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Humboldt Baykeeper Sea-Level Inundation Community Education and Outreach Report

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In Collaboration with:

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Executive summary

Sea level rise (SLR) is an imminent threat to coastal communities with global projections estimated to be 6 inches by 2030, 12 inches by 2050 and 36 inches by 2100 (Griggs 2012 cited by: Laird 2013). Due to its coastal location, the Humboldt Bay region is vulnerable to the hazards associated with SLR (See Figure 1 below). These vulnerabilities include an aging dike and levee system, compounded with the coastal location of critical infrastructure, such as the Arcata Wastewater Treatment Plant. Local governments, such as the City of Arcata, are working with nonprofit organizations, such as Humboldt Baykeeper to adapt to the potential hazards associated with SLR. In order to maintain transparency and accountability within the Arcata community, it is important that the planning process incorporate stakeholder input into design, financial allocation, and setting priorities for maintaining a resilient community. However, civic engagement with sea level rise as a planning issue remains low. In January 2017, Jenn Kalt of Humboldt Baykeeper approached our EMP 475 Senior Planning Practicum in the Environmental Management and Protection Program, Environmental Science and Management Department at HSU to address this low level of civic engagement, and to design recommendations to increase public participation in the City of Arcata's planning process for sea level rise.

This study provides a qualitative assessment of barriers to public participation among different demographic groups within the City of Arcata. We reviewed the literature and conducted interviews. In addition, we looked at efforts that other communities have applied to promote civic engagement and SLR education that would be appropriate for Arcata. The intent of the literature review was to help determine demographics of interest, and to understand previous research identifying barriers to civic engagement among these demographics. , We chose to focus on demographic groups that are underrepresented in the planning process, as well as most vulnerable to SLR impacts. People identified were considered vulnerable if they live and work in proximity to high-risk inundation zones, and/or if their socio-economic condition might limit their resilience to SLR. The demographic groups identified are: Low-income and houseless populations, high school and college students, business owners, senior citizens and tribal communities. After determining demographic groups to focus on, interview questions were designed to assess community members' knowledge concerning SLR and their ability or interest in engaging in the planning process. The scope of this project limited our ability to gather a representative sample of each demographic. Instead, we interviewed representatives of organizations that work with the identified demographics. We hoped that organizations that serve a particular group would provide insight into the values and interests of people utilizing the

organization's services. Through these interviews, we were able to determine their clients' attitudes, vulnerability and understanding of sea level rise, and the barriers to their participation in public planning efforts. Our interview respondents identified several barriers to public participation for our demographic groups of concern including: lack of time, lack of access to SLR information, being unaware of meeting times and dates, no sense of urgency, no personal interest in sea level rise, a disconnect from the environment, lack of transportation, and lack of childcare. In order to understand baseline conditions for public policy and outreach decisions for the City of Arcata, interviews were conducted with members of Arcata's Planning Department. In addition, technical understanding of SLR was provided by Aldaron Laird, a sea level rise expert in the Humboldt Bay region.

Using this information and our literature review, we were able to make recommendations for overcoming barriers and engaging stakeholders in the planning process for SLR in Arcata, CA. Some of these recommendations include providing transportation to meetings, making childcare available for meeting participants, art and engineering competitions, and other outreach programs that cater to different levels of interest and expertise regarding SLR adaptation.

(Humboldt Baykeeper 2017)

Mission Statement

It is our mission to work collaboratively with Humboldt Baykeeper and multiple stakeholders in the City of Arcata to develop an approach to strengthening public outreach and participation, resulting in greater public awareness of the implications of sea level rise along Humboldt Bay. We will review approaches other communities are taking, and carry out interview-based research focused on the current attitudes and knowledge of community members in Arcata. We seek to identify and address key barriers to public understanding of sea-level rise, and to suggest approaches to increasing public awareness. The ultimate goal is to promote public participation and engagement in the planning process and to ensure broader representation in planning decisions regarding sea-level rise.

Introduction

Sea Level Rise (SLR) will increasingly affect residents within Humboldt Bay communities (Figure 1). However, community engagement in the current planning processes is low. A proactive planning approach that engages communities is essential to preventing a future crisis situation, when options are limited. At those times, underrepresented communities are frequently left behind and suffer the most. Various factors may influence a community member's willingness and ability to engage in processes addressing sea level rise adaptation and mitigation (San Francisco Planning Department 2016). Therefore, it is important to be able to identify and overcome the barriers to community public participation. Having participants from throughout the community will provide broader awareness and continuity in the planning process, thereby decreasing potential conflict and ensuring efficiency.

We applied a stepwise approach to developing recommendations for appropriate solutions to enhance community engagement in the sea level rise planning process (Figure 2).

First, we reviewed the literature to find out what other communities have done in this regard and sought ideas that would fit the context of our project. Second, we worked to understand and identify the community's various demographics, their needs and possible barriers to their participation. We assumed that different demographics in the community would have unique barriers to participation and that approaches to engaging people would need to vary accordingly. We identified the following demographics: seniors/elders, low-income and houseless, young adults, students, tribal members, and business owners (see figure 2). These demographics were identified through literature review and consulting advisors as those most vulnerable to natural hazards or least well represented in the planning process in Arcata. Contacting other demographics was beyond the scope of this study. We also assumed that impacts of SLR on residents in different geographic areas will vary. People living and working in the immediate inundation zones will have different interests and concerns than those in outlying areas. People residing in areas outside of the inundation zone will be more affected by the indirect consequences associated with SLR.

We reached out to representatives from organizations serving different demographics to help identify barriers to residents' engagement and participation in public SLR planning processes. We expected that potential barriers might include: lack of childcare, timing of, or distance to meetings or events, and disinterest and lack of information about SLR (see Figure 2). We interviewed community members, local government representatives, and nongovernmental and nonprofit organization staff and reviewed literature regarding other communities' approaches in order to identify successful and relevant outreach methods to overcome barriers to participation in Arcata.

Our underlying assumption was that more effective outreach will be possible once there is a more comprehensive understanding of different community demographics and barriers to their participation. Outreach methods can, for example, be tailored to different target audiences. Participatory processes and publicity that fit within the community's needs and abilities will help engage a wider range of community members and provide input to future planning decisions and local governance.

Sea level rise and its impacts on Humboldt Bay's communities necessitate proactive public participation if we are to adapt in socially, economically and environmentally equitable ways. By recommending different methods of outreach (public participation and publicity) we propose that the City of Arcata will be able to incorporate and engage its so far largely underrepresented community in the planning process. We believe that using the methods discussed here, among others, the City of Arcata will be able to develop an inclusive and robust

approach to public involvement in sea level rise planning that can also potentially be applied in other communities around Humboldt Bay and beyond.

Figure 1: Freshwater Slough in Northern Eureka, CA.
Inundation maps were developed by Jeff Anderson of Northern Hydrology & Engineering for the Humboldt Bay Sea Level Rise Vulnerability Assessment Project. The maps show areas vulnerable to existing and future sea levels that are currently protected from inundation due to the natural shoreline, dikes or berms, and railroad or road grades (Humboldt Bay Keeper 2017).
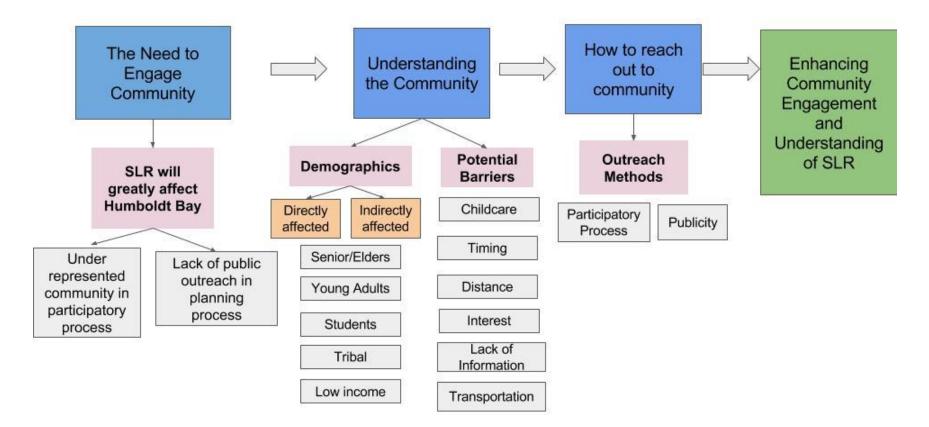
Conceptual Map

Figure 2: Conceptual Model of Humboldt BayKeeper Sea-Level Inundation Community Education and Outreach

The Importance of Public Participation in Planning for SLR

Sea level rise (SLR) is a chronic issue associated with melting glaciers and thermal expansion of water molecules in the ocean (NOAA, 2016). Flooding, hurricanes, coastal erosion, and species migration are acute hazards resulting from sea level rise. Therefore, adaptation measures will often address adapting to the specific hazards associated with sea level rise. Adaptive measures are designed according to planning processes, usually conducted by local governments' planning departments. Because public participation in planning processes is often low, the needs and values of particular demographics may not be incorporated into adaptive designs. This is problematic because this could leave certain groups especially vulnerable to the effects of sea level rise. Most importantly, this disparity may undermine (McBride, 2006).

