages of project management; from Ioppolo et al. (2012)[189].

One example of this type of management is performance management[190], which has much in common with performance evaluation. Performance management:

> "Performance management is the process by which local program managers assemble and review a series of selected indicators on performance on a recurring and frequent basis (e.g., monthly, quarterly, yearly) and use these measures to adjust resource flows and make mid-course corrections in program activities… performance management uses indicators to measure progress.11 Put simply, performance management helps local managers better understand and improve their programs. It provides a systematic way to monitor results that goes well beyond anecdotes and hearsay. Depending on what organizations want to monitor, performance measures can be gathered at the

[189] Ioppolo, G., Saija, G. & Salomone, R., 2012. Developing a Territory Balanced Scorecard approach to manage projects for local development: Two case studies. *Land Use Policy*, 29(3), pp.629–640.

[190] See e.g. Smith, R. Kingsley, GT., Cunningham, M., Popkin, S., Dumlao, K., Gould Ellen, I., Joseph, M., McKoy, D. 2010. "Monitoring Success in Choice Neighborhoods: A Proposed Approach to Performance Measurement." Urban Institute Technical Report.

> household, program, neighborhood, city, state, or national level to assess progress and measure change.[191]"

In this framework, monitoring is an essential part of management as 'what gets measured, gets done.'

Adaptive management is one of the best known post-construction management frameworks[192]. Frequently used for resource management, and particularly fisheries management, adaptive management reduces uncertainty about a social ecological system by monitoring the system and using monitoring to inform an iterative decision making process:

> "Adaptive management has been promulgated as an integrated, multidisciplinary approach for confronting uncertainty in natural resources issues (Holling 1978, Walters 1986). It is adaptive because it acknowledges that managed resources will always change as a result of human intervention, that surprises are inevitable, and that new uncertainties will emerge. Active learning is the way in which the uncertainty is winnowed. Adaptive management acknowledges that policies must satisfy social objectives, but also must be continually modified and flexible for adaptation to these surprises. Adaptive management therefore views policy as hypotheses; that is, most policies are really questions masquerading as answers. Because policies are questions, then management actions become treatments, in an experimental sense. Although some learning occurs regardless of the management approach, adaptive management is structured to make that learning more efficient, although this is questioned by some authors (McLain and Lee 1996). Walters (1997) gives an excellent review of the lessons of AEAM, indicating successes in technical approaches and transformation of understanding, but he also outlines serious shortcomings in resource management institutions.[193]"

Broadly, there are three forms of adaptive management:

> "There are three ways to structure management as an adaptive process (Walters 1986): (1) evolutionary or "trial and error," in which early choices are essentially haphazard while later choices are made from a subset that gives better results; (2) passive adaptive, where historical data available at each time are used to construct a single best estimate or model for response, and the decision choice is based on assuming this model is correct; or (3) active adaptive, where data available at each time are used to structure a range of alternative ~response models, and a policy choice is made that reflects some computed balance between expected short- term performance and long-term value of knowing which alternative model (if any) is correct. Most theoretical literature on resource management is aimed at providing single best predictions of policy choice, and hence, presupposes that a passive strategy is best. Perturbation

[191] Smith, R. Kingsley, GT., Cunningham, M., Popkin, S., Dumlao, K., Gould Ellen, I., Joseph, M., McKoy, D. 2010. "Monitoring Success in Choice Neighborhoods: A Proposed Approach to Performance Measurement." Urban Institute Technical Report.

[192] A good overview of Adaptive Management from the US Department of the Interior can be found here: http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide/Chapter1.pdf

[193] Gunderson, L.H. 1999. Resilience, Flexibility and Adaptive Management-Antidotes for Spurious Certitude? Conservation Ecology, 3(1),7.

> experiments are most likely to arise when an active adaptive strategy is adopted; the main use active strategies has been in agriculture (field tests, rotation policies) and fisheries (varying harvest rates, hatchery systems).[194]"

Each of these approaches has its benefits and drawbacks—passive adaptive policies are simpler to implement but are likely to confound environmental and management effects[195].

Yet systems of management based on iterative reflection and project monitoring and assessment like performance management or adaptive management are not used universally. The potential motivations for using it are strong; better project performance, for example, is why some LEED/energy-efficient/green building projects utilize post-construction audits. Similarly, authors support using monitoring and assessment results to improve restoration programs in light of initial economic and ecological goals[196]. Accountability to the public when public money is used to finance coastalscape revitalization projects is another potential motivation.

Learning from the hard work and time invested in past projects to imitate what they did right or to avoid making the same mistakes is another potential motivation[197]. The outcomes of monitoring and assessment are important feedback to current and future projects:

> "At all of these stages in the cycle it is important to be able to:
> - draw upon the experiences of previous projects and programmes in order to help to identify and avoid problems and the potential waste of resources;
> - to identify targets and to incorporate them within an agreed schedule of action and implementation;
> - to measure and monitor specific aspects of implementation;
> - to evaluate the overall performance of a project or programme, that is, effectiveness and efficiency.[198]"

Dissemination of information about failures and successes is therefore key to avoid repeating previous mistakes and to help build on successes[199].

Despite these benefits, there are many barriers, both real and perceived, that (consciously or not) inhibit the use of performance management (or similar programs) in coastalscape revitalization projects. The two most important are not directly caused by management, but by the monitoring and assessment needed to support performance management or similar evidence- or science-based management programs.

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[194] Walters, C.J., Holling, C.S., 1990. Large scale management experiments and learning by doing. Ecology 71, 2060–2068.
[195] Ibid.
[196] Sundstrom, Shiloh, Cassandra Moseley, Max Nielsen-Pincus, and Emily Jane Davis. 2011. "Quick Guide to Monitoring Economic Impacts of Ecosystem Restoration and Stewardship." Ecosystem Workforce Program, Institute for a Sustainable Environment.
[197] Ibid; Hostetler, M., 2010. Beyond design: The importance of construction and post-construction phases in green developments. *Sustainability*, 2(4), pp.1128–1137.
[198] Roberts P, Sykes H, editors. Urban regeneration. London, Sage; 2000., p204
[199] Hostetler, M. E., and K. Noiseux. 2010. Are green residential developments attracting environmentally savvy homeowners*? Landscape and Urban Planning*. 94: 234–243.

One issue, shared by some of the Salish Sea region case studies reviewed in this report, is that obtaining monitoring data can be difficult, labor intensive, and expensive:

> "A frequent issue in performance management and evaluation is that many of the indicators managers would ideally like to obtain require surveys and other data collection methods that are prohibitively expensive (or unavailable). Simply suggesting the ideal measures is not very useful. More valuable, if more difficult, is to design a feasible data collection process that yields workable indicators that, while not always the ideal, represent useful proxies for what we really want to measure.[200]"

This is a complex problem with no easy solution. Government agencies—including NOAA, who frequently funds community based restoration projects through their CRP program—find funding post construction monitoring and management difficult. The legislature (senators and members of the house) along with their constituents find new projects more exciting than monitoring completed projects.

Performance management (or similar results management systems) may also be barred due to political resistance to their implementation. Program managers "often fear that at least some of the determinants of the program outcomes are out of their control or that judgments will be made about program effectiveness prematurely.[201]"

However performance management (or similar) is not the only valid model for post-construction management. It is unsurprising that these approaches are widely recommended in the (scientific) literature[202], as performance management, adaptive management, and others are closely related to the scientific tradition. In practice in the Salish Sea region and elsewhere, multiple layers of post-construction management occur at coastalscape revitalization sites. Here we discuss management in terms of the actor performing the management action instead of the economic/social/environmental sustainability framework—for management, the actor may make many different types of management decisions (e.g. economic and social) and is therefore the most important unit of analysis. Examples of government- and community-led post-construction management follow.

Role of Government in Post-construction Management

As with post-construction monitoring and assessment, some post-construction management actions are governed by law. At the **Thea Foss waterway in Tacoma, WA**, the sites' history of industrial pollution and status as a superfund site requires the City of Tacoma to monitor and manage the site accordingly. As mentioned, as a result of the most recent five-year analysis, the City and other involved parties will need to continue to monitor and evaluate sources of phthalates and PAH to nearshore and tidal

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[200] Smith, R. Kingsley, GT., Cunningham, M., Popkin, S., Dumlao, K., Gould Ellen, I., Joseph, M., McKoy, D. 2010. "Monitoring Success in Choice Neighborhoods: A Proposed Approach to Performance Measurement." Urban Institute Technical Report.

[201] Lowry, Kem, Stephen Olsen, and James Tobey. 1999. "Donor evaluations of ICM initiatives: what can be learned from them?" *Ocean & Coastal Management* 42 (9): 767–789.

