Climate Action on Tribal Lands: A Community Based Approach

A GROUP PROJECT SUBMITTED IN PARTIAL SATISFACTION FOR THE DEGREE OF

A MASTERS OF ENVIRONMENTAL SCIENCE AND MANAGEMENT FROM

The Donald Bren School of
Environmental Science & Management

University of California, Santa Barbara

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March 2011

ACKNOWLEDGEMENTS

The members of this project would like to express their gratitude to the people and organizations that helped make this project a success. Foremost, we would like to thank our advisor, Hunter Lenihan, for his guidance throughout the creation and development of this project.

We would also like to extend a special thank you to the external advisors of this project for their critical insight and expertise.

Dr. Satie Airame

Dr. Ines Talamentez

Dr. Oran Young

In addition, we would like to thank the individuals and organizations that provided us with important knowledge and insight throughout this project.

Dr. Frank Davis, Dr. James Frew, Maria Raso, Tom Umenhofer,

Dr. Park Williams, and Serra Hoagland

CA Air Resource Board, Chumash Casino & Resort Facilities Staff,

Chumash Environmental Office, SYBCI Elders Council

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

ABSTRACT

This project aims to provide a better understanding of potential climate change impacts on American Indian communities with a focus on the Santa Ynez Band of Chumash Indians. It recognizes the importance of collaboration amongst tribes and supporting organizations. Capacity building is an important part of any climate action plan. The project addresses this by providing tools and resources that this and other tribes may use to inform environmental decision-making related to climate change. It provides a greenhouse gas assessment, modeling of impacts on culturally significant plant species and historic sites, and outreach information and materials. These tools may facilitate networking amongst tribal communities and supporting organizations, which could increase the Tribe's resilience to climate change impacts. Engaging in climate action now offers the Tribe the opportunity to be a leader in environmental management.

EXECUTIVE SUMMARY

As global climate negotiations have failed to develop a binding agreement to reduce greenhouse gas emissions, and passage of a national climate policy is stalled for the time being, many states and communities are taking initiative and moving forward with their own climate action plans. Take for example the fact that more than 1,000 mayors have joined the U.S. Conference of Mayors' Climate Protection Agreement, the passage of AB32 – California's Global Warming Solutions Act, and the recent release of the Santa Barbara County Sustainable Action Plan. This project sought to bridge the gap between the projections of climate change on a global level and the impacts that will have to be addressed on a local, community scale. Mitigation and adaptation efforts were the center of the project focus. Federally recognized tribes, including the Santa Ynez Band of Chumash Indians (SYBCI), are in a unique position to be proactive regarding climate change mitigation and adaptation. Due to their status as sovereign nations, tribes have freedom to pass and implement their own laws and regulations that apply to their reservation lands. This independence provides tribes with more leeway to choose how to maintain and preserve their resources in order to ensure cultural sustainability and security. Many tribes are already pursuing independent environmental governance through the passage of natural resource and climate change resolutions and the implementation of both mitigation and adaptation efforts. This project worked with the SYBCI to assess their impacts on, vulnerability to, and ability to address climate change.

Chumash tribes have continuously adapted to changing climates, both physically and politically, for thousands of years by adapting their lifestyles and cultural practices to available resources (Gamble 2008). While modern day Chumash people are no longer reliant on gathering their food from the land and the sea, their culture, spirituality, and livelihood continue to be intimately tied to the environment (Blackburn 1975). Future climatic projections and potential changes in the Santa Ynez Valley will once again necessitate adaptation. The SYBCI recognizes this need and wants to expand on their current environmental management efforts. While many components of tribal government are actively participating in environmental measures, these operations are uncoordinated and not as effective as they could be with increased outreach and communication. If these disparities were to be addressed, the Tribe would be in a position to take more progressive action and serve as a role model for other reservations throughout the United States.

One component of the Tribe's operations is the Environmental Office, which is the client for this project. Initially, the client designed the scope of the project to include a comprehensive greenhouse gas inventory and literature review of mitigation strategies. However, as the project unfolded, complex and challenging questions arose from this seemingly straightforward agenda:

- How should this project define operational boundaries that are fluid within the tribal government and community?
- How can science present information about the threats of climate change to tribal communities without assuming cultural values and thereby imposing a narrative of heritage?
- How can tribes manage their resources in a way that enhances connections with their vibrant cultural heritage while creating an economically prosperous future?

The suite of materials developed for this project will assist the Environmental Office and the tribal leadership in addressing these questions. Each component of the project deliverables reflects the highest regard for the sovereignty of the Santa Ynez Band of Chumash Indians. However, a true community climate action plan will not be possible until the values, culture, and priorities of the SYBCI are fully represented through community participation and collaborative policymaking.

Current climate change mitigation efforts are driven primarily by the Environmental Office's desire to become a leader among tribal communities, build political capital, create local jobs and combine resource savings with financial savings. A fully integrated project will require more time and increased emphasis on learning about and understanding the Chumash culture and their connections to the environment. As a first step in this process, efforts were focused on three "sectors":

- Greenhouse gas management;
- Vulnerability to climate change impacts and potential to increase resilience;
- Community outreach and engagement.

<u>Greenhouse Gas Management</u>

The client requested a greenhouse gas assessment and review of management practices as a key first step in creating a climate action plan. This assessment is a critical tool for measuring and monitoring emissions and provides a baseline that the community can use to set a reduction target and track future improvements. Moving forward with climate action, it will be up to the members of the Tribe to determine their carbon responsibility and define their goals and framework for future emissions reductions.

Through communication with the tribal administration and other contacts, a review of case studies, and specified client needs, areas to target for policy recommendations were identified. The recommendations were that the Tribe adopt a climate change resolution, implement a building code that requires greater energy efficiency, consider joining ICLEI (International Council for Local

Environmental Initiatives) - Local Governments for Sustainability, review ISO 14000 environmental management standards, and consider efficiency improvements for their casino resort facility. The group encourages the SYBCI to critically review and adapt these recommendations to increase the efficiency of their environmental management efforts in a manner best suited to their cultural, social, and economic circumstances.

Deliverables

- A baseline carbon footprint of the reservation.
- A compilation of policy and efficiency recommendations for the consideration of the SYBCI.

Cultural and Physical Resilience to Climate Change Impacts

Building on community outreach efforts, the vulnerability and resilience portion of the project was designed to raise awareness about climate change and potential adverse effects on the Tribe and reservation resources. After an extensive literature review regarding the history, culture, and background of the Chumash, modeling processes were chosen to illustrate the risks of climate change to the SYBCI. None of the models, maps or assessments created in this project are meant to be predictive, especially at the local scale. Rather, the purpose of these deliverables is to shed light on the concerns that tribal members may have regarding climate change and its environmental and cultural impacts.

Deliverables

- A number of plant distribution maps, modeling the impact of climate change on culturally important species for the Chumash.
- A collection of sea level rise maps, modeled to simulate the impacts of sea level rise on culturally important sites across California, but with a focus on the Central Coast.

Community Outreach & Engagement

An effective climate action plan for the SYBCI will reflect the values and priorities of its stakeholders. Integrating these community values requires education on what climate change means and its potential effects on this state and region. This project involved a few initial steps towards building increased awareness and engagement within the SYBCI community, including participation in the first annual Environmental Fair and presentations to the Elder's Council. In the course of this project resources were also created and aggregated that can be used to facilitate future outreach efforts.

Deliverables

- Various materials including a fact sheet, press releases, literature reviews, and an adaptable presentation that can be used both by the SYBCI as well as other tribes for outreach and engagement.
- A website which provides access to materials and tools developed for community engagement in a user-friendly and accessible format.

Concluding Remarks

Collaborating with a small, sovereign and resource rich tribal community provided challenges and opportunities unique from mainstream approaches to climate action planning. The goal of this project was to provide a sound foundation for climate action within this context. The findings and deliverables of this project will facilitate continued climate action.

The implementation of project recommendations will have numerous concrete benefits for the Tribe including cost-savings, increased energy and water security and independence, protection of natural and cultural resources, partnerships with other tribes and communities, and the opportunity to be a climate leader.

1.0 BACKGROUND AND INTRODUCTION

Geography, climate, and ecology were inextricable factors in the development of Chumash culture, and they remain important today (Gamble 2008). Prior to European contact and colonization there was a network of independent Chumash villages sustained by both locally available natural resources and cooperative trade. While the temperate weather of California's Central Coast generally provided adequate resources, periods of climactic instability forced Chumash tribes to adapt to changes in resource availability (Johnson 2000). The Chumash Indian population was all but decimated in the 1700s and 1800s by the Spanish mission system. Nonetheless, Chumash peoples have persisted, continuously adapting physically, socially and politically to changing environmental conditions on the lands and in the seas, as well as to externally imposed shifts to their way of life. The long and complex history of tribes leads to unique considerations when working with these communities. More information on Chumash history and background can be found in **Appendix A**.

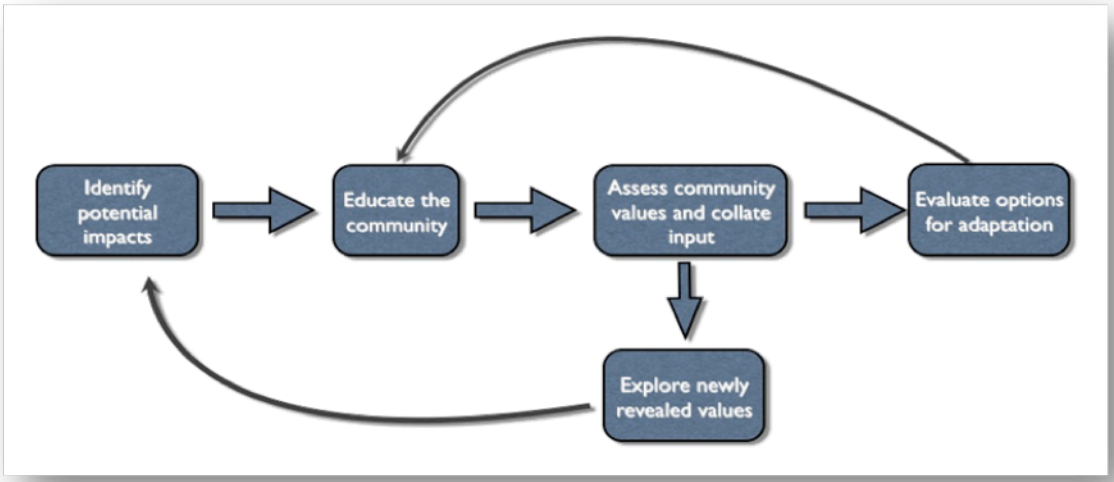
It is important to consider issues of economic and political context, both in the past and the present. The SYBCI is the only federally recognized Chumash tribe, but there are several other remaining Chumash tribes. Due to California Propositions 5 and 1A, the Santa Ynez Band of Chumash Indians was able to open a casino on their reservation in 1994, which they expanded into the Chumash Casino Resort in 2003. The 1999 amendment to the California Constitution to allow gaming on reservations has been critical to the economic development of many tribes. "With the profits from gaming on reservations, Native Americans hold, for the first time, some political presence precisely because they now have sufficient economic clout to force the mainstream political process to take them seriously" (Darian-Smith 2004). This is an important point in American Indian history because it is a time when many American Indian people are gaining a voice socially, economically, and politically.

Realizing this opportunity, the Santa Ynez Chumash Environmental Office has redoubled its efforts in the past few years, with a permanent staff of three and a fluctuating number of interns and part-time employees. This project was generated by their ongoing efforts to assist both the community and the casino in improving energy and resource efficiency. This project presents several options and opportunities for improved environmental management related to climate change.

However, in order for mitigation and adaptation efforts to be successful and long lasting, it is important that they incorporate and reflect the values of the entire SYBCI community (Van Aalst, et al. 2008). Respecting the Tribe's cultural system, this project has taken the first steps toward creating a value assessment tool by

identifying areas of cultural and financial risks that climate change may pose to the Tribe. An iterative process that identifies foreseen consequences of climate change and evaluates cultural significance will require the coordination of tribal operations at all levels.

Figure 1. An iterative process for incorporating values into decision making



This value system can be actively integrated into the daily operations of the Tribe's government and development operations. By effectively incorporating stated tribal values as part of the performance evaluation metric for environmental managers and decision makers, future actions will more accurately reflect the Tribe's needs and concerns.

2.0 MITIGATION

The first step in this project involved addressing the SYBCI's contribution to greenhouse gas emissions. Averting climate change will require emissions mitigation on a much larger scale; however, commitment from this Tribe could inform and inspire changes in other communities, which could have a meaningful cumulative impact.

2.1 Carbon Footprint

A carbon footprint is a valuable tool for measuring and monitoring emissions and was an essential deliverable of this project. The complete footprint report, including methodology and results, can be found in **Appendix B**.

The footprint created as a part of this project includes on-reservation, commercial and government, Scope I and Scope II emissions for 2009. The year and the boundaries were chosen based on the availability and completeness of data and feasibility within the scope and timeline of the project. Residential data was excluded due to the private nature of residential information and the difficulty for utility companies to isolate the usage of the reservation from the rest of their clients. Ultimately, communication with Pacific Gas & Electric (PG&E) and Southern California Gas allowed access to residential data, but at that point it was too late to incorporate this information into this initial footprint. Similarly, Scope III emissions were excluded due to timeline limitations of this project and the private and proprietary nature of purchasing records. Incorporating Scope III emissions into future footprints will provide the Environmental Office an opportunity to expand its collaboration with the casino and resort.

Lessons Learned:

Through conversations with external advisors and a sensitivity training the group learned that surveys and other impersonal interactions are not an effective means for gathering information from the SYBCI community.

The data that was gathered for the footprint includes natural gas, electricity, gasoline and diesel for the casino, hotel, tribal hall, health center, fire station and street lights. The results of the footprint show that the reservation produced nearly 8 million kg CO2 equivalent emissions (CO2e) in 2009. The largest contributor to the overall footprint was the casino floor, while the largest source of emissions was electricity. Commercial emissions represented a far greater percentage of these emissions than that of the government. While this was a predictable outcome, the magnitude of the difference is important for the Tribe to understand and incorporate into their environmental decision-making.

As the Tribe moves forward with a climate action plan, they may choose to draw system boundaries and allocate emissions differently than was done here. How the members of the Tribe determine their carbon responsibility and define their operational identity is a community level decision.

