Limitations

While we were able to determine individual monetary values for many of the ecosystem services provided by Southern California's coastal wetland habitats, several limitations were encountered. The first limitation was the issue of scaling that prevented us from determining a single value estimate for the total study area. This issue was due to uncertainty in the marginal benefits of each ecosystem service and the lack of available data of the habitat extent in our project study site. The second limitation was the lack of primary ecosystem service valuation data that prevented valuation of several ecosystem services selected in this project.

Moving Forward

Providing a clearer picture of the value of Southern California coastal wetlands can increase the inclusion of these wetlands in land-use decisions and add to the tools of policy advocacy. These values can convey the social, economical and ecological advantages of conserving Southern California's coastal wetlands. Additionally, the increased awareness of these ecosystem services may facilitate monitoring efforts of habitat quality, so that these services can continue to be provided.

Communication Tool

The results of this project can be used to encourage and increase the transparency of conversations between environmental groups, community planning organizations, and policy makers in conservation and land use decisions. Public engagement and deliberation can be more fruitful if people have a common metric around which to organize their interactions. Putting wetlands values in dollars may encourage greater participation in discussions which thus far have not been transparent. These values can also increase awareness of these ecosystem services in general and can facilitate conversations about the importance of these services and the habitats providing these services. If people understand the importance of healthy wetlands, and the significance of the impacts on these systems, they are more likely to be aware of current and potential threats to these habitats.

Cost-Benefit Analysis Baseline

When comparing the costs and benefits of future projects, the ranges of values from this project can be used as a baseline estimate for the non-market services provided by wetlands. The inclusion of these non-market benefits in formal analyses will aid in better decision making and allow for more thorough analysis between tradeoffs in development that would limit the provision of these benefits by wetland habitats. Rather than dismissing the value of ecosystem services due to their non-market nature, the value ranges determined in this project provide a middle-ground between theoretical, less-tangible analyses and participatory approaches that lack analysis.

Acknowledgements

We would like thank all those who provided us with resources and guidance throughout this project.

Andrew Plantinga (faculty advisor), Ben Halpern (external advisor), Shawn Kelly (SCWRP), Julio Lorda (TR NERR), Karina Johnson (The Bay Foundation), Eric Stein (SCCWRP), Laura Reige (The Nature Conservancy).





An Economic Valuation of Southern California Coastal Wetlands

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Spring 2016

Overview

Southern California's coastal wetlands are increasingly recognized for the benefits they provide to human well-being. The ability to transparently communicate the importance of coastal wetlands can aid organizations, such as the Southern California Wetlands Recovery Project, in achieving their goals in protecting and expanding these benefits. This project provides an accessible way to communicate many of the benefits provided by these habitats through a baseline estimate that can be easily understood by policy makers and the public.

Motivation

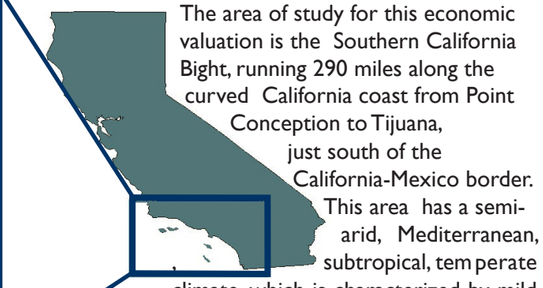
The physical extent of Southern California's coastal wetlands is protected, but the quality is degraded by pollution and development. These impacts, along with a growing population and encroaching sea level rise, diminish the level of ecosystem services provided by wetlands. Strengthening wetland protection and facilitating upland migration can help reduce the severity of these impacts on wetland quality. However, due to the non-market nature of many services provided by wetlands, they are often underrepresented in cost benefit analyses used in development and policy decisions. The common metric of dollars provides context and a foundation to convey the importance of increased inclusion in these decisions.

Project Objective

To provide a tool to aid in more transparent decision making by:

- Identifying key ecosystem services provided by Southern California coastal wetlands
- Estimating the value of ecosystem services to determine gross benefits to society

Study Area



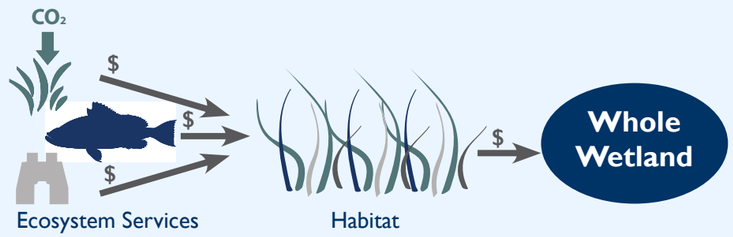
The area of study for this economic valuation is the Southern California Bight, running 290 miles along the curved California coast from Point Conception to Tijuana, just south of the California-Mexico border. This area has a semi-arid, Mediterranean, subtropical, temperate climate, which is characterized by mild rainy winters and hot, dry summers.

