Restoring Civic Engagement & Stakeholder Participation: A Case Study of Wetland Restoration Management in Alviso, California

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ABSTRACT

Wetland restoration projects restore wetland habitat, and help with sea level rise adaptation for natural and urban environments. My thesis is a case study analysis of part of the South Bay Salt Pond Restoration Project's current marshland restoration in Alviso, California (37°25'27.34"N, 121°58'33.72"W) to determine how opinions of the project vary among different project stakeholders. I triangulated results from document analysis of newspaper articles about Alviso from 1890-2014, and interviews of key stakeholder groups, and surveys of Alviso residents. The management structure of the Project is widely praised, with 79% of interview subjects very satisfied, 58% of interview subjects have major concerns being future funding and long timeline. Most Alviso residents have a stronger focus on flood risk protection and were neutral or satisfied with the Project overall, but slightly less satisfied with the community engagement efforts. Many Alviso residents expressed that they would also like for Alviso's interests to be a higher priority. The Project's robust community outreach engages community leaders, but most residents are less engaged. The Project is an example of large-scale wetland restoration management with multi-stakeholder interests, and can inform future projects that seek to restore habitat, coastal resiliency, and civic engagement.

KEYWORDS

INTRODUCTION

Decades of wetland restoration efforts along the California coastline have sought to restore natural ecosystem function and habitat negatively impacted by human development. San Francisco Bay (SF Bay), once one of the world's most productive wetland systems, has experienced a staggering decline in habitat area since 1850, until recently (Gunther et al. 2011). In 1999, Bay Area scientists reached consensus that SF Bay needed at least 100,000 acres of wetland to improve ecosystem health and water quality of the bay (Goals Project 1999). These restoration projects have increased habitat for endangered species such as the California Black Rail (*Laterallus jamaicensis*) and the salt marsh harvest mouse (*Reithrodontomys raviventris*) (Girard et al. 2010). Public access to the coastline and bay has also increased, with more recreational opportunities. Healthy wetlands also diffuse storm surges and other large waves, providing flood protection to SF Bay marsh-lined communities. While there are now about 45,000 acres of healthy tidal marshes (Madsen et al. 2007), sea level rise (SLR) resulting from climate change over the next century threatens to submerge them. There is great concern amongst California coastal management agencies about the impacts of SLR and interest in protecting coastal ecosystems and urban communities, but many are unsure how to best adapt to this impending threat and balance all the stakeholder interests (Tribbia and Moser 2008).

Several restoration projects in SF Bay are implementing a horizontal levee model to protect valuable wetland habitat and coastal marshland-lined urban communities from SLR induced flooding (Lowe et al. 2013). The San Francisco Bay is expected to witness a 1.0 and 1.4 m rise in local sea levels from higher tides, stronger waves and storm surges, and freshwater floods from Sierra and coastal mountain snowmelt (Heberger et al. 2012). The horizontal levee is a type of resilient shoreline model, which is a coastal management technique that uses coastal ecosystems as resilient natural buffers to storm surge events magnified by SLR (Möller and Spencer 2002) (Figure 1). It combines the natural flood reducing benefits of wetlands with a smaller levee to protect coastal urban communities from flooding. The model relies on ecotones that increase in elevation from shallow bay, to tidal mud flat, to tidal marsh, and ending in brackish marsh. This is a resilient, self-adapting model because the brackish marsh is expected to accumulate root biomass and grow vertically at the same rate as the rate of SLR (Feagin et al. 2010, Chmura and Anisfeld 2003). Maintaining the marshland ecosystems that support many endangered flora and fauna will

be important for the flood risk reduction goals of the horizontal levee model. Horizontal levees are also two times less expensive to construct and maintain over a 50-year period than the traditional stand-alone levee alternative (Lowe et al. 2013). There are several resilient shoreline projects in SF Bay using horizontal levee-like models that are designed to benefit the local coastal community; however there are still differences in government agency, nongovernmental organization, and local community stakeholders' perspectives on what goals resilient shoreline projects should prioritize over others.
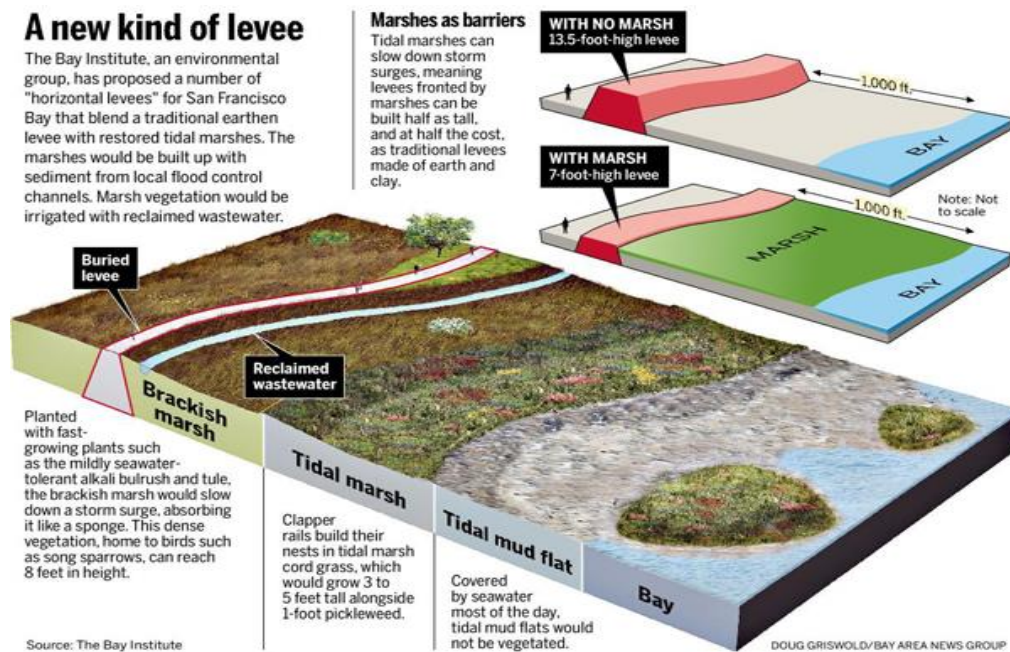

Figure 1. Horizontal Levees. This model of a resilient shoreline uses transitioning ecotones to build an increasing slope from deeper bay waters to brackish marsh and a buried levee. Models like these are being implemented into wetland restoration projects to increase resilience to sea level rise. (Source: The Bay Institute)

An example of a large scale resilient shoreline restoration project is the South Bay Salt Pond Restoration Project (the Project). The Project is the largest wetland restoration project on the west coast of the United States, responsible for restoring 15,100 acres of old salt production ponds back to marshland habitat. Along with other restoration projects, it has been accounting for SLR by using horizontal levee-like models in areas where old salt ponds and marsh habitat are the only barriers between an urban community and the bay (Callaway et al. 2011). Such is the case at the Project's Alviso ponds restoration project area. The old salt ponds in this area, referred to as the Alviso ponds, surround the coastal community of Alviso. Located at an average of twelve feet

below sea level, Alviso is an example of a coastal community that has very high risk of flooding and is extremely vulnerable to SLR. The Project has been working with the Alviso community to restore their ponds since 2006 and has already connected 1,400 acres of ponds to the bay, and improved public access (SBRP 2012). As one of the first resilient shoreline restoration projects in SF Bay, the Alviso ponds restoration can be analyzed to evaluate possible options for other low-lying coastal communities that include habitat restoration, public access, and flood protection, and how such a resilient shoreline project that involves many stakeholders is managed.

While wetland restoration is a very dynamic field with many different approaches, California coastal managers have limited knowledge or resources that prevent them from creating and implementing climate change adaptation strategies for coastal communities (Moser and Tribbia 2006). Among the recommended actions that California governments should take to improve their adaptive capacity are: hold public forums to discuss risks and response options, encourage collaborative research, and incorporate risks to integrated resource and hazard management plans (Moser and Luers 2008). The wide scope of an SLR adaptation strategy requires the input of many stakeholder groups in various levels of government, nongovernmental organizations, and community residents. A similar process of stakeholder input is seen in resilient shoreline wetland restoration projects like the Alviso ponds restoration, which is an example of a multi-agency planning process that is unique among other restoration projects in SF Bay in its unity of purpose and coordination. Given that the Alviso ponds restoration is so unique and multi-purposed, stakeholder perceptions of Alviso ponds restoration need to be studied to assess what the benefits and shortcomings are in this project's planning and community outreach processes.

I will conduct a case study analysis of the current marshland restoration work in Alviso, California to determine how perceptions of the Project's activities vary among different project stakeholders. Specific questions of this study are as follows:

1. What are the differences in perception between each of the project stakeholders (e.g. City of San Jose, Santa Clara County Water Authority, Alviso community members, etc.) in how the three stated goals of the restoration project should be prioritized?

