Chapter 2: **Project Identification, Feasibility, and Planning**

Project identification is the first step in the strategic planning process. Before spending significant time and resources on a project, restoration practitioners should be able to identify the biological importance and likelihood of restoration success at potential project sites (Battelle 2003). An initial feasibility analysis should also be performed that evaluates how the local or state political climate, permits, funding, or community acceptance might support or impede a project. As project planning proceeds, a team should be assembled that is knowledgeable of the opportunities, complexities, and potential pitfalls of the project. Finally, the development of partnerships and consideration of funding opportunities are also important steps in planning.

This chapter introduces the steps and tools needed to identify tidal hydrology restoration sites and to conduct initial feasibility analysis and project planning. It includes discussion of:

- Recognizing a restoration opportunity;
- Regional-scale planning;
- Characteristics of a potential tidal hydrology restoration site;
- Evaluation of project feasibility; and
- Project identification, feasibility, and planning highlight project: St. Vincent Island Estuarine Habitat Restoration Project, Apalachicola, Florida.

Much of the information in this chapter is a compilation of the experiences of restoration experts and cited literature. Additional project identification, feasibility, and planning resources and summary recommendations can be found in the ***Toolkit*** (page 166).

Opportunistic Action vs. Regional Planning

Identification of a project site can result from **regional strategic planning** or a **discrete opportunity**. Discrete restoration opportunities may arise from a variety of circumstances, such as natural disasters and changes in industrial or commercial land use. Due to potential tax benefits and improved public relations, land owners may also be compelled to donate land or establish conservation easements that may provide a restoration opportunity. At a smaller scale, private landowners often allow for habitat restoration on their land to increase property values or to exercise environmental stewardship.

While discrete opportunities can springboard successful projects, strategic planning helps prioritize regional restoration efforts, allows for widespread restoration support, and may focus available funding on projects that meet larger spatial and temporal goals and objectives. The purpose of long-term regional planning is to develop a strategic plan that identifies ecosystem-based needs, goals, and priorities. Planning at the regional level typically requires an in-depth process that is vetted through local experts, stakeholders, and resource managers. Long-term restoration must be an ongoing process whereby restoration implementation becomes a continuing series of management decisions (Steyer 2000). Comprehensive restoration strategies also lead to the development of long-term expected outcomes, which can instill a sense of commitment and inspire confidence in the local community and potential funding organizations.

An example of a comprehensive, long-term, regional approach to coastal restoration is the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) Program. The CWPPRA program has been a catalyst for large-scale changes in ecosystem-level resource management. The program is mandated to: maintain an interagency Task Force to steer operations; implement intensive planning for the development

Resource managers at St. Vincent National Wildlife Refuge utilized a hydrology study, completed by the U.S. Geological Survey, to identify and prioritize sites in need of hydrologic restoration.

Photo Credit: USFWS

of restoration strategies; develop and implement restoration projects; and implement a comprehensive monitoring program to evaluate the effectiveness of projects. By coordinating efforts, CWPPRA has minimized redundant efforts and conflicting goals, thereby maximizing the long-term productivity of Louisiana's coastal wetlands (Steyer 2000).

For more information about CWPPRA monitoring, see **Chapter 7: Scientific Evaluation and Monitoring**

When planning at a regional scale:

- *Be flexible.* Make the project scale and timeline compatible with concurrent priorities for the larger community.
- *Be open to the public.* Organize public forums to identify priorities and encourage buy-in from a wide range of groups.
- *Be strategic.* Examine the interests of all stakeholders and consider project components that lend themselves to strategic partnerships, leveraging opportunities and public interests. (For instance, it may be important to emphasize economic benefits in terms of property values, recreation, and tourism.)
- *Think broadly.* Advocate for the broadest ecological benefits possible and do not be stifled by political boundaries or by a focus on managing an individual species.

Identifying Sites for Tidal Hydrology Restoration

Structural alterations. Site identification begins by recognizing structural alterations that impede tidal flow. Usual culprits of impeded flow include failing or inadequate culverts, dikes, levees, causeways, and landfills that were implemented without full consideration or understanding of ecosystem impacts. These structures may have initially been installed to enhance the site, but have since lost their functionality and may be damaging ecosystem health. Such structures may need to be removed or re-engineered.