[202] See, e.g. Roberts P, Sykes H, editors. Urban regeneration. London, Sage; 2000.
Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2011. Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.
Lindenmayer, D.B. & Likens, G.E., 2010. The science and application of ecological monitoring. *Biological Conservation*, 143(6), pp.1317–1328.

sediments and look for other ways to prevent pollution in upland soil and groundwater from contaminating the sediments of the Thea Foss. They will also need to work with the US Coast Guard to finish implementing a 'no anchor' zone to protect the sediment cap in water.

Similarly, the Thea Foss Development Authority conducted a social assessment[203] to determine how stakeholders felt about the development direction of the Thea Foss Waterway. As mentioned in the 'social monitoring' section, many stakeholder groups (including community members and developers) were interviewed and asked what they felt was working and not working about the development strategy.

A number of management suggestions for the Thea Foss Development Authority emerged as a result of this analysis. For example, nearby vacant lots are detrimental to property values, and so a number of the management suggestions focus on site development by streamlining the development process and changing how potential sites for development are marketed including:

- "*Think entrepreneurially about repositioning the Foss*. A pedestrian district developer thinks very carefully about key points of focus, and is willing, in some cases, to induce the location of a catalyst use to generate activity. For an example, a well-regarded local or regionally-known restaurant located on the water at a key node could be a major asset, even if rent is below-market….
- *Branding and Marketing*. There is a need to focus specifically on raining awareness of the Foss to improve its regional significance. This should involve study of the region to determine how to best distinguish the Foss from other regional attractions in the eyes of both residents and visitors. At this time there is a perception that the Foss is limited to upscale boaters and professionals, with very little interest or awareness among younger generations (e.g., UW students) that can make the area more vital. This effort should be oriented to attracting cross-section of ages; in addition to attracting University-related students, visitors, and faculty, the Foss can attract children and seniors more effectively. This would involve the creation of a full-time programming position within the FWDA to bring a comprehensive approach to managing event and space programming. Immediate efforts should be applied to determining a funding plan for this function….
- *Expedite entitlement timeframe by coordinating the entitlement process with the City*. Currently the development community has expressed frustration with what are perceived to be redundant processes and/or inconsistent direction regarding projects. In particular, developers have expressed concern that City Planning could be more assertive in "going to bat" for improved flexibility in commercial zoning changes—a process that often gets embroiled in State shoreline policy limiting such uses to "water dependent " concepts, which often lack market support. In general, greater flexibility to respond to changing market conditions will provide greater economic value to ground floor commercial uses.[204]"

[203] Economic and financial feasibility assessment were suggested as well, however these have not been carried out yet to our knowledge. These assessments are to include for example: preparing a feasibility analysis of projected development scenarios, providing a financial feasibility Excel model, and creating a 6 year budget projection.
[204] Merrittarch. 2011. Revisiting the Foss Waterway Master Redevelopment Strategy: 2011 Update. Available online at:

Other suggested management actions include evaluating parking alternatives and conducting a detailed parking strategy, seeking additional activities and recreational concepts to attract families with children, creating a public market (such as a farmers market) to attract visitors, and prepare economic and financial feasibility analyses.

http://cms.cityoftacoma.org/cityclerk/Files/CouncilCommittees/Handouts/2012/EDHandouts/ED_20120131handouts.pdf

Figure 20: Vacant lots flanking development along the Thea Foss Waterway.

Management actions may be based on observation of market conditions (or other drivers) instead of formal monitoring and assessment. For example, development at the Thea Foss Waterway (as

elsewhere in the country) has been greatly impacted by the 2008 housing market crash. Even as the housing market has recovered, lending institutions have significantly changed how they do business. Potential developers are now required to invest more of their own capital in a project. As a result, the Thea Foss Waterway Development Authority is finding it harder to leverage the private investor to make significant contributions to the public areas along the Thea Foss Waterway, and will need to change their management of the unsold property as a result.

The role of community and private developers in Post-construction Management

Coastalscape revitalization projects in the Salish Sea region are also managed by private parties and community members both formally and informally. At **Dockside Green in Victoria, B.C.**, the Vancouver City Savings Credit Union (Vancity) released sustainability reports addressing certain aspects of economic, environmental, and social sustainability in the form of a performance assessment. Where Vancity's progress with the Dockside Green has not met their goal, they have come up with remedial management actions. For example, Vancity had committed to providing 46 units of non-market affordable rental units which the Capital Region Housing Corporation would buy at a fixed price with 'cost savings provisions.' Vancity would assume the risk of development, and the project was to be funded by Vancity, CRHC, the City of Victoria, and others. However, the Purchase and Sale and Development Agreements with CRHC were never finalized, so the goal of providing (nominal) funding for affordable housing remains unmet. Vancity suggests it is trying to finalize plans for another solution—this is particularly important, as the Master Development Agreement required an Affordable Housing Strategy[205]. Other management actions include exploring alternative methods of algae control (after populations of crayfish, which eat algae, in the stormwater management system declined) and the somewhat ambiguous "economic challenges" which are being addressed by Vancity[206].

Private parties and community members also manage the Thea Foss Waterway both formally and informally. Formally, a Covenants, Conditions and Restrictions (CCR) agreement was set up by the Thea Foss Development Authority and the system is built into the deed of the property sold to the developer which requires owners to contribute money to the maintenance of the public areas[207]. The maintenance includes routine cleaning and upkeep of public spaces of esplanade and the parks. All of the property owners are part of the agreement, including developers, residents owning property, and the Development Authority itself. As the Development Authority sells more land, its role in the CCR is diminished and the private vote increases. The owners association manages the budget (which all owners contribute money to) to maintain the public areas of the Thea Foss waterway. As full build-out of the Thea Foss site approaches, the owners association may take on an expanded role that includes organizing events and activities that draw people to the waterfront and benefit the coastalscape revitalization project as a whole.

Informally, residents of the Thea Foss have organized themselves—possibly as a natural outgrowth of the district planning, and possibly because the Tacoma Waterfront Association was a natural catalyst. Interested residents have formed groups to address public art and to attract events to the waterfront, among other initiatives. One of the largest citizen-led projects is the Foss Waterway Seaport, a museum

[205] Vancity. 2012. "Dockside Green Annual Sustainability Report 2011."
[206] Vancity. 2010. "Dockside Green Annual Sustainability Report 2009."
[207] CCRs are very hard to remove, often requiring long and expensive legal action. Therefore they are more robust to economic fluctuations than other maintenance models.

dedicated to Tacoma's maritime history. The group has partnered with the Foss Waterway Development Authority, who is providing building space for the museum rent-free while the Seaport group is responsible for ongoing maintenance and the museum's content. Overall, different citizen groups become involved at different points in time (e.g. planning vs. management) according to their interests.

Finally, monitoring and assessment also does not always lead to management action. For example, at the **Olympic Sculpture Park in Seattle, WA**, an assessment of the monitoring data found that the habitat enhancements at the site were working as anticipated, and no management changes were made.

In the Salish Sea region, post-construction management takes many forms. While some projects are managed almost entirely by one entity—Vancity at Dockside Green, for example—others have multiple layers of management. These layers include public management, both voluntary and driven by legislation, and private management[208]. For example, at the Thea Foss development in Tacoma the Thea Foss Development Authority continues to oversee development, the City of Tacoma is responsible for managing the site's ongoing legacy of industrial contamination, while the property owners (condo owners, building owners, and the DA) fund and manage the public spaces. Although this sort of parallel action also occurs in monitoring and assessment—see the parallel Superfund and community opinion monitoring done in Tacoma—the differences between management approaches seems greater than between monitoring or assessment approaches. The Superfund and community opinion monitoring in Tacoma, for example, address very different issues but are both are using defined methods to try to address a question about the site. The management coming from these two lines of inquiry is similar as well; both are using the monitoring and assessment information to make decisions about future site management. However, in the management phase, these two management avenues are joined by other approaches that are not currently science- or inquiry-based.