2. How do Alviso residents' perceptions of SLR and climate change and experience with flooding influence their perceptions about the restoration project?

3. How important are public access and nature benefits culturally and economically for the Alviso community?

4. How do the goals of the Project's community involvement program compare with Alviso residents' opinions on the project?

I will examine the perceptions of Alviso residents towards the bay, wetlands, and sea level rise both currently and in the past, and understand perceptions of other key stakeholder groups outside of Alviso as well. I expect all stakeholder groups to find these benefits of the restoration very important: 1) improving public access to the coastline for recreation; 2) decreasing economic cost of SLR; 3) restoring wetland habitat; and 4) preventing flooding from future SLR. I expect a difference in the relative importance of these different priorities between Alviso community groups and other non-Alviso stakeholder groups due to the waterfront culture and history of Alviso, and recent flood events. I would expect stakeholders with a larger scope, such as Santa Clara County, to express a wider range of priorities than Alviso community groups because large stakeholder groups typically involve collaborative input from policy makers, managers, researchers and concerned citizens (Tribbia and Moser 2008).

BACKGROUND

This case study will focus on Alviso (37°25'27.34"N, 121°58'33.72"W), a community of approximately 2,077 inhabitants (U.S. Census Bureau, 2010), and the multiple stakeholder groups outside of Alviso that have an interest in the restoration and decision-making power in the restoration project planning. Alviso is a coastal community built in the late 19th century, located at southern tip of SF Bay (Figure 2). It was a thriving port city through the 1930's and has retained a strong maritime culture (Kos et al. 2009). For much of the 20th century, fruit orchards surrounded Alviso and the agricultural water demands caused the depletion of the aquifer that Alviso sits on top of. Aquifer depletion, combined with soil compaction from heavy machinery, caused Alviso to subside to an average of 12 feet below sea level (Kos et al. 2009). The Alviso ponds, currently located between the community of Alviso and the bay's waters, are manmade and were used for several decades for salt production (Figure 3). Currently, the South Bay Salt Pond Restoration Project is restoring the Alviso ponds back to historic natural marshland habitat (Figure 4), incorporating the horizontal levee design to create a climate change resilient shoreline that will provide some flood protection for Alviso, along with habitat for native waterfowl and other marshland species.
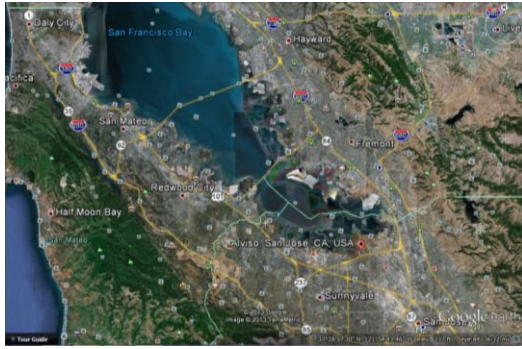
Figure 2. The community of Alviso, in the City of San Jose, is located at the southern tip of the SF Bay. The area inside the yellow circle includes Alviso and the Alviso ponds.

Figure 3. Alviso ponds border the coastal community of Alviso. The salt pond levee network is visible, along with the channelized rivers and sloughs.

Figure 4. Same view as Figure 2 but with an overlay of pre-1850 habitat types. Most of the area that is now Alviso ponds was once willow grove, alkali meadow, and riparian woodland.

METHODS

Data sources

Document analysis

I reviewed online and print documents for the cultural and historical context for creating questions and analyzing responses from interviews and surveys. To identify Alviso public discourse around flood risk, climate change, sea level rise, public access to the bay, and habitat restoration, I read newspaper articles from the *San Jose Mercury News* and the quarterly newsletter, *Continuity,* produced by the Preservation Action Council of San Jose. Alviso does not have its own local newspaper, and the *San Jose Mercury News* and *Continuity* are popular in Alviso. I further identified the discourse, opinions, and goals of other non-Alviso stakeholder groups from the websites of the California Coastal Conservancy (CCC), Army Corps of Engineers (ACE), Fish and Wildlife Service (FWS), Santa Clara Valley Water District (SCVWD), South Bay Salt Pond Restoration Project (the Project) itself, and the City of San Jose.

To gain more historical context of Alviso's maritime culture and identify past discourse about wetlands, I examined books, public records, and newspaper articles published since 1900, available at the Alviso Branch Library and the Martin Luther King Jr. Branch Library in the San Jose Public Library System. I scanned or took pictures of important historical documents. I also reviewed city plans of Alviso from when the salt ponds were first constructed, along with historic city documents about flood management, to better understand the historical context of the salt ponds restoration and community experience with and desire for flood management.

Semi-structured interviews

To obtain detailed responses about differing perceptions of goals and management of the restoration project, I conducted three to five structured interviews per stakeholder group: California Coastal Conservancy (CCC), Army Corps of Engineers (ACE), Fish and Wildlife Service (FWS), Santa Clara Valley Water District (SCVWD), those contracted to work on the South Bay Salt Pond Restoration Project (the Project), and Alviso residents. From these groups, I

interviewed a total of 19 individuals who were selected by snowball sampling. I began by contacting individuals who participated in the Project's Project Management Team (PMT) based on recommendations from the Executive Manager of the Project, and contacted other interview subjects based on recommendations from my previous interview subjects. I only interviewed individuals who identified themselves as more involved in and knowledgeable of the Alviso Ponds restoration relative to others in their stakeholder group. I conducted 16 of the interviews in-person, and three over the phone. I preferred conducting in-person interviews and only conducted phone interviews if it was too difficult to schedule a time to meet with interview subjects. All interviews lasted 30-40 minutes.

To provide structure to the interviews, I prepared a total of 17 interview questions: nine of which I asked every interview subject, and eight of which were additional questions for Alviso residents only (Appendix A). I took notes on an interview worksheet that I prepared with all the questions on it. I also audio-recorded each interview to be reviewed at a later time. While I had this preplanned set of interview questions, I used a semi-structured interview approach for all 19 interviews to create a less rigid conversation and allow for follow-up questions along throughout the interview. Interview questions asked all subjects how they prioritize the three stated goals, climate change concerns, and other project management concerns. Additional questions for Alviso residents focused on their previous flood experience and local opinions about the Project.

Surveys

To build off of ideas presented by Alviso resident interview subjects, I distributed surveys to Alviso residents to get a larger sample of opinions regarding the restoration project. I designed questions for the survey based on coded themes from Alviso resident interview responses (Appendix B). The survey asked the same questions as interviews did but in questionnaire form: priority of stated goals, climate change and sea level rise concerns, community engagement program, and experience with past flooding. I also added several demographic questions: such as residence time in Alviso, involvement in the local community, reasons for living in Alviso, etc.

To distribute the surveys, I partnered with George Mayne Elementary School and Alviso community leaders. I distributed hardcopy surveys through George Mayne Elementary School which is the local elementary school that serves around 100 students from Alviso. Partners at the

school's administration office identified students from the Alviso 95002 zip code and included both English and Spanish hardcopy surveys in the Alviso students' weekly Wednesday folder of forms and announcements that they bring home to parents. There were two rounds of survey distribution. The first round was two weeks before the surveys were officially due, and the surveys were included in the Wednesday folders as previously described. The second round of survey distribution was four days before the survey was officially due. Students brought completed surveys back to school, and then I gathered them all from the administration office. I also distributed the online version of the survey by working with a community leader to post the English and Spanish survey links in the Alviso Neighborhood Facebook page and email list, and also in two other local Alviso groups' Facebook pages.

Data processing

Document analysis

To compare the different stakeholder groups that I interviewed, I categorized the stakeholder groups based on their missions and values, and assessed how these missions and values are represented in the goals of the Project. I synthesized information about how each stakeholder group participated in and what opinions they had, towards wetland restoration, flood protection, sea level rise, public access to the bay, and habitat restoration into brief "interest summaries" for each group. These interest summaries created a narrative for each stakeholder group that helped reveal how the three goals of the restoration: habitat restoration, public access, and flood risk management were prioritized differently for each group.

To synthesize my review of historical Alviso documents, I tracked flood events in Alviso since 1900 and marked important Alviso historical political, economic, and social events that also influenced Alviso culture. I summarized the sentiments expressed in newspaper articles that I read about historic flood events, and tracked them to understand how opinions towards flooding changed overtime.

Semi-structured interviews

To compare individual and stakeholder group opinions reflected through interview responses, I coded responses and summarized those using descriptive statistics. I coded interview responses by assigning a keyword or term to specific ideas or themes in the response. See Appendix C for a full list of keywords and terms and their definitions. Due to the semi-structured interview approach, there were often multiple keywords used to represent one interview subject's response to one question. I used the same keywords to code responses to the same question across all interview subjects. I used the written notes that I took during interviews and reviewed audio recordings of interviews to more accurately code responses. To determine broader stakeholder group opinion, I identified terms that were most common among individuals from each stakeholder group for each interview question. I then used descriptive statistics to compare between different stakeholder groups' opinions in Microsoft Excel.