Ecological change. Site identification may also occur through observation of physical and ecological shifts in the associated landscape. These shifts may be observed before the tidal obstruction is apparent. Shifts in an area's ecological health may be evident through singular biological incidents such as fish kills or sudden drops in fisheries harvests. Other distinct events include widespread vegetation die-offs, recurring algal blooms, or invasive species proliferation.

While unique events are relatively easy to observe and document, gradual ecological shifts may also be an indication of ecological impairment due to loss of hydrologic function. Whether ecological change is identified through casual observation or specific evaluation, characterization of the extent of ecological change is important. Long-term monitoring and comparison between historical and current conditions may provide the best evidence that physical alterations to the environment have resulted in ecological change. Information on past conditions can provide valuable information on impacts to the site that may affect restoration actions (Stedman 2003). ***Table 2a*** below identifies indicators of such long-term ecological changes.

A list of questions to consider when evaluating sites for tidal hydrology restoration are available in the **Toolkit** *(page 167).*

Table 2a. Long-term indicators of ecological change.

Common Long-Term Indicator	Impacts Caused by Physical Alteration
Shifts from native to non-native species	Altered hydrology may weaken native species' ability to compete with invasive species.
Shifts in fish assemblages	As physical conditions change, some fish species will prove better adapted to the new environment.
Shifts in benthic assemblages	Species dependent on specific sediment characteristics, turbidity, and water chemistry are impacted by altered hydrology.
Changes in water quality	Reduced tidal flow will alter an area's water chemistry, including salinity, dissolved oxygen, and pH.
Increased flooding and/or shoreline erosion	Blocked freshwater and tidal exchange may lead to increased upland flooding during high rain events. Altered sedimentation due to altered hydrology may increase rates of erosion.
Loss of habitat heterogeneity	Disturbed areas tend to be more homogenous (i.e. vegetation monocultures).

CONSIDER

Effects on Coastal Freshwater Systems

When identifying potential restoration sites, be cognizant that tidal hydrology restoration projects may not be prudent for every location. Breaking down coastal structural barriers inherently enhances tidal connectivity. The potential for saltwater intrusion could actually pose a threat to some low-lying coastal freshwater ecosystems. Alternatively, many estuaries would benefit greatly through improvement to freshwater flows as a means to re-establish oligohaline habitat and an estuarine salinity gradient.

Importance of Reference Sites

Comparing a potential project site to relatively undisturbed or "healthy" reference sites nearby is an effective strategy to understand the impacts of hydrology modification on many ecological indicators (Diefenderfer 2003), including water quality (salinity, dissolved oxygen content, or pH), vegetation, and nekton community composition. Comparisons to reference sites can also help define desired ecosystem services and provide targets for post-restoration monitoring.

For more about reference sites, see **Chapter 7: Scientific Evaluation and Monitoring.**

Tools for Identifying Potential Sites

Project teams can use a variety of low- and high-tech methods and tools for site identification.

In-field investigation. Few tools rival in-person identification of a potential site. While onsite, the team should locate tidal barriers such as roads, ditches, berms, and areas of impervious surface. Other considerations include adjacent land uses, tidal flow rates and timing; water quality, the presence of wetland plants or invasives, whether or not a wetland existed on site, and what factors resulted in wetland loss or degradation.

Desktop investigation. The internet can provide access to a range of resources. A great deal of site information can be rapidly gathered through government agencies or communication with area residents. Information may have been previously gathered by regional or municipal land use plans and studies. Many resource agencies can provide maps on characteristics such as topography, soil, vegetation, and floodplains. Aerial photography can also help identify an area's association with other wetlands and bodies of water, and historical photographs can provide clues to original conditions. All of these data can be incorporated into a geographic information system to aid in site identification and planning.

Geographic information systems (GIS). GIS is a data management tool providing users with an understanding of locations or events based on spatial, or georeferenced (latitude and longitude), data. GIS is used to locate specific features on a landscape, analyze relationships between features, or model landscape processes. With GIS, the team can identify, compare, and prioritize sites, and produce maps based on team-defined criteria. Products supplementing GIS applications often include:

- *Remotely-sensed imagery.* Aerial imagery provides users with a comprehensive aerial view of an environment. Color, infrared, satellite, and digital imagery also fall under this category. Comparing historic imagery with current imagery could provide evidence of landscape changes over time.