The potential environmental, economic, and social impacts of sea level rise in California highlight the importance of addressing the issue in land use planning and regulatory work. Just over 21 million people lived in California's coastal counties as of July 2014 (CDF 2014), and the state supports a $40 billion coastal and ocean economy (NOEP 2010). As municipal governments implement sea level rise adaptation measures, it is important for them to analyze various community values. By having a stronger understanding of community values, governments may design outreach and educational programs that will engage stakeholders. By engaging stakeholders in the sea level rise adaptation discussion, governments will be able to design and implement strategies that are transparent, inclusive and based upon community needs and input. This project focuses in large part on what is referred to as "the vulnerability of place." Vulnerability of place is the capability of a region to adapt to sea level rise based upon social aspects including characteristics such as age, income, ethnicity, gender, and employment status (Thatcher, 2013).

One analysis explains two types of civic engagement: expressive and instrumental (Swaroop and Morenoff 2006; Son and Lin 2008; cited by: Manturuk, 2012). Instrumental engagement refers to community members engaging in "goal-oriented processes" such as attending a public meeting or joining a community organization. Expressive civic engagement is fostered by building a sense of community identity and social inclusion. Therefore, expressive civil engagement will provide the foundation for comprehensive instrumental engagement because the expressive aspect is influenced by a sense of cohesion and interaction amongst community members (Manturuk, 2012).

Methods

Question development

For a qualitative assessment of attitudes and behaviors among community members regarding sea level rise (SLR) and the planning process, we conducted interviews with representatives of several organizations serving underrepresented demographics, as well as knowledgeable members of the community. Demographic groups were selected based on their vulnerability to natural hazards or their identification as underrepresented groups by the literature or local advisors. Other demographics were not considered, as the scope of this project did not allow sufficient time to investigate all demographics or classes that make up the community. The groups selected were the most applicable for the community of Arcata. The overall purpose of the interview process was to determine the extent to which the community is engaged in a SLR dialogue, what barriers to engagement might be, and to assess the level of different groups' vulnerability.

Before beginning the investigation of barriers to participation, it was important to have a science-based understanding of the topographical area and infrastructure at risk in the community. For this reason, we met with a SLR expert for the Humboldt Bay region. In this interview, we asked questions about how SLR would affect the community and its resources, and what neighborhoods are perceived to be at high risk due to their location. We also met with representatives from the City of Arcata Community Planning Department.

IRB Process

In accordance with Humboldt State University guidelines, it was necessary to submit our questions and intent for this project to the Institutional Review Board (IRB). The IRB is a formal group that reviews research protocols involving human subjects carried out by HSU affiliated researchers. Therefore, after drafting our questions, our informed consent form, and the e-mail sent to potential subjects requesting interviews, we submitted these documents to the IRB for approval (RB 16-208). Once approved, we were able to begin the interview process.

In-depth interviews

Based upon advice from our client, our project advisor and a review of the literature, we narrowed our research to seven specific demographics and vulnerable communities. These included: low-income populations, the houseless, tribal members, college students, high school students, businesses, and senior citizens. These demographics are considered either especially

vulnerable to SLR and/or underrepresented in civil discourse, which is problematic considering that some are especially vulnerable to SLR.

Due to the scope of this project, gathering a representative sample of the demographic was not feasible. Therefore, representatives of organizations that work with the identified demographics were interviewed to determine their clients' attitudes, vulnerability and understanding of sea level rise and the likely barriers to their participation in planning efforts focused on SLR. In general, these were organizations that serve these groups such as agencies, non-profit organizations, and associations. The organizations that agreed to be interviewed were: Arcata House, Natural Resources Club (HSU), Humboldt Real Estate Association, and an Arcata High School teacher. Unable to conduct an interview with a representative member of the business community, we visited businesses in particularly vulnerable neighborhoods and conducted on-the-spot interviews. As explained below, we were also unable to contact tribal representatives. We also asked the respondents we were able to contact about their clients' understanding and/or interest in SLR.

Upon the conclusion of each interview we asked participants if they could recommend another person and/or representative who could provide us with more information. We then followed up on these recommendations. All questions may be found in Appendix A.

Observational Analysis- work group at City Council

To determine baseline conditions in the planning process regarding SLR, we attended a public meeting on the topic. This provided insight to the current conditions, planning stage and public outreach methods being applied in Arcata. The meeting we attended was a City Council study session that took place February 6th, 2017, for the Wastewater Treatment Plant located on south G St.

Literature Review

In addition to conducting interviews, we reviewed literature to identify barriers and vulnerability of demographics. The barriers identified in interview responses and literature review were then applied to develop appropriate outreach methods for each demographic. Because some organizations were unresponsive or unable to participate in the interview process, recommendations for their applicable demographic were based exclusively on the literature review. The literature review provided important insight to be applied to our recommendations to address the barriers to participation, as well as vulnerabilities to hazards associated with SLR which is elaborated upon in the section below. Planning documents, periodicals and documents

on measures taken by other communities were reviewed to develop recommendations for community outreach, participation, and organization.

Results and Recommendations

This project focuses on addressing vulnerability of place by engaging members of the community through expressive and instrumental civil engagement. (Manturuk, 2012). Through the research process, we were able to determine barriers to participation, and create recommendations that will promote expressive civil engagement, that will hopefully result in instrumental engagement. Barriers to participation are discussed for each demographic below and recommendations are made for increasing the groups' participation in the SLR planning process. Finally, there is a list of recommendations for broad outreach programs that could potentially engage the demographics we focused on, as well the public in general.

Low Income/ Houseless

Low Income/Houseless Literature Review

Regarding vulnerability of place, two socio-economic group of particular concern are those with low to moderate-income levels and the houseless. These two socio-economic groups are especially vulnerable because economic constraints make them less able to move or retreat from low-lying areas that may be inundated, and they may be unable or unwilling to engage in SLR planning processes. Neglecting to incorporate the needs of these two demographics in the planning process could result in environmental injustice, which planners in the Humboldt Bay region should avoid.

Low-income community members engage in civic processes at a lower rate than that of the general population, which decreases their civic, social, and political influence (Manturuk, 2012). This phenomenon may be attributable to the higher rate of renters amongst low-income populations. Renters are not necessarily as invested in an area as a homeowner, and are therefore less likely to engage in civic processes that will affect their neighborhood (Manturuk et. al, 2012). In terms of sea level rise planning, it is reasonable to expect that this sentiment would apply. People who do not intend to stay in the area, or who do not have a long-term investment in property, are less likely to be engaged in the planning process for the neighborhood in which they live.

Additional barriers to civic engagement among low-income community members include, "…no available time, family care issues and divorce, lack of community groups, [and]

isolation because of a recent move or lack of transportation" (McBride, 2006). The McBride study recommends increasing civic engagement among low-income populations through family-oriented volunteer programs, as well as ensuring that the location and timing of meetings is conducive to the needs of this demographic (Orthner & Mancini, 1991, cited by :McBride, 2006).

Low-Income/Houseless Methods

The scope of the project and time constraints limited our capacity to meet with a representative of low-income populations. Therefore, recommendations for this demographic are based upon the literature review. However, an interview with a representative of a houseless/homeless organization in Arcata was conducted. On April 3, 2017, we conducted an over-the-phone interview with a representative at the "Arcata House." This interview lasted approximately twenty minutes. The "Arcata House" is a facility that advocates for the houseless through individual empowerment and connecting people to necessary services. The representative informed us of the organization's mission and answered questions related to their clients' level of civic engagement, barriers to civic engagement among this demographic, concern related to SLR, and provided us with recommendations for engaging the houseless in the planning process. For a full list of the questions asked during this interview, see Appendix B.

Houseless Results

The representative from the "Arcata House" said that SLR was indeed a topic of concern for the organization. One of the reasons for this is that many of their client's live along low-lying areas near the Humboldt Bay, or the Mad River. Therefore, their vulnerability to inundation is very high. Also, they are concerned about citizens who currently rent homes in low-lying areas, but will be displaced by SLR. Without the necessary means to find alternative housing, these people have the potential of also becoming houseless. The representative noted that their clients did not explicitly express concern about SLR, but did discuss issues associated with flooding.

In terms of civic engagement, while some clients at the "Arcata House" engage in civic processes, the representative explained that many feel uncomfortable attending public meetings. In addition to feeling uncomfortable, many of the clients are disabled and/or lack reliable transportation.

Low-income Results

Based upon the literature review, barriers to public participation among low-income populations include, access to transportation, childcare, and time.

Houseless Recommendations

One recommendation for increasing engagement among the houseless population is based upon the current outreach program at the "Arcata House". Currently, this organization is broadening the scope of their work to provide not only housing and networking, but also a community center for those that they serve. This community center provides a facility where the homeless may comfortably listen to information pertaining to community-related events and vocalize their concerns. Community planning officials could provide Arcata House with pertinent information regarding the sea level planning process so that it can be discussed amongst this demographic. This could include the "Arcata House" hosting members of the Planning Commission to come and discuss sea level rise planning ideas with the clientele, thereby providing a space where the homeless may contribute to the discussion in an environment where they feel comfortable.

Regarding transportation, the "Arcata House" staff noted that they provide transportation for their clients, however, being informed in advance as to the date and times of meetings is important for them to plan for meeting the transportation needs. Therefore, we recommend that the city engage in a direct dialogue with this organization and provide the pertinent information regarding the date, time, and agenda for public meetings.