Surveys

To test the significance of survey responses, I entered survey responses as integers and conducted my analysis using Excel and STATA. I calculated summary statistics for each questions' responses to survey questions. I compared responses on priority of goals, project satisfaction, community engagement efforts satisfaction, and local community group involvement to find relationships across Alviso residents with different opinions.

Triangulating results

I triangulated the results between the three data collection methods to answer my central research question and related sub-questions about how opinions about the Alviso Ponds restoration project vary between stakeholders. I compared results about how stakeholder groups prioritized the three goals, across the three data collection methods. Other opinions that I compared the results of between data collection methods were opinions about the Project's management, flood damage, perceived risk of climate change and sea level rise, and perceived flood protection preparation to find similarities and differences between stakeholder groups.

RESULTS

Document analysis

I found that each of the stakeholder groups had different mission statements, visions, or objectives represented through their websites, press releases, and published reports. These missions and priorities aligned with one or more of the stated goals of the Project (Table 2). All stakeholder groups are larger organizations that participate in many other issues besides restoration of the Alviso Ponds, and each stakeholder group has a niche in realm of wetland restoration work that it participates in. I observed that stakeholder groups' goals and missions were best understood through the groups' "About" pages and explanations of the groups' history, values, and current projects from their websites.

I observed that the missions and activities of US Fish and Wildlife Service (FWS) and Citizens Committee to Complete the Refuge (CCCR) were most aligned with the Project's habitat goal. FWS is a federal agency that focuses on protecting and enhancing habitats through conducting research on wildlife and ecosystem management, and enforcing federal wildlife laws. CCCR is a local San Francisco Bay Area nonprofit organization that focuses on increasing the area of wetland habitat protected by entrusting more habitats to the Don Edwards San Francisco Bay National Wildlife Refuge, and promoting wetlands education to the public.

The missions of the California State Coastal Conservancy (SCC) and Alviso Residents were representative of more than one Project goal. SCC is a state agency that focuses on acquiring and protecting coastal habitats for wildlife and public access, and funds many projects that promote these goals. The mission statements and objectives of SCC align with both the Project's habitat and public access goals. I found online pages for six Alviso community groups, which ranged from religious organizations to political opposition groups. All of these groups had a common purpose of uniting a segment of the Alviso community towards a common cause, to continue or restore some part of the local culture or environment and make Alviso a better place to live. I gathered from this online investigation of Alviso organizations that all three of the goals were equally important to Alviso Residents (AR) as there were local organizations that addressed all three of them.

Table 2. Stakeholder mission statements and stated goals. Websites indicate that FWS and CCCR prioritized habitat restoration, ACE and WD prioritized flood protection, SCC prioritized habitat restoration and public access equally, and AR saw all three of the goals as equally high in priority.

Stakeholder Group	Stated or implied mission statement	Most prioritized goal
FWS	Our mission is to work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people.	habitat
ACE	Deliver vital public and military engineering services; partnering in peace and war to strengthen our Nation's security, energize the economy and reduce risks from disasters.	flood
SCC	The California Coastal Conservancy, established in 1976, is a state agency that uses entrepreneurial techniques to purchase, protect, restore, and enhance coastal resources, and to provide access to the shore. We work in partnership with local governments, other public agencies, nonprofit organizations, and private landowners.	habitat, public
WD	The mission of the district is to provide Silicon Valley safe, clean water for a healthy life, environment, and economy.	flood
CCCR	Our goal is to protect the Bay's remaining wetlands by working to place them under the protection of the Don Edwards San Francisco Bay National Wildlife Refuge, and to foster world-wide education regarding the value of all wetlands. The Citizens Committee to Complete the Refuge believes current and future generations of bay area residents deserve a clean, healthy, sustainable and vibrant San Francisco Bay.	habitat
AR	To maintain Alviso as a place with character and community. To keep Alviso as a place where people like to live.	coequal

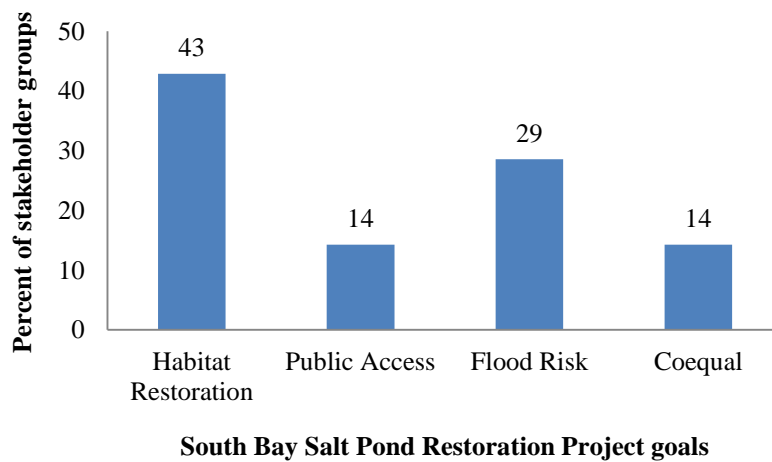**South Bay Salt Pond Restoration Project goals**

Figure 5. Prioritized goal from interpretation of stakeholder mission statements and values. According to missions and values expressed in stakeholder groups' websites, 43% of stakeholders would prioritize habitat restoration, 29% flood risk management, 14% public access, and 14% of stakeholders' missions and values reflected an equal emphasis on all three goals.

I found that Alviso has experienced major flooding at least eight times over the past century. I defined a "major flood" as a large flooding event that required most Alviso residents to evacuate from their homes. I found evidence from archived newspaper articles that there were major floods in 1938, 1940, 1950, 1951, 1952, 1953, and 1983. I read from these old newspaper articles that Alviso residents were commonly evacuated for at least a couple weeks in the aftermath of a major flood, and the discourse about flooding in Alviso during the 1950's was that it was a common occurrence to be expected during most winters. The 1983 flood was the most recent major flood in Alviso, and I noticed a stronger accusatory tone in response to the 1983 floods than in response to other years' floods from Alviso residents towards the City of San Jose for not providing better flood protection.

The "Free Alviso" movement arose as a response to consolidation with City of San Jose, and this movement was documented through newspaper articles during the 1970's. In the eyes of Alviso residents, the city had ignored many of the promises it had made to Alviso and treated it like a second-class neighborhood through decisions such as approving a landfill site and waste water treatment plant right next to Alviso. Alviso residents were also unsatisfied that San Jose was delaying upholding its promise to pave streets in Alviso, and Alviso residents paved their own streets in 1974 from impatience.

Structured Interviews

I identified general opinions towards the restoration project through my interviews with representatives from the six stakeholder groups. All stakeholder groups regularly attend biannual stakeholder meetings and one or two different monthly working group meetings. All stakeholder groups also viewed all three goals of the restoration project as important and intrinsically interconnected. Each stakeholder group did identify one or two goals as higher priority than the other(s) (Table 2), though the degree to which the goals are ranked higher or lower in priority is different for each stakeholder group. I found that all stakeholder groups were also very concerned about sea level rise and climate change (Table 3). While I identified different concerns and opinions about the community engagement program, management, and progress of the Project, I identified widespread agreement among stakeholder groups that the Project was a unique restoration that everyone was proud to be contributing to.

The three goals of the restoration were prioritized differently by almost every stakeholder group, and each stakeholder group contributed to the Project in unique ways. Interviewees from U.S. Fish and Wildlife Service (FWS) view the habitat restoration goal as the highest priority, and public access and flood risk reduction goals as equally lower priority. FWS is the major landholder that the restoration is occurring on, and contributes staff for scientific research. Interviewees from U.S. Army Corps of Engineers (ACE) view habitat restoration and flood risk reduction goals as equally high in priority, with the public access goal as lower priority. ACE's primary contribution to the Project's restoration efforts is funding and leading the Shoreline Study (SS), through which ACE is working with the Santa Clara County Water District (WD) to research, plan, design, and construct a levee bordering Alviso. Interviewees from WD view the flood risk reduction goal as slightly higher priority than the other two goals, and WD lobbies policy makers in both the State of California and U.S. Federal Government to allocate more money to the Project and SS. Interviewees from the California Coastal Conservancy (SCC) view the habitat restoration goal as slightly higher priority than the other two goals. Among all the stakeholder groups, SCC provides the most funding for the restoration project. Interviewees from Citizens Committee to Complete the Refuge (CCCR) viewed the habitat restoration goal as a higher priority than flood risk reduction and public access goals, which they equally prioritized after habitat restoration. CCCR is not a member of the Project Management Team, so while it does not attend more specific working group meetings, it submits formal comments and raises concerns during Stakeholder

Meetings. Alviso resident (AR) interviewees view the flood risk reduction goal as highest priority, followed by the habitat restoration goal, then followed lastly by the public access goal. Alviso community leaders regularly attend stakeholder meetings and discuss restoration issues further in the Alviso Working Group.