2.2 Tribal Operations Recommendations

Due to their status as sovereign nations, federally recognized American Indian tribes are advantageously positioned to address the complex problems of climate change through policy mechanisms, including:

- Adopting a climate change resolution
- Developing a building code that encourages increased energy efficiency standards
- Implementing the ISO 14000 environmental management system for the Tribe's commercial properties,
- Joining ICLEI - Local Governments for Sustainability to facilitate implementation of mitigation and adaptation efforts

These items are recommended for consideration by the client and Tribe. For the purpose of this project, recommendations were based on simple cost benefit analysis, case studies of other communities and projects, and the opinions of stakeholders.

Create and Sign a Climate Change Resolution

A first step for the Tribe to consider in addressing climate change is the passage of a resolution. Many guidelines for climate action and environmental management plans begin with acquiring high-level community and governmental support (Clymer 2010). The adoption of a climate change resolution will empower decision-makers in the community to make sustainability and energy efficiency higher priorities. When creating a resolution, it is imperative that the community leaders incorporate their own thoughts, perspectives and justification on why climate change is an important issue for their specific community. To demonstrate community unification and to impact a broad audience, the resolution should be signed by various community leaders including elders, spiritual leaders, business leaders, educators, and regulators. A template of an example SYBCI climate change resolution can be found in **Appendix C**.

For More Information: The Anchorage Declaration is a product of the 2009 Indigenous Peoples' Global Summit on Climate Change in Anchorage, Alaska and includes a general acknowledgement of the problem of climate change as well as a 14-point call to action (The Anchorage Declaration 2009). The Proclamation of the Swinomish Indian Senate on a Swinomish Climate Change Initiative is a great example of an individual tribe's general commitment to climate action (Proclamation of the Swinomish 2007).

Create and adopt a building code that promotes energy and water efficiency

The significance of buildings and their relationship to climate change can often be overlooked in comparison to more visible means of greenhouse gas emissions, such as automobiles and power plants. Residential and commercial buildings account for the majority of consumption of energy and other resources in the United States, using 72 percent of all electricity consumed in the country. Additionally, buildings contribute more than 40 percent of the nation's carbon dioxide emissions and produce 136 million tons of construction and demolition waste annually (Sussman 2008). Consequently, the Chumash tribe can greatly reduce its carbon footprint by taking action to lower commercial and residential building emissions on the reservation. The logical first step to addressing this issue is the passage and implementation of a strong and effective building code. The Tribe does not currently have any building codes in place.

Building codes are a set of rules that regulate the safety of new construction and buildings in a municipality or targeted area. Perhaps the most important role these regulations play is the protection of the public health, safety, and welfare of a community. Building codes can also be a crucial method for local governments to encourage energy efficiency and environmentally sustainable development. In fact, many codes have been developed that "promote the growth of ecological building projects, permit the development of renewable energy resources, preserve critical areas of habitat and farmland, and reduce driving and auto emissions by planning for urban patterns of development" (Salkin 2009). Financial incentives can also be provided to promote sustainable commercial and residential building practices. In this way, an environmentally sensitive building code can be one of the most effective methods of mitigation and adaptation to the impacts of climate change. (More resources on building codes can be found in **Appendix D**)

The SYBCI has made significant strides in improving the energy performance of certain buildings on the reservation, most prominently the casino and hotel. However, there remains room for meaningful improvement. A new building code will allow for greater oversight and guidance of future development on the reservation, including any future construction on the newly acquired 1,400-acre parcel. (A simple, step-by-step approach for how the SYBCI can develop, pass,

and implement a building code that promotes greater efficiency and sustainability on the reservation is also included in **Appendix D**).

For More Information:

National Indian Law Library: http://www.narf.org/nill/
Tribal Court Clearinghouse: http://www.tribal-institute.org/

Building Codes
Colorado River Indian Tribes: http://www.crit-nsn.gov/crit_contents/ordinances/Health-&-Safety-Art-1.pdf
Standing Rock Sioux: http://www.standingrock.org/data/upfiles/files/Housing Title XVII.pdf
Grand Traverse Band: http://www.narf.org/nill/Codes/gtcode/12.pdf

Join and/or Implement ISO and ICLEI

There are a variety of standards and programs that are designed to assist communities in the process of creating environmental management plans. Two of the most well known programs, ISO (International Organization for Standardization) 14000 and ICLEI are outlined here. By using these well-known standards and programs the Tribe can establish their own goals and methods of management while maintaining scientific rigor. Access to reliable information and professional assistance will make the process of creating a management plan faster and more likely to succeed. In addition to the reduction of negative impacts on the environment, proper environmental management can lead to cost savings from reduced cost of waste management, reduced use of energy and raw materials, streamlined distribution and supply chains, and an improved public image.

ISO 14000

ISO 14000 is a suite of standards and guidelines for environmental management. The various standards that comprise this system address the procedures for creating and implementing an effective environmental management strategy. These principles also provide specific details on life cycle analysis, performance

evaluation, monitoring, and auditing. The purpose of the standards is to provide organizations and entities of all sizes a reliable and comparable way to voluntarily control the environmental impact of their activities, as well as to continually improve their environmental performance in a systematic way. The standards are based on process, not performance, so the user can set their own goals. ISO is designed to conform to third-party verification standards, leaving open the option for certifications and awards. These guidelines are successfully used by thousands of companies and organizations around the globe (ISO 14000 Essentials 2011).

ICLEI

ICLEI - Local Governments for Sustainability is an international association of local governments who are committed to sustainable development. The premise of ICLEI is that global sustainability objectives can be accomplished through cost-effective, efficient, and locally designed initiatives. By joining ICLEI, governments gain access to a respected online GHG inventory tool, community climate action information, support services, local and regional trainings and networking opportunities with both national and international communities. (A list of relevant ICLEI case studies can be found in **Appendix E**). The organization's Climate Resilient Communities program may be of particular interest to the Chumash tribe. This program focuses on helping local governments develop adaptation measures and tools to prepare for the expected impacts of climate change (Sussman 2008).

In offering all of these recommendations, the group hopes to enhance the effectiveness of the Tribe's environmental management and policy systems. The SYBCI is encouraged to critically review these recommendations and adopt them in a time and manner that they decide is most appropriate. These action items, if fully realized, will greatly improve the Tribe's ability to become a recognized leader among tribal communities in the fight against climate change.

2.3 Greening the Chumash Casino Resort Hotel

The green hotel industry is becoming more popular as consumers demand environmentally responsible services, and as communities put increased pressure on businesses to reduce their environmental footprint. Most importantly, this industry has grown as hotels see the benefits of going green to their bottom line, employee retention, reputation, and customer satisfaction. In response to the demand from the hospitality industry, more environmentally friendly services and products are being offered for green hotels (Alexander

2002). (A literature review exploring the various benefits of greening hotels and marketing environmental investments can be seen in **Appendix F**).

The Chumash Casino Resort Hotel (CCRH), with its beautiful natural setting, is in an ideal location for emphasizing the importance of conserving natural resources. Making environmental stewardship a component of every guest's stay can enhance the visitor experience and provide cost savings for the hotel. There are an incredible number of options on how to make an existing hotel greener, and choices should be based on customer and employee preferences, cost-benefit analysis, and feasibility studies. The result will be reduced impacts on the environment, significant cost-savings, and an improved public image.

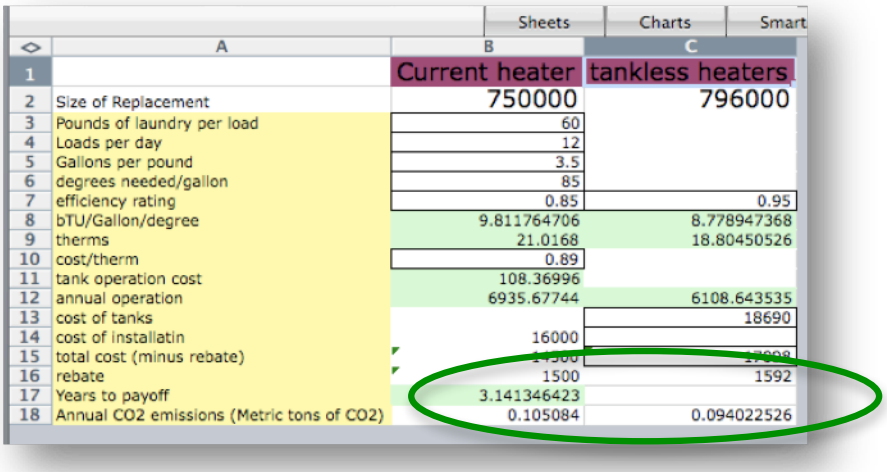
The CCRH and casino share many resources and, as a result, have together already implemented a variety of energy-saving measures. Many of these changes, such as an efficient Heating, Ventilating, and Air Conditioning (HVAC) system, have been made in hotel operations. Measures visible to the guests include CFL bulbs in the rooms and sheets that are changed every three nights for guests with longer stays. The hotel has plans for incorporating more energy-efficient measures in the near future, including the installation of a solar hot water system, installation of a new and more efficient laundry system, heat collection from kitchen exhausts, tankless water heaters, and a soft remodel of the hotel rooms which may incorporate new green features.

Operations and management of the hotel are a great place to begin the greening process simply because decision-making is under the direct control of management. There are a suite of greening options ranging from the immediate and the affordable to the long-term and capital-intensive. (A list of green hotels and some of their distinct features can be found in **Appendix G**, along with resources for green hotels.) Examples of quick and inexpensive changes include replacing burned-out light bulbs with CFLs or even more efficient LEDs; double-sided printing on recycled paper; all natural bathroom amenities such as soaps, shampoos, and lotion; and using non-toxic cleaning supplies. Changes that may take more time and investment to implement, but will have greater efficiency impacts, include programmable thermostats, energy management systems that require a key card for lights and temperature control, and advanced low-energy washers and dryers, (Alexander 2002). Fortunately, the hotel already employs a management and operations staff that embraces the idea of going green.

Additionally, there are several capital investments that the casino and resort may explore as a way to reduce their carbon footprint. For instance, tankless water heaters may meet their guest's demands as well as their current boiler system, but at a reduced rate of energy consumption. Because operation costs are always a concern, this project has provided a tool for the casino and resort to evaluate the economic impact of tankless water heaters for their laundry

operations, in addition to an analysis of the greenhouse gas reduction that this system would provide.

Figure 2. A tool for the casino and resort to evaluate the economic impact of tankless water heaters for their laundry operations.



Sheets | Charts | Smart

	A	B	C
1		Current heater	tankless heaters
2	Size of Replacement	750000	796000
3	Pounds of laundry per load	60	
4	Loads per day	12	
5	Gallons per pound	3.5	
6	degrees needed/gallon	85	
7	efficiency rating	0.85	0.95
8	bTU/Gallon/degree	9.811764706	8.778947368
9	therms	21.0168	18.80450526
10	cost/therm	0.89	
11	tank operation cost	108.36996	
12	annual operation	6935.67744	6108.643535
13	cost of tanks		18690
14	cost of installatin	16000	
15	total cost (minus rebate)	[illegible]	[illegible]
16	rebate	1500	1592
17	Years to payoff	3.141346423	
18	Annual CO2 emissions (Metric tons of CO2)	0.105084	0.094022526

While the Environmental Office may be strictly concerned with reducing greenhouse gas emissions, the casino facilities are focused on profit margins and payback periods. To help meet their concern, we have also provided a sensitivity analysis that explores escalation rates for natural gas prices, based on a normalized random distribution of future gas costs (Figure 2). The second graph (Figure 3) represents a sensitivity analysis for payback period based on the number of laundry loads that the hotel facilities do on site. Currently, a company from Los Angeles processes much of the laundry off-site. Through better collaboration with the casino and resort, the Environmental Office may be able to meet its goals of reducing operational greenhouse gas emissions by supplementing capital investments. While facilities management may perceive payback periods to be too long, other aspects of the SYBCI's operations may find value in purchasing greenhouse-reducing technology.

For instance, these graphs show that the payback period of tankless water heaters may be as long as four years. Casino facilities managers consider this payback too long. However, this technology offers an opportunity to avoid carbon emissions. With improved lines of communication, the Tribe can work as a unified entity and explore whether such investments make cultural sense, even if they do not represent the best financial investment.

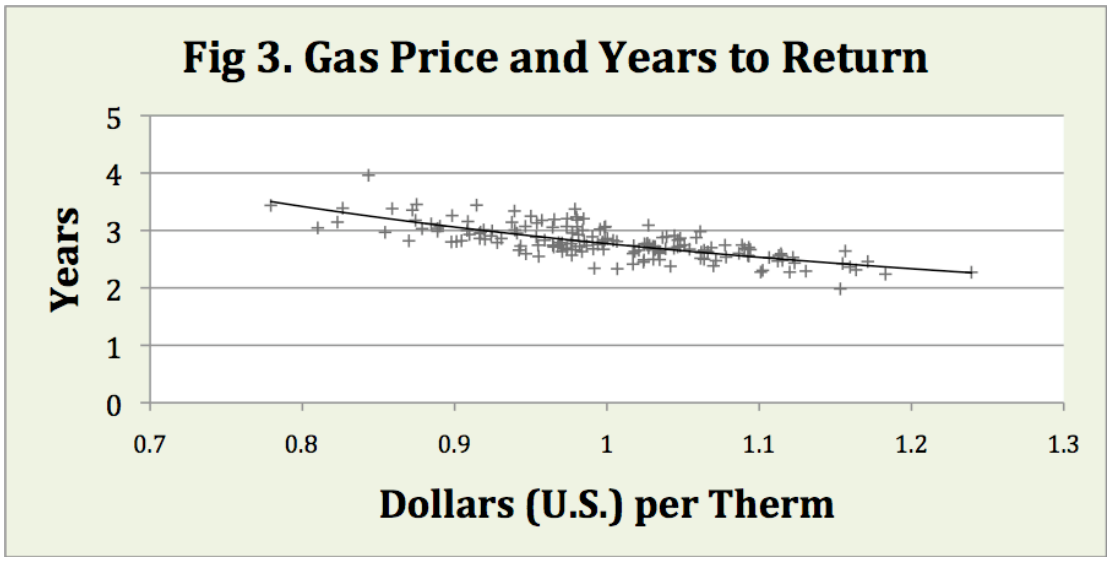


Figure 3. The higher the price of gas per therm, the faster an investment in more efficient laundry systems will pay off (years to return). This information is valuable to the hotel and casino decision-making staff.