Steps of the Planning Process

Lessons learned from post-construction monitoring, assessment, and management (collectively referred to as post-construction management) can help inform management of the current project, and future projects as well. Multiple phases of project planning can benefit from lessons learned from post-construction monitoring. A brief overview includes:

- *Visioning*: Visioning allows project managers (frequently with significant input from the community, as in Tacoma and Bellingham[209]) to determine the desired shape and goals of development. Lessons learned from previous projects influence the sphere of possible designs, greatly impacting this stage of planning. For example, the success of the Olympic Sculpture Park's habitat restoration in a heavily urbanized waterfront suggested that habitat enhancement efforts would work elsewhere along Seattle's waterfront. The Seattle Seawall's habitat enhancement efforts were influenced by OSP's success[210].
- *Document existing conditions*: Documenting the existing social, economic, and environmental conditions is critical to understand what changes are needed. This data also provides baseline data for later comparison with post-construction monitoring data to help determine the impact of the project. Attempts at post construction management highlight the importance of

[208] Understanding these layers of management and how they interact in depth, while a worthwhile goal, is beyond the scope of this paper.
[209] See Dyson, Faghin, and Leschine (2013) and Dyson, Ryu, and Leschine (2011).
[210] See Dyson, Faghin, and Leschine (2013)

understanding base conditions. For example, it was difficult for the Green Shores pilot project to evaluate Olympic Village in Vancouver, B.C. as little baseline information was available. However, assessments of the Olympic Sculpture Park and Seattle Seawall were more valid because the monitoring was carried out in a rigorous scientific method; a similar observation would have applied to the Port Townsend dock project had plans for monitoring been funded. Also, understanding what impacts were actually generated by the project (as opposed to which were anticipated) can influence what types of pre-construction monitoring data are collected.

- *Develop project alternatives*: Project alternatives may take the form of competing bids to develop a parcel of land (as in Tacoma and Bellingham) or between different alternatives presented in an Environmental Impact Statement. As in the visioning stage, post-construction management can shape what project alternatives are considered. New projects may be more likely to consider alternatives that have been successful elsewhere in the region.
- *Analyze and Iterate project design*: Planners may iterate a project's design based on feedback from the community and other stakeholders. Post-construction management can help planners understand which stakeholders to engage, and perhaps most importantly, how pre-construction analyses are likely to translate into post-construction success. For example, post-construction audits of Environmental Impact Statements can help highlight where anticipated impacts and actualized impacts overlap; later projects can use this information to better anticipate environmental impacts. Results of previous revitalization projects can help model what might happen in future revitalization projects, which provides important information for planners analyzing and choosing between different project designs[211].
- *Project adoption and implementation*: At this stage in the planning process, a design is chosen and constructed. Lessons learned from post-construction management elsewhere can inform selection criteria, inform construction techniques, and help avoid unintended impacts.
- *Post-construction monitoring, assessment, and management*: Monitoring and assessment design from successful projects can be adapted for use in subsequent projects, if appropriate. New projects can also gain cautionary tales; without monitoring and assessment, it is difficult or impossible to know how well a project (experiment, really) worked. The Port Townsend dock is a good example of this. Setting aside funding or securing funding is therefore integral to success.

These steps represent a 'typical' planning flow based on our personal observation with coastalscape revitalization projects in the Salish Sea region. However, other planning models may also benefit from lessons learned from previous projects through post-construction management. Such lessons learned have also lead to the creation of 'best practices,' some of which are discussed in the next section.

[211] Whitehead, Tim, David Simmonds, and John Preston. 2006. "The effect of urban quality improvements on economic activity." *Journal of Environmental Management* 80 (1): 1–12.

III. Post-Construction Monitoring, Assessment and Management "Best Practices"

Observations of post-construction management of coastalscape revitalization projects—and more broadly, urban regeneration—has led to recommendations concerning pre- and post-construction management. Here, we discuss a number of these recommendations and 'best practices.' However we also note that suggesting 'best practices' implies that a certain planning theory or framework is being used by which 'best' is measured. Therefore, we conclude with a brief overview of planning theory, and how the post-construction management ideas discussed in this paper fit into this broader context.

Many best practices focus on how to better design coastalscape revitalization projects[212], and the literature expounds the benefits of new land use planning concepts like green developments and New Urbanism. However, "the success of a design is determined by what happens during the construction and post-construction phases of a… project. These two phases are often ignored in land use planning and given only minimal attention by built environment professionals. As a result… developments may not be functioning as originally intended.[213]" Further, "For development to be truly sustainable, organization and post-construction management may need as much attention as physical design.[214]" Here, we focus on how to plan for successful post-construction management by highlighting recommendations from the literature and our Salish Sea case studies.

Monitoring Best Practices

Monitoring forms the basis for post-construction assessment and management of coastalscape revitalization projects. Monitoring is necessary to understand if systems (buildings, waterfront revitalization projects, etc. perform as designed[215]. Unfortunately, the failure rate of monitoring programs is very high, and there is a history of poorly planned and unfocused monitoring programs that are either ineffective or fail completely[216]. Problems include 1) being driven by short-term funding opportunities or political directive ("rather than being under- pinned by carefully posed questions and objectives") 2) hampered by poor design that doesn't take advantage of statistician's expertise and 3) design is "often prefaced by protracted and unresolved arguments about what to monitor" which often results in monitoring everything poorly (instead of monitoring a few things relevant to the crucial question well)[217].

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[212] For example, Dyson et al. (2013) examined evaluation and monitoring frameworks used to design coastalscape revitalization projects in the Salish Sea region, along with the benefits of using these frameworks.
[213] Hostetler, M., 2010. Beyond design: The importance of construction and post-construction phases in green developments. *Sustainability*, 2(4), pp.1128–1137.
[214] Hostetler, M. E., and K. Noiseux. 2010. Are green residential developments attracting environmentally savvy homeowners*? Landscape and Urban Planning*. 94: 234–243.
[215] Roberts P, Sykes H, editors. 2000. Urban regeneration. London, Sage.
[216] Lindenmayer, David B, and Gene E Likens. 2009. "Adaptive monitoring: a new paradigm for long-term research and monitoring." *Trends in Ecology \& Evolution* 24 (9): 482–486.
[217] Lindenmayer, David B, and Gene E Likens. 2010. "The science and application of ecological monitoring." *Biological Conservation* 143 (6): 1317–1328.

As a result, a large portion of the recommendations made pertain to monitoring. Recommendations for monitoring include:

- Allocating adequate resources (human and fiscal) to complete monitoring. Many monitoring programs are either never started (e.g. Tacoma job creation) or are abandoned (e.g. Port Townsend) due to lack of human and fiscal resources. Without these basic inputs to get started, a monitoring program never has a chance to produce relevant data. Without this monitoring, data, it is very difficult (or impossible) to understand how the project has performed. In Port Townsend, the dock meant to be an innovative test of new dock building techniques on seagrass instead became a $1.5 million experiment without any results for want of $150,000 to fund follow up monitoring.
- Understanding the economic, social, and environmental characteristics of the area can help planners know what potential issues might arise when the project is built[218]. A straightforward example includes knowing to look for industrial waste at a brownfield site (e.g. Tacoma); however anticipating gentrification, displacement of certain social or economic groups, and other complex interactions that will need abatement and post-construction monitoring are very important.
- Have a clear goal for monitoring. Simply carrying out monitoring for its own sake is likely to waste scarce resources and produce data that isn't useful for post-construction assessments and management. This includes having a framework assigning responsibility for monitoring to the appropriate parties; in Tacoma, the Superfund monitoring is split between the Utilities and the City of Tacoma based on geographic criteria.
- Treat monitoring as a scientific research endeavor: "Some members of the scientific community have traditionally viewed monitoring as a management activity that is unrelated to scientific research. However, many other authors, including us, have argued that well- conceived and well-executed monitoring is an important component of long-term scientific research programs and, as such, is very useful to natural resource managers and policymakers…. the features of good science and, hence, good research are often the same features that characterize good monitoring and good environmental management." This includes investing in a good monitoring study design and consulting with statisticians and other scientists as necessary. Port Townsend had a well-developed monitoring and assessment plan in place before their funding fell through.
- Conduct a pilot study to verify that data collection is feasible and appropriate[219].
- Develop good questions that are appropriate for the project, the community, and the types of post-construction assessment and monitoring that are envisioned. Developing a conceptual model of the system may help when developing questions, along with collaboratively working with scientists, statisticians, policymakers, and other stakeholders[220].

[218] Wolf, Charles P. 1983. Social Impact Assessment: Methodological Overview. In *Environmental Impact Assessment*, 253–279. Springer.

[219] See: Jackson, L. E., J. Kurtz, and W. S. Fisher. 2000. "Evaluation guidelines for ecological indicators." U.S. Environmental Protection Agency Office of Research and Development. EPA/620/R-99/005.

[220] Lindenmayer, David B, and Gene E Likens. 2009. "Adaptive monitoring: a new paradigm for long-term research and monitoring." *Trends in Ecology \& Evolution* 24 (9): 482–486.
Lindenmayer, David B, and Gene E Likens. 2010. "The science and application of ecological monitoring." *Biological Conservation* 143 (6): 1317–1328.