Table 2. Stakeholder stated goals and opinions from interviews. Almost all stakeholder groups ranked the three goals (habitat, public, and flood) in different orders of priority. Each stakeholder group also had a slightly different set of resources or roles to contribute to the restoration project. See Appendix C for the complete key of terms and definitions.

Stakeholder Group	Prioritized goals of the restoration	Role in the project management process
FWS	#1 is habitat, public and flood tied for #2.	land, research, attend
ACE	#1 habitat and flood, #2 public.	complementary, *fund, *research, attend
SCC	Coequal, but actually habitat is slightly more.	fund, attend
WD	Coequal, but actually flood is slightly more.	attend, lobby, *research, complementary
CCCR	#1 habitat, #2 flood and public.	attend, comment
AR	If have to choose: flood, habitat, public. If people understand that all of them are possible at once, then coequal.	attend
LS	Coequal	research
CCP	Coequal	facilitate, fund

I found that the public access goal was consistently ranked lower than the habitat restoration or flood risk management goal, and was only considered the top priority by one interview subject. I created a goal ranking index, where I assigned values 1, 2 and 3, in order of increasing priority placed on a particular goal: lowest priority (#3 choice), medium priority, and highest priority (#1 choice), respectively. According to this ranked index, all goals were more equal in representation based on priority among stakeholder groups, because many more groups ranked public access as a second priority (Figure 6). Goal priorities were even more equalized when only goal priorities of stakeholders active in the Project Management Team were considered.
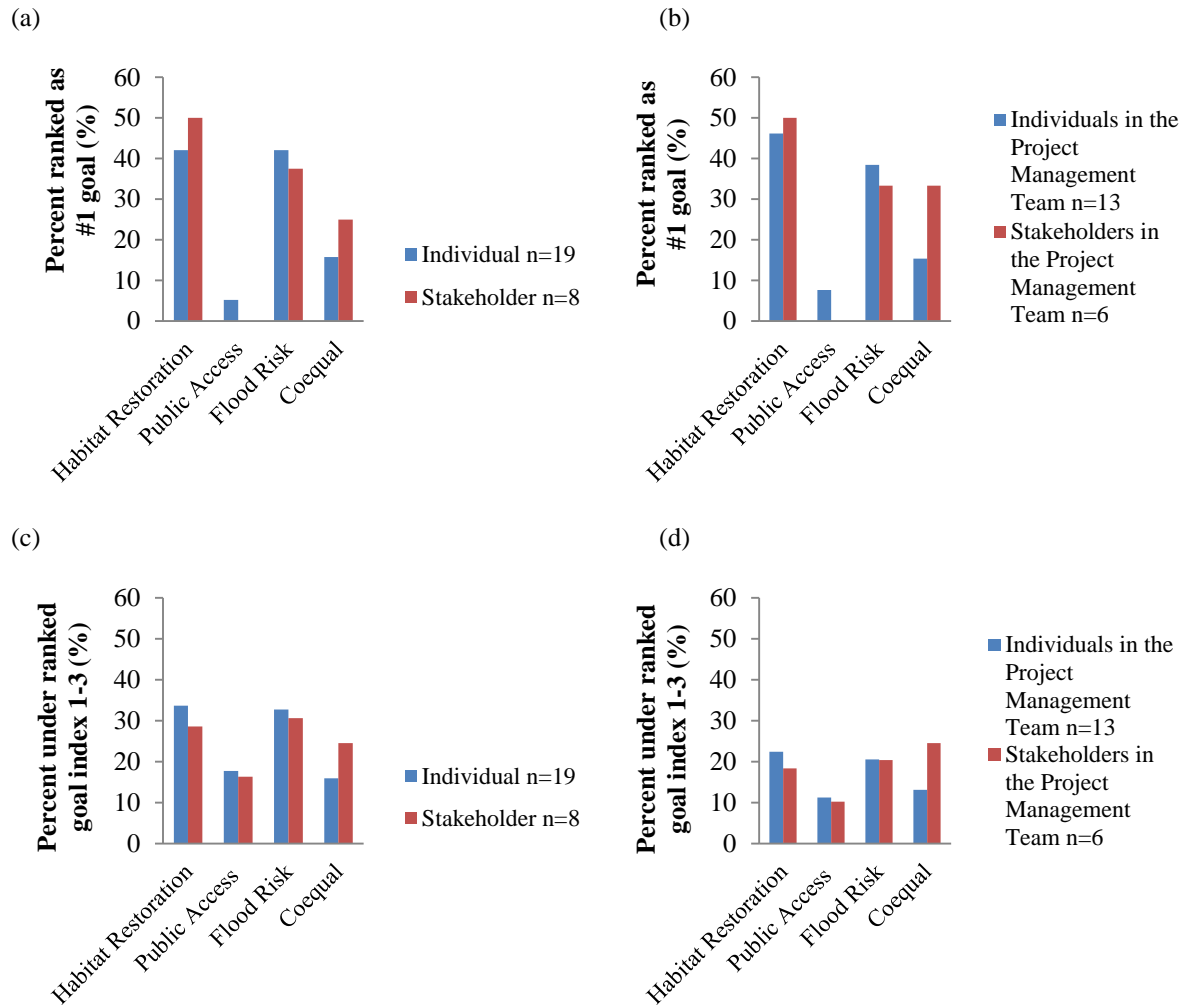
(a)

(b)

(c)

(d)

Figure 6. Difference in ranking between goals for individuals and stakeholder groups. Bar graphs of how individuals and the stakeholder groups they represent rank each of the Project's goals in priority, comparing all those who were interviewed with only those in the Project Management Team: (a) #1 prioritized goal of all interview subjects, (b) #1 prioritized goal of interview subjects on the Project Management Team, (c) ranked goals of all interview subjects, and (d) ranked goals of interview subjects on the Project Management Team.

All stakeholder groups were very concerned about climate change and sea level rise, and agreed that sea level rise projections has influenced every part of the restoration project. There were many different climate change impacts that were of concern to each stakeholder group (Table 3). ACE and SCC were both concerned about projected decreases in sediment concurrent with increasing climate change. FWS and CCCR were both concerned that wetlands will not have space to move upland and provide habitat for endangered species as sea level rise floods lower wetland habitat. FWS, SCC, and AR interviewees more consistently mentioned concern for public health and danger from storms or floods worsened by climate change. SCC was also concerned that there

is not enough accurate public discourse and awareness about the urgency and true damage of climate change, and AR was concerned that the Alviso community would be disproportionally affected by climate change impacts. I found that most interviewees reported that their stakeholder group was involved in actions to address climate change by reevaluating projected SLR threat on existing projects and plans (reevaluation), participating in the current Alviso Ponds restoration project (restoration), physically improving already completed projects to be more resilient to SLR (improve), creating coalitions and committees to address climate change adaptation (collaboration), or building political support for wetland restoration (policy). The reevaluation was the solution most consistently mentioned by ACE and WD for addressing climate change.

Table 3. Stakeholder concern and actions around climate change. I found that all stakeholder groups viewed sea level rise as very important and affecting every aspect of the restoration project. All stakeholder groups were also very concerned about climate change impacts, with the dominant impacts mentioned were room, sediment, people, discourse, and justice. The proposed solution more commonly mentioned was reevaluation. See Appendix C for the complete key of terms and definitions.

Stakeholder Group	Concern for SLR and influence on restoration planning	Concern for general climate change impacts
FWS	very, everything	very, sediment, people, room,
ACE	very, everything, beginning	very, reevaluation
SCC	very, everything	very, sediment, people, discourse
WD	very, everything	very, reevaluation
CCCR	very, everything, beginning	very, room
AR	very, everything	very, people, justice

I noticed that the general opinion across non-Alviso stakeholder groups is positive towards the community engagement program while Alviso resident interviewees had mixed opinions about it. SCC and individuals contracted to work for the Project were most knowledgeable about community engagement program and organized outreach and events, while stakeholder groups such as FWS, ACE, and WD were more disconnected with the community engagement program. I observed that interviewees from any non-Alviso stakeholder group expressed more pride for the community engagement program and found it more unique compared to other restorations' programs if they had been more involved with organizing the program. I found mixed opinions

amongst Alviso resident interviewees who each found the community engagement program to be poor, average, or great (Table 4).