- *Digital elevation models (DEMs).* Elevation data (collected from aerial or bathymetric surveys) are critical to understanding how water moves, and thus modeling hydrology. When working with elevation data (or any other spatial data set) it is important to understand how the data were collected and created, including horizontal and vertical spacing, accuracy, and datums. This information is usually found in the dataset's metadata.

- *Maps.* Land cover, land use, and elevation relief maps can help users visualize a site and its surrounding area. Historical maps illustrate previous site conditions while current maps show existing features. Online mapping tools provide users with the capability to create maps specific to their needs.

Ideally, a project team will combine GIS data from a potential restoration site with in-field observation.

Historic charts, aerial photographs, and nautical charts like this 1938 chart of Mullet Key at the mouth of Tampa Bay, Florida (now Fort DeSoto County Park), are useful tools for identifying modifications to hydrology.

The ***Toolkit*** *contains a useful Site Identification Checklist (page 168) for examining potential restoration sites, as well as a list of GIS data portal and online mapping tools (page 170).*

Project Feasibility and Planning

Following the identification of a tidally restricted site, the **feasibility analysis** and planning stage will be initiated. Several factors must be evaluated to determine if restoration of the site is achievable, including landownership, team and partnership opportunities, funding, and permitting needs. During the initial feasibility analysis, such factors should be given cursory consideration. After satisfactory completion of the feasibility analysis, the same factors should be revisited more thoroughly during the planning stage. Ideally, multiple evaluations of the following factors should be produced throughout the project cycle.

A feasibility questions worksheet summarizing the feasibility and planning information below is available in the ***Toolkit*** *(page 173).*

Landownership/land use. Ownership of the potential restoration location will have direct ramifications on the feasibility and expedience of project implementation. Adjacent or regional land uses may or may not be compatible with re-establishing a former wetland (Stedman 2003). Publicly owned land will likely have a management plan that should be reviewed to determine opportunities and restrictions on project implementation. Privately owned land may require negotiations for purchase or conservation easement.

Land Ownership Impacts on Project Feasibility

The Clam Bayou Tidal Hydrology Restoration Project near Sanibel Island, Florida, was both catalyzed and burdened by adjacent private landowners. Landowners surrounding Clam Bayou helped finance the project and were especially active during the project identification phase. However, intense public interest in the project also resulted in a higher sale price for the privately owned land required for construction. Negotiations with the landowner resulted in construction delays and elevated project costs.

For more information, see the ***Clam Bayou Tidal Hydrology Project Portfolio*** *(page 128).*

Questions to ask about landownership (***Toolkit*** worksheet, page 173):

- *Is the land privately or publicly owned?* Determine whether landowners might be willing participants in the restoration effort, or whether they might be willing to sell their property.
- *Is adjacent land privately or publicly owned?* Consider whether the owners of surrounding areas will be supportive of neighboring restoration.
- *Is there nearby private or public infrastructure?* Identify any infrastructure that could potentially be impacted by restoration, or that might impede construction.
- *Will landownership restrict access to the project area?* Consider whether the project construction efforts will require large equipment, and whether landownership will influence equipment use or movement. If the site is publicly owned, research the management plan governing the property to determine whether public ownership could impose any limitations on project implementation.

Project team. The project team is the core group leading the restoration project, from feasibility analysis through project implementation and subsequent monitoring. Having a well-rounded team is a key factor in determining project feasibility. While building a project team, it is important to assemble a variety of expertise. For example, hydrologists, engineers, biologists and ecologists, regulatory staff, financial experts and accountants, project managers, outreach coordinators, and volunteers may all be valuable assets to a tidal hydrology restoration project team.

The team-building process should include identifying useful skill sets and tools beneficial to project planning and implementation. For instance, it might be useful for the team to include a member with connections to local community groups or with ready access to and understanding of GIS tools, hydrological models, or previous relevant research and datasets.

The project team should include both essential members (due to cost or expertise sharing) as well as strategic members who can facilitate political and community support. Give careful consideration to the specific needs of your project (i.e., engineering needs, hydrologic needs, and biological focus). Tentatively gauge the interests and skills of potential team members. Once there is a clearer understanding of who will participate in the project team, hold a brainstorming meeting and discuss overarching project ideas.