- Previous results can be used to model what might happen in a future revitalization project. However, for this to be effective, there must be good data collection in order to provide reliable model inputs[221]. For example, economic models, such as input-output models or the DELTA/START framework, exist in the literature and are frequently used. Social, economic, and environmental models could also be integrated into a multi-criteria analysis to help planners decide between different coastalscape revitalization project designs[222].

Overall, successful monitoring programs should:

> "(i) address well-defined and tractable questions that are specified before the commencement of a monitoring program; (ii) be underpinned by rigorous statistical design; (iii) be based on a conceptual model of how an ecosystem might work or how the components of an ecosystem that are targeted for monitoring (e.g. a population) might function; and (iv) be driven by a human need to know about an ecosystem[223] (e.g. the effects of a pollutant or changes in climate)so that they 'pass the test of management relevance.'[224]"

With this in mind, Lindenmayer et al. (2011)[225] suggest adopting an 'adaptive monitoring' framework for monitoring (Figure 18). They define adaptive monitoring as:

> "a monitoring program in which the development of conceptual models, question setting, experimental design, data collection, data analysis, and data interpretation are linked as iterative steps. An adaptive monitoring program is one that can evolve in response to new questions, new information, situations or conditions, or the development of new protocols but this must not distort or breach the integrity of the data record. The adaptive monitoring approach can be applied to all kinds of monitoring including question-driven, passive and mandated monitoring programs.[226]"

Importantly, steps (question setting, experimental design, data collection, analysis, and interpretation) are iterative. This means that managers and planners of coastalscape revitalization projects can change questions when the original questions have been answered or new questions emerge; can change frequency or type of data collection if conditions dictate; and can adapt new protocols when new technology emerges (only if integrity of data series is not compromised). Further,

> "the adaptive monitoring paradigm does not lead to a set of highly specific prescriptions that can be applied uncritically to any given monitoring program. Rather, its specific application will be context dependent and will vary in response to the particular

[221] Whitehead, Tim, David Simmonds, and John Preston. 2006. "The effect of urban quality improvements on economic activity." *Journal of Environmental Management* 80 (1): 1–12.
[222] E.g. Camoin. 2006. "Development Impacts & Benefits Study: Local Waterfront Revitalization Program City of Watertown."
[223] Or more broadly, the local social, economic, and environmental conditions.
[224] Lindenmayer, David B, and Gene E Likens. 2009. "Adaptive monitoring: a new paradigm for long-term research and monitoring." *Trends in Ecology \& Evolution* 24 (9): 482–486.
[225] Lindenmayer, David B, Gene E Likens, Andrew Haywood, and Lee Miezis. 2011. "Adaptive monitoring in the real world: proof of concept." *Trends in ecology \& evolution* 26 (12): 641–646.
[226] Ibid.

problem to be resolved, the questions being posed and the composition and ecological processes of particular eco- systems.[227]"

Key lessons for being successful with this approach include: recognizing the inter-relationship between management and adaptive monitoring in that new monitoring insights will change management practices; the need to clearly explain to policy-makers what adaptive monitoring is and distinguish it from post-hoc 'reactive' monitoring; and to form collaborative partnerships with involved stakeholders. Key barriers include convincingly explaining the value of monitoring and what is lost when monitoring is not completed, forming effective partnerships.

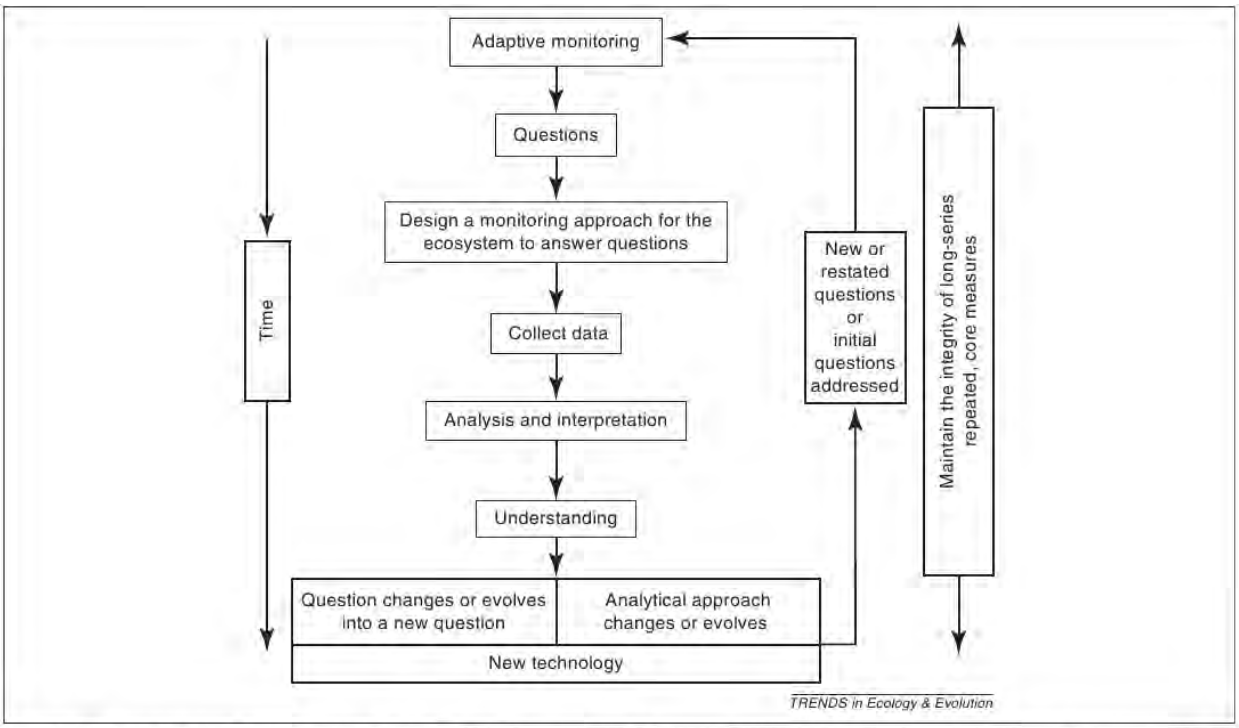

Figure 1. Adaptive monitoring framework (redrawn from [1]) highlighting key steps that enable a monitoring program to evolve in response to new questions, new information, or the development of new protocols.

Figure 21: Diagram of the adaptive monitoring framework from Lindenmayer et al. (2011)[228].

What Lindenmayer et al. (2011)[229] unfortunately don't discuss is how to finance an 'adaptive monitoring' endeavor. Coastalscape redevelopment projects will need to be creative in balancing their monitoring effort against the resources that are available. What are the most important data to gather for the projects' post-construction assessment and management goals? Can private money or citizen scientists be leveraged to provide critical information? Grants and other forms of government funding have been the traditional answer; the monitoring at Olympic Sculpture Park was funded with a combination of grants from King County and the Washington State Estuary and Salmon Restoration Program. However, government agencies often have trouble allocating funds for post-construction monitoring, as their

[227] Lindenmayer, David B, and Gene E Likens. 2009. "Adaptive monitoring: a new paradigm for long-term research and monitoring." *Trends in Ecology \& Evolution* 24 (9): 482–486.
[228] Lindenmayer, David B, Gene E Likens, Andrew Haywood, and Lee Miezis. 2011. "Adaptive monitoring in the real world: proof of concept." *Trends in ecology \& evolution* 26 (12): 641–646.
[229] Ibid.

constituents (politicians and tax payers) frequently place more emphasis on new projects than monitoring completed ones.

A model for Adaptive Monitoring for coastalscape projects might look like the following as shown in Figure 22.