Low-income recommendations

Public transportation in the area is inadequate for community members to be able to attend public meetings. The system in the area reaches each stop, once per hour. This can be very inconvenient when managing time between getting off work, potentially picking up children, and then getting to a meeting. Also, Arcata has a high rate of precipitation, and the limited number of bus stops mean that many people must walk more than two blocks in uncomfortable weather to get to the closest bus stop. Therefore, we recommend that the city adopt a shuttle system to provide access for this demographic. In the event that a round-trip shuttle system would be financially unfeasible, a one-way system would suffice. In a one-way system, community members would be responsible for getting to the meetings, but the shuttle would provide transportation to their destinations upon conclusion of the event.

Another recommendation is a rideshare program. This program could be a link on the city's SLR website. This link could provide a forum where community members could post needing a ride, or being able to offer rides based upon neighborhoods, needs, etc. This will also contribute to the civil discourse and enhance unity among community members.

As mentioned above, another barrier to public participation is lack of childcare. Although this is problematic for community members in all income brackets, the affordability is of special concern for low-income populations. In addition to affordability, many families are reluctant to be separated after work, considering that the children have already been in school or daycare throughout the day. Therefore, it is recommended that certain planning meetings be specifically designed to accommodate whole families. Although Arcata City Hall may be an inadequate venue for hosting such an event, the community center could provide the space and stimulation necessary for hosting different age groups.

In addition, or as an alternative, to having "Whole Family" planning meetings, the city could provide "SLR School." During a planning event, the city could provide childcare for participants. The childcare would take place at the community center (so that parents could still be near their children) but in a different room. While the guardians participate in the planning process, the children would have an educational opportunity to learn about climate change, sea level rise, and other atmospheric/climatic events in an age appropriate manner. This will alleviate the issues associated with lack of childcare, and help stimulate a conversation among families upon the conclusion of the meeting. Furthermore, providing the children with information pertaining to these events will encourage a dialogue amongst the youth in the community, which could also perpetuate the dialogue at schools. Finally, by providing "SLR School", children will be accustomed to attending civic events. This will increase the likelihood of them engaging in civil discourse as adults (McBride, 2006)

A third barrier to public participation is time. Lower-income community members do not necessarily have jobs that allow them to attend meetings between five and six on weekday nights. Likewise, community members may be more willing to participate in informal settings. As a result, community members need to be inspired to participate, and this should be done in a fun and engaging manner. It is for this reason a "block party" or parties are recommended. A block party can be informative and inspiring. It will allow community members to network and learn about the implications of SLR. People who are excited and inspired by the information learned at the block party, will receive further information about how to get involved and the links for input in the planning process.

High School Students

High School Students Literature Review

In addition to low-income and houseless Arcata community members, it is important to engage the youth in the planning process. Considering that the magnitude of sea level rise (SLR),

the resulting impacts on coastal zones, and the ability of society to cope via adaptation remain uncertain, (Nicholls et. al, 2010) today's youth are the ones who will be facing the result of these uncertainties in the future. In order for the youth to learn how to address SLR issues, it is crucial that they are well educated about SLR. Researchers argue that late childhood is the ideal time to begin educating young people about global problems such as climate change and sea level rise (Ojala, 2012). Such research shows the importance of integrating environmental issues, such as SLR, into high school curriculum. Sadly, environmental education (EE) is limited in curriculum within the United States (Ham & Sewing, 1988). However, in both literature and in curricula there has been an increasing emphasis on promoting positive attitudes towards the environment, and the results of several surveys suggest that many teachers support this aim (Cotton, 2007). Despite this growing interest in including EE in schools' curricula, many schools are still falling short. This is due to several barriers that both students and teachers face.

Deciding whether to teach about SLR in the classroom is largely determined by the teachers' beliefs and understanding of SLR, and EE as a whole. This suggests that, unless curriculum developers take account of teachers' beliefs in designing new curriculum materials, those materials are unlikely to be implemented in the intended format (Cotton, 2007). Deciding to incorporate EE depends upon a teacher's level of confidence and preparation on the subject, as well as being able to overcome potential impediments, such as lack of funding (Simmons, 1998). Therefore, it is important for schools to not only have teachers who are well educated in EE but also to have funding set aside for EE in the curriculum.

Disconnect from the natural environment, also known as "nature deficit disorder", is one of the biggest challenges facing today's youth (Louv, 2005). "Nature deficit disorder" is a label used to address the cost to children as they are increasingly deprived of direct contact with nature and the experience of unstructured free play in the out-of-doors (Driessnack, 2009, Louv, 2005). Lack of direct contact with nature is causing a huge disconnect between today's youth and important environmental issues. Promoting opportunities for students to get outside and experience nature will help to combat this issue.

When teachers encourage students to be civically engaged it makes a huge impact. Evidence suggest that civic training in adolescence can influence adult behavior (Andolina et. al, 2003). Therefore, communities should combat the overall issue of lack of civic engagement at the source. Personal and psychological benefits of civic engagement for young adults include fulfillment of the human need to belong and to feel that life has a purpose beyond the pursuit of individual gain (Flanagan et. al, 2010). This results in students being more likely to continue in

civic engagement throughout their lifetime and to feel a sense of commitment to their community as well as the environment.

High School Students Methods

We were unable to conduct interviews with high school students due to IRB restrictions and time constraints. Instead, we decided to interview high school teachers to get a better understanding of the barriers that high school students face. We scheduled an interview with a chemistry and biology teacher at Arcata High School. We asked the teacher a series of 9 questions. The interview lasted approximately 15 minutes. After this interview, we were able to identify key barriers to civic engagement on the issue of SLR that high school students in Arcata face.

High School Students Results

Barriers that high school students face in regard to their participation in SLR planning processes are: limited access to information, lack of a connection to the environment, lack of concern about SLR, and the lack of involvement opportunities. There are also barriers associated with teachers being able to relay information to their students. These barriers include time, funding, understanding of the topic, and access to materials.

We recommend that teachers visit the National Oceanic and Atmospheric Administration's (NOAA) website[1] for guidance on how to educate students about sea level rise. On the NOAA webpage there is a "Sea Level Rise Module Guide for Educators". There is also an educational video teachers can show students, grade levels 6-12, to help them better understand the basics of sea level rise. Other material such as lesson plans, fact sheets, and interactive handouts are available on the NOAA web page as well.

There should be a strong emphasis on getting students outdoors so that they have a direct experience with the environment. Lack of interaction with nature, or "nature deficit disorder", is a growing dilemma. Childhood has moved indoors, and children are paying the price (Driessnack, 2009). They are losing their connection to the natural world and are having a hard time relating to environmental issues. Therefore, we strongly suggest taking students outside to learn about EE. We believe that it would be beneficial to take students to the ocean during low tide and high tide so that they can see exactly how much the ocean can rise based on the tide time. This will help them to understand how much the ocean can change based on just the changing tides. This can be

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[1] http://oceanservice.noaa.gov/education/sea-level-rise/welcome.html

related to the drastic changes that we will soon be facing due to sea level rise. The Arcata Marsh would be a good spot to experience the rise and fall of the ocean due to tidal influence. Teachers should also ask students how they think the tides will change due to SLR and what else SLR will affect.

Today's youth are rarely involved in politics or local government planning processes. Only 1 % of current high school students are involved in political clubs at school (Andolina et. al, 2003). This is a result of lack of opportunity and encouragement to get involved. This is the case in the US but in Sweden and other European countries, interested adolescents have the opportunity to become members of the youth branches of the established political parties, as well as issue-oriented organizations such as Greenpeace (Ostman, 2014). We highly recommend that high schools in the Arcata area encourage involvement in local politics. Students who participate in political groups in high school continue to be disproportionately, civically, and politically active after graduation (Andolina et. al, 2003). We found out in our interview that Arcata High School has an environmentally focused student club. Therefore, we recommend that information about upcoming planning events be provided to Arcata High School, so that the club can integrate some of the processes into their activities, which could include having representatives attend city and planning events at Arcata City Hall.

College Students

College Students Literature Review

College Students represent multiple demographics whose values and interests cannot be represented by a single person or organization. However, for the purpose of this project, there are certain similarities related to barriers and participation, and we therefore found it appropriate to investigate aspects of this population as it relates to civic engagement.

The evidence that young Americans are disconnected from public life seems endless (Carpini, 2000). Being involved in public planning processes is the least of most college student's worries. College students tend to have very heavy workloads, resulting in lack of time and motivation to become involved with public planning processes. Although, studies show that with the right guidance and resources this can change (Flanagan & Levine, 2010). Schools can provide training grounds for civic involvement, offer opportunities for open discussions and create avenues for service work all of which lead to high levels involvement (Andolina et. al, 2003). When universities present and strongly promote civic engagement opportunities to students, the results are often positive.

Students who volunteer in college are more likely to engage in volunteering, community activities, and other forms of civic engagement as adults (Andolina et. al, 2003). This suggests that colleges need to promote student involvement and provide volunteer opportunities to boost civic engagement from students in the future. For many students who attend college away from home, the ties to community that help support civic involvement are no longer present (Andolia et. al, 2003). This proves that there is a disconnect between students and their new community when they are away at college. Busy schedules may limit college students from engaging in their new community, but academic institutions and local governments could help bridge this gap. Current research suggests that the media plays an important role in informing and engaging students in environmental as well as civic issues (Ostman, 2014). Most colleges have access to a wide variety of media sources that they can use to inform students of civic engagement opportunities. Despite this, studies show that colleges often do not use their media resources to reach out to their students about civic engagement opportunities (Flanagan & Levine, 2010).