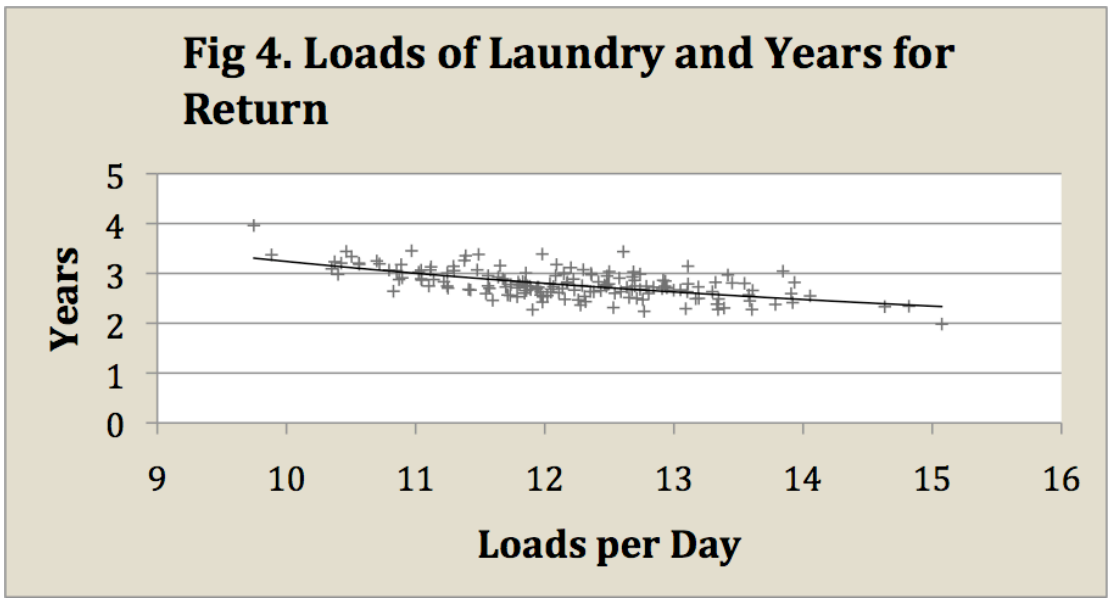


Figure 4. The more loads of laundry the hotel does on-site, the faster the investment in more efficient laundry systems will pay off (years to return).

Further research could provide valuable guidance on the most effective measures to take in the immediate future. The hotel has tentative plans for a soft remodel of the rooms in the near future, which may include the replacement of carpet and upholstery, bathroom fixtures, televisions, and furniture. This renovation is an ideal opportunity to consider the installation of environmentally preferable options.

Guest Behavior

A survey of CCRH guests could provide the hotel with valuable information on the priorities of customers. By enacting the programs that the customers value most, the programs will have a higher chance of success. (A sample guest survey can be found in **Appendix H**). Many customers may prefer the changes that are most visible and that they can participate in, such as linen-change and cleaning frequency options, bulk soaps and shampoos, reduced water and energy use, and key card management options. Alternatively, some guests may not be interested in changes to their experience and consequently would like less visible programs such as solar panels to provide energy and hot water, greener cleaning products, and improved seals on windows and doors.

How to Persuade Guests to Go Green

Hotel management has already considered and implemented a wide variety of programs and technologies to reduce the energy consumption of the hotel through supply side management. The other aspect of energy use that must be considered is demand, which comes primarily from guests. The CCRH wants their guests to have a luxurious visit and does not want to directly pressure guests into particular behaviors that they may view as burdensome. There are, however, other ways of educating and persuading guests to modify their behavior. These methods can be creatively applied to the hotel industry.

Subtly implying social norms is an effective way to influence consumer choices. In a study performed with hotel placards asking guests to help save the environment by reusing towels, the placard which added the phrase "join your fellow guests" was 25 percent more effective in inspiring guests to reuse towels (Simon 2010). Participation increased even more in a follow-up study that went into more detail by referencing the percent of guests in the same room that had participated in the program. Reminding guests of SYBCI environmental ethic and regional concerns for water and energy could lead to voluntary guest reductions of resource consumption (a more in-depth exploration of influencing guest

behavior can be found in **Appendix I**, along with three examples of cards that can be provided to guests).

Another option for changing behavior is to make the desired change the norm and the status quo behavior the exception. This change has been accomplished with the use of plastic bags in some areas of the country. Instead of plastic bags being automatically used, they have to be requested at the register and cost a few cents extra. The additional cost is not as significant of a deterrent as the idea of having to specifically ask for the bags in front of other people. Programs of this nature in large cities such as San Francisco and Los Angeles have proven successful at decreasing use and demand of these environmentally damaging products.

Small incentives, even ones without monetary value, can produce real results. OPower, a consulting firm that works with dozens of utility companies, initialized a program where customers whose energy use was below average were rewarded with large smiley faces on their bills. This experiment resulted in a two percent decrease in energy use compared to communities without the smiley face program. This small percentage, scaled over thousands or millions of homes, would result in significant reductions in energy consumption (Simon 2010).

Environmentally Preferred Options to Consider

Through communication with hotel and casino facilities staff and additional research, the following list of environmentally preferred options was created. (Environmentally preferred options are explained in further detail in **Appendix J**)

- Low VOC carpets, furniture, paints, finishes, etc.
- Carpet tile installation
- Low-flow fixtures
- Bulk soaps
- Organic/natural/non-toxic soaps
- Less-toxic and non-toxic cleaners
- Ozone laundry system
- Increasing on-site processing of laundry

The SYBCI can contribute to a global solution to climate change by engaging in mitigation strategies and implementing policies such as the ones mentioned in the previous section. However, none of the measures will entirely eliminate climate change impacts. The next section focuses on an initial assessment of the vulnerability of the SYBCI to the impacts of climate change.

3.0 ADAPTATION

Global climate change poses a myriad of threats in almost every component of modern life, such as economic instability, weather unpredictability, a lack of food and water security, natural disaster costs and dangers, healthcare concerns, and biodiversity loss (Allen et al. 2010, Ebi and Burton 2008, Fussel 2007). Being aware of the broad dangers that may arise, the resilience and risk assessment portion of this project seeks to focus attention on tribal risks, and specifically the vulnerability of the SYBCI reservation.

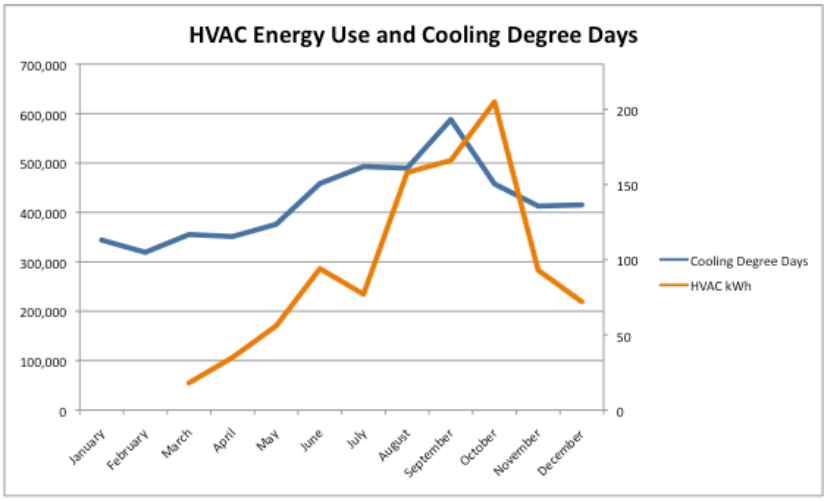
The complicated history that has led to the reservation system drastically affects tribal vulnerabilities to climate change. Preceding the dislocation of American Indian communities and the establishment of reservations, tribes had the ability to follow important species' migrations with variable seasonal changes and long-term, natural climate changes (Morgan, 2008). For American Indian tribes today, global climate change is a threat to their established culture. Similar threats will have drastically different impacts on a reservation than they would on other types of communities. The relatively recent colonization of America coupled with the advent of American workforce mobility has created a fluid sense of community, culture and family identity for many Americans. Therefore, colonial cultural traditions are not as geographically oriented and are adaptable to spatial dislocation (Lester 2004, Power 2009). However, the crux of American Indian culture lies with the community living together as a whole, sharing and passing down traditions and interacting with the environment. If tribal members can no longer live together as a community, cultural ties and traditions are endangered.

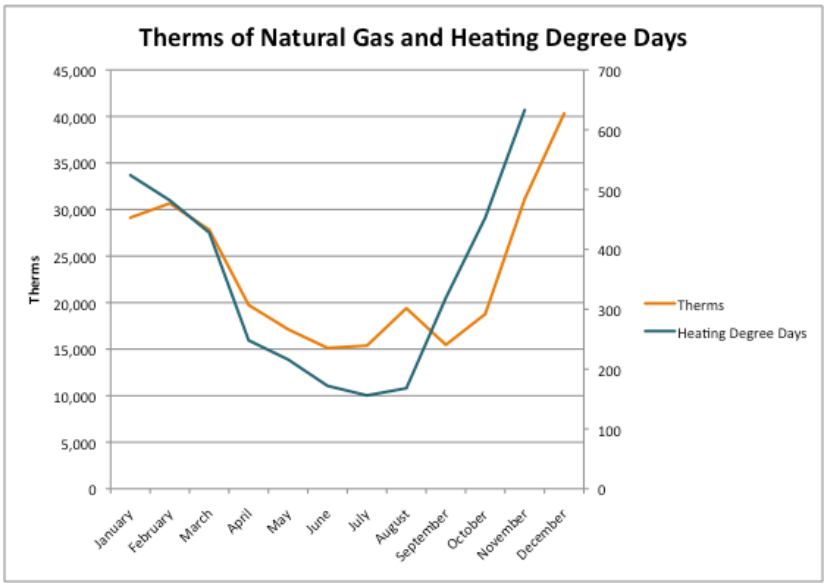
This project chose several areas for risk assessment based on literature reviews and interactions with the tribal community. However, the following studies are not intended to entirely encapsulate current tribal concerns regarding climate change, or to impose a system of cultural values upon the Tribe's current community structure. It is strongly recommended that the Environmental Office undertake a thorough exploration of current cultural values, using these materials as educational tools.

3.1 Economic risks

Energy Costs

The Energy Information Administration (EIA) forecasts continued energy price escalation well into the future due to resource scarcity and increased global demand. This will affect the Tribe's expenses in a variety of ways. The energy costs on the reservation are closely tied to outdoor temperatures. Using data from Weatherunderground.com, the following graphs reflect the energy use by the Tribe in relation to outdoor temperature. Electricity used to cool the casino and hotel is plotted against total monthly cooling degree-days. Natural gas consumption used to heat the casino and hotel is graphed in relation to monthly heating degree-days.





Figures 5 & 6. These graphs demonstrate the close relationship between weather (by month) and energy use (therms and kWh). Altered climate conditions will affect the casino's energy use patterns. The combination of higher energy prices and an increase in energy demand can pose a serious economic threat to the Tribe's operations.

Tourism

Liquid fuel prices are also expected to escalate, increasing travel costs for casino and resort guests. This price increase is expected to alter patterns of tourism and effect revenue. Additionally, the casino relies on deliveries of food, laundry and other goods and services from Los Angeles. With rising fuel prices these services will become more expensive and less sustainable.

Any change in the agricultural makeup of the Santa Ynez Valley could contribute to tourism declines. Several studies have pointed to the positive externality that agrarian settings provide for proximate hospitality and tourist industries (Abler 2004, Maranon and Visintin 2007). If the presence of vineyards in the surrounding valley is altered due to climate change, the casino and resort may be affected. To explore this issue the casino should consider conducting a benefits transfer study. A cost benefit analysis that incorporates a travel cost method would provide valuable insights for how to continue to attract guests from Los Angeles and San Diego, despite an increase in travel costs and a decline in local agriculture. Innovative solutions could be synergistic with greenhouse gas reduction goals as well. For example, providing mass transit options for guests coming from the Los Angeles area would reduce trip generation to and from the casino and offset increased travel costs for guests as well as reduce greenhouse gas emissions.

3.2 Cultural risks

Plant Migration

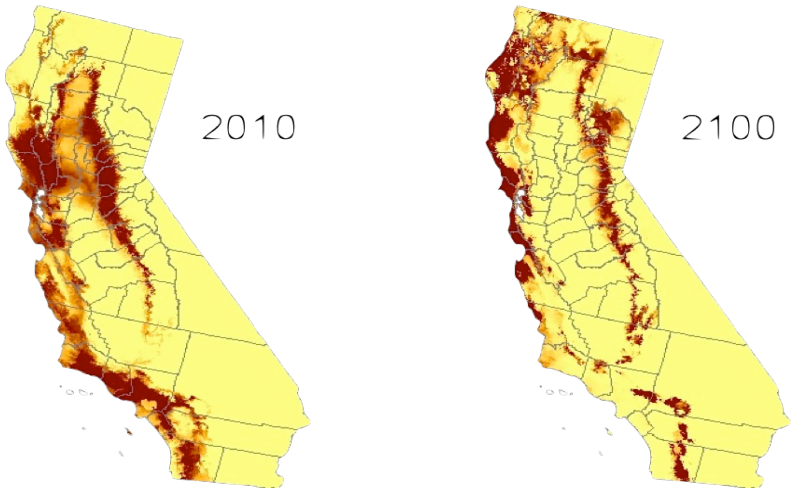
For this project, several modeling processes were chosen to illustrate the risks of climate change to the SYBCI. Specific plants important to the Chumash for cultural or ceremonial reasons that still exist on the reservation in Santa Ynez today were chosen for modeling. These plant species include toyon (*Heteromeles arbutifolia*), coast live oak (*Quercus agrifolia*), valley oak (*Quercus lobata*), and coffee berry (*Rhamnus californica*).(For more information on the cultural significance of these plant species see **Appendix K**). Currently, the SYBCI and the Environmental Office are allocating significant resources to raise cultural

awareness about the traditional use and language associated with these plant species.

The present and projected future habitat distribution of the chosen culturally important plants was mapped. The IPCC A2 climate change scenario, characterized by continued economic growth and slow declines in greenhouse gas emissions, was used within MaxEnt, a widely used and open source plant distribution mapping software. ArcGIS Mapping was used to estimate the distributions of these plant species by the mid- and late-century.

Plant distribution will be greatly impacted by climate changes as a result of the complex interactions between climate, plant growth, animal species distribution, human settlement, fire activity, temperature, and precipitation patterns. With these altered conditions some species, such as toyon, may no longer have viable habitat within the reservation.