I identified that the dominant concern for the project's goals, progress and management among stakeholder groups was future funding, and all stakeholder groups were overall very satisfied with the progress of the Project (Table 4). The lack of future funding was a dominant concern for interview subjects from FWS, SCC, WD, and CCCR. The long timeline of the Project was another concern expressed by ACE and AR interviewees. Additionally, AR interviewees were also concerned about complacent public officials in local and state government who do not help Alviso, the many levels of bureaucracy and policy processes that are barriers to completing the project more quickly, and political support for this project at the local to state level that is out of AR control. Both WD and ACE share similar concerns about the Shoreline Study (SS) of "expensive", "time", and "bureaucracy". FWS and ACE overall emphasized satisfaction with the Project's management structure ("promanage"). FWS and SCC overall emphasized satisfaction with the Project's timeline and progress so far while AR and ACE were unsatisfied with the timeline and progress of the SS. ACE and WD were overall dissatisfied with the SS's progress. AR satisfaction towards the Project ranged from satisfied to very satisfied.

Table 4. Stakeholder opinions on management, progress, and community engagement. I found that the dominant concern for the Project among the stakeholder groups is the lack of future funding. The dominant concerns for SS among ACE and WD are expensive, bureaucracy, and time. All stakeholder groups were satisfied with the Porject progress, and emphasized mostly satisfaction and some dissatisfaction with the Project's management and timeline. See Appendix C for the complete key of terms and definitions.

Stakeholder Group	Concerns with the Project	Opinions on Alviso community engagement	Satisfaction with the Project's progress
FWS	funding	great Not very familiar.	positive, posmanage, postime
ACE	*expensive, *bureaucracy, *time, *politics	Great. Not very familiar	positive, posmanage, *negative, *negtime
SCC	funding the Project: funding, time, meetings	great Works the most closely with CCP and the Project's program.	positive, postime, model
WD	SS: *time, *bureaucracy, *expensive Have no complaints about the Project when compared with SS.	great, *poor Not very familiar with the Project community engagement. SS does not have a community engagement program.	positive, postime, *negative, *negtime
CCCR	funding	great	positive
AR	politics, bureaucracy, time, officials	poor, average, great Mixed opinions.	ok, positive

I found from my AR specific interview questions that AR interviewees had a common attitude of bitterness or frustration towards larger policy making entities such as the City of San Jose or State of California. There was no general overall opinion for AR about how interviewees thought the Project was prioritizing its own three goals. I learned that there are many possible outcomes of this restoration that AR interviewees were excited about, with the most common ones being the excavation of the Alviso Slough, creation of an Alviso port, and revitalization of Alviso's historic maritime culture. AR interviewees commonly remembered the strength of the community showing through as Alviso residents helped each other, the smell of mildew and mold in flooded houses, extended evacuation of the entire community, and the necessary rebuilding of much flooded property in Alviso.

Table 5. Alviso resident specific questions. AR interviewees did not have a dominant opinion about how they thought the Project prioritizes its goals. Common responses for most exciting outcomes of the restoration were slough, port, and maritime. Those that had experienced the Alviso floods of 1983 commonly recalled localhelp, smell, rebuild, and evacuate. See Appendix C for the complete key of terms and definitions.

AR Specific Interview Question	AR Response
How do you think the restoration project is ranking these three goals?	mixed rankings - equal
What outcome of this restoration project are you most excited for?	slough, port, maritime
Have you witnessed the Alviso floods of 1983? If so, what are some memories you have of it?	localhelp, smell, rebuild, evacuate; bitterness from unfair treatment and stigma were common attitudes among interview subjects.

Surveys

I observed a wide distribution in survey respondents in key demographic traits such as residency time, and almost equal representation of those who have and have not experienced flooding in Alviso before. 14 out of 29 respondents had experienced at least one major flood in Alviso, all of whom experienced the 1983 floods. There was a large variation in the length of residency in Alviso of survey respondents, with a mean of 23 years and standard deviation of 16 years. 70% of respondents were involved in at least one local organization, with 27% of respondents being in two or three groups. 62% of respondents viewed the three goals as coequal and did not rank the three goals in priority. Of the 38% of respondents who did not view the goals as coequal, the most common ranking of the priorities for Alviso residents were 1) flood risk management, 2) habitat restoration, and 3) recreation and public access. 83% ranked flood risk management as their highest priority goal, and 17% ranked habitat restoration as their highest priority goal. Public access was ranked as the last priority goal by 73% of respondents.

I found that 35% of the survey respondents were satisfied or very satisfied with the restoration project, and a larger group of 62% was neutral. 40% of the survey respondents were satisfied or very satisfied with the Project's community engagement efforts, and 36% of respondents were neutral about the Project's community engagement efforts. There was an observed relationship between overall satisfaction level towards the Project, and satisfaction level towards the Project's community engagement efforts (Figure 7). 78% of those who were neutral in overall satisfaction level of the Project were also neutral towards community engagement, and 67% of those who were satisfied in overall satisfaction level of the Project were also satisfied with community engagement.
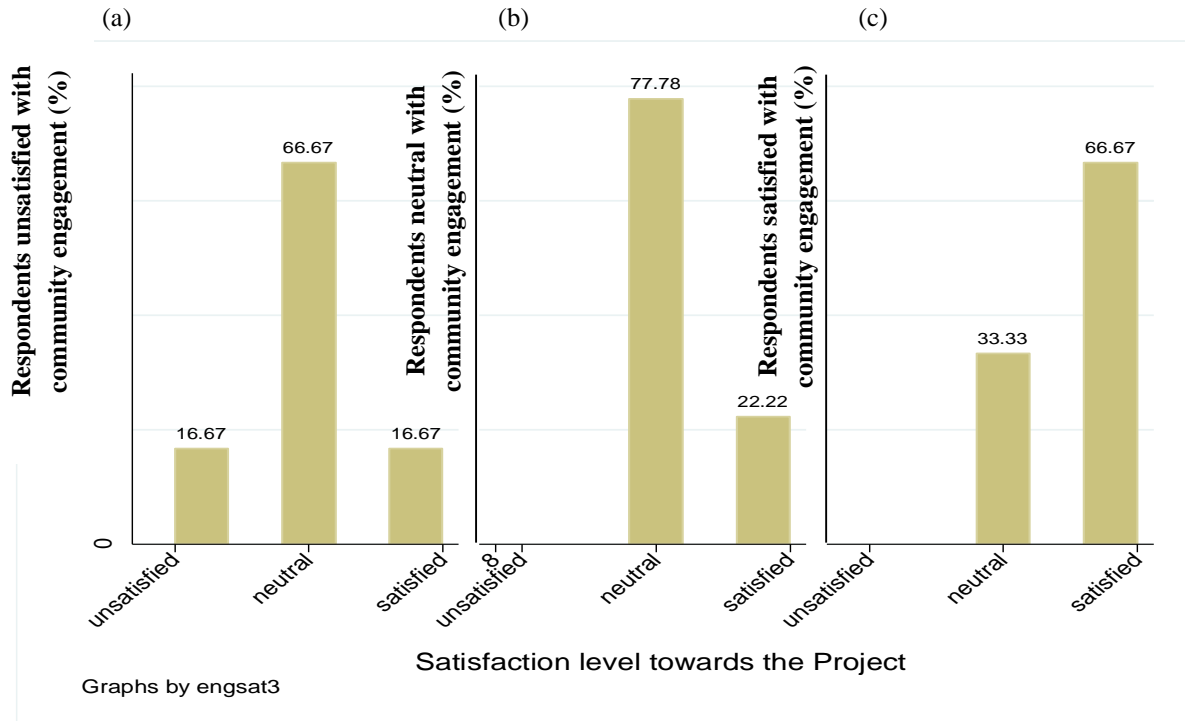
Figure 7. Comparison between levels of satisfaction towards the Project and levels of satisfaction towards community engagement efforts. Bar charts graphing grouping of those who were unsatisfied, neutral, or satisfied with community engagement with those who were unsatisfied, neutral, or satisfied with the Project: (a) respondents unsatisfied with community engagement, (b) respondents neutral with community engagement, and (c) respondents satisfied with community engagement. n=25.

DISCUSSION

My study identified the current diversity of opinions about the wetland restoration and community engagement program among key stakeholder groups of the Alviso Ponds restoration. The many floods and attempts for restoration of the Alviso Slough demonstrate a historical concern of flood and access to the bay for Alviso residents. At the same time, the economic decline of Alviso over the past 150 years and presence of a landfill and wastewater treatment plant on the borders of the community create an environmental justice lens through which many community members use to view the current restoration. The South Bay Salt Pond Restoration Project (the Project) Project Management Team (PMT) stakeholders take great pride and satisfaction in the community outreach efforts, as this restoration project is putting much more effort into community engagement compared to community engagement programs of other restoration projects (J. Bourgeois, *personal communication*). This additional effort is a major reason for the observed high

Alviso resident satisfaction rates for the restoration project, despite mixed opinions about and low resident participation in the Project's community engagement program. Adaptive management was identified as an integral component of the restoration's management process, and is referred to as both one of the best aspects of this project management structure, and also one of the main reasons that the project is not progressing as fast as many stakeholder groups would like to address sea level rise and sedimentation concerns sooner.