Here are some useful steps to consider in the early stages of project team development:

- Define the project area's known problem(s) and brainstorm potential project goals and objectives.
- Discuss a variety of options or designs for addressing the problem(s).
- Discuss any potential feasibility concerns and funding scenarios.
- Consider team roles and responsibilities. Ensure that people in identified areas of expertise will be available to support the project.
- Identify and rectify gaps in knowledge, skills, and resources.

Questions to ask about the project team (***Toolkit worksheet***, page 173):

- *Does the team possess the range of skills needed to plan a project that will meet restoration goals?* Determine if the project team in place is interdisciplinary with the appropriate representation of engineers, natural resource managers, scientists, accountants, and project managers. Ensure that the project team is prepared to move forward with planning and implementation.
- *Is the team adaptive?* An effective project team will brainstorm potential opportunities as well as roadblocks in order to build in project flexibility and ensure that the project can adapt to shifts in priorities or resources.

Partnerships. Partnerships are those relationships developed with agencies, corporations, and nonprofit groups to provide support and resources to the project team through all stages of project implementation. Some partnering groups may have a relatively small role in project implementation and provide project advocacy, meeting space, or funding. Other partners may be actively engaged in project implementation and provide staff to serve as project team members. Advocacy provided by partners proves especially beneficial to tidal hydrology restoration projects where the footprint of the affected area is large, resulting in high visibility and the potential for direct impact to a wide range of stakeholders.

Questions to ask about partnerships (***Toolkit worksheet***, page 174):

- *What local, state, and federal partners are critical for providing technical support?* What agencies may already have site-specific data to inform decision-making and design? Consider private companies that have a reputation for supporting local restoration efforts. Encourage participation of organizations that may have in-house staff or equipment to help facilitate the project.

- *What local, state, and federal partners may be able to provide necessary funding or in-kind services?* Consider the technical expertise available through such agencies as well as potential funding opportunities. (See ***Potential Funding Requirements and Sources*** below for more information.)

- *What agencies or groups are vital for providing public education, advocacy and support?* Consider local non-governmental organizations (NGOs) with active members and volunteers.

Local involvement. The participation of and coordination among diverse public and private groups is a necessary component of successful restoration (RAE 2002). The most efficient and effective restoration projects are those supported by stakeholders in the local community. This includes support from local residents, nonprofit groups, state and federal agencies, local planning boards, politicians, academics, contractors, and others. One project example emphasizing these ancillary benefits is the Bahia Grande Tidal Hydrology Restoration Project in Texas. Tidal flow to the Bahia Grande basin had been severed, resulting in a vast dry area that was the source of frequent and harmful dust storms that impacted the health of local residents. Returning tidal flows to the area restored 6,500 acres of tidal wetland while also alleviating a source of major health problems and their associated expenses.

For more information about building public support for tidal hydrology restoration projects, see **Chapter 8: Community Support**

Questions to ask about local involvement (***Toolkit worksheet***, page 173):

- *What is the project influence area/geographic extent?* Understanding the geographic extent of the project will help identify both the potential impacts to the local community and all potential stakeholders.

- *Have you consulted project stakeholders?* Make sure to include potential stakeholders such as project partners, landowners, and the interested or affected public during project planning and design.

Potential Funding Requirements and Sources

Though developing reasonable costs estimates can be difficult at the early stage of feasibility analysis, it is a good idea to estimate the scale of project funding required. You should consider categorizing funding needs according to stages of project implementation (i.e., identification, design, construction, etc.). You should also estimate the funding required for a few potential design scenarios (i.e., one large levee breach versus several small breaches with culverts). Contacting the project managers of the example projects included in this manual may be very useful for developing rough budgets (see the ***Project Portfolios,*** page 85).