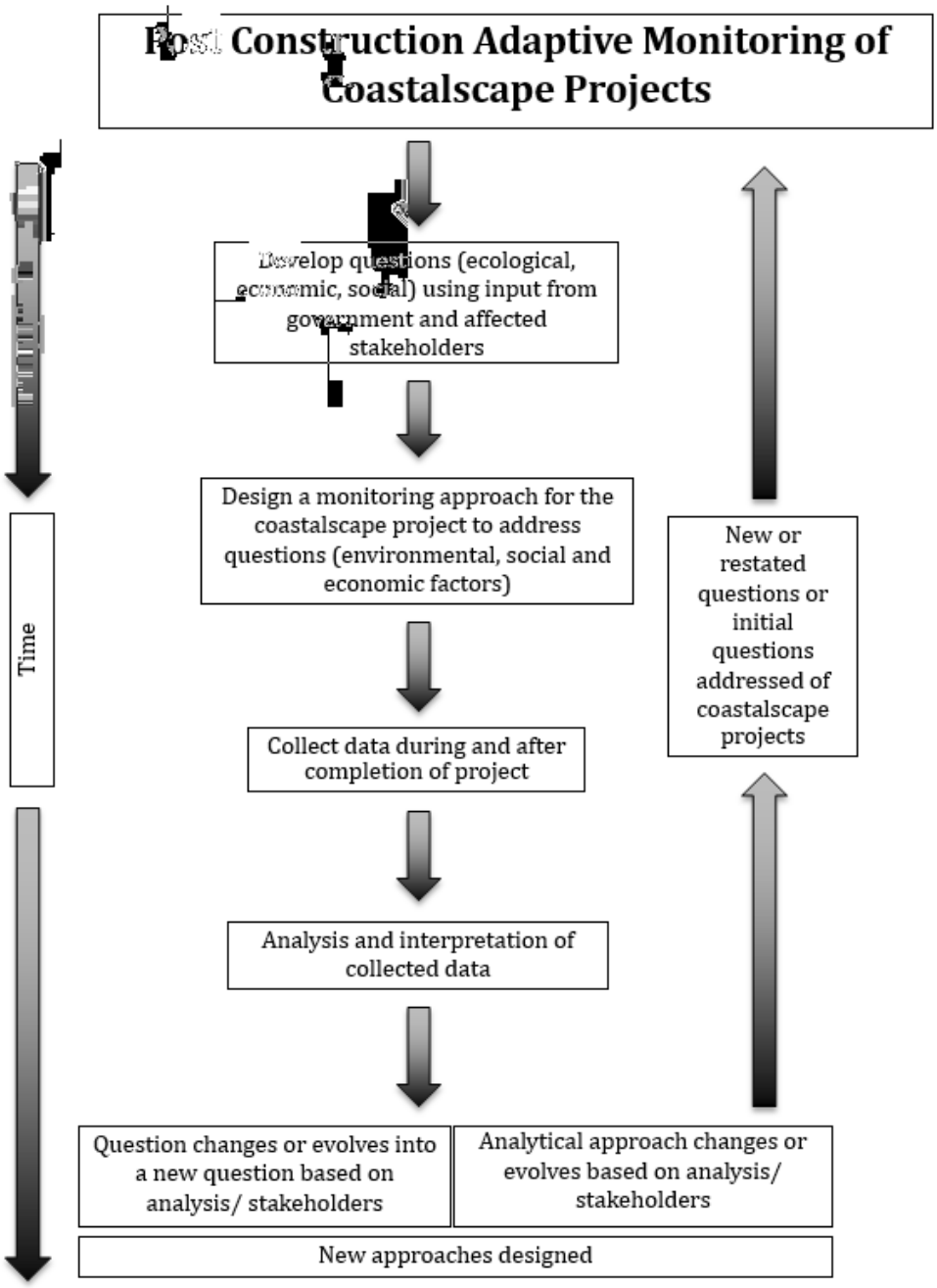

Figure 22 – Coastalscape Adaptive Monitoring Framework

Assessment Best Practices

Assessments take monitoring data and suggests a path of action for post-construction management[230]. Perhaps the most important 'best practice' is to conduct post-construction assessments (economic, environmental, and social) of coastalscape revitalization projects. While it is difficult to measure or establish benefits from urban regeneration—due to the problem of the counterfactual case—post-construction assessment of coastalscape revitalization projects is one of the best ways to learn how well the project has fulfilled pre-development goals, including LEED ND or Green Shores guidelines. Here we discuss some methods used in the literature (often for pre-construction assessments) that may be useful for post-construction assessments. In the Salish Sea region, multiple coastalscape revitalization projects lacked assessments, and were unable to draw conclusions about the efficacy of certain approaches and policies. In most cases, including Port Townsend (seagrass) and Tacoma (jobs), this was due to lack of monitoring data.

While many assessments focus on one set of goals (social, economic, environmental, etc.), ideally coastalscape revitalization projects interested in sustainability should use assessment methods that address multiple goals. Such methods have been used elsewhere in the literature and could also be useful for assessments of coastalscape revitalization projects, pre- and post-construction. These methods can supplement those discussed in the 'Assessment' section above. These include:

- *Multi-criteria decision analysis or evaluation*: Multi-criteria decision analysis[231] (also called multi-criteria evaluation or analysis) is a form of integrated decision making that is "an operational evaluation and decision support approach that is suitable for addressing complex problems featuring high uncertainty, conflicting objectives, different forms of data and information, multi interests and perspectives, and the accounting for complex and evolving biophysical and socio-economic systems.[232]" MCE allows "a number of revitalization factors to be assessed at once by prioritizing and ranking them, then weighting each factor and combining all factors into an index scale, which can be used to interpret need for urban revitalization.[233]"
  While most commonly used as a tool to decide between different coastalscape revitalization projects or project designs, the approach can also be adapted to evaluate a project post-construction on a diverse set of criteria[234]. This approach is particularly useful when the project's goals include a complex mix of economic, social, and environmental objectives and assigning monetary values is difficult or impossible. In these cases, a retrospective cost-benefit analysis (for example) is not very useful. A mix of quantitative and qualitative measures of the projects' outputs can be compared with the costs incurred to build the project[235]. MCDA/MCE is a flexible

[230] E.g. Wolf, Charles P. 1983. Social Impact Assessment: Methodological Overview. In *Environmental Impact Assessment*, 253–279. Springer.
[231] MCDA or MCE is a fairly large field; the Journal of Multi-Criteria Decision Analysis deals with the subject exclusively.
[232] Wang, J. J., Jing, Y. Y., Zhang, C. F., & Zhao, J. H. 2009. Review on multi-criteria decision analysis aid in sustainable energy decision-making. *Renewable and Sustainable Energy Reviews*, *13*(9), 2263-2278. Available online at: http://www.sciencedirect.com.offcampus.lib.washington.edu/science/article/pii/S1364032109001166
[233] Synder, M, Jino Distasio, and Salah Hathout. 2006. "The use of spatial and non-spatial analysis for evaluating the need for urban revitalization in Winnipeg." *Prairie Perspectives* 9 (1): 143–68.
[234] Europe Commission EuropeAid. Multi-Criteria Analysis.
http://ec.europa.eu/europeaid/evaluation/methodology/examples/too_cri_res_en.pdf
[235] Roberts P, Sykes H, editors. 2000. Urban regeneration. London, Sage; p219

approach that can be adapted to different purposes or projects. The Urban Regeneration Model (based on UK Treasury guidelines) is one example[236].

- *Balanced Scorecard Approach*: Created in the early 1990s[237], the Balanced Scorecard approach was originally applied in businesses and later adapted to assess public authorities such as the Thea Foss Development Authority. The approach was created "with the purpose of integrating all former performance evaluation systems into a balanced method. The reasons were that if on the one hand a financial analysis alone would lead to good financial results, on the other hand these could be hiding a deficient organization and consequently poor future results.[238]" While the BCA is "based on the definition of a set of performance indicators under four perspectives (financial, customer, internal processes and learning and growth)," these categories could easily be altered to fit the needs of a coastalscape revitalization project. The approach could then be used to combine multiple assessments or points of view about coastalscape revitalization projects. This assessment method is also a management tool, as it allows planners and managers to learn about the performance levels of their organization/project and identify areas that require urgent attention[239]. However, "weighted variables must be used so as to avoid simplistic analysis; the results of benchmarking implementation are not immediate and easily tangible; and, finally, the outcomes might not be pleasant and can change the status quo in the organization (Marques and Witte, 2010).[240]"
- Mixed methods and triangulation

Both of these approaches are amenable to triangulation and mixed method approaches using both quantitative and qualitative analyses. Further, these are certainly not the only other methods that might be useful; books like *Sustainable Urban Development: The environmental assessment methods*[241] provide more information. Even rough analyses can be useful; in Dockside Green's case although the assessment lacked quantitative data the assessment fulfilled the monitoring requirements of the development agreement.

Importantly, comparing a pre-development assessment—for example, an EIS or input/output model estimating project impacts—with a post-development audit can help determine how well the pre-

[236] Roberts P, Sykes H, editors. 2000. Urban regeneration. London, Sage; p219

[237] Kaplan and Norton 1992 and 1993 (goals and objectives) and 1995 (strategy maps) and 2001 (strategic management); most recently Kaplan and Norton 2004.
Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard: measures that drive performance. *Harvard Business Review, JanuaryuFebruary,* pp. 71&80.
Kaplan, R. S., & Norton, D. P. (1993). Putting the balanced scorecard to work. *The performance measurement, management and appraisal sourcebook*, 66-79.
Kaplan, R. S., & Norton, D. P. (2001). Transforming the balanced scorecard from performance measurement to strategic management: Part I. *Accounting horizons*, *15*(1), 87-104.
Kaplan, R. S., & Norton, D. P. (2004). Measuring the strategic readiness of intangible assets. *Harvard business review*, *82*(2), 52-63.