Alviso History and Culture

Alviso's rich maritime and flood history influenced the perceptions of a more engaged and older Alviso resident demographic. Many of the most active Alviso community leaders had been living in Alviso for many years and were more knowledgeable of the restoration activities than other Alviso residents were. This is likely because residents who grew up during the mid 20th century remembered a robust South Bay Yacht Club, a rich and diverse marine ecosystem, and a time when Alviso was a dominant port town that connected trade from the south to the north. These childhood experiences helped form a strong mission among older Alviso residents to restore the former vitality of Alviso and defend it against undesirable development. These residents are extremely vocal today through community organizations such as the South Bay Yacht Club, Alviso Neighborhood Group, Alviso Water Group, and Santa Program.

Alviso community members who held leadership positions in local community organizations become key community leaders that are more likely to be actively involved in the Alviso Ponds restoration component of the Project. In the community outreach efforts of many restoration projects, civic engagement is often dominated by those who are already involved in local community organizations and/or those with larger social networks (Brennan and Dodd 2009, Harvatt et al. 2011). These individuals often also have been living in the community for a longer period of time (R. Santos, *personal communication*). The most vocal Alviso community leaders often have some or all of the following categories of experiences: family history in Alviso, childhood experiences in Alviso, and large network of community support. These three categories of experiences complement each other to provide Alviso community leaders with the background knowledge of Alviso history and culture; and commitment to uphold Alviso ideals of maintaining

a close tight-knit community, restoring lost marine and shoreline habitat, improving the local economy, and fighting against unwanted development.

Residents who have lived in Alviso for longer experienced more floods. The emotional experiences from destructive floods had a lasting psychological impact, and shaped the culture and community dynamics in Alviso. Those who had experienced one or more of these large floods recall the deep emotional experience of losing everything they owned, and helping each other rebuild their homes. Other studies have shown that residents who have personally experienced flooding or other natural disasters are more likely to be knowledgeable about and active in projects that alleviate risk of future disasters (Harvatt et al. 2011, McGee 2011). Such is the case in Alviso, where most of the community leaders who participate in the Project's Alviso Work Group have had personal experience with flooding in Alviso, or have extensive background knowledge on these historic floods. Residents who had experienced floods generally were more knowledgeable about the Project, which supports existing hypotheses.

Alviso has a distinct small, close-knit community atmosphere, which can be explained by not only its physical size, but also shared experiences and long residency of Alviso families. Residents enjoy living in Alviso – there is very little homeownership turnover compared to other communities in the Bay Area (R. Robinson and R. Santos, *personal communication*). This slow resident turnover results in the long-lasting presence of Alviso families – generations of the same family that have stayed in Alviso and upheld culture and traditions. During large flood events, Alviso residents received little outside help. Even after Alviso was incorporated with the City of San Jose, Alviso did not receive much aid from San Jose to recover from the large floods of 1983. So, community members relied on each other to help rebuild Alviso and share what they had to survive. This experience of working together to recover was difficult, but helped make the community closer and more personal. This close community dynamic is maintained today through inclusive community traditions such as holiday dinners and the annual Crab Feed at the Yacht Club; and Opening Day at the Marina, during which residents maintain and create connections with others in the Alviso community. Most Alviso residents know most other Alviso residents, which creates a small town atmosphere that most residents and visitors like about Alviso.

Environmental Justice

Many Alviso residents are not involved in the Project's community outreach efforts even though meeting details are widely known. The lack of interest in participation could be attributed to multiple factors such as inconvenient meeting times, lack of knowledge about the Project, and disempowerment from past experiences. Disempowerment represents the most concerning factor, because it represents the loss of faith in the power of voicing one's opinions. This sentiment primarily stems from past negative experiences with In Alviso, the presence of a landfill and wastewater treatment plant is a sign that makes some Alviso residents feel like they are the dumping ground for San Jose. This kind of thinking can either encourage residents to be more vocal about representing their community, or have the opposite effect of residents self-alienating themselves from the participation in the planning process because they become discouraged in planning agencies' commitment to the community (Brulle 2010).

Disconnect between the Project Management Team and Community

There is a disconnect between restoration planners who believe that the community engagement program reached a wide audience of Alviso residents, and Alviso residents themselves would like to be more included in the planning process and had no strong opinions for or against the Project's community engagement efforts. This is a common observation across different restoration projects and assessments of community engagement programs; managers typically overestimate the satisfaction of the community engagement program while local residents are less satisfied. The Project contracted the Center for Collaborative Research, a third party, to create and oversee the Project's community engagement efforts. Like those of other public restoration projects, the community engagement efforts in Alviso relied on email newsletters and invitations to monthly stakeholder forums to inform and attract residents (Brennan and Dodd 2009, Brulle 2010). What sets the Project's community outreach efforts apart from those of other restoration projects is the frequency of the stakeholder forums and newsletters, as other restoration projects only held a few public discussions for local residents to participate in over the course of the entire project (M. Selkirk, *personal communication*). Monthly stakeholder forums were also almost always located in Alviso at a central location during the afternoon or evening. Alviso community leaders were very involved in the stakeholder forums and felt that their opinions were respected

and influenced the decision-making process. The Project established strong connections with these community leaders, who easily discussed their opinions directly with the PMT. Close personal connections between the PMT and community leaders make those on the PMT more satisfied with their community engagement efforts than other Alviso residents, the vast majority of which do not participated at the same level as Alviso community leaders.

Climate Change Concern and Action

All stakeholder groups have widespread concern about climate change, yet not much action is taking place to significantly address the issue. Sea level rise projections inspire a sense of urgency, uncertainty, and frustration amongst stakeholder groups interviewed involved in the Alviso Ponds restoration. All stakeholder groups on the PMT view climate change as an extremely concerning challenge for the restoration, and recognize that the levee infrastructure and restoration work needs to proceed very quickly to ensure that newly restored wetland will have a chance to accrete and collect sediment to keep up with sea level rise. The uncertainty of sea level rise projections is an especially bureaucratic barrier for designing the appropriate size of the levee that the ACE will be building as part of the Shoreline Study. Other stakeholder groups have not yet made progress on existing projects elsewhere in the Bay Area in addressing future climate change impacts. A large barrier to quickening the process of addressing climate impacts is agency bureaucracy and the long process of approving changes to a completed project, or project plans. Stakeholder groups in the project management team are more concerned about climate change impacts than Alviso residents as a whole because the facts behind sea level rise and wetland establishment projections are not as clear to residents. Other studies have shown that those who are less knowledgeable about sea level rise or flood risk are less likely to actively address the risk (Harvatt et al. 2011). Thus, there is room for the Project's community engagement to include more education and emphasis on climate change, which could help improve awareness about climate change amongst Alviso residents.

Limitations and Future Directions

There are limitations in all three data collection methods in my study. Through document analysis, I am only able to collect information from historical documents that I could find. There are likely plenty of other documents that I did not have access to that could have influenced my study. I also looked for opinions from stakeholders via online publications and websites. I did not analyze other forms of media such as visual art or music. I carefully selected those who had the most experience with the restoration project to interview for my study. While I asked for responses to my questions in terms of the stakeholder group's response, it is difficult to discern if the responses my interview subjects gave were representative of their own personal opinions or actually the opinion of the stakeholder group. Personal opinions could be different from that of the larger stakeholder groups' opinions and make my data an inaccurate reflection of the stakeholder group. There is also a strong response bias associated with my Alviso resident surveys. Since I relied on Alviso residents to turn in their completed survey, those more likely to put in the extra effort to respond and return the survey may be Alviso residents who would be more likely to be active and engaged in the restoration project, or those that have strong opinions about it. I might have missed responses from those that would have had more neutral opinions.

My study was focused on examining the management infrastructure and community engagement aspects of the restoration project to identify how it was unique from other restoration projects. More work could be done to investigate aspects such as funding and comparison with other restoration projects along SF Bay to better understand challenges of wetland restoration in SF Bay and how the Project is different from other projects in the SF Bay. This would include monitoring of how funding sources have changed over the course of this multi-decade project and what the funding forecast currently looks like. It would also include assessing how the management process and community engagement program differs from those of other restoration projects around SF Bay.