College Students Methods

We were only able to interview one college student due to lack of participation and time constraints. Natural Resources Club president, Tim Scully, agreed to be interviewed. We asked Scully a series of 11 questions to help us better assess barriers that college students face. The interview lasted for approximately 10 minutes. We believe that Scully was able to give us a good understanding of his perspective on what barriers college students face regarding SLR civic engagement.

College Students Results

The barriers that college students face regarding civic involvement have been identified as lack of time, information, and incentive to become involved. Often, students are so overwhelmed by their school work that they don't have time to determine when and where public planning processes take place. Unless a college student is an environmental major, the topic of SLR isn't often discussed in class. There is a general lack of information on barriers associated with civic engagement among college students.

Scully noted that he has never heard of or been to an event or workshop about SLR at HSU. We recommend that HSU does a campus wide workshop at the beginning of each school year to educate students about the potential adverse effects caused by SLR. This workshop would include SLR inundation maps to show students the potential affected areas. Showing the inundation maps will help students to put the potential effects of SLR into perspective and let

them see if their homes will be affected. . The workshop could also include basic information about SLR, brainstorming sessions to think of possible solutions to SLR impacts, opportunities for Q&A.

We also recommend broader on campus advertising of the Arcata City Council meetings about SLR. Currently, students have no way of finding out when these meetings occur. If HSU included City Council meeting times in their monthly calendar and newsletters it could potentially increase the number of students who attend these meetings. Faculty could also make announcements at the beginning of classes and encourage their students to attend. Faculty might also offer a small amount of extra credit to students who attend these meeting. This could significantly increase the likelihood of student attendance at Arcata's planning meetings.

Business Owners

Business Owners Literature Review

In considering community vulnerability to SLR, it is important to understand the economic ramifications of this hazard, and ways to engage those affected. Sea level rise and its projected impact on the economic integrity of rural areas such as Humboldt County cannot accurately be predicted due to the dynamic nature of the subject. As SLR expert Alderon Laird stated, we are still in the "discovery phase" of assessing and planning for a rising shoreline in the Humboldt Bay community. What is clear is that SLR is occurring locally and at a much faster rate than in other coastal areas. It is estimated that in Humboldt County, we experience SLR at 2-3 times the long-term global rate. (Northern Hydrology and Engineering, 2015).

In response, assimilating the community and its demographics is a priority. To do this cohesively, it is clear that business owner participation in the SLR planning process needs to increase.

Niche of Business Owners in Humboldt County

Humboldt County has more entrepreneurs per capita (20.3% of total jobs) than the rest of California counties (17.6%) (Mullins, 2015). From 2002-2010 over 2,283 people started a new business in Humboldt County. With 1% maturity of these businesses into larger employers, there is a potential to create more than 300 service jobs associated with expanding and overseeing an emerging business (Prosperity, 2012). In a survey conducted on North Coast businesses in Humboldt County, a key factor of successful businesses in our region was their ability to build social capital through contributions to the larger community "…when a business contributes to

the larger community it is demonstrating to community members that they care about the community, while at the same time producing community trust in their business; and therefore, generating the economic support that businesses need to survive and be successful" (Steinberg, pg. 20, 2005).

This study also highlighted another prominent factor of successful North Coast businesses-- their ability to build social capital through "communities of practice". Local "communities of practice" rely on the existing social networks and internal support from one another to effectively build social capital for the entire community (Steinberg, 2005). Having a strong sense of place within Humboldt County, while supporting and being supported by the local community, identifies the significant role of business owners on the North Coast. Humboldt County's economic strategy development, Prosperity, is an active collaboration of over 450 community and business leaders that is helping to guide economic growth in the North Coast region (Prosperity, 2012). The collaboration highlights the strengths of industry in Humboldt County and identified the 8 industries that are growing the fastest within the region:

- Diversified Health Care
- Specialty Food, Flowers & Beverages
- Building & Systems Construction
- Investment Support Services
- Management & Innovation Services
- Niche Manufacturing
- Forest Products
- Tourism
  (Prosperity, 2012).

Business Owners Methods

Attempts to contact local organizations that support business communities in the immediate area were unsuccessful. As a result, we focused our interviews on a specific region of Arcata, predicted to have significant impacts from sea level rise within the next 50 years.

An afternoon was spent (~2-3 hours) of surveying the south G St. area where several locally owned businesses are located. Of the 6 businesses visited, only 2 were able to participate in an on-the-spot survey that consisted of 6 questions over a period of roughly 10 minutes.

Business Owners Barriers

Barriers to participation that were identified from the interviews with local business owners in Arcata included: time, failure to establish contact, sense of urgency, and personal interest level on sea level rise.

The two businesses that were successfully interviewed held opposite views on the urgency sea level rise in their south G St. location. One business owner was very concerned about sea level rise and the threat of inundation to the immediate area and the business. The other was not concerned about sea level rise and did not feel their business was threatened by sea level rise.

The two businesses also accounted for different types of land and building ownership. One business owner was a renter of the building, while the other business owner owns the building and property that their business resides on. Interestingly, the land and building owner, rather than the renter, was less concerned about rising sea levels. The property owner had also just finished a survey of their property with the Coastal Commission in order to expand their business. Access granted by the Coastal Commission to further expand this owner's business was approved under the condition that the land is located 10 feet above sea level. From our discussion with this business owner, they believed that the city would take the necessary actions to negate the future effects of sea level rise on their property and they did not foresee any personal vulnerability to sea level rise.

While this is not a representative sample, it is clear that some business owners in this location will expect the city to protect business owner's interests in the case of a rising shoreline. The renter expressed more concern about the short to long-term effects of sea level rise for their business. This business owner stated that the loss of affordable rentals in the south G St. area (as a factor of the zoning) would potentially affect the price of managing a business in Arcata. For business owners who rent property, the loss of relatively inexpensive rental space on south G St. could lead to relocation concerns and could make the cost running a business in Arcata prohibitive (example of renting a building South G St. versus the Arcata plaza).

Business owners' personal interest in sea level rise is also a factor of participation for this demographic. The business that held a greater sense of urgency was also more personally invested in learning and understanding about sea level rise in the local community. Likewise, the business that held no sense of urgency about sea level rise had no interest in participation opportunities (e.g. workshops, or public meetings). Time may be an amplifying factor coupled with interests and the priorities of individual business owners and their perception of how sea level rise will affect the outlook of their business. Although the individual business owners had very different viewpoints on sea level rise and how it will affect their livelihood as well as overall interest in the issue, they both agreed that sea level rise is happening. Both business owners

expressed interest in cooperating in any future planning efforts to address sea level rise in the local community.

We have attributed the businesses' ability to thrive in our local region as a result of internal support structures and traction with the larger community. Evaluating existing engagement strategies can help facilitate SLR planning early-on and provide a collaborative framework for the business community and local planning department to build upon.

A local and feasible avenue to explore would be to utilize the collaborative efforts of existing strategic networks such as the Prosperity Network. Prosperity, as mentioned previously, is a large collaboration of local business authorities and community members that has concentrated the local economy into 8 eight targets of opportunity. Outreach to the Prosperity Network could provide for the inclusion of SLR planning into an already well established collaborative.

Another way to effectively plan for SLR and enhance local business participation is to use a method that is easy to interpret visually. A case study in Philadelphia used GIS technology to assess the vulnerability of public transport and infrastructure to sea level rise. In this study, being able to visualize the vulnerability of specific structures with projected inundation dates facilitated the adaptive planning process, effectively preserving the region's resources (Oswald, 2013). In the same manner, GIS could be used to map specific businesses in Humboldt County vulnerable to SLR with estimated dates of inundation. Presenting this information to the appropriate business collaborative could help raise awareness of the situation amongst local business owners and begin an adaptive planning process for supporting businesses at risk.

Other recommendations to address and engage the business community include workshops and forums and informational packages.

The use of informational packages (a compilation of pertinent SLR documents specific to this community) to raise awareness of SLR within the business community is a simple cost-effective method of creating dialogue on the topic. As recommended by Aldaron Laird, the intention of informational packages is to foster the grounds of communication between local business communities and among the supporting community in the early stages of SLR. The use of innovative technology (e.g. GIS) can be an effective tool in creating cognizance of SLR. The use of informational videos developed by the local community, can not only be visually striking but also create a sense of place to the viewer. This can translate directly over to business owners

in creating a video that speaks to the values of their demographic and captures the effects of SLR on their community.

As mentioned previously, GIS can also be an effective tool to visually analyze what sectors of business are at risk and begin the necessary process of adaptive planning to support those businesses. This GIS modeling could also be an effective tool to include in informational packages targeting the business community.

As a part of the necessary collaboration process, ensuring that the information is properly disseminated is a necessary component of successful engagement. In order to reach out to businesses, it would be advantageous to utilize existing networks. Notable connections could include: Prosperity Network, the Marsh District, rotary clubs and the Chamber of Commerce.

Real Estate Association

Land values will change with SLR and realtors are among the most aware of such trends.

"The real estate industry, particularly along the vulnerable coastlines, is slowly awakening to the need to factor in the risks of catastrophic damage from climate change, including that wrought by rising seas and storm-driven flooding. But many economists say that this reckoning needs to happen much faster and that homebuyers urgently need to be better informed. Some analysts say the economic impact of a collapse in the waterfront property market could surpass that of the bursting dot-com and real estate bubbles of 2000 and 2008. The fallout would be felt by property owners, developers, real estate lenders and the financial institutions that bundle and resell mortgages" (Urbina, 2017 page number).