[238] Guimarães, B., Simões, P., & Marques, R. C. (2010). Does performance evaluation help public managers? A Balanced Scorecard approach in urban waste services. *Journal of environmental management*, *91*(12), 2632-2638.

[239] Ibid.

[240] Ibid.

[241] Curwell, S. R., Deakin, M., & Symes, M. (Eds.). (2007). *Sustainable Urban Development Volume 2: The Environmental Assessment Methods* (Vol. 2). Taylor & Francis.

development assessment predicted the actual impacts of the project[242]. The need for such follow-up is recognized in the literature to understand the uncertainties inherent in planning and decision making, and some objectives of follow-up are to:

- "provide information about the consequences of an activity (for instance, conformance with EIS predictions or environmental performance of the activity) and check compliance with implementation requirements;
- enhance scientific knowledge about environmental systems, cause–effect relationships, mitigation measures, construction techniques and so on;
- improve the quality of the methods and the techniques used in EIA, and make it more cost-effective;
- improve public awareness about the actual effects of development projects on the environment, thereby legitimizing the consent decision and justifying the continuation of the activity; and
- maintain some decision-making flexibility by affording explicit opportunities to intervene in developments when changes in the activity, or in the environmental and socio-political environment warrant (that is, an adaptive management approach). [243]"

Community participation and integrating local community issues are both important. Existing monitoring data may be able to be repurposed to perform these follow-up assessments to reduce costs. Citizens can also be involved in environmental assessment follow-up efforts[244].

Management Best Practices

As with monitoring and assessment, few instances of post-construction management exist in Salish Sea region coastalscape revitalization projects frequently due to lack of resources. There are two aspects of post-construction management worth discussing here—making post-construction management decisions and enforcing pre-construction project requirements.

Adaptive management is possibly the most well-known and well-regarded approach to post-construction management. It is used by many restoration projects and organizations[245] to assist in

[242] Most EIAs done prior to construction; many ecological assessments done prior to restoration work (e.g. Morley, S. A., & Karr, J. R. (2002). Assessing and restoring the health of urban streams in the Puget Sound Basin. *Conservation Biology*, *16*(6), 1498-1509.
or Ehrenfeld, J. G. (2000). Evaluating wetlands within an urban context. *Ecological Engineering*, *15*(3), 253-265.)

[243] Arts, J., Paula Caldwell, and Angus Morrison-Saunders. 2001. Environmental impact assessment follow-up: good practice and future directions—findings from a workshop at the IAIA 2000 conference, Impact Assessment and Project Appraisal, 19:3, 175-185. Available online at: http://www.tandfonline.com.offcampus.lib.washington.edu/doi/pdf/10.3152/147154601781767014; see also Tomlinson, P., & Atkinson, S. F. (1987). Environmental audits: a literature review. *Environmental monitoring and assessment*, *8*(3), 239-261 and Dipper, B. (1998). Monitoring and post-auditing in environmental impact assessment: a review. *Journal of Environmental Planning and Management*, *41*(6), 731-747.; also Wood, G. (1999). Post-development auditing of EIA predictive techniques: a spatial analytical approach. *Journal of Environmental Planning and Management*, *42*(5), 671-689. for a spatial analysis perspective.

[244] Hunsberger, C. A., Gibson, R. B., & Wismer, S. K. (2005). Citizen involvement in sustainability-centred environmental assessment follow-up. *Environmental Impact Assessment Review*, *25*(6), 609-627.

[245] E.g. Large restoration projects: http://www.evergladesplan.org/pm/program_docs/adaptive_mgmt.aspx and the U.S. Department of the Interior: http://www.doi.gov/initiatives/AdaptiveManagement/

complex land management decisions in the face of uncertainty. Adaptive management is most useful when: "management choices are available, there is an opportunity to apply learning, management objectives can be identified… uncertainty can be expressed in testable models and a monitoring system can be established to reduce uncertainty.[246]" Overall, it is a method to link science and decision making suitable for use with coastalscape revitalization projects.

The literature also points out that sometimes management by individual property owners can compromise the original sustainability goals of a project: "There must be consistent, appropriate management of both built and conserved areas. However, evidence suggests that homeowners, even within green developments, do not understand the function of conserved natural areas and are not aware of appropriate management practices to maintain environmental features within yards and homes.[247]" Owners of homes/condos/apartments and those managing shared areas often make decisions negatively impacting sustainability including: excessive irrigation, excessive fertilization and pesticide use, spread of invasive plants and animals, replace native landscaping with exotics, improper management of Low Impact Development (LID) features such as failing to clean and maintain them, allowing foot-traffic and other disturbances to enter conserved areas, feeding wildlife or otherwise promoting human/wildlife conflict, and failing to support local natural area management practices[248].

While frequently a concern with green suburban development, this problem may be encountered anytime the community must be relied on to maintain sustainable infrastructure—such as through a CCR agreement like the one in Tacoma's Thea Foss Waterway.

To prevent these and other similar issues, planners and managers need to pay more attention to detail in the post-construction phase (as well as pre-construction and during construction). Long-term management and education programs are one potential solution, as is creating voluntary incentive-based policies encouraging appropriate continued post-construction management. However, both of these solutions are associated with costs to the developers, the City, etc. Further, incentive based programs can fail if policies are "developed without the involvement of important stakeholders and the incentives are not viewed as true incentives for affected parties," or if they are implemented "without marketing or education plans… because the private sector is not aware of them" and therefore does not take advantage of them[249]. Other recommendations appropriate for coastalscape revitalization include:

1. "Creation of strict Codes, Covenants, and Restrictions (CCRs) that address environmental practices and long-term management of yards, homes, and neighborhoods. These CCRs should describe environmental features installed on lots and shared spaces and appropriate measures to maintain these. An example of an environmental CCR can be found at http://edis.ifas.ufl.edu/uw248.
2. Development and installation of an on-site education program that includes educational kiosks along primary walkways and a Web site that provides detailed information about local environmental and conservation issues. An example can be found at

[246] Williams, Byron, Robert Szaro, and Carl Shapiro. 2009. Adaptive Management. The U.S. Department of the Interior Technical Guide. Available online at: http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf
[247] Hostetler, M. 2010. Beyond Design: The Importance of Construction and Post-Construction Phases in Green Developments. Sustainability Vol. 2 pp 1128-1137.
[248] Ibid.
[249] Ibid.

www.wec.ufl.edu/extension/gc/harmony/. This type of education program can impact homeowner knowledge, attitudes, and behaviors.

3. Establishment of a homeowner association that includes a sub-group to oversee conservation issues associated with built and conserved areas.
4. Creation of a funding source to help with the management of natural areas. Funds can be collected from homeowner association dues, home sales (even resales), and the sale of large, natural areas to land trusts with some of the funds retained for management.
5. 5. Hiring a landscaping company that understands environmental management techniques for shared common areas, such as stormwater retention ponds, forested areas, and riparian buffers.[250]"

As seen in Tacoma, CCRs are already implemented in coastalscape revitalization projects and all of these suggestions could be implemented without major changes to how coastalscape revitalization projects are currently managed.

Enforcement of pre-construction requirements is another issue requiring the attention of coastalscape revitalization planners and managers. In their analysis of state subsidy programs, Mattera et al (2011; 2012)[251] noticed that many states that collected monitoring data for their programs failed to act on this information and carry out enforcement measures. Further, reported data is not verified by state agencies or a third party in 31% of the programs with reporting requirements. Nevertheless, planners and managers need to ensure that public money (funded by taxpayers) spent benefits the public, and not just private interests. To this end, policy recommendations include:

1. "All recipients in all programs should be required to report to agencies on job creation, wages, benefits and other performance benchmarks. Recipient reporting data should be disclosed online at least annually as part of a state's disclosure system.
2. All reported information should be verified by agencies using techniques such as auditing and cross-checking of company claims against separate reliable data sources such as unemployment insurance records.
3. Agencies should penalize recipients found to be out of compliance, employing techniques such as recapture (claw-backs), recalibration of future benefits and rescission/termination of subsidy agreements. Programs that are performance- based should operate without penalties only if recipients are required to fulfill all programs requirements before receiving any subsidies.
4. Penalty systems should be straightforward and consistent and not weakened by various exceptions or by giving agency officials discretion on whether to implement them.

[250] Hostetler, M. 2010. Beyond Design: The Importance of Construction and Post-Construction Phases in Green Developments. Sustainability Vol. 2 pp 1128-1137.