Broader Implications

As sea level rise continues to threaten low-lying coastal communities, there is a great need to restore large areas at once to maximize beneficial sea level rise buffering ability of wetland spaces. Large restoration projects require involvement from many stakeholder groups that have different resources to contribute and goals to achieve. The South Bay Salt Pond Restoration Project

can serve as a good example of how a diverse group of stakeholder groups can effectively work together to progress towards common goals and successfully restore a large area of wetland. With more than 85% of historic wetlands in SF Bay destroyed (GP 1999), and over half of those in the lower 48 states destroyed (Dahl 1990), there are many opportunities for recovering wetlands that have been drained, filled in, or converted to other forms. Wetland restoration can not only be a sea level rise adaptation strategy, but also can be an opportunity to alleviate issues of environmental justice for low-income communities that often inhabit the most vulnerable low-lying coastal areas. Environmental justice concerns can be addressed by a robust community outreach program that encourages citizen involvement in the decision-making process and in the process, empowers them to speak with a collective voice. A strong community outreach program will not solve environmental justice issues, but it can help provide a space for the community to convene and discuss pressing community issues and observe their voices influencing management decisions.

Large restoration projects require key management components and must address funding challenges to be successful. Multiple components involved for successful restoration project are funding, community engagement, key people, and adaptive management. Funding is a growing concern for not only the Project, but also most other public projects across the country, and there is a trend of public-private partnerships to fund what used to be completely public funded projects. There are costs and benefits to privatizing the funding sources for public projects, but when public funding streams are drying up, large multi-decade restoration projects such as the Project have no other choice than to engage private sector investment to continue progressing with the restoration. These private partnerships require valuable time and resources to acquire. Community engagement helps build public support for the project, which is crucial for avoiding lawsuits or other challenges later in the restoration process. The cooperation and commitment of key restoration project planners from each stakeholder group, present on the project management team, are extremely important. Without committed personnel working on a long-term restoration project, institutional knowledge of the project would be lost and communication would be less effective. A clear adaptive management decision-making structure helps a long-term project make the best decisions with the given data and uncertainties, with the confidence that continued monitoring and data analysis will influence future decisions and possibly past decisions as well. Working with human and natural ecosystems, is complex and challenging, but with the correct decision-making

infrastructure, programs, and resources, large-scale wetland restoration can help alleviate social and environmental issues at the same time.

ACKNOWLEDGEMENTS

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APPENDIX A: Interview Questions

Stakeholders interviewed: Alviso residents, nonprofit environmental community, Army Corps of Engineers (ACE), Fish and Wildlife Service (FWS), Santa Clara Valley Water District (SCVWD), CA Coastal Conservancy (CCC).

1. The stated goals of the project are 1) restore and enhance a mix of wetland habitats, 2) provide wildlife-oriented recreation and public access, and 3) improve flood risk management in the South Bay.

   From the perspective of [STAKEHOLDER GROUP], how would you rank these three goals in importance?

2. What is [STAKEHOLDER GROUP] doing to attain these goals for the Alviso Ponds restoration?

3. (Alviso resident only) How do you think the restoration project is ranking these three goals?

4. (Alviso resident only) What outcome of this restoration project are you most excited for?

5. What are your concerns about this project's goals, progress, and management?

6. What are your opinions about the community engagement program for the Alviso Ponds restoration?

7. & 8. What are specific examples of some pros & cons/could be improved about this community engagement program?

9. How satisfied are you with the restoration project's achievements and progress so far?

10. How important is sea level rise to the restoration project design, concerns, and goals that [STAKEHOLDER GROUP] hopes to realize from the project?

11. How concerned is [STAKEHOLDER GROUP] about climate change impacts on Alviso, the restoration project, and the greater Bay Area

12. (Alviso resident only) How long have you lived in Alviso?

13. (Alviso resident only) How many flood events have you witnessed here? Which years?

14. (Alviso resident only) Have you witnessed the Alviso floods of 1983? If so, what are some memories you have?

15. (Alviso resident only, if YES to Q13) What percentage of your annual income do you think you spent on repairs from the floods of 1983?

16. (Alviso resident only) How much do you think your property value has decreased while you have lived here because of previous flooding? A dollar amount? A percentage?

17. (Alviso resident only) How much do you think your property value has decreased while you have lived here due to current and future flood risk?

APPENDIX B: SURVEY QUESTIONS

Dear Alviso Resident,

My name is Judy Li and I am an Environmental Science undergraduate student at U.C. Berkeley. I am conducting my senior thesis research project on flooding in Alviso and residents' opinions about the salt ponds restoration. Your responses will help me assess the South Bay Salt Pond Restoration Project's community engagement efforts and provide feedback. This survey should take about 10 minutes.

All information will remain anonymous and confidential. The completed results of my research will be available in Alviso for residents to view this summer when my study is complete. All responses are greatly appreciated!

Thank you!
Judy   *Questions? Email: judy.researchproject@gmail.com*

Alviso Ponds Restoration and Flooding Survey

1. How many years have you lived in Alviso? _____years

2. Why do you like living in Alviso? (rank from 1 = most important reason, to 5 = least important reason)
    ___ Personal family history   ___ Affordability
    ___ Beautiful environment and climate   ___ Alviso culture
    ___ Convenient distance to work   ___ Other (please specify) _____
    ___ Small close-knit community

The South Bay Salt Pond Restoration Project is a large 15,000 acre restoration project that is transforming salt production ponds into natural historic wetland habitat. The Alviso salt production ponds are currently being restored into wetlands as part of this multi-decade project. The goals of the Restoration Project are to: *1) restore and enhance a mix of wetland habitats, 2) provide wildlife-orientated recreation and public access, and 3) improve flood risk management in the South Bay.*

3. Which of these goals are more important to you? Less important? (rank from 1 = most important, to 3 = least important; if they are all equally important, mark an "X" for the last choice)
    ___ Restore and enhance a   ___ Provide wildlife-orientated   ___ Improve flood risk
    mix of wetland habitats.   recreation and public access.   management in the South Bay.

    OR: ___ All three of these goals are equally important to me.

4. Do you think the *Restoration Project* views its own three goals as equally important? (circle one)   **Yes   No**

5. **If no**, which of these goals seem to be more important to the *Restoration Project*? Less important? (rank from 1 = most important, to 3 = least important)
    ___ Restore and enhance a   ___ Provide wildlife-orientated   ___ Improve flood risk
    mix of wetland habitats.   recreation and public access.   management in the South Bay.

6. How excited are you about the following outcomes from this restoration project? These outcomes reflect possibilities, but not proven facts. (put an "X" in the appropriate box)

STATEMENTS	Don't think this will happen	Very not excited	Not excited	Neutral	Excited	Very excited
Trails through the restored area.						
Increased economic activity in Alviso from visitors.						
Better water access to the Bay from Alviso.						
More diverse and abundant local wildlife.						
Reduced flood risk.						
A new port in Alviso.						

Something is being done.						

7. How much do you agree with the following statements? (put an "X" in the appropriate box)

STATEMENTS	Not Applicable	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I am satisfied with the work of the South Bay Salt Pond Restoration Project.						
I am familiar with what the Restoration Project is doing.						
I know when and where the Restoration Project is holding educational forums or events for the community.						
I have been actively engaged in the restoration process.						
I would like to be more actively engaged in the planning process.						
I am familiar with the progress of the restoration.						
I am satisfied with the Restoration Project's efforts to engage Alviso residents in the planning process.						
My opinions are respected by the Restoration Project's management team.						
My opinions have influenced restoration management decisions.						
I don't care to get involved with the restoration process						
I am concerned about projected sea level rise caused by climate change.						

8. What are your main concerns about this restoration project? The statements below reflect opinions, not necessarily proven facts. (check all that apply)
    - ☐ No concerns.
    - ☐ I won't benefit from the restoration.
    - ☐ It won't reduce flood risk for Alviso.
    - ☐ It won't open up the Alviso Slough.
    - ☐ Project management does not listen to my concerns.
    - ☐ There will be less salt-pond shorebird habitat.
    - ☐ The restoration is taking too long to complete.
    - ☐ Other (please specify) _____

9. What concerns do you have about climate change? (check all that apply)
    - ☐ No concerns.
    - ☐ Sea level rise will increase Alviso's flood risk.
    - ☐ Larger floods will hurt the Bay Area economy.
    - ☐ More severe droughts for all of California.
    - ☐ Plants and animals will have a hard time adjusting to warmer temperatures.
    - ☐ Other (please specify) _____

10. Which of these Alviso floods have you experienced? (circle all that apply)   **1983   1958   1955**

11. **If you experienced the 1983 floods**, what helped you recover? (check all that apply)
    - ☐ Flood insurance.
    - ☐ Local friends and family in Alviso.
    - ☐ Friends and family outside of Alviso.
    - ☐ Government help.
    - ☐ Other (please specify) _____

12. **If you experienced the 1983 floods**, how were you personally affected? (check all that apply)
    - ☐ Barely affected.
    - ☐ Helped other Alviso residents recover.
    - ☐ Lost most of my possessions.
    - ☐ Temporarily evacuated.
    - ☐ Home was flooded but eventually repaired.
    - ☐ Home needed to be completely rebuilt.
    - ☐ Permanently moved to a different house.
    - ☐ Other (please specify) _____

13. **If you experienced the 1983 floods,** how much did you spend on repairs after the flood?