The Humboldt Realtors Association is made up of 350 members. We interviewed a representative of the Realtors Association due to their insight with homeowners and prospective homeowners. Humboldt realtors have recognized that flooding will be an increased threat as sea levels rise, however sea level rise terminology is not used specifically. Our respondent noted that realtors are more focused on advising their buyers on current hazards of high level of flooding in low-lying areas of Humboldt Bay. They identified low-lying areas in Manila, Fortuna, Arcata and Eureka. What is often called "nuisance" flooding — inundation caused more by tides than weather — is already affecting property values (Urbina 2017). The current ways of dealing with flooding include flood insurance which can be expensive, and act as a barrier to purchasing or selling property in flood hazard zones. The Federal Emergency Management Agency (FEMA) mapping service defines these zones. According the interview,

FEMA insurance rates for flooding have significantly increased, since Hurricane Katrina, making low-lying areas less desirable

FEMA updates maps used to determine the floodplain and insurance needs within flood prone areas every couple of years, especially after a large weather event like the winter of 2017. This presents a challenge for homeowners because, as sea level rises, flooding will likely increase in magnitude, frequency and spatially. As a result, more areas are being included in the floodplain than before. In Fortuna, 160 homes were recently added to the FEMA flood map and are now required have flood insurance. This can put homeowners in a financial disadvantage due to the high cost of to purchase flood insurance.

When asked if the realtors association in Humboldt County has already started planning for sea level rise, our respondent stated that they have not, and that they are more reactive than proactive as a group. The respondent opined that older realtors talk about the implications of natural disasters and sea level rise but younger realtors have yet not started to talk about these subjects.

Other natural hazard events like, tsunamis are a topic of concern and discussed with property owners. The understanding of SLR and other global environmental issues varies greatly among the members of the association, and the clients they work with. From the interview, it seems that many homeowners and realtors that had experienced large flooding events in the past like the 1964 flood were more aware of flooding as a hazard.

We recommend reaching out to the local realtors through the Humboldt Realtors Association during the SLR planning process and for education on SLR. The representative we interviewed was receptive to the idea of an education workshop for the realtors. Realtors are generally knowledgeable of the area in which they work and are often asked to provide accurate information regarding the area. Information provided to the clients helps their clients make informed decision when purchasing or selling a property. Providing accurate information helps realtors build good relationships with their clients which often helps build their clientele and future business.

Seniors and Elderly Citizens

Literature Review for Senior and Elderly Citizens

Like low-income and houseless populations, older adults are considered vulnerable to SLR because they have limited resources. Older adults, especially those living in poverty or on limited fixed incomes, tend to be an especially vulnerable

population in floods and other storm related events (Worth, 2015). As sea levels rise, flooding due to storm surges is a probable hazard for areas along Humboldt Bay. At the same time, the number of older adults is projected to increase to 88.5 million in 2050 (Tillett, 2013). In addition, there are relatively higher concentrations of older adults in coastal zones of the United States, making them a more vulnerable population to the adverse effects predicted for sea level rise (Tillett, 2013). Current estimates conclude that there are 1,675 Arcata residents who are 65 years old or older (Homefacts, 2017). The lack of transportation during disaster events is the main cause of the vulnerability for low-income populations and the elderly in nursing homes (Worth, 2015). These individuals may be most vulnerable to the adverse effects of sea level rise due to the likelihood that they lack the transportation means necessary to evacuate. A survey of residents who did not evacuate during Hurricane Katrina, found that more than half lacked transportation means (Brodie et. Al 2006). It is key that local outreach programs target older community members in order to implement effective adaptation measures to the unique risks faced by older individuals (Tillett, 2013).

To determine the most effective outreach programs for targeting older adults and the barriers to senior participation in community events, the American Association of Retired Persons suggests that civic engagement is influenced by many different demographic factors and that education, household income and perceived influence are key predictions of participation (AARP, 2012). Socioeconomic status is perhaps the most influential indicator of civic engagement and should be taken into consideration when engaging seniors that are lower-income and have lower education levels. Volunteer civic engagement among mid-life and older adult individuals, has declined but has seen signs of rebound since the economic recession in 2008 (AARP, 2012). Most current community involvement is focused on local community neighborhood activities and religious and spiritual activities (AARP, 2012). Recruitment and engagement of this demographic was found to work best through already established connections with churches, and other places of worship, as most social and volunteer activities involve religious or spiritual activities (AARP, 2012, Saint Paul Foundation, 2007). A study of non-engaged retirees found that 70 percent of those not involved in community participation, listed television viewing as the primary activity (Kaskie, 2008).

Methods for Senior and Elderly Citizens

We were unable to interview a representative from an agency or organization that works with or for seniors in Humboldt County. Interview questions were developed with the intention of determining barriers to participation, the general level of knowledge and interest about SLR among seniors, and outreach recommendations from those who work with this demographic (See Appendix A-5). We therefore reviewed the literature to address these questions and create recommendations for increasing participation appropriate for senior and elderly citizens. The barriers and recommendations are based on the literature of civic engagement for seniors, those over the age of 65 years of age, in the United States.

Barriers for Senior and elderly Citizens

The literature identifies a number of barriers to civic engagement among older adults including language, literacy, computer literacy, transportation, financial stressors, and lack of awareness about opportunities (Saint Paul Foundation, 2007). Studies show that demographic factors such as economic status and education level may be more influential barriers to civic engagement than age alone (AARP, 2013). An apathetic attitude is another barrier to participation as there is a reduced optimism in the ability to influence change, alone or through groups, among this demographic (AARP, 2102).

Recommendations for Senior and Elderly Citizens

Taking into consideration that engaging seniors is best through already established social groups, especially religious or spiritual organizations (AARP, 2012), we recommend reaching out to these groups to host or advertise community events involving sea level rise. Because retirees who are not already involved in community activities, identified television as their primary activity, engaging retirees through targeted media campaigns could be an effective approach (Kaskie, 2008). Public service announcements (PSAs) regarding community events for sea level rise planning should therefore be broadcasted on television to reach this section of older adults. These PSAs should target senior citizens by emphasizing the opportunity to influence change and

make a positive difference in the community. This approach may also prove more effective than focusing on education or economic status of older adults.

Transportation has been identified as a barrier to participation for many of the demographics included in this report, including seniors. A rideshare program to and from public meetings may alleviate some of these issues and increase participation if it is appropriately advertised. Ride share programs are recommended to and from senior apartments like the Bayview Senior Apartments and Plaza Point as well as assisted living facilities like the Sterling House of Arcata. In addition, it is highly recommended that senior organizations are consulted for more details about seniors in the Humboldt Bay area as these recommendations are based on the senior citizens in the United States.

Tribal Communities

Tribal Communities Literature Review

Climate change related impacts are forcing relocation of tribal and indigenous communities, especially in coastal locations around the globe. These relocations, and the lack of governance mechanisms or funding to support them, are causing loss of community and culture, health impacts, and economic decline, further exacerbating tribal impoverishment (Bennett 2014). Becoming allies to tribal nations in the face of sea level rise and climate change adaption strategies requires local governmental entities to sit with tribal nations to understand their unique cultures, values and the unique barriers they face with climate change.

California is the home of many Indian tribes, each with its own unique territory, history, and traditions. Because native people have a tradition of working and managing their lands, resource management is not a modern invention. This applied discipline has been rooted in the way of life for Indigenous people in California and elsewhere for millennia. Our California landscapes, a reflection of historical processes, both natural and cultural, bare the undeniable imprint of a medley of management techniques (Anderson 2005). Specifically, here in the Humboldt Bay, of Northern California the Wiyot people have lived for thousands of years. The North Coast of California is rich with abundant terrestrial, riverine, estuarine, and marine resources. Wiyot people lived in permanent villages along the waterways, which also served as travel and trade routes. Seasonal camps were made on the tribal lands and prairies, and mountainous regions provided berries, acorns, pine nuts, wild game, and basketry materials. Wiyot people actively managed their resources, burning for open grasslands, cultivating edible bulbs, and following strict hunting and fishing protocols. (Wiyot Tribe 2017)

Recent scientific findings, as presented in Alderon Laird's: Humboldt Bay Shoreline Vulnerability Assessment (Laird 2013) indicate that much of Wigi (in the Wiyot language) (Endert, Warburton 1966) or what is now known as Humboldt Bay and other low-lying areas around it will be inundated by rising sea levels. Indigenous people are among the first to face the direct consequences of climate change, due to their dependence upon, and close relationship, with the environment and its resources (United Nations 2017). Sea level rise has major implications for all community populations and ecosystems within the area, but will first and foremost greatly affect tribal peoples and the natural space they have been a part of since time immemorial. This is because climate change exacerbates the difficulties already faced by indigenous communities including political and economic marginalization, loss of land and resources, human rights violations, discrimination and unemployment (United Nations 2017).

Current forms of climate change more directly affect indigenous peoples than any other social groups (Martello 2008). As local governments plan, initiate and implement SLR adaptation measures and community outreach methods, it is crucial to include tribal governments and their communities in the process, thereby increasing understanding of native community values and opinions. As a result, planners may design specific outreach methods that will benefit and create dialogue to engage tribal communities in conversations about sea level rise adaptation planning and tribal community resilience.