Once the scale of funding is estimated, outline a general strategy for identifying and securing those funds (Borde et al. 2004). Below are some tips for developing a funding strategy:

- *Accomplish as much as possible with the minimal amount of resources.*
- *Consider how team member contributions will offset funding requirements.* For instance, a project with fewer partners may require hiring a consultant to handle community meetings or design and permitting. Other projects with more strategic partnerships may have team members capable of managing tasks without the need for a consultant.
- *Seek private contributions.* The most likely source is often private organizations or corporations rather than individuals. Sometimes private organizations will have funds set aside for community initiatives.
- *Consider pursuing public funding opportunities (i.e., state or county governments).* For example in Florida, the water management districts can be a source of public funding.
- *Evaluate the niche areas for different grant opportunities and apply for multiple grants.* For instance, NOAA's Community-based Restoration Program gives preference to projects that put the majority of funding toward physical implementation of fisheries habitat restoration activities. The U.S. Fish and Wildlife Service (USFWS) Coastal Program supports a broader array of project activities along the coast.

A list of organizations involved with technical and financial support for restoration is available in the ***Toolkit*** *(page 175).*

- *Approach academic institutions to discuss pre- and post-restoration monitoring ideas and options.* Undergraduate and graduate students can be a useful and cost-effective source of labor and can gain valuable work experiences for future careers through their involvement in pre- and post-restoration monitoring.

A diverse partnership of academic institutions, government agencies, and NGOs led by the Friends of Huntington Beach State Park in South Carolina successfully achieved the goal of reintroducing tidal flow to Sandpiper Pond.

Photo Credit: SC State Parks

- *Keep in mind that different funding agencies and organizations often have different missions, timing, and requirements.*

Questions to ask about funding (***Toolkit worksheet***, page 174)

- *What are the funding needs?* Determine the scale of required funding. Consider possible sources, whether from in-house capital, grants, private capital, or partnerships.
- *What funding strategies should be considered?* Determine what sources and strategies can be used to attain funding.

Regulation and permitting. Determine which agencies you will need to approach to obtain the required permits, and consider the most effective time to engage these agencies in the project process. Based on available information and team input, determine if the permitting environment will be favorable for project implementation.

Questions to ask about permitting (***Toolkit worksheet***, page 174):

- *What permits may be required?* Assess whether the permits are reasonably attainable and estimate the general time frame for receiving local, state, and federal authorization.

See **Chapter 5: Permitting** *for more on permitting tidal hydrology projects.*

PROJECT HIGHLIGHT

St. Vincent Island Estuarine Habitat Restoration Project

St. Vincent National Wildlife Refuge, Franklin County, FL

St. Vincent National Wildlife Refuge (NWR) is a 12,000-acre barrier island located near Apalachicola Bay, Florida. The island is characterized by upland, freshwater, and estuarine habitats. Prior to becoming a NWR, the island was subjected to major hydrology modifications through the construction of 90 miles of road, largely put in place for private hunting expeditions more than 40 years ago.

In 2000, the U.S. Geological Survey (USGS) completed a map report titled *Assessment of the effect of road construction and other modifications on surface-water flow at St. Vincent NWR, Franklin County, Florida*. In this report, USGS comprehensively evaluated the effects of road construction and identified priority restoration options to accomplish surface water–hydrologic wildlife habitat improvements. Field data collection was used to identify areas of road construction and other modifications that may have altered surface-water flow. The sites investigated were (1) road crossings that block creeks (2) road crossings or ditches that connect adjacent creeks; and (3) road crossings that could block saltwater movement in the creeks near the coast. Water flow and water conductivity measurements were collected at these locations and were used to generate a strategic plan for hydrology management and restoration. The goal of the NWR is to use this report to reduce the expanse of roads on the island by 50 percent.

In 2008, the NWR and its largely volunteer workforce implemented part of the plan. An estimated 1,925 acres of estuarine marsh is benefiting from the scrape-down of 4.6 miles of roads historically created on berms through the marsh, the construction of four low water crossings on one remaining 4.2 mile road, and the installation of a culvert under the road bed.

For more information on this project, see the **St. Vincent Island Estuarine Habitat Restoration Project Portfolio** *(page 104).*

Top:
Roads constructed through the estuarine marsh altered tidal hydrology on St. Vincent Island National Wildlife Refuge near Apalachicola, FL. A series of activities, including road removal and the installation of a low water crossing and multiple culverts, were identified and implemented to restore estuarine tidal influence.
Photo Credit: NOAA

Left:
Resource managers at the National Wildlife Refuge conduct an on-site project planning meeting.
Photo credit: USFWS