a.	No repairs	d.	$1,000 - $2,000	g.	$6,000 - $8,000
b.	Less than $500	e.	$2,000 - $4,000	h.	$8,000 - $10,000
c.	$500 - $1,000	f.	$4,000 - $6,000	i.	More than $10,000

14. **If you experienced the 1983 floods**, what was your household annual income right before the floods?

a.	$0 – $25,000	d.	$65,000 – $85,000	g.	More than $150,000
b.	$25,000 – $45,000	e.	$85,000 – $100,000	h.	I do not wish to respond
c.	$45,000 – $65,000	f.	$100,000 – $150,000		

15. Is your current job located in Alviso? (circle one)   **Yes**   **No**   **Other** (please specify) _____

16. How old is your current house? _____ years.

17. How many people are in your household? _____ people.

18. What is your current household annual income?

a.	$0 – $25,000	d.	$65,000 – $85,000	g.	More than $150,000
b.	$25,000 – $45,000	e.	$85,000 – $100,000	h.	I do not wish to respond
c.	$45,000 – $65,000	f.	$100,000 – $150,000		

19. What is your ethnicity? (circle all that apply)   **Hispanic/Latino   White   Asian/Pacific Islander   Black   Native American   Do not wish to respond   Other** (please specify) _____

20. What community organizations are you part of? (check all that apply)
    - ☐ None
    - ☐ South Bay Yacht Club
    - ☐ Alviso Water Task Force
    - ☐ Alviso Neighborhood Group
    - ☐ Star of the Sea Church
    - ☐ Rotary Club
    - ☐ George Mayne Elementary School PTA
    - ☐ Other (please specify)

Thank you for completing my survey!

If you would like to be contacted for possible follow-up questions, please write your email address: _____

Additional Comments:

APPENDIX C: Key of Terms and Definitions

Table C1. Key of terms and definitions. Answers to each interview question were coded based on themes so responses could be summarized in the terms below.

Question	Term	Definition
1	habitat	goal: restore and enhance a mix of wetland habitats
	public	goal: provide wildlife-orientated recreation and public access
	flood	goal: improve flood risk management in the South Bay
	equal	all three goals: habitat, public, and flood; are coequal because they are interrelated
2	fund	provide funding for something that moves the project forwards
	land	landholder, allow the restoration to take place
	research	provide research expertise/effort
	do	construct, restore, or otherwise physically changing the landscape
	outreach	conduct outreach and education to other stakeholders about the project
	lobby	pressure policy makers to change policies
	facilitate	organize projects and facilitate planning
	balance	balance multiple stakeholder interests
	*	term describing the Shoreline Study (ACE)
	complementary	working on another project in partnership that will complement the restoration
	comment	comment on decisions that management team makes to influence the decision
	attend	attend stakeholder and/or management team meetings
3 [ALVISO]	habitat	goal: restore and enhance a mix of wetland habitats
	public	goal: provide wildlife-orientated recreation and public access
	flood	goal: improve flood risk management in the South Bay
	equal	all three goals: habitat, public, and flood; are coequal because they are interrelated
4 [ALVISO]	slough	scour the slough through notch A8
	tourism	day visitors who appreciate Alviso nature and help Alviso economy
	trails	use of trails on levees to enjoy
	zoo	bring back an "open zoo"
	decrisk	decrease flood risk
	maritime	bringing back historic maritime culture for recreation and access
	port	bring back a port for trade, culture
5	continuity	keeping all (non-Alviso resident) stakeholders working closely together into the future
	time	aspects of the project are moving too slowly
	money	there is increasingly less funding available for the project, with a future perspective
	*	term describing the Shoreline Study (ACE)
	expensive	the current project is too expensive
	officals	officials who work in the government who become useless

	politics	politics/policy outside of stakeholders' control is inhibiting progress
	risk	current flood risk is not addressed
	meetings	too many meetings
	birds	there won't be enough salt marsh habitat left for birds under existing plans
	uncertainty	how to make decisions in the face of uncertainty
	cooperation	there are challenges with resolving differing priorities with other stakeholder groups
	bureocracy	there are too many levels of bureocracy and internal policies/reviews to overcome
	community	continued Alviso resident participation
6	great	Alviso Ponds community engagement program is better than other programs
	average	Alviso Ponds community engagement program is similar to other programs
	poor	Alviso Ponds community engagement program is worse than other programs
7	science	good science was presented
	private	good outreach to private sector
	tours	good organization of tours of the restoration
	electronic	good electronic advertising
	advertise	good effort and degree of reaching out to Alviso residents about the program
	relationship	good relationships with specific Alviso residents were built
	signage	good pubic signage and trails
	pilot	good testing of new projects
	celebration	good celebration of major milestones/construction events
	external	good external outreach and recognition about project
	something	good that something is happening
	A8	good management of different interests about mercury mobilization and flood protection for pond A8
	frequency	good regular or frequent opportunities for engagement
	stakeholders	good presence of stakeholders at engagement program
	receptive	good reception of feedback from the community
	transparency	good transparency about the goals, progress, and plans of the project
	CCCR	good presence of Citizens Committee to Complete the Refuge
	considerate	good consideration of Alviso resident comfort and culture when conducting the program
8	advertise	not enough advertising to reach out to more Alviso residents
	topics	not enough discussion on other important relevant topics
	unclear	not clear what the point of Alviso engagement is anyways
	multilingual	not enough multilingual material in the program
	representation	not enough diverse representation and/or people participating in the program
	apathy	not easy to make residents care
	frequency	not enough program events/meetings
9	positive	overall very satisfied
	ok	happy, but not estatic
	neutral	some satisfaction and unsatisfaction
	negative	overall unsatisfied

	model	project serves as a great model for multi-stakeholder planning
	incompatable	complementary project management or goals are not compatable with that of SBSPRP
	postime	project is going at a good pace
	negtime	project is going too slowly
	extcollaboration	collaboration with other groups external to the normal stakeholders has been difficult
	posbalance	multiple stakeholder interests balanced well
	negbalance	multiple stakeholder interests balanced poorly
	posmanage	management of project is executed well
	negmanage	management of project is executed poorly
	posengagement	community engagement program was done well
	negengagement	community engagement program was done poorly
10	everything	every part of the restoration project has been changed to account for SLR
	beginning	SLR was considered since the beginning (in models, early planning, etc.)
	gradual	SLR concern has dramatically grown from one of many concerns to the biggest concern
	support	actions to protect from SLR depends on support from community
	neutral	not very concerned about SLR
	little	a little concerned about SLR
	very	very concerned about SLR
11	neutral	no concern about climate change impacts
	little	a little concern about climate change impacts
	very	very concerned about climate change impacts
	room	concern that there is not enough room for wetlands to move upland and provide habitat for endangered spp.
	sediment	concern for decreasing sediment with increasing climate change
	infrastructure	concern for flood effects on public infrastructure such as pumbing, electricity, roads, etc.
	freshwater	concern that there will be freshwater flooding
	table	concern that water table will rise and make storm and tidal flooding worse
	localecon	concern for effects on local Alviso businesses
	economy	concern for effects on businesses in Bay Area esp. Silicon Valley
	livability	concern for reduction of what makes residents love Alviso: culture, nature, community
	people	concern for public health effects and danger from storms or floods
	justice	concern that Alviso will be disproportionally affected
	notalviso	all of this is not for Alviso
	treatment	concern about the treatment plant
	shortterm	concern that planners care more about short term gain than long term prevention
	discourse	concern about public discourse and awareness about urgency and true damage
	reevaluation	solution: researching or analyzing existing projects/plans to reevaluate SLR threat

	restoration	solution: current restoration project
	improve	solution: improve already completed projects to be safer from more intense SLR threat
	collaboration	solution: creating coalitions, committees to address climate change
	policy	solution: trying to build political support for wetland restoration
12 [ALVISO]	~	did not live in Alviso, but has experience with Alviso
13 [ALVISO]	1983	Experienced floods of 1983
14 [ALVISO]	evacuate	evacuated home in Alviso
	loss	lost almost everything
	stigma	contributed to the negative Alviso stigma
	localhelp	Alviso residents helped each other, strengthen community
	exthelp	benefited from external help/aid from orgs like Red Cross
	rebuild	houses needed to be rebuilt and repaired
	unfair	Alviso residents were not treated as well as more affluent communities were by City of SJ through evacuation and rebuilding process
	chemicals	chemicals from WWTP in flood water
	smell	smell of mold, mildew in houses
15 [ALVISO]		
16 [ALVISO]	nodec	housing values did not decrease because of flood risk
	other	other factors contribute, inconclusive
	thinkbig	THINKS that property value has decreased
17 [ALVISO]	higher	property value would be higher, but not sure by how much
	unknown	new housing codes lower flood risk of new houses
	nodec	housing values did not decrease because of flood risk