[251] Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2011. Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.

Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2012. Money Back Guarantees for Taxpayers: Clawbacks and other Enforcement Safeguards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.

5. Agencies should publish detailed data on their enforcement activities, including the names of the recipients found to be non-compliant and those penalized (including the penalty amounts).[252]"

Specifically for economic or job creation incentives, suggestions include:

- "Every economic development program should contain job creation, job retention or training requirements.
- Each of those requirements should be strengthened by provisions barring employers from shifting existing jobs from other facilities and mandating that the jobs be kept in place for a minimum period of time—preferably for at least the duration of the subsidy (e.g., the number of years a tax break is allowed).
- Every job or training position in a subsidized facility should be subject to a wage requirement, preferably tied to dynamic labor market averages (rather than a fixed amount or a poverty rate) and structured in a way that raises wages at subsidized firms above existing market levels. Those requirements should be posted in the subsidized workplace, the way that federal minimum wage rules have t0 be displayed.
- Those jobs and training positions should also offer a package of employee benefits, including healthcare coverage in which the employer contributes to the cost 0f the premium.
- Wage and benefit requirements should be applied not only to full-time, permanent employees but also to part-time, temporary and contract workers. Job quality standards covering direct employees should not create a perverse incentive for contingent employment.[253]"

Implementing these policies in coastalscape revitalization projects could help make developers more accountable for pre-development promises (e.g. Tacoma's Thea Foss developers suggest they will encourage a certain number of jobs, but this is not followed up) and may result in coastalscape revitalization projects that are more beneficial for the community at large.

It is interesting, though perhaps not surprising, to note that much of the best practices advice offered in the literature focuses on increasing the use of the scientific method in post-construction management. This advances an important question central to good management of coastalscape revitalization projects: is science-based monitoring, assessment, and management the best way to manage coastalscape revitalization projects? What strengths and failings does this framework have? Are there other frameworks better suited to planning and managing coastalscape revitalization projects? The next section in part addresses these questions by exploring common planning frameworks.

Planning theory in practice

Coastalscape revitalization planning could benefit from the planning theory literature. The planning theory literature provides a framework to understand the current state of coastalscape revitalization

[252] Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2012. Money Back Guarantees for Taxpayers: Clawbacks and other Enforcement Safeguards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.

[253] Mattera, P., Cafcas, T., McIlvaine, L., Seifter, A., and Tarczynska, K. 2011. Money for Something: Job Creation and Job Quality Standards in State Economic Development Subsidy Programs. Good Jobs First Technical Report; Washington D.C.

planning, and provides critiques of current coastalscape revitalization planning useful for planning future projects. Currently, coastalscape revitalization projects are frequently planned without thinking about the philosophy and moral and cultural norms that underpin planning decisions. These can have a profound impact on stakeholder groups, so it is important that coastalscape revitalization planners understand how their approach to planning will impact different stakeholders.

Many different planning theories underlie current planning policies and practices for coastalscape revitalization projects. Each has advantages and disadvantages, and the conscious or unconscious choice of planning framework has real-world implications regardless if they are intended. Here, we provide an overview of some of the important planning theories in the context of coastalscape revitalization, and discuss some of the benefits and drawbacks of each theory[254].

The comprehensive rational planning model is the oldest of the planning theories, and was for a long time the dominant planning model[255]. It sees planning as a scientific-technical process, where planners proceed through a series of steps to arrive at the 'best' planning solution[256]. Banfield (1955; 1959)[257] highlighted five steps: determining project goals, creating different design alternatives, comparing the consequences of different designs, choosing between designs, and implementation of the chosen design. Key critiques include the impossibility of obtaining enough information to choose the 'best' planning solution, inability to achieve objective goals, the assumption of a single set of goals for the public interest, and the inability for planners to be truly 'comprehensive.' Moreover, decision makers tended to ignore planners' suggestions and instead accede to the requests of powerful, well connected stakeholders[258]. In comprehensive rational planning, there is no defined role for local people and stakeholders without power. However, despite decades of critique, the central logic remains in many planning processes.

A number of new planning models arose in response to Alan Altshuler's[259] critiques of the comprehensive rational planning mode and other objections to top-down, expert-driven planning. One of the most prominent (and enduring) of these was the communicative planning model[260].

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[254] This book provides a broad overview of planning theory useful to readers looking to familiarize themselves with common planning theories: Allmendinger, P. (2009). *Planning theory*. Basingstoke: Palgrave MacMillan.

[255] Alexander, E. R. (1984). After rationality, what? A review of responses to paradigm breakdown. *Journal of the American Planning Association*, *50*(1), 62-69.

[256] Ibid.

[257] Banfield. Edward C. 1955. "Note on a Conceptual Scheme," in Politics, Planning and the Public Interest, by Edward C. Banfield and Martin Meyerson. Free Press.
Banfield. Edward C. 1959. "Ends and Means in Planning." International Social Science Journal. 11.

[258] 1965 doctoral thesis by Alan Altshuler (Altshuler, A. A. (1965). *The city planning process: A political analysis* (p. 1). Ithaca, NY: Cornell University Press.); also Lawrence, D. P. (2000). Planning theories and environmental impact assessment. *Environmental Impact Assessment Review*, *20*(6), 607-625.

[259] Innes, J. E. (1996). Planning through consensus building: A new view of the comprehensive planning ideal. *Journal of the American Planning Association*, *62*(4), 460-472.

[260] See for more information about collaborative planning: Innes, J. E. (1996). Planning through consensus building: A new view of the comprehensive planning ideal. *Journal of the American Planning Association*, *62*(4), 460-472.
Healey, P. (2003). Collaborative planning in perspective. *Planning theory*, *2*(2), 101-123.
Healy, P. (1997). *Collaborative planning: Shaping places in fragmented societies*. UBC Press.
Margerum, R. D. (2002). Collaborative Planning Building Consensus and Building a Distinct Model for Practice. *Journal of Planning Education and Research*, *21*(3), 237-253.
Forester, J. (1999). *The deliberative practitioner: Encouraging participatory planning processes*. The MIT Press.

Communicative planning is based on Habermasian communicative rationality[261] as interpreted by Forester and "emphasizes the planner's role in mediating among 'stakeholders' within the planning situation.[262]" In communicative planning theory, "the planner's primary function is to listen to people's stories and assist in forging a consensus among differing viewpoints. Rather than providing technocratic leadership, the planner is an experiential learner, at most providing information to participants but primarily being sensitive to points of convergence, Leadership consists not in bringing stakeholders around to a particular planning content but in getting people to agree and ensuring that whatever the position of participants within the social-economic hierarchy, no group's interest will dominate.[263]" Like comprehensive rational planning, however, multiple criticisms have been leveled at communicative planning. A key critique is that communicative planning is "more likely to support a neoliberal agenda than resist it" and that communicative planning can be co-opted to provide the appearance of democracy while not posing a fundamental challenge to the existing power structure[264]. In other words, like rational planning, those who already have power will continue making important planning decisions[265]. Practically, the communicative turn in planning has not decisively created a new paradigm, but it has changed how planning is understood. Questions of power, rationality, agency, and values are now considered within the planning sphere[266].

Other planning theories suggested in the last 50 years include: transactive planning (Friedmann), American pragmatism (Dewey and Rorty), New Urbanism (Calthorpe and Duany), and the just city (Fainstein)[267]. Each approach to planning has advantages and disadvantages, implications for power relations and social justice in the city.

Current coastalscape revitalization projects occupy a complex regulatory, planning, and management landscape which planners and managers must navigate[268]. Many relevant laws/guidelines are rooted in rational planning amended by public involvement and communicative planning[269]—examples include NEPA and SEPA. The charrette of New Urbanism also make an appearance in coastalscape revitalization design; see for example planning examples in Bellingham. **Urban planners and project managers need to examine the assumptions and framework they are working under to understand the potential impacts of their choice (conscious or not) on those stakeholders impacted by the proposed**

Forester, J. (2006). Making participation work when interests conflict: Moving from facilitating dialogue and moderating debate to mediating negotiations. *Journal of the American Planning Association*, *72*(4), 447-456.
Innes, J. E., & Booher, D. E. (2010). *Planning with complexity: an introduction to collaborative rationality for public policy*. Routledge.

[261] E.g. Habermas, Jurgen. 1984. The Theory of Communicative Action. Boston, MA: Beacon Press

[262] Fainstein, S. S. (2000). New directions in planning theory. *Urban affairs review*, *35*(4), 451-478.

[263] Ibid.

[264] Purcell, M. (2009). Resisting neoliberalization: communicative planning or counter-hegemonic movements? *Planning Theory*, *8*(2), 140-165.