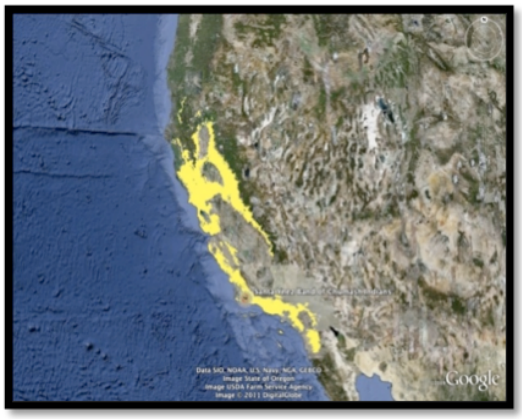
Figure 7. Modeled Toyon habitat in 2010 and 2100



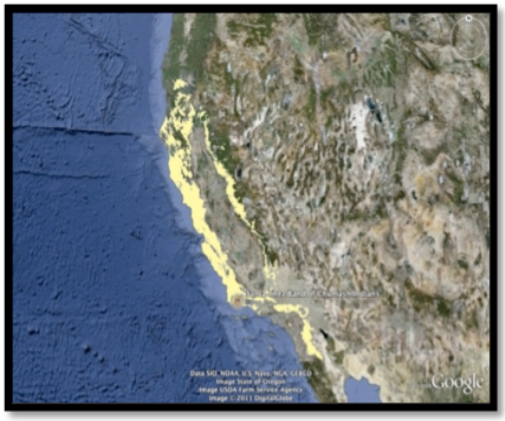
In addition to the ArcGIS maps seen here, an interactive map is on the project website. Google Earth was used in the project because it is free and user-friendly and can be used by any tribe or community member who is interested in modeling their cultural risks to climate change. Below are screenshots of toyon distribution maps that can be seen on the project website **www.itaqkuti.org**.

Figure 8. Toyon range for current, mid- and end-of-century, as seen on the project website.

Current Toyon Range



Mid-Century Toyon Range



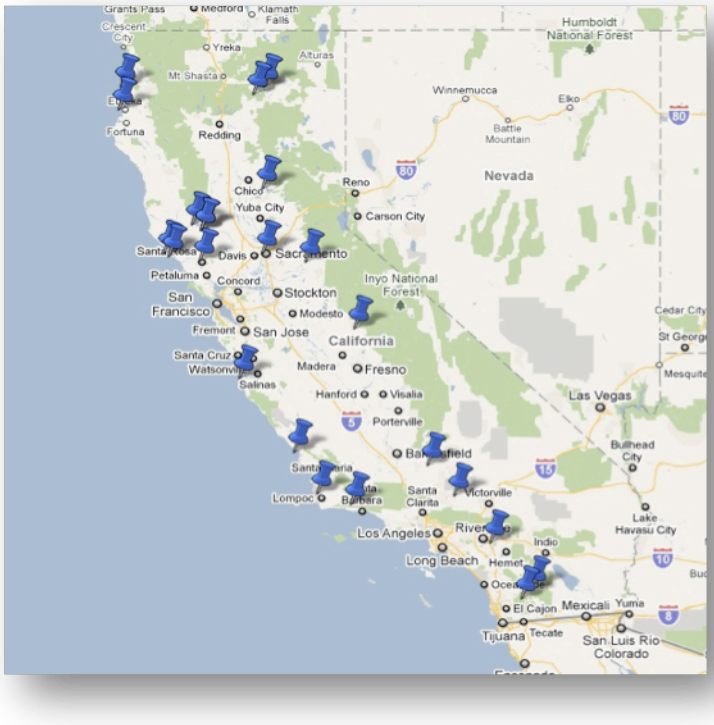
End of Century Toyon Range

Sea Level Rise

One of the major concerns of global climate change is sea level rise as a result of melting glaciers and thermal expansion of water. Sea level rise will cause a wide range of impacts, including dangerous and expensive flooding and storm-surges, as well as a permanent loss of coastline habitat and property. Much of California's coast is comprised of bluffs and cliffs, which makes for less dramatic impacts than low-lying areas such as Florida's wetlands. Nonetheless, even in

bluff areas erosion and landslides present a challenge that will impact the quality and stability of California's coastline.

Figure 9. California State Parks: American Indian Cultural & Historical Sites



Sea level rise was modeled to see how changes in sea level would affect culturally important sites across California. Many American Indian tribes have kept their culturally important sites confidential in order to protect them from misuse. Respecting this preference, the sites chosen for this model are all publicly documented and state-managed. Figure 10 illustrates how various sea level changes will affect some of these culturally important sites. A potential three-meter sea level rise by the end of the century could threaten much of Morro Bay, an important site for Chumash ceremonies and natural resources. This increase would also inundate much of the Elfin Forest, Morro Bay State Park, and some access points to Morro Rock, where solstice ceremonies are held every year.

Figure 10. How sea level rise of different magnitudes would affect the areas where important cultural sites exist.

Morro Bay and Surrounding Area at Current Sea Level

Morro Bay After a 3-Meter Sea Level Rise

Morro Bay After a 10-Meter Sea Level Rise

A ten-meter sea level rise would destroy most of the natural and cultural sites along Morro Bay's Coast. While a ten-meter sea level rise is not likely to occur within the next century, the SYBCI are considering a multi-generational time frame that incorporates passing on traditions for hundreds or even thousands more years. There are always challenges with accurately modeling change into such a distant point in the future, but it is nonetheless important to look at the long-term possibilities. As previously mentioned, these maps are not meant to be factual or predictive, but are rather educational tools to spread awareness of local and cultural vulnerabilities to climate change.

For More Information:

- Example of communicating climate change from COMPASS (Communication Partnership for Science and the Sea), developed for California legislators;
- Educational materials on sea level rise from the Gulf of the Farallones National Marine Sanctuary;
- Educational materials on ocean acidification from the Channel Islands Marine Sanctuary.

These maps have been and will continue to be utilized as educational tools through community outreach efforts. Providing current climate predictions gives people a more tangible idea of how climate change may affect their communities. These adaptation concerns are a critical aspect of creating a community commitment to implementing a climate action plan. Once this information is made widely available, tribal members can use it at their discretion to engage the community in climate action.

4.0 COMMUNITY OUTREACH & ENGAGEMENT

The structure of environmental management in a tribal community is different from most municipalities, as it is not just environmental management, but also cultural management. Understanding this connection is crucial to the success of any tribal community climate action plan. Tribal environmental offices and representatives must consequently have an in-depth understanding of their tribe's history and relationship to the environment.

4.1 Community Engagement

To know, assess and incorporate community values requires dialogue and interaction with the community at every level. This type of genuine relationship is critical to discussing the challenging questions of tribal identity and boundaries, the role of science in the community, and the tribe's priorities for managing cultural and economic resources in the future. The members of this project immediately recognized the need for building a respectful and trusting relationship in order to facilitate this type of collaboration. This connection will be a critical component to any academic and professional relationships with the SYBCI in the future. Unfortunately, nine months really is not enough time to build the true level of trust necessary to form significant relationships within the community. Nonetheless, we were able to begin this process through participation in an Inter-Tribal Pow-Wow, the first annual Environmental Fair, the fall Harvest Dinner, Winter Solstice, and brief presentations to the Elders Council.

Lessons Learned:

Before the group could approach the community, it was important for all members of the group to participate in a cultural sensitivity training. During this sensitivity training, the group discussed differences in worldviews and history from an American Indian perspective. The group was given advice on how to properly address and interact with various members of American Indian communities, which was helpful when conducting further outreach activities with the Chumash community.

Project-timeline and Community Outreach and Engagement

The first opportunity for the group to engage tribal community members in a dialogue about climate change and what it means to them was the First Annual

Environmental Fair on the SYBCI's reservation. Reservation events represent an opportunity for dialogue and information sharing and are a central component of community structure for the SYBCI. The Environmental Fair provided a venue for the group members to interact with tribal members and introduce the project. We provided a handout succinctly explaining what climate change means and why it is of particular importance for American Indian communities (this handout is available in **Appendix L**).

An interactive game was used at the fair to both gauge the level of environmental knowledge in the community and to educate community members. Interestingly, we found that in most of the participating families it was the children who knew the answers to questions on climate change impacts. The parents and grandparents of these children recognize the importance of this issue, and many Chumash adults have expressed a desire to learn more about climate change.

The Environmental Fair led to an opportunity to meet with the Elders Council, where the group introduced the project's objectives and structure. While the Elders expressed limited knowledge about the science of climate change, they provided insight regarding potential impacts specific to SYBCI history and heritage. A continued dialogue with the Elders Council will be essential to building a culturally relevant plan.

When working with a community where relationships and respect are slowly built over time it is imperative to take advantage of every opportunity to interact. In addition to participating in numerous community events the group wrote an article titled "UCSB Students Helping Chumash Address Climate Change," which was published in the March/April 2011 issue of the *Samala*, the SYBCI magazine (this article is available in **Appendix M**).

Educational Presentation on Climate Change

After the Elders Council expressed an interest in learning more about climate change we gave a short presentation explaining what climate change means and introducing some of the predicted climate change impacts in the Southwest and California specifically. This presentation covered reduced snowpack and earlier snowmelt and runoff leading to likely reductions in water availability during the summer and fall, coastal risks to sea level rise, increasing fire threats, and plant stress and changes in vegetation. In addition, we discussed the case for taking action (e.g. energy and water independence and security), and potential for partnerships and collaboration (this adaptable educational presentation is available in **Appendix N**). This event was an excellent opportunity to discuss our project's findings with the Tribe's decision-makers, and was well-received. This

receptivity on the part of the Elders Council indicates that presentations and workshops can be a useful means of sharing information with tribal leadership.

Organizational Outreach

In addition to first-hand interaction with the tribal community, American Indian organizations and state universities working with tribes on climate action were contacted to learn about their experiences, solicit their advice and insights, and open the door for further collaboration. One of the project goals was to set a foundation for future collaboration amongst the SYBCI and these organizations. The utilization of networks will help the SYBCI to become leaders in climate change action and to help others do the same, multiplying the positive impact of American Indian communities in the global fight against climate change.

- *University of Colorado Law School*
- *Institute for Tribal Environmental Professionals*
- National Congress for American Indians

Based on conversations with these organizations, we developed brief outlines on their work and the potential for collaboration with each of these groups. One of these case studies can be found at the end of this section, and the rest can be found in **Appendix O**:

Lessons Learned:

A summer internship by one of the group members was one way in which the group became more acquainted with the people and organization of the SYBCI. Establishing an early relationship with various members of the government and community turned out to be highly beneficial and allowed for easier communication and information gathering later on in the project.

Community Outreach and Engagement in the Future

As a part of creating and implementing a climate action plan, the Environmental Office will need to continue to educate and engage the tribal community. (An overview of literature exploring the most effective means of communicating climate change can be seen in **Appendix P**).

4.2 Public Relations

The SYBCI has already invested in a wide variety of environmental management efforts. By engaging in mitigation efforts now, the Tribe is earning political and social capital that could be useful in gaining funding and other forms of support in the future. However, there has not been much publication of these improvements to external audiences. The group met with the Tribe's public relations department to discuss publicizing the environmental improvements undertaken at the casino and on the reservation. During this meeting, we offered to work with the head of the Public Relations Department and the staff member in charge of operational improvements in the casino and resort to create a few sample press releases, as well as templates of materials for guest education in the hotel and on the website. The aim of these templates is to give examples of ways the Tribe can further capitalize on their environmental investments through positive and free publicity. (An example guest pamphlet and two mock press releases can be seen in **Appendix Q**). More sophisticated public relations on greening of the Chumash Resort Casino may help to foster cooperation between the SYBCI and neighboring communities by highlighting the SYBCI's commitment to the environment.

4.3 Future Opportunities

By making climate change information and materials more accessible to the Tribe, both through the use of the website (discussed in 4.4) and through outreach efforts, this project aims to increase the Tribe's awareness of climate change. It is our aim to provide a range of materials to help the Tribe to make well-informed decisions on climate change. If the Tribe chooses to fully develop and implement a climate action plan this will provide many new opportunities for collaboration among tribes and supporting organizations.

Both nationally and internationally, there is a need to increase sustainability as global population grows and pressure on the environment increases. American Indian communities such as the SYBCI could be leaders in sustainable practices, and successful environmental programs and policies could facilitate new funding opportunities. Just as the traditional Chumash adapted to their environment, the SYBCI is in a position today to be a progressive community that adapts to its physical, political, and socioeconomic circumstances with the future in mind. However, this community cannot make a measurable impact on climate change alone. There is a need to connect the efforts made by the SYBCI with other efforts towards climate action on tribal lands. There are an assortment of supporting organizations, which can provide the information and connections necessary for successful partnerships in climate action.

4.4 Opportunities for Partnerships and Capacity Building

Since the SYBCI cannot change the course of climate change alone, it is important that tribes collaborate and form partnerships. These partnerships could serve a variety of forms and functions. In fact, the possibilities are endless. According to Jose Aguto, the policy advisor on environment and climate at the National Congress of American Indians (NCAI), one of the key issues in tribal communities today is capacity building (Personal communication 3/15/11). Mr. Aguto spoke of moving away from a history of ineffective assistance to tribal communities to a more engaging form of economic and environmental empowerment. In order to encourage capacity building in this project, our group sought to explore past and current efforts to build climate change capacity on tribal lands. The following case study highlights the potential for partnerships between academic institutions and tribes (two additional case studies can be found in **Appendix O**).

Partnerships in action: University of Colorado Law School

Sarah Krakoff, Associate Dean of Research and Law Professor (Personal communication, 01/20/2011)

Julie Teel, Senior Research Fellow, Center for Energy and Environmental Security (Personal communication, 02/25/2011)

Sarah Krakoff has written extensively on both American Indian and natural resources law and ethics issues, including a 2008 paper in the Denver University Law Review on "American Indians, Climate Change, and Ethics for a Warming World". In 2007, the University of Colorado Natural Resources Law Center (NRLC) published a report, in partnership with the Western Water Assessment, on "Native Communities and Climate Change: Protecting Tribal Resources as Part of National Climate Policy".