Community resilience is the existence, development, and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, unpredictability, and surprise (Magis 2010). Native peoples are no strangers to relocation and the perpetual colonial construct and its consequences for their communities. Forced relocation of their communities has happened throughout history, and tribal peoples have been resilient in adjusting and adapting to new and unfamiliar landscapes, subsistence resources, and climatic conditions (Bennet, Maynard 2017). However, that does not diminish the magnitude of social and economic challenges they will endure in their communities in in the face of climate change.

Tribal Communities Methods

Because time constraints limited our ability to fulfill the various tribal vetting processes, for interview based research, recommendations for tribal communities demographic were based solely on literature review. We reviewed literature to identify barriers and vulnerabilities that tribal communities would face. The barriers identified in the literature review were then applied

to develop appropriate outreach methods for tribal communities. Therefore, the literature review for tribal communities provided important insight to be applied to our recommendations to address the barriers to participation, as well as vulnerabilities to hazards associated with SLR. Planning documents, periodicals and documents on measures taken by other communities were reviewed to develop recommendations for community outreach, participation, and organization.

Tribal Communities Results

Tribal governments and tribal groups have specific approval processes for participating in certain research studies. The time frame for this process exceeded our project's time frame for conducting interviews. Therefore, our group was unable to get interview data from tribal peoples. As a result, one of the biggest barriers a SLR outreach effort may face is consent from tribal organizations and local tribal governments to find out what barriers to participation tribal people face . In order to research the barriers tribal communities face, one must first obtain approval before moving forward with any project or survey within tribal communities to identify culturally appropriate options. When conducting research with American Indian tribes, informed consent beyond conventional institutional review board (IRB) review is needed because of the potential for adverse consequences at a community or governmental level that are unrecognized by academic researchers. (Harding 2012). American Indian tribes are sovereign governments. Tribes comprise distinct peoples, as that term is used in international law, with inherent rights to self-determination (United Nations, 2007). Tribal governments are the only ones with authority to "speak for" the tribe as an entity. It is important for outsiders to recognize that each tribe and tribal community is unique. For example, tribal governments may be organized differently, tribal decisions may be made via differing formal and informal processes, and authority in various spheres (e.g., political, traditional, or cultural) may reside in different places (Cornell, 1988; Williams, 1994). In that sentiment, we compiled our barriers and recommendations based on literature review and local documentation.

There are many barriers tribal communities face in terms of public participation and outreach in public projects. One specifically would include that many Indigenous peoples find themselves in a 'double bind' regarding the acceptance of the relevance of their knowledge by some in the West, the first bind is epistemological; the second is institutional (Ross et.al 2016). Tribes have historically had what is commonly known as government-to-government relationships but this has primarily focused on tribal nations relationships to the federal government, and only recently state governments. It is less common and there are far fewer examples of tribal nations working closely with city and county governments or local

municipalities. In cases where there have been successful collaborations, there has been an extensive time period, which include relationship building, cross-cultural communication training and often paid consultants, which have helped to bridge the two (Zaferatos 2004).

Using case studies of various tribal communities, Anne Ross and associates compiled a table identifying specific barriers that tribal communities face in collaborative stewardship efforts and natural resource management planning. Some of the barriers addressed in, *Indigenous Peoples and the Collaborative Stewardship of Nature,* highlight the lack of recognition that Indigenous knowledge once had a place in natural resource management. For a complete list of barriers found through their research please refer to list in Appendix C, table 3.1 (Ross, 2011).

In order to incorporate tribal input into SLR conversations, local governments must build partnerships with local tribes that will be the first to be affected by sea level rise. Therefore, the Wiyot tribe whose ancestral land surrounds Humboldt Bay, should be prioritized for initial contact and involvement in any planning for public outreach and participation. The survey questions compiled were initially for respondents serving different tribal groups and can also be tailored by tribes in which they see appropriate. This can also act as an aid to assess vital ways the community can increase publication outreach and participation of conversations about sea level rise and also aids to community resiliency.

Local tribal serving organizations like United Indian Health Services (IUHS) Potawot Community Health Village serve as a good resource to increase community involvement and participation in tribal community awareness about seal level rise. UIHS already provides a community space where people regularly meet across various disciplines. Potawot is made up of nine member local tribes. To arrive at this place after three decades of growth at UIHS, required the work of many: the board of directors, the entire staff and consultants, the Tribes and Indian community that they serve as well as many friends and supporters (UIHS, 2002). Potawot serves as a good representation as to how to create actively working tribal committees made of tribal professionals, tribal governments, and traditional and cultural practitioners. The symbols and programs that UIHS has infused into its operations at Potawot community health village are rooted in the history and traditions of local tribes. (UIHS, 2002)

Recommendations would also include having a public participation specialist or any one that is doing future research on this topic becoming familiar with all government guidelines and appropriate protocols for engaging tribes to explore appropriate avenues. Any analysis of tribal communities affected by sea level rise, must include a broader discussion of vulnerability from tribal professionals, cultural and traditional practitioners and all community members. As part of this recommendation we advise consulting throughout the entire process with cultural and tribal

community experts, as well as elected tribal council members and creating tribally specific public outreach and participation programs. Tribal peoples should be at the forefront of any environmental planning, public outreach and informal dialogue that will greatly affect their communities regarding climate change adaptation planning. It is also important to note that enhancing and supporting the adaptive capacity of indigenous peoples will only be successful if it is integrated with other strategies such as disaster preparation, land-use planning, environmental conservation and national plans for sustainable development. (United Nations, 2017)

These recommendations should only serve as a guide to consult with local tribal communities and the organizations that serve them for they are knowledgeable of their community values and the barriers they face.

General Recommendations For Community Engagement

Many communities are working to engage their citizens in planning for SLR. Below are a few examples including the Shrinking Shorelines Project coming up in California, the Blue Tape Event from South Carolina, ideas for a website and tabling, design workshops, mural competitions, an otter parade and way to reach out to the Spanish and Hmong speaking community.

Shrinking Shores Project

On June 3rd 2017 in anticipation of World's Ocean Day, the State Coastal Conservancy is organizing a statewide sea level rise education event with local governments along the California Coast. The event will create a physical representation of future tide levels along a well-used public beach in a local government's jurisdiction. The event will focus attention on the widely used beaches that will likely take the first hit as rising sea level erodes them. However, beach culture is less prominent in Humboldt County. Therefore, we recommend local governments of Humboldt Bay area take part in the event but focus on the open space recreation areas and low-lying neighborhoods along the coast within their jurisdiction instead of beach areas. The new Bay Trail along HWY 101 between Arcata and Eureka may be an appropriate recreation area for this event. Event organizers recommend using signs on stakes, or a series of flags that represent 1ft, 2ft and 6ft of sea level rise and the years by which sea level rise is predicted reach that elevation. However, the rate at which sea level will rise is difficult to predict, therefore we do not recommend using the years associated with current predictions. Instead, we suggest that signs indicating feet without the associated year. This event is meant to educate the

public on SLR and we feel it is important to supply the most accurate information available to date and minimize confusion among the public. In addition to signs or flags, small sections of ribbons could be set up near a staffed tent that provides additional information on SLR. Additional information provided at the staffed tents should include maps of vulnerable areas around the Bay, information on sea level rise, and pamphlets with basic SLR information and links to sites with additional information. According to interviews with representatives and sea level experts, some agencies and specific groups have been involved in SLR education, however there have been few efforts to inform the general public about sea level rise and its effects. This event hopes to facilitate a conversation among community members while educating and inspiring community members to participate in active conversations regarding sea level rise.

Blue Tape Event

In coastal South Carolina, the South Carolina Small Business Chamber of Commerce hosted a "blue tape event". This event consisted of using blue tape to designate the projected high water mark for sea level rise projections (Bodin, 2015). The blue tape was placed in various locations throughout different cities to spread. It is recommended that this event be replicated in Arcata. The blue tape could designate both coastal inundation levels and storm water insurgence through the drainage systems. We recommend providing interpretive signs at some of the locations where blue tape is placed explain the symbolism of the blue tape. In addition, the tape could be stamped with a link to an Arcata SLR webpage

Arcata SLR Website

As mentioned above, the blue tape event suggests a link to an Arcata SLR webpage. We recommend developing a webpage with information about SLR from various academic sources and user-friendly maps showing projections over time, like the NOAA Sea Level Rise Viewer (NOAA 2017) that allow users to view sea level rise for a particular area. Additional information, pdfs or links to relevant planning documents and policy could also be provided. The Surging Seas website is a sea level rise analysis produced by Climate Central and could be used as a model (Climate Central 2017).

In addition, we recommend updating information about community events, meetings, competitions and presentations addressing the impacts of SLR. Upon the conclusion of the meetings, minutes and video footage could be posted to keep citizens informed who are unable to make it to these events or meeting. Projections estimate that current King Tide events compounded with storm surges will be the normal sea level sometime during this century. When

these events occur, users of the website could sign up for text notifications. These notifications will remind people to observe the inundation pattern with a disclaimer that this is potentially the future "norm". The Humboldt Baykeeper King Tide Initiative that collects and posts photographs of King Tides around the Humboldt Bay area could also display their photos here to reach a broader audience. The King Tide Initiative is a great way to display the potentially future "norm" and could promote a greater sense of urgency among community members that are not able to visit coastal area during a King tide event.

A forum for people to discuss concerns, opportunities, or other pertinent input would allow people to contribute without having to attend the meetings. Furthermore, a forum could be used to determine what kind of information the community wants or needs to understand sea level rise as well appropriate times to hold events. The forum could be the opportunity for a ride share program, in which people can plan trips to SLR planning events to alleviate transportation barriers to attending these events.