An Ecosystem Service Based Approach

This project employed a "bottom-up" approach to conduct the valuation of Southern California's coastal wetland habitats. The methods used in this project quantified the value of individual ecosystem services provided in the selected wetland habitats. The values determined for each ecosystem service could then be grouped into habitats, which in turn could be grouped into whole wetlands. Due to the nonmarket nature of many of these ecosystem services, three different valuation methods were used in determining economic monetary values.

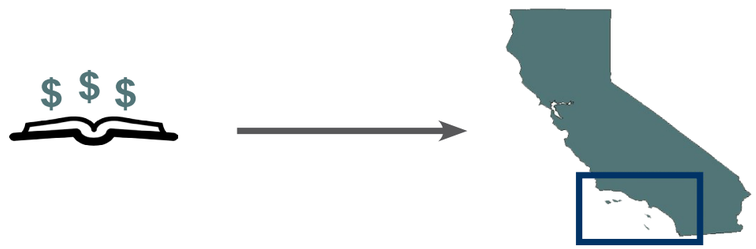
Ecosystem Service Rate Valuation

This method used annual flow rates for the identified key ecosystem services provided by Southern California's coastal wetland habitats. Flow rates were taken from existing studies that had been conducted in habitats similar to Southern California. A commonly accepted dollar value of the ecosystem services was then applied to the flow rates to determine the overall gross monetary benefit.



Benefit Transfer

This method used values from existing literature from study areas that were similar in ecosystem services, climate and demographics and applied these gross values to the study site. In the literature, market and non-market, and use and non-use values of ecosystem services were primarily valued using avoided cost, replacement cost and hedonic pricing methods.



Contingent Valuation Survey

This survey provided regionally specific values to Southern California's coastal wetlands. We distributed 400 surveys through Amazon MTurk, an online, crowd-sourcing platform.

Using a hypothetical increase in income tax, we asked California residents what they were willing to pay to avoid degradation of Southern California coastal wetlands. The results provided an upper and lower bound on respondents' willingness to pay, as well as an average annual stated value.

In contrast to the two other methods, the survey captured values for avoiding degradation. Rather than determining the value of individual ecosystem services, the survey provided values for the wetland areas as a whole.

Results

Ecosystem Services of Southern California Coastal Wetlands	Beaches & Dunes	Brackish Marsh	Oyster Bed	Saltflat	Salt Marsh	Seagrasses	Shallow Subtidal	Tidal Mudflat	Whole Wetland
Flood and Storm Protection	●	●	●	$476	$15,194	●	●	●	$40
Refugia Habitat	●	●	●	●	●	$80	$623	●	$170
Shoreline Stability and Erosion Control	●	●	●	●	●	●	●	●	$50
Water Flow Regulation	●	●	X	X	●	●	X	X	$24
Air Quality	●	●	X	X	$13	$47	●	$17,215	●
Biological Controls	●	●	●	●	●	●	●	●	●
Carbon Sequestration	$42	$1,174	$338	X	$56	$103	●	$290	●
Nutrient Cycling	●	●	$8	X	●	$30,999	●	●	$139
Pollution Buffering and Wastewater	●	$39	●	●	$1	●	●	●	●
Aesthetics	●	●	●	●	●	●	●	●	$10
Cultural Activities	$12	●	●	●	●	●	●	●	$7
Recreation	$7,549	●	●	$5,337	$5,337	●	●	●	$154
Science and Education	●	●	●	●	●	●	●	●	$7

The table details the individual ecosystem services valued in this study. The habitats were selected based on their unique rates of ecosystem service provision. All values are for a single hectare of each habitat type and reported in 2015 US dollars. Selected habitats are displayed across the top of the matrix. "X" symbols represent ecosystem services that not provided by a particular habitat. Grey circles indicate ecosystem services that are provided by the habitat but could not be valued in this study.

60%
$45 or more

24%
No payment

60% of the 400 respondents were willing to pay $45 or more to prevent degradation of these Southern California coastal wetlands, while 24% were not willing to pay the increased tax.

$65 per year to prevent degradation of coastal wetlands

California residents are willing to pay, on average, $65 per year to avoid degrading coastal wetlands beyond their current state.