Since the release of this report and paper, the NRLC has continued to work with a number of Western tribes on communicating the risks of climate change, assessing community specific vulnerabilities, and assisting with climate change mitigation and adaptation strategies. This past year the law school organized a workshop between northwestern tribes already actively engaged in climate action (specificity the Swinomish, Tulalip, and Quinalt) and southwestern tribes (specifically Navajo, Walapi, Zuni, and Hopi) interested in learning more about what they can do to address climate change at home. This sharing of information is essential to developing a stronger American Indian voice in political decision-making.

The Law school developed on interim website on Native Communities and Climate Change, which can be accessed here: http://www.tribesandclimatechange.org/. Representatives from different tribal resource departments attended the meeting in November 2010. The intention of the workshop was to help southwestern tribes get ideas for climate change mitigation and adaptation, sources of funding, and so on. One of the identified needs was for the provision of the best and most up to date science at both the national and regional level. So much climate science focuses on global-scale changes, but these tribes need to know what this will mean in their region. The organizers also realized that it wasn't as simple as bringing these tribes to the table to get them actively engaged in a dialogue about climate change. Within some of the tribal communities it became clear that there were cultural barriers to even talking about climate change. Some representatives were receptive and expressed community support, while others were individually receptive but said their communities were resistant. There were also widely divergent levels of understanding about what climate change means and how it will impact tribal communities. One of the biggest takeaways for Professor Krakoff was that academics and scientists interested in providing support do not need to, and should not force the vocabulary. Instead the focus should be on identifying and working with the tribes' needs and priorities.

In the wake of the workshop the NRLC group decided to focus their efforts on building an engaging, well-organized, and comprehensive database and online website of climate change resources of specific relevance to American Indian tribes. They have approached this project in close consultation with the Northern Arizona University Institute of Tribal Environmental Professionals, who have developed the most comprehensive database to date on Tribes & Climate Change. While this is a significant resource this site has been described as "narrative" and not particularly user friendly (see http://www4.nau.edu/tribalclimatechange/). Julie Teel, a Senior Research Fellow at the UC Law School, has been directing the building of the new website along with three graduate students. Ms. Teel, Sarah Krakoff and others have also been working directly with two tribes – the Navajo and Southern Ute – on community resource analysis, and are in the process of developing energy efficiency and adaptation plans for each of these tribes. Ms. Teel made a few observations on the process of working with these tribes. The Southern Ute are wealthy from oil and gas resources, and in the course of their work NRLC staff ran up against a challenging perception: "Why should we car [about climate change]? We are doing so well." On the other hand the Navajo are still socio-economically disenfranchised and a more common response in this community was: "Why should we care? We are barely surviving." The question is one of community priorities and resources. While the reports being developed by the Law School were originally meant to be implementing documents, they have had

to be downgraded to reports for consideration by the tribes. In the course of working with these two tribes NRLC recognized the huge need for outreach and education, but unfortunately funding is not currently in pace. Ms. Teel pointed to Daniel Cordalis, a Navajo and PhD student, who believes outreach and engagement is absolutely essential and has developed climate change fact sheets and worked to engage with tribal leadership.

Sarah Krakoff and NRLC are interested in collaborating with other tribes and groups interested in supporting tribal climate action. Professor Krakoff asked, "Where do we go from here? How do we export all of this work to the people who need it, and find the resources and time to follow-up with the tribes already working on climate change?"

4.5 Website

In recent years, the online interface has become one of the most effective methods of communicating information. Recognizing this development, the group also developed a website to facilitate outreach and engagement efforts with the Chumash, as well as with other tribal communities. This website compiles the information collected for the project with regards to climate change mitigation and adaptation efforts, and presents it in an easy-to-read, accessible manner. Ultimately, the goal of this deliverable was to provide the SYBCI Environmental Office with a template for how to improve their online presence in the community and strengthen their effectiveness in communicating the impacts of climate change. (Example screenshots of the website can be found in **Appendix R**)

CONCLUDING REMARKS

Local communities and regional governments must evaluate their exposure to future climactic changes despite the difficulty that scientific uncertainty, economic limitations and long time-horizons create. Many businesses and communities are already making meaningful progress toward these ends, building networks of shared values and strategies. Their relationship with regional geography is complex and well developed, often stretching back for millennia. Additionally, recent colonization has limited the flexibility of their traditional adaptive mechanisms. Within the last century, their once open landscape has been privatized, and the reservation system has delineated narrow geographic bounds for cultures to continue.

As people so intricately tied to place, tribes face a two-fold vulnerability from climate change. Tribal lands are likely to suffer a great deal from climactic shifts, both economically and culturally. An altered environment will impact cultural observances, rituals and ecosystems. Tribes are motivated to manage the issues of climate change by the same long time-horizons that create gridlock in other political realms. Most nation-states are currently focused on economic development and evaluate policies on abbreviated time frames. Electoral and corporate cycles serve as the modern calendar. Tribes, meanwhile, continue to measure time in terms of generations. New policies and practices stem from a connection to the past and a concern for the future. Decisions must be profitable and pertinent to the current situation, but must also represent the best interest of generations to come. A carbon based economy makes this navigation difficult. Current patterns of capital growth are dependent on placing the world's future at risk.

The Santa Ynez Band of Chumash Indians has recognized this dilemma, and is taking important steps toward developing a comprehensive strategy for climate change mitigation and adaptation. This begins by evaluating community specific vulnerabilities to climate change, as well as taking responsibility for their contribution to the problem. While efforts on such a small scale will not have significant impact on the magnitude of climate change, community action can serve as force to change its direction. Providing a model for sustainable economic growth can provide leadership and momentum. If enough communities resolve to implement similar mitigation goals, the most severe climate change scenarios could be averted. This project has provided tools for the SYBCI to optimize their own operational efforts and to continue a long tradition of stewardship by exploring opportunities for collaboration with other tribes and organizations.

In order for the Santa Ynez Band of Chumash Indians, and in particular for the Santa Ynez Chumash Environmental Office, to build an effective climate action plan, it must take initiative to improve coordination and communication within the tribe. Many aspects of tribal operations function independently of each other, even when interests are aligned. Creating an effective and comprehensive climate action plan will require an improved interface between economic development and environmental values. As an academic project, external to tribal operations, we have provided a potential framework for collaboration amongst all tribal operations and governing bodies.

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Appendix A: History and Background

Background section: history, geography, place, and culture

Archaeologists have found human remains indicating the existence of early Chumash peoples on Santa Rosa Island from over 10,000 years ago (Gamble 2008). At the time of European contact, there was incredible cultural diversity in the Santa Barbara Channel area. Chumash culture was not homogenous but rather varied from place to place. The nature of a place determined each village's natural resource use and lifestyles, which were great determinants of one's tribe. There were connections made between tribes, but these were mostly for building trade networks. Europeans applied the word "Chumash" to several linguistically distinct groups who shared certain common cultural traits.

Similarly today, there are several different Chumash tribes. The Santa Ynez Band of Chumash Indians is the only federally recognized tribe. For the purposes of this paper, we will refer to the Santa Ynez Band of Chumash Indians (SYBCI) in name when the knowledge or action is specifically coming from this tribe. When referring to more general historical knowledge that does not necessarily distinguish between Chumash tribes, we will use the term "the Chumash" or "Chumash peoples" to describe common historical patterns of resource use. However, we fully acknowledge and respect the differences between the many culturally and linguistically distinct Chumash tribes.

Geography of the region

Chumash peoples originally inhabited an extensive area located in a transition zone between Northern and Southern California (Johnson 2000). The interior boundary of traditional Chumash country is clearly carved out by three mountains ranges. Historically, Chumash country began where the Tehachapi Mountains meet the San Emigdio Mountains of the Coast Ranges. These mountain ranges converge at a point, which is transected by the Western Transverse Ranges. The unique east-west orientation of the plate boundary here is the reason behind the existence of the Santa Monica Mountains, Santa Ynez Mountains, and the Northern Channel Islands. The northernmost boundary of traditional Chumash country was just north of where San Luis Obispo lies today (Gamble 2008). The southernmost boundary was about halfway between Santa Barbara and Ventura.

This region is not only unique geologically, but it is an area rich in ecological diversity (Johnson 2000). The interaction between the cool current from Northern California and offshore winds creates an upwelling effect. The

nutrients that are brought up by this effect support a large plankton bloom in the Santa Barbara Channel, which in turn supports a diverse range of species. Regional differences in marine species composition led to regional cultural differences among Chumash peoples based on different resource bases. Due to their geographical position, the Chumash had a diverse resource base available to them during periods of relative climate stability. Once trade networks were established among Chumash villages, the environment could generally support Chumash peoples with cooperation among neighboring tribes. This is particularly true since most Chumash people inhabited areas with access to terrestrial and marine ecosystems. The Chumash were one of the only hunter-gatherer groups to form permanent villages along the coast, typically around major estuaries. The largest settlement on record was at the Goleta Slough, which is thought to have supported around one thousand Chumash people.

Historical background – from European contact

Juan Cabrillo first encountered Chumash tribes in 1542. Cabrillo's expedition spent several months in the Santa Barbara Channel. The Spanish sent two more expeditions through the Channel soon after, but most of the information that was gathered during this period was superficial in nature. The accounts of Chumash people from this time concern mostly material aspects of the culture such as clothing, housing, and tools. The later expeditions by Portola (1769-70) and Anza (1775) gave more detailed accounts of Chumash culture at European contact, but the observations were often ethnocentric and rarely considered deeper cultural meaning.

From the time the first Franciscan mission was started in 1772 until the missions were secularized in 1834, the Spanish missionaries had an opportunity to study Chumash culture that no one would ever have after the forced acculturation of Chumash people that occurred during this period. There were few efforts to understand Chumash culture during this time, and almost all the accounts were from an outsider's perspective as they passed through the area. The only primary source of knowledge comes from a mandatory questionnaire sent to the missions by the Mexican government, in which the missionaries reported basic information acquired from Chumash people.

The initial period of ethnographic interest began with a series of newspaper articles by Alexandar Taylor. This collection ended a period of historical obscurity between 1834 and 1860, during which there was little known about the survivors of the Mission system. The 1870s were a time of increased anthropological research, including the Wheeler Survey, which collected information on Chumash cultures. Once again, most of the information gathered on Chumash cultures was either archaeological or linguistic. There

were few scholars who tried to understand the remaining indigenous knowledge held by the surviving Chumash elders of this period.

John Peabody Harrington (1884-1961) began his ethnographic research of the Chumash people in 1912 (Blackburn 1975). He spent many years gathering information on Chumash culture from the remaining elders who were still fluent in the language. Many anthropologists drew from his work, although his notes were not made available until after his death. Harrington was probably the only anthropologist to spend the time to get to know Chumash culture, but he did not have a strong interest in publishing information on the tribe. His informants included Fernando Librado, Maria Solares, Luisa Ygnacio, Lucrecia Garcia, Juan de Jesus Justo, and Simplicio Pico. Harrington went to great efforts to hide the identity of these individuals, but without the knowledge he acquired from these individuals, the Santa Ynez Band of Chumash Indians would have little information on their ancestors. The closest ancestors of the Santa Ynez Band of Chumash Indians are thought to be Maria Solares and Fernando Librado (personal communication from Winter Solstice presentation- can include or not).

There were several places that were important for the Chumash, both for sustenance and spirituality. For example, Point Conception marks an ecological boundary for marine species as well as an important point for the Chumash soul. Chumash stories tell of… The art of storytelling was crucial to the continuation of Chumash culture over time. Most of the traditional Chumash narrative has barely survived the test of time, and only then due to the work of Harrington and his few surviving Chumash informants (Blackburn 1975).

Traditional patterns of resource use and response to environmental change

Chumash culture developed in an environment that was rich in biodiversity (Johnson 2000). Paleontologists have found evidence showing that the Chumash experienced periods of significant climatic change. The changes in available resources during these times led to cultural change for the Chumash. Anthropologists differ in their opinions on the pathway for this cultural change, but it is clear that the cause for such change was in response to climate change. There was not a centralized power in the region, but rather the power lay with the individual chiefs in each village. Trade seemed to happen for the mutual benefit of all, not because of power relations. Regional alliances may have been formed, but these seem to be mostly surrounding trade.

The Chumash organized into simple chiefdoms, with one chief as the head of the village (Gamble 2008). Archaeologists speculate as to why the society developed this way, but one factor to consider in the development of Chumash sociopolitical complexity is the state of the environment. The time period

between A.D. 450 – 1300 was a time of high marine productivity and drought on the mainland. This shift toward a more marine based economy may have influenced the development of power relations among Chumash villages. For instance, the Chumash are known to have used shells as currency, which may have been a result of the islanders becoming wealthy in natural resources during this time. During this time, many technologies were developed to better harvest resources. This diversification in resource collection also could have been a factor in developing sociopolitical complexity by creating new jobs or roles in the community.

The most important technology the Chumash developed was the plank canoe, or tomol (Gamble 2008). The Chumash who owned tomols were wealthy and of high rank. The ownership of tomols for island Chumash tribes was particularly important because it acted as a buffering mechanism for changes in climate that led to warmer, and less productive, waters (Johnson 2000).There have been several abnormal climactic events in Chumash history. The major one, however, was the Medieval Climate Anomaly, which caused a cultural transition from the Middle to Late Periods. By responding the environmental change around them, early Chumash peoples' sense of the environment led to a progressive culture.

Contemporary history

At European contact, the indigenous population of California was estimated at 150,000 (Darian-Smith 2004). The survivors of the mission system were funneled into the reservation system. The General Allotment Act, or Dawes Act, of 1887 divided Indian reservations into parcels meant for single families in an attempt to assimilate them once again. This policy allowed for homesteaders moving out west to claim traditional Indian lands. In 1890, the American Indian population in the state was estimated at 17,000. The Indian Reorganization Act of 1936 reversed the Dawes Act and reinstated the reservation system. Reversing the Dawes Act brought tribal communities back together, but the federal government never addressed the $10 billion owed to American Indians for the commercial use of their lands. This money was somehow "lost", along with many tribal lands.