Table at Farmers market

We recommend that a table be set up at the Farmer's Market held every Saturday in Arcata. This table will have visual images of sea level rise projections, informational brochures, and preparation guidelines. Additionally, if consent from the North Coast Growers Association is acquired, an image of the effect of SLR on these producers would be very useful. Patrons of the Farmers Market would learn about the vulnerability of their local food source as many of the low-lying areas around Humboldt Bay are agricultural lands and will likely be affected first. The link to the SLR Planning website, and current information about upcoming planning events would be featured. Because other recommendations include competitions to bring awareness to this issue, community members will be able to learn about past events and upcoming competitions. Merchandise will be available (such as T-Shirts, bumper stickers, pins, etc) and the generated funds could go towards other participatory planning events. The designs on the merchandise might be decided based upon one of the previous art competitions. The most optimal location for this booth would be near the CalFresh booth.

Working groups

To initiate community and neighborhood conversation, and inspire people to become more active in the planning dialogue we recommend hosting SLR Block party (parties) in neighborhoods throughout Arcata. The block party could have information about sea level rise and how it may affect the neighborhood. In addition, information about upcoming workshops

could also be provided. At workshops, community members could work in groups to brainstorm adaptive measures for the community to address sea level rise hazards. Workshops may also provide an opportunity for experts to engage in a public dialogue with other stakeholders about SLR and the planning process. From interviews, it seems that there is a dialogue with government personnel and experts but there is a lack of conversation between these groups and public. This assumption is based on interviews with city governments, SLR experts and demographic representatives. One of the goals for workshops would be to develop working groups. Working groups could for example, meet on a regular basis to compile information and choose representatives to attend official city council and planning meetings. By having representatives attend community meetings, community members unable to attend public meetings due to time, childcare, and transportation will have their interests addressed.

Rebuild by Design: Humboldt State University

Following Hurricane Sandy, the United States Department of Housing and Urban Development launched a campaign using collaborative design methods to increase response, preparedness, and resilience in the event of natural hazards (Rebuild by Design, n.d.). According to the HUD website, "The goal of the competition was to promote innovation by developing regionally-scalable but locally-contextual solutions that increase resilience in the region." (HUD, 2017) This competition has grown to include over 100 cities, and it we recommend that Arcata model a competition based upon this design.

Arcata is in a unique position having Humboldt State University within the community. This provides a great opportunity to harness the skill and expertise of students, faculty, and staff to create unique design solutions to adapt to the implications of SLR. The "Rebuild by Design" approach incorporates "four essential dimensions of urban resilience" which include: Health and Wellbeing, Economy and Society, Infrastructure and Environment, and Leadership and Strategy. Using a multi-disciplinary approach, different departments could undertake projects specific to their course of study that address one of these dimensions. Projects may be integrated into the capstone level coursework for different departments, or may be extracurricular activities. The different design methods and recommendations will be compiled by interns and be available for review by the conclusion of the following fall semester. In the "Rebuild by Design", model a "Chief Resilience Officer" was appointed to oversee the collaborative process. If Arcata and HSU were to identify such a person, the CRO could act as liaison between the different departments.

Mural Competition

For Arts! Arcata, a mural competition could be initiated to bring the community's attention to SLR. The theme for the mural could be decided upon by non-profit environmental groups in the community (such as Humboldt Baykeeper, Northcoast Environmental Center, Seventh Generation Fund, etc.). The theme could focus on environmental quality, ecological integrity, community values, etc. Information about the competition could be provided at the Farmer's Market Booth and the Arcata SLR Webpage.

Otter Parade:

The "Cow Parade" is an international event in which artists design and decorate cow sculptures which are then displayed throughout city centers. After a period of time, the cows are auctioned off and the proceeds go to support a non-profit organization. Using the "Cow Parade" model, we recommend that the city initiate an "Otter Parade". The North American River Otter is a regionally known and recognized species in the community that may be adversely affected by SLR. Because the North American River Otter eats fish, and fish populations may decrease or relocate as a result of climate change and SLR, they provide a relevant representation of values at risk due to SLR. Furthermore, otters are a culturally important species to Indigenous peoples in the local area could be a way of bringing Humboldt Bay communities together.

Notifications for this event could be in local newspapers and publications, internet blogs, social media, the Arcata SLR website, and through radio public service announcements. Given a sufficient time-frame, local artists could design the otters and decorate them with images of their choice. Notification could also be sent to local schools asking each school to have a group of students decorate an otter. In addition, local tribal communities, houseless organizations and senior citizen groups could be invited to participate. A designated showcase opening could be determined, and the otters could be put on display throughout Arcata. Businesses could sponsor groups and receive advertisement on the interpretive signs about the otters. After being displayed for a specific amount of time, they could be auctioned off with proceeds benefiting environmental non-profits in the area, and/or go towards other SLR outreach programs.

Reaching out to the Spanish and Hmong Speaking Communities

While researching, we noticed there was a lack of information available in other languages for sea level rise. In addition, language is one of the barriers that limits civic engagement among older adults in the United States (Saint Paul Foundation, 2007). Therefore, we strongly recommend reaching out the Spanish and Hmong speaking communities through tabling

at specific events and providing information in other languages on the Arcata SLR website and all other events like the Shrinking Shores Project.

Festejando Nuestra Salud is a Spanish language health fair event held every October at the Redwood Acres Fairgrounds. Tabling at this event and providing translated information may reach out to this community. However, like other demographics in the community, further research and interviews should be conducted to determine the best outreach method for this group. We recommend contacting the Latino Outdoors Club at Humboldt State University for more commendations on effective ways to reach out to this community in the Humboldt Bay area. In addition, we recommend contacting the Spanish Translation and Interpretation Club that provides translation and interpretation services to schools, individuals and non-profit organizations.

We recommend reaching out to Hmong community organizations to provide information about SLR, and develop further recommendations for this community.

Conclusion

Public participation in planning and policy decisions is essential to maintaining a healthy democratic process. However, certain barriers limit the ability for particular demographics to be engaged in traditional methods of participatory governance. Regarding sea level rise, it is important for local governments to engage the public in the planning dialogue by providing information in an approachable and engaging manner. Once the public becomes more knowledgeable about SLR implications, there will be more incentive for community members to provide input into the planning process. However, social and logistical barriers to engagement will still exist despite interest in the planning activities. Therefore, the recommendations outlined in this document should help communities to overcome these barriers and create a more inclusive and equitable planning design for resiliency in advance of sea level rise.

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Appendix A

Goals

To accomplish our mission we created a series of goals to ensure the success of our project:

Goal 1*: Identify case studies that have increased public participation in planning decisions involving SLR in other areas*

> **Objective 1.1**: Literature review of other community projects and case studies for SLR outreach
>> **Action 1.1:** Find sources for Literature Review of public participation and outreach
>> **Action 1.2:** Document applicable source

> **Objective 2.2** Analyze data collected through literature review
>> **Action 2.1:** Apply literature information to interview questions
>> **Action 2.2:** Summarize literature review information for the report.

Goal 2*: Identify and understand the barriers associated with participation in SLR planning process across a range of demographics.*

> **Objective 2.1.** Interview representatives and groups that work with these demographics to identify the barriers to public participation for each demographic
>> **Action 2.1.1.** Identify the demographics
>> **Action 2.1.2.** Identify representatives
>> **Action 2.1.3.** Gather representatives' contact information

> **Objective 2.2.** Develop questions for interviews
>> **Action 2.2.1.** Determine questions for interviews
>> **Action 2.2.2**. Submit questions to IRB

> **Objective 2.3.** Implementation and Follow-Through of Interviews
>> **Action 2.3.1.** Schedule interviews
>> **Action 2.3.2.** Organize data analysis sheet for interview content
>> **Action 2.3.3.** Conduct interviews
>> **Action 2.3.4.** Transcribe interviews
>> **Action 2.3.5.** Analyze data collected in interviews

Goal 3*: Make recommendations to local governments for public outreach to the community in attempt to promote public engagement.*

> **Objective 3.1.** Analyze Constraints / Opportunities
>> **Action 3.1.1.** Interview Arcata City planners to understand constraints
>> **Action 3.1.2.** Review barriers and possible outreach methods
>> **Action 3.1.3.** Integrate information from interview data and literature review
>> **Action 3.1.4.** Determine criteria for realistic solutions and recommendations
>> **Action 3.1.5.** Evaluate potential solutions to recommend

Action 3.1.6: Determine realistic recommendations based the constraints and opportunities

Objective 3.2. Draft cumulative place-based outreach methods, adaptable for Humboldt Bay area drawing from interviews and literature review.

Action 3.2.1. Draft report
Action 3.2.2. Submit draft for revision
Action 3.2.3. Make corrections
Action 3.2.4. Present to class
Action 3.2.5. Consider class feedback and make corrections
Action 3.2.6. Present to Arcata Planning Commission
Action 3.2.7. Finalize report

Appendix B

Interview Questions for Respondents Serving Different Demographic Groups

Table A-1 Research Survey Questions

City of Arcata Department Staff Research Questions
1. How do you think Arcata will be affected by sea level rise?
2. What do you consider to be the most pressing issue associated with sea level rise for Arcata?
3. What do you consider to be the most pressing issue associated with sea level rise for Humboldt Bay?
4. What are some recommendations for addressing these issues?
5. Which demographic groups in the community actively participate in city council meetings and advisory committee meetings?
6. What do you consider to be barriers to public participation in your community?
7. Do you have any recommendations for increasing public participation in the planning process?
8. Do you have public outreach meetings planned focused on sea level rise?
9. If so, when will they be?
10. Is there anyone that you could recommend for an interview that has further information about public participation and/or sea level rise?