[265] Fainstein, S. S. (2000). New directions in planning theory. *Urban affairs review*, *35*(4), 451-478.

[266] Richardson, Tim. 2005. "Environmental assessment and planning theory: four short stories about power, multiple rationality, and ethics." *Environmental impact assessment review* 25 (4): 341–365.

[267] Fainstein, S. S. (2000). New directions in planning theory. *Urban affairs review*, *35*(4), 451-478.

[268] Lawrence DP. Planning theories and environmental impact assessment. Environ Impact Asses Rev 2000;20: 607– 25.

[269] Richardson (2005) has a well written exploration of environmental assessment and planning theory.

coastalscape revitalization project. Questions of power, moral judgments, and ethics must be addressed in coastalscape revitalization projects[270].

[270] Flyvbjerg, B. (2002). Bringing Power to Planning Research One Researcher's Praxis Story. *Journal of Planning Education and Research*, *21*(4), 353-366.

IV. Summary and Conclusion

When we began this research, we expected to find numerous examples of post-construction monitoring, assessment and management for all aspects of sustainability (social, economic, and environmental—though we suspected that environmental would be most common). Based on prior research and the number of pre-construction evaluation programs that were involved, we expected follow up assessments to follow construction. Instead, what we found is that in the Salish Sea region, as is common elsewhere, project design and attending pre-construction forecasts receives more emphasis than post-construction management. This is unfortunate, given the potential benefits from post-construction management. Additionally, while many projects cite economic concerns and job creation as motivating factors, *we found almost no attempt to measure economic project outcomes*.

However, while we found more information about project design case studies in the Salish Sea region than post-construction management, examples do exist:

- In Tacoma, post-construction management of the Thea Foss waterway is fragmented. Mandated environmental monitoring, assessment, and management are required to track sediment contamination, a relic of the site's industrial history. Social post-construction management has focused on stakeholder opinion of how development is proceeding. However, while economic monitoring efforts have been stymied due to lack of personnel and funding at the Thea Foss Development Authority, management of the remaining parcels has changed due to macroeconomic shifts.
- Similarly, at the Olympic Village development in Southeast False Creek, Vancouver, B.C., mandated environmental post-construction monitoring and assessment has found increasing fish populations. While there has been no post-construction monitoring for economic or social impacts, the Vancouver Planning Department is about to start a post-construction review of the project that could prove informative.
- In Port Townsend, an attempt at environmental post-construction monitoring and assessment of a new dock built using an innovative eelgrass-friendly approach failed due to lack of funding; the region was denied an opportunity to learn from—and potentially improve on—the techniques used to build the dock. No economic monitoring
- At Victoria's Dockside Green, a largely qualitative performance assessment addressed social, economic, and environmental sustainability concerns, allowing managers to act where the project was not matching pre-development goals. While their assessment provides a useful model, a lack of transparency and rigor limited its potential impact.
- The Olympic Sculpture Park in Seattle, WA, a rigorous environmental post-construction monitoring and assessment found that habitat enhancements along a highly urbanized waterfront could meaningfully impact juvenile salmon. Environmental compliance management was also required at the site.

These examples, coupled with those found in the literature provide important insight into post-construction monitoring, assessment, and management:

- The three aspects of post-construction management described below—monitoring (collecting data), assessment (judging the project based on the data), and management (taking actions in response to monitoring/assessment or for other reasons)—are inherently interrelated.
- **Monitoring** provides invaluable data about waterfront revitalization projects and helps address the uncertainty of predictions used in decision making, verify assumptions, and ensure that projects comply with applicable laws and policies. Unfortunately, many coastalscape revitalization projects fail to conduct post-construction monitoring (economic, social, or environmental) due to lack of resources (monetary and personnel). In Tacoma, a skeleton staff focused on development simply doesn't have the manpower to follow up with developers about job creation or economic return. In Port Townsend, lack of funds (despite being promised) precluded expected post-construction environmental monitoring and assessment. This is a loss for the region, as multiple other large dock projects could have benefitted from Port Townsends' innovative dock design. Where monitoring is done, it is often for compliance (Tacoma's Thea Foss CERCLA compliance; Vancouver's Olympic Village fish habitat compliance). Monitoring programs are frequently too short to make useful conclusions, and there is also a wide range in the quality of data collected, with some very rigorous programs (e.g. Olympic Sculpture Park) and others that rely heavily on vague qualitative information.
- **Assessments** compile monitoring data using standardized or ad hoc methods and help ensure project accountability, detect management error, and help make decisions based on project strengths and weaknesses. While most assessments of coastalscape management projects are performance evaluations (comparing design goals with project outcomes), management capacity assessments and outcomes evaluations are also useful techniques that projects should also consider using. Since assessments rely on monitoring data, issues that impact monitoring indirectly affect assessments. For example, poor quality (or no) data makes conducting a rigorous assessment impossible. Assessments also face issues of their own, particularly lack of resources dedicated to assessments, lack of rigor in performing assessments (especially quantitative data and analysis), the generally narrow focus of assessments, and too great a focus on performance evaluations over other forms of assessments.
- **Management** takes assessment reports and takes action based on the results. Good, relevant assessments are critical to management, while management often influences the type of monitoring and assessments performed. The post-construction management landscape for coastalscape revitalization projects is very complex, with multiple actors (government, community, and private) and involved at different scales. Management is reliant on monitoring and assessment, and the success of management is therefore in part reliant on successful monitoring and assessment initiatives. However, management decisions are not always made using assessments (e.g. responding to the 2008 housing crash).

As a whole, post-construction management has the potential to influence the planning process for new coastalscape revitalization projects. Drawing on lessons of success and failure, particularly from post-construction assessment, can influence: what is considered within the sphere of possible projects during project visioning and developing project alternatives; the types of pre-construction monitoring data to collect to effectively monitor potential impacts; and how anticipated impacts correspond with post-construction impacts.

Reviewing Salish Sea case studies and the relevant literature highlighted some important best practices:

- For effective post-construction **monitoring**, allocating sufficient resources (human and fiscal) is the most important consideration. Many monitoring projects are never started or fail due to inadequate resource allocation. Other important best practices include: understanding what the important local economic, social, and environmental issues of an area are; having a clear goal for the monitoring program; treating monitoring like a scientific endeavor, including a rigorous statistical design; and creating a robust and rigorous data collection program to provide information for assessments and as inputs for pre-construction models developed for other projects.
- Post-construction **assessments** should: use robust evaluation methods appropriate for the projects' assessment goals and available data, whether focused on one field (e.g. fiscal analysis) or more broadly on sustainability (e.g. multi-criteria evaluation or a balanced scorecard approach); examine potential gaps between anticipated and actual project impacts (e.g. EIS audits); and where appropriate, involved citizens in the assessment process (both determining what to examine and collecting data).
- Post-construction **management** should: consider using an adaptive management framework for post-construction decision making; take measures to ensure persistence of sustainability goals including homeowner education and CCR requirements; and consider using effective enforcement to ensure that pre-construction goals are achieved (e.g. jobs promised are maintained over time).

However, these best practices assume a certain planning framework—specifically a rational planning model modified to encourage community participation and other aspects of communicative rationality. Many other frameworks exist in the planning theory literature (as well as in practice) each with their own advantages and disadvantages. Urban planners and project managers involved in coastalscape revitalization projects need to examine the assumptions and framework they are working under to understand the potential impacts of their choice (conscious or not) on those stakeholders impacted by the proposed coastalscape revitalization project. Questions of power, moral judgments, and ethics must be addressed in coastalscape revitalization projects[271].

Despite this, a scientific-technical approach to post-construction monitoring, assessment, and management (such as the one described here) is essential for understanding a project's economic, social, and environmental impacts and comparing anticipated impacts with actual impacts. In other words, this approach is essential for institutional and community learning about coastalscape revitalization.

Ultimately, then, we must add our support to calls for more post-construction monitoring, assessment, and management. Post-construction management is particularly important in places like Port Townsend where new approaches to development are being tested. Setting aside funding and personnel to maintain a rigorous monitoring and assessment program is the first and perhaps the most essential stage to realizing this goal. In addition, post-construction management efforts addressing multiple aspects of sustainability (such as the Dockside Green reports) are an important step towards robust

[271] Flyvbjerg, B. (2002). Bringing Power to Planning Research One Researcher's Praxis Story. *Journal of Planning Education and Research*, *21*(4), 353-366.

long-term project management[272]. However, this shift will only occur once the planning and built environment community acknowledges that design is only the first step towards sustainability.

[272] While in some cases sensitive economic information can't be released for private companies, the public spaces should be thoroughly analyzed and this information distributed to the public to encourage transparency.