The period between the Depression and the 1990s marked a time of poverty on many Indian reservations, which continues today in many places. The Reorganization Act certainly gave some tribes a chance to maintain their culture in a communal setting; however, it did so in a way that was separated from the rest of the American population. Many social problems in Indian communities arise from the dissociating stereotypes imposed on people from a young age. American media has developed two distinct images of the American Indian. The first is the image of a civilized heathen, which was fully established by the time

the U.S. Congress passed the "civilization fund" of 1819 in order to convert Indians to Christianity (Darian-Smith 2004). This stereotype seemed to still be prevalent at the time of the Reorganization Act, but that image has faded with the years. Hollywood used to make movies about cowboys versus Indians, but since the 1980s the image has shifted to characterizing Indians as spiritual and in touch with nature. This may have something to do with the locations of many reservations being out in the countryside. Another factor may be the perception of traditional Indian lifestyles as more environmentally aware and ecologically sensitive. While people may associate themselves with indigenous rituals and beliefs, it is important that Indian communities were not the ones advancing these ideas in the American psyche. In fact, it would have been difficult for Indian communities to promote their cultural beliefs and values to society under the reservation system. For too long, American government and society has put Indian communities out of sight, out of mind.

Gaming on Reservations

California Proposition 5, or the Tribal-State Gaming Compacts Initiative, was critical to the economic development of many tribes including the SYCBI. It passed on November 3, 1998 with sixty-two percent of Californians voting yes on the Proposition (Ballotpedia 1998).Proposition 5 permitted Class III gambling (slot machines, twenty-one and other banked card games, craps) on tribal lands, which meant that tribes could make a profit on gaming on the reservation. Until 1998, the only legal forms of gambling for California tribes were traditional social games, as well as bingo and certain card games (Proposition 1A).The California state government must agree to a tribal-state compact to allow for such gaming, which includes a number of regulatory measures. The first of these compacts was signed in April of 1998 by the Governor and the Pala Band of Mission Indians. There were then ten more tribal-state contracts negotiated before the Proposition was approved. This was an important moment in history because many Indian people felt that people cared about tribes for the first time.

Although Proposition 5 changed state law, the California Constitution prohibits Nevada- and New Jersey-type casinos(Prop 1A). Therefore, opponents of Proposition 5 took the case to the State Supreme Court, which ruled it unconstitutional in August of 1999. The Governor then negotiated with the Legislature to approve tribal-state compacts for a total of 57 tribes if a new Proposition (Prop 1A) was approved to change the California Constitution to permit Indian tribes to operate slot machines, lottery, and banked card games. Proposition 1A, or the Gambling on Tribal Lands Amendment, passed with sixty-four percent of voters in favor and successfully modified Section 19 of Article IV of the California Constitution(California Prop 5).Proposition 1A also has provisions for sharing revenues from larger casinos with tribes who lack a state-tribal compact(Prop 1A). There is also a Special Distribution Fund, which all

tribes with compacts must give to, and this money is generally used for treating gambling addiction and other regulatory issues generated by the compacts.

Darian-Smith (2004) says it best by saying, “In a profound sense, many tribes are seeking to revive their customs and traditions, and revitalize their sense of unique cultural identities and affiliations. Gaming on reservations allows Native Americans, for the first time, to envisage a real possibility of taking charge of their own futures and well-being.” The success of the Chumash Casino and Resort Hotel has given the tribe the financial security to be more proactive with regards to environmental and social threats to their well-being. We hope to provide academic support and innovative ideas to the SYBCI in order to empower this community by fostering climate action and environmental awareness.

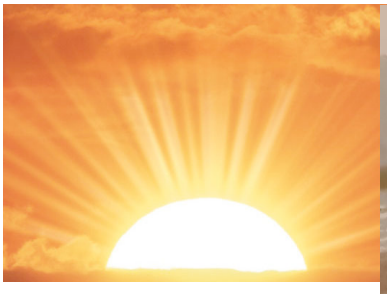
Appendix B: The Carbon Footprint

Carbon Footprints

A "Carbon Footprint" is an accounting process that measures and reports the amount of atmospheric carbon emissions that a person, a process, a company or a nation is responsible for. While a variety of methods and protocols exist for this procedure, the results aim toward the same end: revealing the sources that contribute to climate change and helping to minimize them. Carbon footprints serve as a baseline to which future energy use and emissions can be compared against. In the process of examining energy input systems and flows, inefficiencies are often exposed.

Carbon and the Environment

Carbon dioxide (CO_2) and other green house gases (GHGs) allow the sun's rays to pass through the atmosphere as light. These rays reach the Earth's surface, are absorbed, and then re-emanate as heat. Once these rays have been slowed, they become long-wave radiation (heat), and are trapped by the same green house gases that allowed them through as short-wave (light). This keeps the Earth warm enough for plants and animals to survive. Hence, some amounts of GHGs are necessary for life to exist.

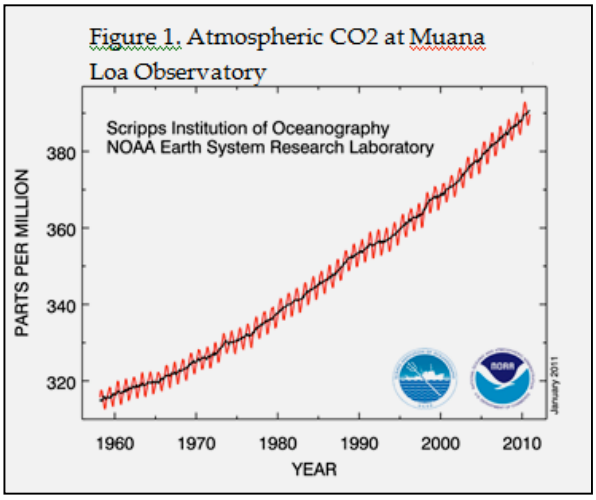


The sun's rays come in as light, and leave as heat.

The Earth's surface converts short-wave radiation from light to longer-wave heat.

While clouds keep some of the sun's energy out of the system, Green House Gases, like carbon, hold heat in.

An enormous amount of carbon has been stored for millions of years in a variety of subterranean forms, including our main sources of energy: coal for electricity and oil for gasoline. When we exhume and burn these fuels, carbon is released from its stable, physical form and becomes an atmospheric gas. Carbon can then remain in the atmosphere for thousands of years, trapping heat into Earth's system. Humans have caused the emission of so many GHGs that the Earth is beginning to trap too much heat, causing an increase in global temperatures. This increase in global temperatures has a wide range of concerning ramifications.



While carbon emissions are measured by weight, usually kgs or tons, carbon in the atmosphere is measured in parts per million, or ppm. Once emitted, carbon and other GHGs distribute around the globe via air currents. By measuring and tracking ppms of CO_2 in the atmosphere, scientists can monitor the global increase in CO_2. Figure 1 shows the atmospheric CO_2 measurements over the past 50 years from an observatory in Hawaii.

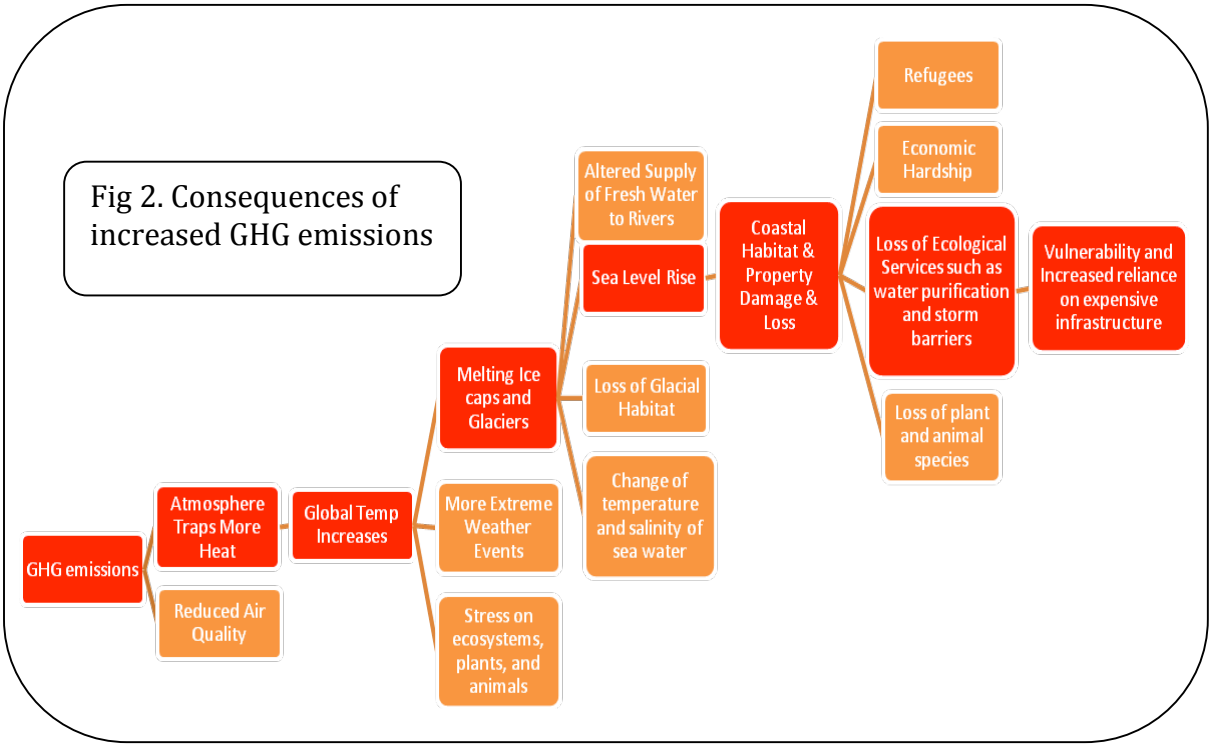


Fig 2. Consequences of increased GHG emissions

System Boundaries and Data Collection

Carbon Footprint Inventory and Protocol

Currently, there is not one standard protocol for local government or communities to assess their green house gas emissions. However, several protocols exist that are scalable for the purpose of this study. The California Air Resource Board provides many resources for conducting carbon footprint inventories of this nature. The Local Governments Operation Protocol (LGOP) provides the appropriate guidance for this study.

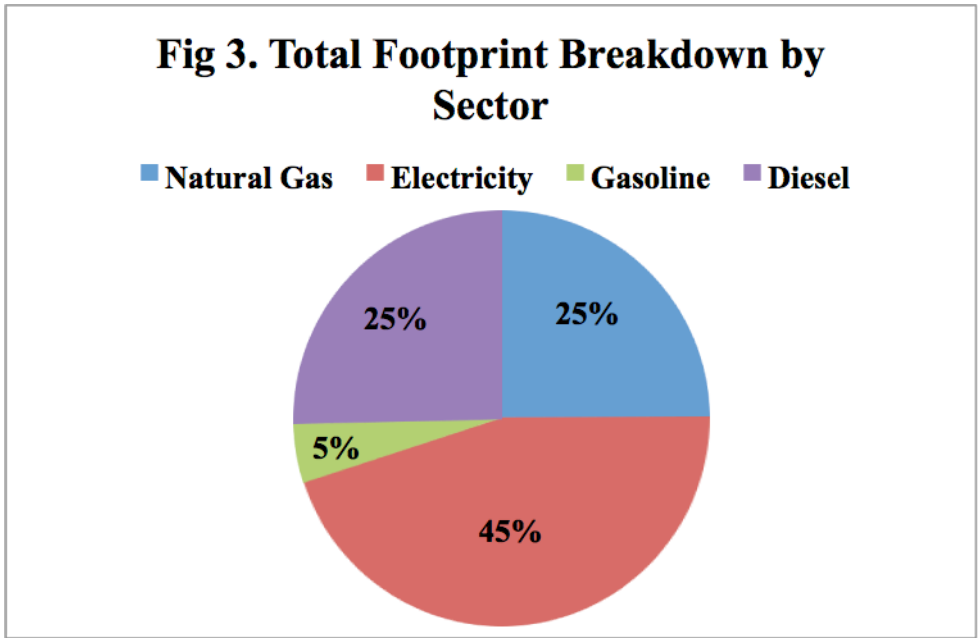
Carbon emissions are divided into three different "scopes." Scope I emissions are direct emissions, created on location and include tail-pipe emissions and burning natural gas to heat water. Scope II emissions are offsite emissions from electricity generation. Scope III emissions are allocated to the purchase of goods and services, including solid waste removal and disposal. This footprint includes complete Scope I and II emissions of on-reservation government and commercial operations. Scope III, residential, and off-reservation emissions are not within the boundary of this study. Where data for Scope III, residential, or off-reservation emissions were readily available, they have been included in the Appendix for future use. Recommendations on how to incorporate Scope III and residential information are included in the Recommendations section of this report.

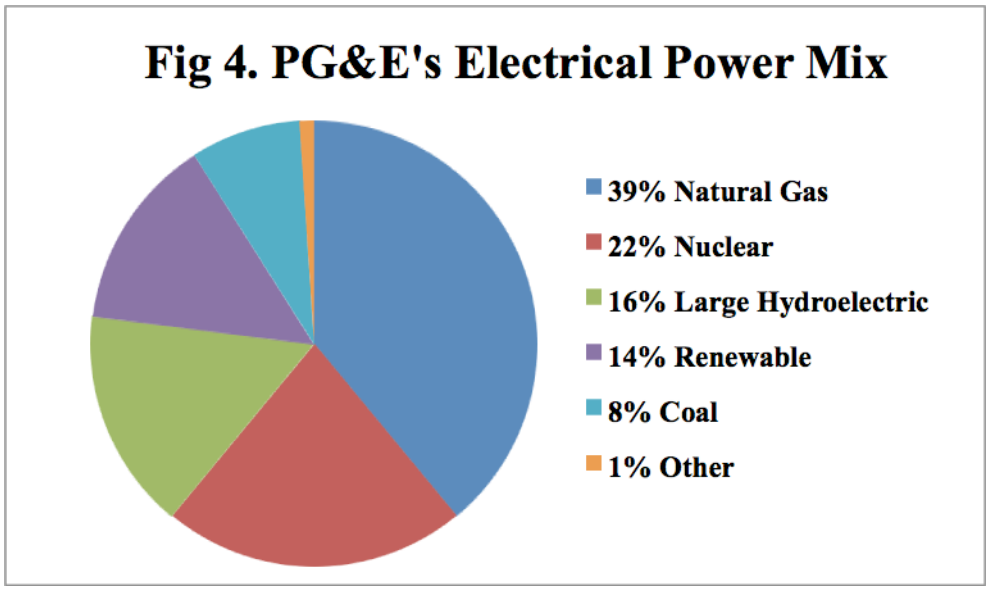
Choosing a year for establishing a baseline is important and is based on relevancy to the community and availability of data. For this study the year 2009 is used because complete information on emission sources within the boundaries of this study was available and 2009 provides the clearest and most recent picture of emissions for the Santa Ynez Band of Chumash Indians.