Table A-2 Research Survey Questions *(continued)*

Local Sea Level Rise Experts / Consultants Research Questions
1. How do you think Arcata and Humboldt Bay will be affected by sea level rise?
2. From your research, what communities are the most vulnerable?
3. What kinds of responses are being organized around Humboldt Bay?
4. What are some of your ideas for public outreach on SLR?
5. Which (if any) demographics have already been involved in education about SLR?
6. Do you know of any neighborhood or community committees being formed to address SLR?
7.   Have you seen tools that have worked to engage other communities?

Table A-3 Research Survey Questions *(continued)*

Business Owners Research Questions
1. Will sea level rise affect Humboldt Bay? If yes, how? When?
2. To what extent will sea level rise in Humboldt Bay affect the health of local businesses?
3. Are there any businesses or sectors of industry that are particularly susceptible to sea level rise?
4. How will the impact of sea level rise on local business affect the economy in Humboldt Bay?
5. Has the local business community already started planning for sea level rise?
6. Are there barriers to participation in local government planning for SLR that limit local business owners' involvement?
7. How can the local government and community reach out in collaboration with local business owners in planning for sea level rise? Are there any activities, programs or processes to encourage involvement that you recommend?
8. Do you have any additional comments about sea level rise and its effect on the business community?
9. Is there anyone that you could recommend for an interview that has further information about business responses to sea level rise?

Table A-4 Research Survey Questions *(continued)*

United Indian Health Services (UIHS) Potawot Community Health Center Representatives
1. Could you please give a brief description of your organization's mission?
2. As an organization that serves tribal communities, has there been dialog within your community about flooding, or levels of water rising currently or in the past?   a. If yes, how did the community prepare for this?
3. How would sea level rise affect your clients and their communities?
4. In general, how will sea level rise affect cultural practices, traditional ecological knowledge practices of communities you serve?
5.   How would sea level rise affect cultural sites of communities you serve?
6. Do communities participating in your organization have the resources they need to adapt or retreat in the event of sea level rise?
7.   Do you believe your clients would be interested in participating in events or outreach programs on sea level rise?
8.   Which demographics (Elders, Youth, etc.) in your community do you notice actively participating in community planning processes? (i.e. any tribal committees, cultural planning , community organizing)
9.   What are your recommendations on how to get the community involved in conversations about sea level rise? (Elders, Youth etc?)
10. Does it seem at times like your clients want to participate in community activities but don't know how or have other restrictions/ barriers? If so, what are some of the barriers to public participation your clients face?
11. Is there anyone that you could recommend for an interview that might share further information about public participation and/or sea level rise or climate change in native communities?

Table A-5 Research Survey Questions *(continued)*

Senior Citizen Service Organizations Research Questions
1. Could you please give a brief description of your program's mission?
2. Do the people that you serve talk about sea level rise and climate change? If so, what kinds of things do they talk about?
3.   Do you think seniors would be interested in participating in an event regarding sea level rise?
4. Do the people you serve participate in community events, city council meetings and/or advisory committee meetings? If so, to what degree?
5. Do you think there is an interest in participating in these types of events?
6. What do you think would or does limit your clients from participating in local government planning processes? Are there barriers to participation in public or community events?
7. Is there anyone that you could recommend for an interview that has further information about public participation and/or sea level rise?

Table A-6 Research Survey Questions *(continued)*

Arcata High school Teachers Research Questions
1. Will sea level rise affect Arcata? If so how? When?
2. Do your students have questions regarding adaptation to climate change or sea level rise?

3.   Are climate change and sea level rise required topics in your curriculum?
 	
   a. If yes, what about climate change and SLR do you discuss with your students?
 	
   b. If not, do you talk about climate change and SLR?

4. What do you think are the most important topics for your students to know about climate change and sea level rise?
5.   Have your students worked on a project involving sea level rise? Maybe for a science project? A club project?
6. How could the school increase awareness and encourage involvement from student on sea level rise?
7.   Do you think that Arcata High students should be involved in the City of Arcata's sea level rise planning process?
8.   Do you think Arcata has the resources it needs to adapt to sea level rise?
9. Is there anyone that you could recommend for an interview that has further information about student participation and/or sea level rise?

Table A-7 Research Survey Questions *(continued)*

HSU Student Club Members that may have interest in SLR Research Questions
1. How long have you lived in the area?
2. Do you plan on living here after you graduate?
3.   What is your major?

4. Will sea level rise affect Arcata?
        a. If so, how?
        b. When?
        c. How did you learn about this?
        d. Was this discussed in an HSU class?

5.   Do you feel like sea level rise will impact you in some way?   a. If so, how? If not, why not?
6. What do you think is the most important thing to consider with regards to sea level rise?
7.   Do you think that sea level rise is being talked about enough in your classes?
8. Have you ever participated in a workshop or event about sea level rise at HSU?

9. Have you been involved in the public participation planning processes in your community at home or here in Arcata?
        a. If yes specify what processes?
        b. If no, why not?

11. Would you be interested in participating in planning process about sea level rise?

Table A-8 Research Survey Questions *(continued)*

Social Services Organizations Research Questions
1. Could you please give a brief description of your organization's mission?
2. Is sea level rise a topic of concern for your organization and why?
3.   Do you think that your clients will be affected by sea level rise? If so, how? Who? Where?
4. Have you heard any of your clients expressing concern about sea level rise?
5.   Do your clients participate in public outreach / public governance processes?
6. If not, what do you think limits your clients from participating in the planning process?
7.   Do you have any recommendations as to how to engage your clients in the SLR planning dialogue?
8. Could you recommend another social services representative to discuss these issues with?

Table A-9 Research Survey Questions *(continued)*

Humboldt Realtors Association Research Questions
1. Could you please give a brief description of your organization's mission?
2. Is sea level rise a topic of concern for your organization and why?
3. Has the local realtor community already started planning for sea level rise?
4. Do you think that your clients will be affected by sea level rise? If so, how? Who? Where?
5. Have you heard any of your clients expressing concern about sea level rise?
6. Do your clients participate in public outreach / public governance processes?
7. Are there barriers to participation in local government planning for SLR that limit local Realtors involvement?
8. How can the local government and community reach out in collaboration with local realtors in planning for sea level rise? Are there any activities, programs or processes to encourage involvement that you recommend?
9. Do you have any additional comments about sea level rise and its effect on the realtor community?
10. Is there anyone that you could recommend for an interview that has further information about realtor's responses to sea level rise?

Appendix C

Summary of barriers to Indigenous involvement in Natural Resource Management (Ross 2011)

Table 3.1

TABLE 3.1 Summary of barriers to Indigenous involvement in NRM.

Barrier	Description
Epistemological Barriers	
A IK not recognized	There is lack of recognition that Indigenous knowledge once had a place in natural resource management.
B Narrow definitions	Narrow definitions of concepts of 'tradition' and 'custom' reduce opportunities for recognition of Indigenous knowledge in modern communities.
C Nonvalidation of IK	Indigenous peoples' expertise and connection to the land or seascape are not deemed to have been 'proven' to the satisfaction of scientists and resources management bureaucrats.
D Translation of IK	Indigenous peoples are required to translate their knowledge into frameworks that are widely understood by scientists and resource managers.
E Social/ spiritual expression	When knowledge is expressed in a social or spiritual, rather than a scientific, framework, scientists often find the relevance of such information challenging.
F Codification of IK	The need to write down information can lead to Indigenous concerns about codification and appropriation of knowledge.
G Ownership of knowledge	Barriers can arise when Western systems of property rights (including intellectual property rights) are imposed over Indigenous ways of controlling and managing ownership of knowledge.

Continued

Table 3.1 *continued (Ross 2011)*

Barrier	Description
TABLE 3.1 Continued	
H Spatial/temporal boundaries	Barriers may occur as a result of a system that requires land and water to be bounded spatially and temporally via the demarcation of areas on maps or within chronologically defined management planning systems.
Systemic or Institutional Barriers	
I 'Outsiders' kept 'outside'	Bureaucratic arrangements such as meeting requirements and government institutional structures make the involvement of any 'outsiders' difficult.
J IK & management institutions	Barriers that occur when Indigenous knowledge cannot be accommodated within reductionist and formulaic approaches to management such as those found in management manuals.
K Decentralization	Barriers can arise as a result of the decentralized nature of Indigenous concepts of governance and decision making, which challenges bureaucratic systems of centralization.
L Racial/cultural inferiority	Some 'races' or cultures are seen as being categorically inferior, practicing inherently destructive or under-productive forms of livelihood, and therefore incapable of possessing a complex knowledge of nature.
M State power	The State has more power than Indigenous people do and so has greater control. Indigenous people must strategize about how and when to assert their concerns.
N 'Benevolent' West	The State is assumed to act benignly, despite obvious resource degradation under the State's watch. Indigenous people must prove that State actions have been detrimental.
O Globalization	The State needs to meet global environmental challenges on global (often theoretical) scales, rather than on the local scale used in Indigenous knowledge systems.