Emerging strategies to improve the ecological health of the Delta emphasize a landscape-scale approach to restoration (BDCP 2012, Delta 2025). However, few tools are available that illuminate what large, interconnected habitat restoration should look like for the Delta, how to design projects that successfully provide desired ecological functions.

Management Tools for Landscape-Scale Restoration of Ecological Functions in the Delta is a new Ecosystem Restoration Program-funded project (Jan-Bob February 2012) designed to contribute to this needed dimension to Delta planning. The project will build on the detailed understanding of former (early 1800s) ecological patterns and underlying physical processes recently published by Whipple et al. (2012) to help establish a regional vision for landscape-scale restoration.

With a team of experts in ecology and physical process, we are integrating this depiction of the historical landscape with contemporary knowledge to define the array of ecological functions formerly provided different regions of the Delta. Suites of metrics representing each function will be quantified, then examined in the context of the Delta's broader physical settings. These key functions and metrics will be used to develop conceptual models of landscape-scale function that can be applied to identify areas in the current Delta where similar functions might be reestablished and maintained. This understanding of Delta landscapes past, present, and future can help managers and scientists develop practical and effective landscape restoration strategies that support desired ecological functions in the future.

The Delta supported complex mosaics of habitats in the recent past. By way of eight illustrative Delta-scale patterns of habitat diversity in the historical Delta. These patterns are critical to the Delta's ecological services such as sodul, sedetation, and hydrology. Metaphors used to describe the Delta are often poetic and philosophical, as in Thoreau's 1866 On the Ticor, the Delta serves as a metaphor for the whole of nature.

Delta by the Numbers:

- 7:100 Delta
- 181,870 hectares
- 1% wetland
- 2,600 freshwater emergent wetlands
- 81% annual average surface
- 3% deltaic
- 27% early 1900s
- 1980s

What ecological functions did the Delta provide?

Ecological functions are the desired state of any ecosystem, such as floodplain vegetation or fish habitat; they are composed of different and interacting ecological components that provide a range of services to humans and other species. Ecological functions include:

- Primary production (fishery productivity)
- Habitat and connectivity for native plants (e.g., riparian birds)
- Habitat and connectivity for littoral fish
- Processed plant (primary production)
- Standing stock (primary production)
- Complex in-channel habitats
- Access to off-channel habitat
- Productivity
- Marsh
- Inundation
- Habitat mosaics

What constituted a functional landscape?

A functional landscape unit is defined by a suite of ecological functions that are sustain by different historical Delta to the physical conditions, and then those functions that developed over time, and by extension, maintain healthy landscapes today. The next step is applying what we have learned about the historical Delta to the contemporary landscape to evaluate what fundamental elements — both ecological and geophysical — are needed to support and maintain healthy landscapes today. This is how and where does the contemporary Delta provide these same ecological functions, and where doesn’t it? How can we develop tools to support the next steps in this inquiry, which will be critical if we are to retain the contemporary landscape?

Management Tools for Landscape-Scale Restoration

The Delta of the future will be very different from the Delta of the past. Yet, we have much to learn from studying Delta landscapes of the past. There are many parallels between the contemporary landscape and the Delta that they shape the future of the Delta. A functional landscape is an ecological system that provides and regulates ecological functions that are critical to the Delta’s ecosystem services. A functional landscape in the Delta is a critical component of some ecological services such as fishery productivity, freshet functions to the Delta, and hydrology. We will develop tools that provide spatially explicit information on ecological functions.

References

- Whipple et al. (2012) to help establish a regional vision for landscape-scale restoration.
- Moran et al., 2006, on a combination of land and water bodies with fine hydrological and ecological resolution.
- Ericksen, 2012, on the potential for sustainable management of water and habitat in the Delta.

MANAGEMENT TOOLS FOR LANDSCAPE-SCALE RESTORATION

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