Data for this study was systematically gathered from reliable sources. When possible, data was gathered directly from the tribe's records. In instances where the data was not available directly from the Tribe, utilities were contacted and data was collected from the utilities' database. Where data for the community was not available averages and models from scientific literature were used. Data comes in a variety of units including gallons of fuel, kWh of electricity, and therms of natural gas. In order to be able to add and compare this data, all of the data was converted into kg CO_2 equivalents ($kgCO_2e$). Converting data introduces a degree of error and uncertainty, but is necessary to create a useful footprint. Gasoline and diesel conversion factors came from the EPA and kWh and therm conversion factors came from Pacific Gas & Electricity (PG&E) data for this region.

The 127 acre Santa Ynez Band of Chumash Indians reservation consists of approximately 140 households, a tribal hall, a health clinic, a wastewater

treatment plant, a fire station, streetlights, a casino, and a hotel. Included in the boundaries of this footprint are electricity, natural gas, diesel, and gasoline use data for the casino, hotel, health clinic, tribal hall, fire station, and streetlights.

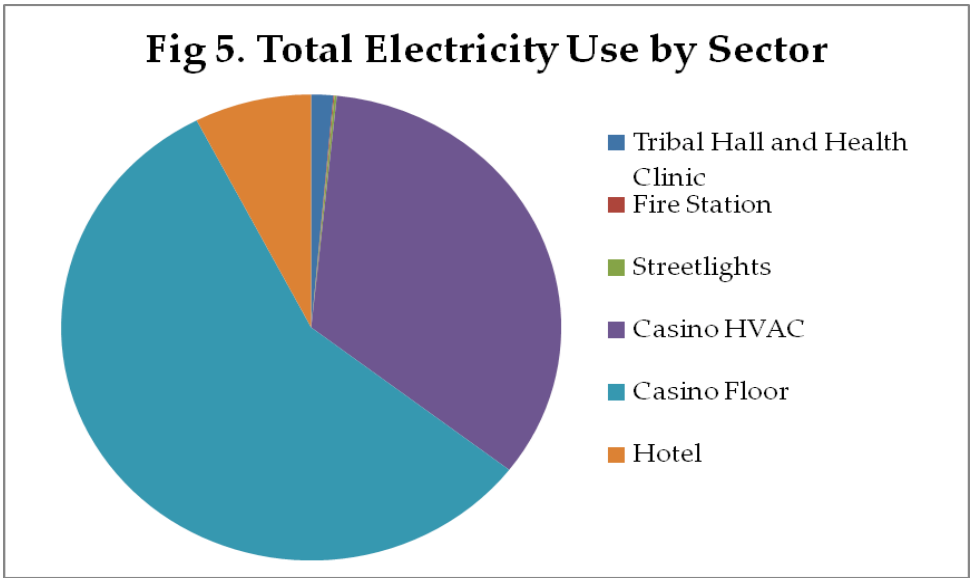




Electricity

Electricity data was collected directly from billing statements in the form of kWh. According to PG&E, there are 0.24kg CO2e per 1 kWh. (Carbon Footprint Calculator 2011) This conversion factor takes into consideration the emissions of the various sources of electricity as well as the energy it takes to create and transport the energy. Figure 4 illustrates the electrical power mixed provided by PG&E.

The 2009 electricity used by the government and commercial operations totaled nearly 3.6million kg CO2e. A breakdown of electricity use by sector is illustrated in Figure 5. The casino floor is the largest contributor, followed by the casino HVAC. As can be seen in Figure 5, the government sectors contribute minimally to the electric footprint.



The US Department of Energy (DOE) Energy Efficiency & Renewable Energy (EERE) program (EERE 2011) provides an abundance of useful strategies to increase energy efficiency and reduce energy use. Cost-benefit analysis, feasibility studies, and the priorities of the community can help determine the best methods to reduce energy. A few of the most common recommendations on how to increase energy efficiency include updating insulation, proper maintenance on HVAC units, replacing traditional light bulbs with LEDs, automated and moderately set thermostats, installing occupancy sensors, utilizing passive light and shading the building from over exposure to solar irradiance.

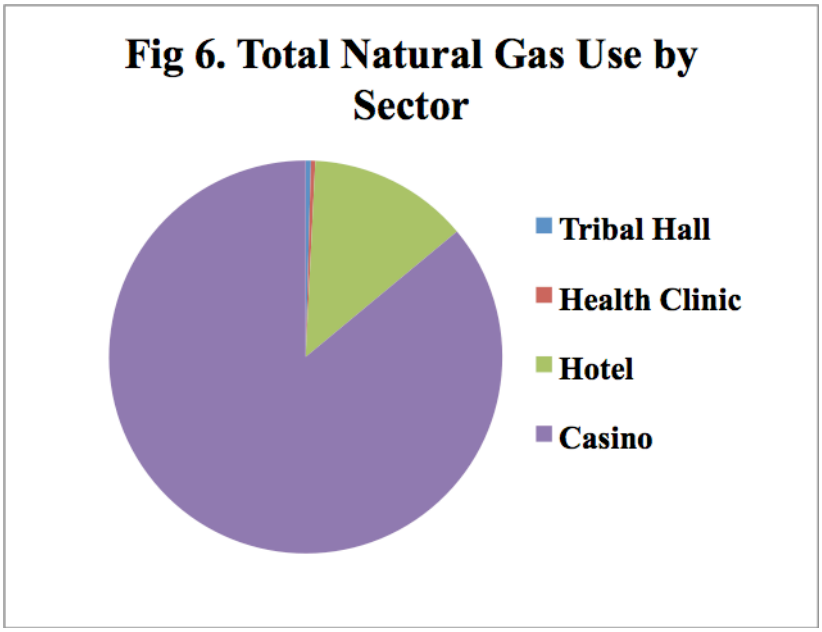
Gasoline and Diesel

The tribal hall and health clinic, hotel and casino, and fire station all use a fleet of vehicles. Fuel use for these vehicles was obtained through tribal records on gallons of fuel purchased, with the exception of the fire trucks in which gallons used were inferred from records of mileage. Data on fire truck fuel efficiency was gathered from the EPA. The gallons to $kgCo_2e$ conversion factors provided by the EPA were $8.8kgCO_2e$ per gallon for gasoline and 10.1 $kgCO_2e$ for diesel. The hotel and casino also maintain a diesel generator that provides electricity in case of emergency and is run occasionally for maintenance. Data on diesel consumed by the generator was gathered from bills paid to the diesel provider, which was converted to gallons using the price per gallon. The total fuel use for the reservation was 41,631 gallons of gasoline and 201,383 gallons of diesel, for a total of nearly a quarter of a million gallons of fuel.

The recommendations on how to reduce fuel use are fairly straightforward; reduce miles driven and/or use more efficient vehicles. The casino maintains a fleet of buses that are used to bring guests to the casino from various nearby cities and towns. Improving the fuel efficiency of these buses would greatly contribute to reducing the carbon footprint associated with fuel use. Currently, efforts are being made to convert several government work trucks to biodiesel. Using waste from the casino kitchens to accomplish this would have the dual benefit of reducing waste and reducing carbon emissions.

Natural Gas

Natural Gas data was collected from SoCal Gas Bills. The total amount of natural gas used on the reservation was approximately 325,535 therms, which using a conversion factor of 6.1 kg CO_2e per therm equals 1,985,764 kg CO_2e. (Carbon Footprint Calculator 2011). The use of natural gas, broken down by sector is illustrated in Figure 6.



Natural gas is used on the reservation primarily for hot water heating in the hotel rooms, commercial kitchens, and laundry room.

WWTP – BOD

Biological Oxygen Demand (BOD) is a measurement of the amount of dissolved oxygen required for aerobic organisms to breakdown the organic material in water. Hence the higher the amount of organic material in water, the higher the amount of BOD. The amount of organic material in the wastewater is correlated with the amount of greenhouse gas emissions, primarily CO_2 and CH_4, produced by the treatment of that water (Cakir 2005). The calculation of kg CO2e from BOD for this footprint was performed using equations provided by the EPA (Inventory of US 2008). BOD is measured at the waste water treatment plant (WWTP) weekly, and the annual sum of BOD was used in this calculation. Management of the treatment plant and the various processes used is also critical to determining emissions. The WWTP has no anaerobic processes as well as excellent and efficient management, and as a result the emissions are negligible.

Diesel Generator

The diesel generator on the reservation is used as a source of backup or supplemental electricity for the hotel, casino, and waste water treatment plant. The generator is used in case of power outages and is occasionally run for tests.

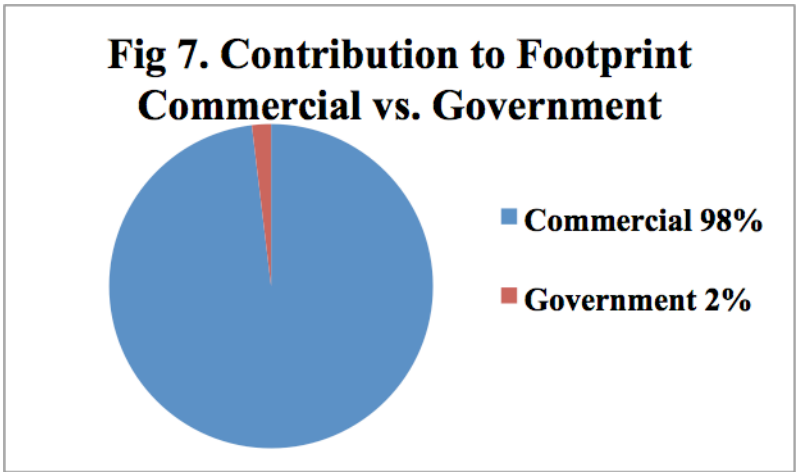
The generator can be used during peak load times to reduce the amount of electricity being bought from PG&E, and in fact PG&E will pay for this reduced demand under certain circumstances. This is called the demand response incentive (Demand Response 2011). The diesel used in the generator is the same as diesel used for transportation, so the EPA conversion factor of 10.1 kg CO_2e/gal diesel was used to determine emissions.

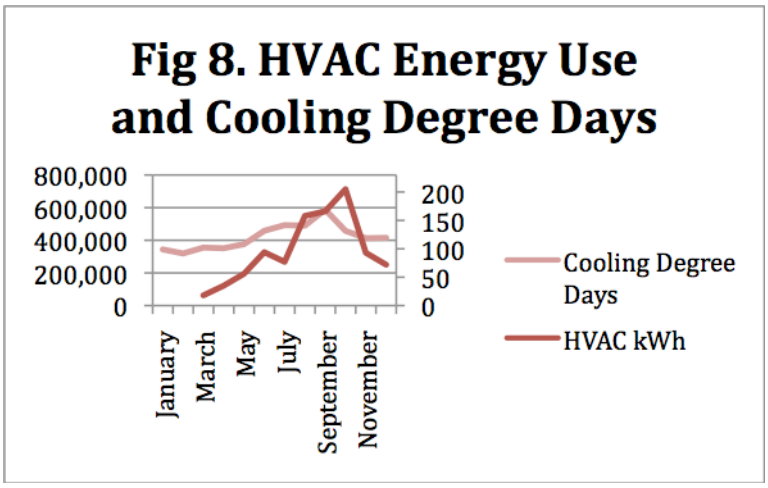
Data for the diesel generator was provided in dollars spent on purchasing diesel for the generator. The cost per gallon was also provided, allowing the gallons to be calculated. Diesel is purchased every few months, so it is possible that some of the diesel purchased in 2008 was used in 2009 and similarly some of the diesel purchased in 2009 was used in 2010. The total diesel used by the generator in 2009 was 1,481 gallons, resulting in emissions of 14,959 kgCO_2e.

A comparison of the emissions per kW produced by the generator versus the emissions per kW produced by PG&E could provide interesting data. Emissions information combined with cost-benefit analysis of producing electricity by generator during peak times could assist management in determining the ideal amount of electricity which should be produced onsite by the generator.

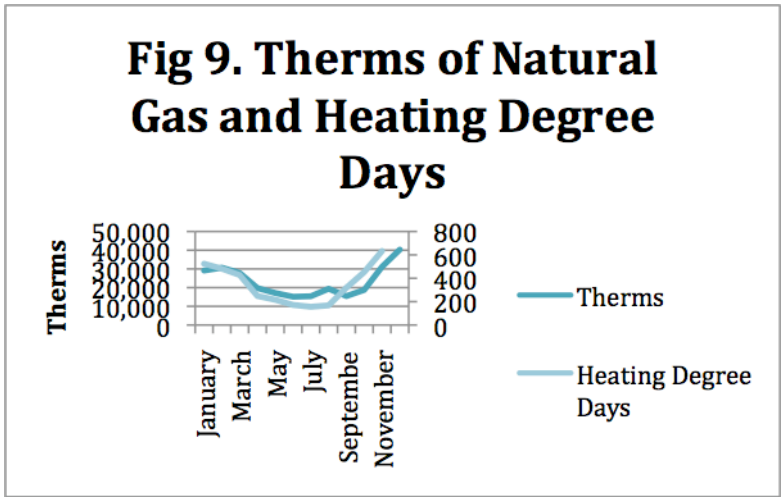
Analysis

It is clear that the overwhelming majority of emissions are produced by commercial endeavors on the reservation, specifically the hotel and the casino. This is logical due to the large energy demands of the commercial endeavors and the number of people they serve compared to the relatively small community that the government serves. Understanding this relationship is critical for making the most cost-efficient and effective decisions about how to reduce the footprint of the community. A small percentage of change in the casino or hotel could yield greater energy savings than a large change in the governmental sector.





It is clear that the Tribe's energy use is closely related to weather. The HVAC system has a high electricity demand load in the summer. Volatile organic compounds are evacuated by pulling in fresh air. However, in the summer, that air demands a great deal of temperature conditioning. This relationship between outside temperature and electricity demand is reflected by Figures 8 and 9. Cooling degree days are measured against kWh's. Cooling degree days were gathered from the nearby College Canyon weather station.



Similarly, when the weather gets cold the casino requires a great deal of energy to heat air. This second graph charts the casino's natural gas use against heating degree days, also gathered from the College Canyon weather station.

Altered weather patterns will certainly have an effect on the Tribe's energy use. Monitoring climactic shifts and energy use patterns will help the Santa Ynez Chumash to make informed decisions about their future energy needs.

Projections

When using the carbon footprint as a baseline, it is critical to think of how energy use will change in the future. This change will depend on how the population and the activities of the population will change over time. As seen in this footprint, the casino is the largest contributor to the footprint and it largely serves people from outside the reservation community. An increase or decrease

in the visitors to the casino and hotel will likely have a larger impact on the carbon footprint than changes in the tribal population.

The casino made changes in 2010 that will likely increase its energy efficiency, including switching all of its indoor lighting to LEDs and installing a new HVAC system. In 2011 there may be more changes such as new washer and dryers, lighting occupancy sensors, replacing street and landscape fixtures with LEDs, and smart thermostats in guest rooms. Within the government sector solar panels were installed on the Tribal Hall and Health Clinic and the street lights were converted to LEDs in 2010.

Beyond population and technological changes, there are also environmental changes to consider as a factor in the future energy use of the reservation. Potential climate change effects include warmer temperatures, increased risk of fire, and more extreme weather events such as floods and droughts. While it is not currently possible to accurately predict the effects of climate change on a small area such as the reservation, it is still a worthwhile exercise to consider how change will affect resource use. Warmer days will increase reliance on energy-intensive air conditioning, but may reduce the need for heating in the winter. Extreme weather may discourage people from traveling or it may encourage people to seek the comforts and entertainment of vacation. Other local industries that attract tourists to the valley, such as wineries and ranches, may also be affected by climate change and could see changes in visitor numbers.

Recommendations

While this footprint appropriately captures the largest and most direct carbon-emitting sources on the reservation, there are many ways in which the footprint could be expanded. Gathering residential data, particularly on transportation, may be challenging but it could provide valuable insight. It is highly likely that residential data will be minute compared to the energy intensive operations of the hotel or casino, but it is nonetheless valuable information for the community. The residents of the reservation have a strong voice in their community, and more information on their own energy use can empower them to make energy-conscious decisions. While outside the boundary of this footprint, some residential data was collected during the course of this project and is included in the appendix.

Scope III emissions are an important part of a complete footprint, though these emissions are often the most difficult to gather. Scope III emissions encompass the emissions of goods and services purchased. This includes a wide variety of items such as poker chips for the casino, food for the buffet, linens for the hotel, and clothing for residents. Data for Scope III emissions from the commercial and government sectors can be primarily gathered from accounting

records. For residential data surveys, audits, and personal accounting information can be used.

An important emission source associated with the casino and hotel are the vehicle emissions of visitors, also known as trip generation. A survey of visitors could determine a range or average of the distance traveled by visitors, the mpg of the vehicle used for travel, and the frequency of visits. A simple example calculation using assumptions can demonstrate the significance of trip generation. Approximately 8,000 people visit the casino each day, and for the purpose of this rough calculation it can be assumed they travel approximately 50 miles round trip, and their gasoline vehicle gets 25mpg. Using the EPA factor of 8.8 kg CO2e per gallon, this would result in 140,800 kg CO2e per day just from the vehicles of visitors. (Please note this calculation is an example and does not include any real data).

The Tribe has various entities that are located off of the reservation which were not included in this footprint. This includes Hotel Corque, restaurant Root 246, a gas station, and the Chumash Employee Resource Center. Additionally, there are members of the Tribe that live off of the reservation. To make a more broad and inclusive footprint in the future, the Tribe may wish to include these off-reservation entities.

In the process of creating the carbon footprint, which contains only Scope I and Scope II emissions from on-reservation government and commercial operations, data on other sources of emissions became available. While this information could not be arbitrarily added to this footprint, it is valuable information and is provided here.

Solid Waste / Landfill

The available data for landfill waste is 2,421 tons delivered to the Tajiguas landfill from unincorporated areas of Santa Ynez Valley. This waste includes residential and government waste from the Chumash reservation. An approximation of the waste attributable to the reservation could be calculated by dividing the reservation population by the total population the landfill serves, and then multiplying that number by the total landfill tonnage. This type of broad estimation may be useful, but more accurate waste data could be gathered by an audit. For California, the emissions associated with landfilled waste are 0.28 metric tonnes CO_2e per ton of waste (Personal Comm. Edwards 2011).

Water Use

The SYBCI have water supplied by the Santa Ynez River Water Conservation District (SYWCD). Tribal operations have already undertaken many water conservation efforts, including efforts to replace water intensive

landscapes with native or regionally adapted plants. The casino and hotel are investigating many supply side efficiency measures for water such as oxidizing laundry systems and low-flow showerheads.

Water is allocated from off of the reservation so its energy use is accounted for in Scope III emissions. This report includes the amount of water supplied by SYWCD and divides that number by the total kWh's of electricity used by SYWCD. The data for amount of water supplied was provided by SYWCD and the total kWh's were taken from their monthly bills in our baseline year. This provided an "energy intensity" of water of 842.7 kWh/acre foot. This method does not account for the carbon associated with the capital investments, vehicle transportation, natural gas nor the built environment that is necessary for SYWCD to supply water.

Footprint Useful Resources

The following sources may be interesting and useful for the readers of this report.

US EPA Climate Change-Greenhouse Gas Emissions
http://www.epa.gov/climatechange/emissions/

This EPA site provides federally based information on what GHGs are, how to inventory them, and emission trends and projections.

CA Air Resources Board http://www.arb.ca.gov/homepage.htm

CARB provides current information on Californian laws, programs, and resources relevant to climate change and footprint methodology.

ISO 14000
http://www.iso.org/iso/iso_catalogue/management_and_leadership_standards/environmental_management/iso_14000_essentials.htm

The official ISO site details the rationale behind the standards and offers resources for working with the standards.

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Appendix C: Sample SYBCI climate change resolution

Whereas, there is an overwhelming scientific consensus that greenhouse gases, including carbon dioxide, released into the atmosphere have a profound impact on the Earth's climate; and

Whereas, the National Academy of Sciences declared global warming a real problem with anthropogenic causes; and

Whereas, 162 countries including the United States pledged to reduce their greenhouse gases under the United Nations Framework Convention on Climate Change; and

Whereas, the effects of climate change including rising temperatures, changing precipitation patterns, melting sea ice and glaciers, ocean warming and rising sea level, an increase in extreme weather events with increased flooding in some places and droughts in other have the potential to significantly impact the natural environment which the Chumash is culturally and physically dependent on; and

Whereas, the effects of climate change have the potential to effect the economic and social welfare of the community; and

Whereas, it is the responsibility of the Chumash to provide for the well-being of their community in the present and for future generations, and;

Whereas, through knowledge, spirituality, science, practice, experience, and relationships with nature, SYBCI has a vital role in defending and healing the natural environment, and;

Whereas, the community leaders have considered the potential effects and impacts of climate change on the SYBCI and its people and resources, and has deemed these effects and impacts of concern,

Now Therefore be it Resolved, that this committee proclaims its support for programs and initiatives that effectively address the potential effects of climate change, and also hereby declares;

To undertake efforts to determine the local effects of climate change on the reservation land and culturally important sites, and;

To develop appropriate policies and strategies to reduce the SYBCI contribution to climate change by reducing carbon and other greenhouse gas emissions, to improve energy efficiency and reduce energy consumption, to consider sustainability in future developments, and;

To communicate and coordinate with other Indigenous Peoples, entities, and governments to most effectively address concerns about the projected impacts of climate change.

By the authority of these individuals as representatives and leaders of the SYBCI, this resolution is made this 1st day of July, 2011.

Appendix D: Developing a building code

Outlined below is a simple approach to how the SYBCI can develop, pass, and implement a building code that promotes greater efficiency and sustainability on the reservation. There are many ways for the Tribe to tailor a new building code to areas of particular concern, from water quality to aesthetics to energy efficiency.

Collect resources and identify the unique needs present in the community

One of the most crucial aspects of the success of any building code is how effectively it is tailored to local needs and interests. Common problems in tribal communities that can be addressed through building code implementation include water quality and quantity issues, overcrowding, and deteriorating homes. The Tribal Court Clearinghouse (available online) provides a helpful list of specific considerations the Tribe may want to take into account in developing a new building code. These include topics such as monitoring and enforcement compliance, administration, and public outreach and education.

Many building codes also utilize uniform standards from the International Code Council to ensure that, at a minimum, basic public health and community concerns are met. Common standards are advantageous because they are familiar to a wide range of professionals, from builders to suppliers to contractors. In order to meet more specialized and unique needs, the Tribe can insert language that allows exceptions under certain circumstances. Alternatively, the Tribe can also impose stricter requirements as appropriate.

In addition to compiling a list of community needs, the Tribe should gather all current codes and regulations likely to be affected by the implementation of a new building code. These include enactments related to housing, zoning, planning, and business and economic development.

Consider federal guidelines and requirements

Many federal regulations are applicable to building code development and implementation on tribal reservations. Prior to the adoption of any comprehensive building code, the Tribe should research this federal language and take it into account as is deemed necessary. These regulations may include guidelines involving environmental review, public health, and flood prevention requirements. Other language that the Tribe may wish to incorporate can be found in the Native American Housing Assistance and Self-Determination Act (1996) and the Fair Housing Accessibility Guidelines (1991).

Encourage new technology and innovation in environmental design

Through the adoption of more stringent goals and requirements for new and existing buildings, the SYBCI will remain at the forefront of climate action among tribal communities. The most direct way a building code can address climate change is by encouraging the adoption of more efficient and environmentally friendly building and construction methods. Many municipalities have adopted codes that encourage, and even require, innovative environmental design and building practices. As a result, a host of new technologies have arisen to meet this growing demand. Below is a summary of several practices and/or requirements that the SYBCI may wish to incorporate into a new building code.

- Consider mandating a green building ordinance, such as required adherence to Leadership in Energy Efficiency and Design (LEED) standards and/or participation in the EPA's Energy Star Homes program.
    - Many communities have committed themselves to adhere to these standards, including Boston and Washington, D.C. Several smaller communities have developed similar regulations more tailored to their unique circumstances. Regardless, many studies have demonstrated that this type of construction provides quick payback of construction costs in the form of energy savings.
- Require specific design elements in future buildings.
    - An example of a desirable design element would be a vegetation requirement that mandates a certain amount of pervious surfaces in and / or on buildings. This regulation could be achieved through the construction of green roofs, tree and native vegetation plantings, energy-smart, drought-resistant landscaping, and pervious sidewalks or driveways. These innovations would help address several challenges on the reservation, including water quality issues and energy demand.
- Promote renewable energy development on the reservation.
    - The Tribe should consider promoting small-scale installation of solar panels at appropriate locations on the reservation. According to Sussman (2008), rooftop panels can provide more than ten percent of grid electricity, depending on the scale and breadth of deployment. Other renewable energy technologies, such as solar hot water, wind and geothermal, should be investigated and implemented on the reservation as deemed appropriate. The use of these technologies would help reduce the carbon footprint of the Chumash reservation.
- Review existing guidelines and regulations and streamline them as necessary to ease restrictions on energy-sensitive development.
    - In many areas, siting and installing renewable energy projects is extremely difficult. This challenge is due in part to old regulations,

and their lack of amenability to new innovations and technologies. Through the sensitive adaptation of older guidelines, the Tribe can eliminate obstacles to and encourage more renewable energy use and development on the reservation.

A building code that encourages a reduction in the reservation's energy usage and carbon footprint holds little meaning without a strong enforcement component. The Tribe should be prepared to develop and implement a monitoring regime that will verify that the policies set forth in the building code are being followed. This effort will ensure that emissions reduction programs are successful and represent progress in addressing the problems associated with climate change on the reservation. Additionally, the Tribe should utilize the carbon footprint completed for this project, located in Appendix A, as a baseline of energy emissions. Goals for emissions reductions can then be formulated in order to guide future development and construction on the reservation.

Additional resources:

- Tribal Legal Code Project: http://www.tribal-institute.org/codes/part_six.htm
  This website, a project of the Tribal Law and Policy Institute, is a great resource for tribes looking to modernize their codes and regulations. The section on building codes provides detail on the typical content of building codes, case studies of tribes that have implemented effective codes, and additional resources.
- International Code Council (ICC): http://www.iccsafe.org/Pages/default.aspx
  The ICC publishes the International Codes, which have been adopted in all fifty states and the District of Columbia. The organization has a variety of publications and resources that the SYBCI may find useful while developing a building code.
- U.S. Green Building Council (USGBC): http://www.usgbc.org/
  The USGBC is a non-profit organization that develops and regulates LEED, a green-building certification system for existing and new construction. Their website has a lot of information on the LEED system that the Tribe may wish to review prior to permitting new construction or renovations of existing buildings on the reservation.
- U.S. EPA Energy Star Homes: http://www.energystar.gov/index.cfm?c=home.index
  The EPA runs a program similar to LEED called Energy Star Homes, which also sets strict guidelines for energy efficiency in residential areas.

- U.S. Department of Energy Tribal Energy Program: http://apps1.eere.energy.gov/tribalenergy/
  According to the website, this program "promotes tribal energy sufficiency, economic growth and employment on tribal lands through the development of renewable energy and energy efficiency technologies."
- U.S. Department of Interior Office of Indian Energy and Economic Development (IEED): http://teeic.anl.gov/aboutus/index.cfm
  The IEED works with tribal communities to promote economic and infrastructure development. Specific issues that the office works on include increasing jobs and businesses, growing capital investment, and developing energy and mineral resources.

Appendix E: ICLEI case studies

ICLEI has worked with many communities that have successfully implemented climate change mitigation and adaptation efforts. While the circumstances of each case may not be directly comparable with the situation of the Tribe, the underlying themes and lessons learned from these programs may be helpful to the Tribe in developing their own mitigation strategy.

Coimbatore, India: Reducing carbon emissions while improving Coimbatore's municipal public services

The city of Coimbatore undertook a citywide energy assessment in 2008 to identify the areas of operation with the highest energy consumption and carbon emissions. The outcome of this assessment revealed that the water supply and public lighting sectors consumed the most energy and had the highest rate of emissions. These sectors accounted for nearly 75 percent of municipal carbon emissions (Bhagavatula 2010).

Using the results of the assessment, the city formulated a range of pilot projects and overhauls that would improve efficiency and reduce energy use. Specific programs undertaken included the installation of wind-solar PV hybrid systems and improvements to the city's street-lighting system. Overall energy savings through these programs amounted to a 30 percent reduction in consumption from the pre-project scenario. Other benefits were realized as well, ranging from increased public awareness to an improvement in municipal services (Bhagavatula 2010).

This case study demonstrates the importance of a comprehensive energy assessment in developing efficiency programs and promoting public awareness. The SYBCI can utilize the footprint created for this group project to conceptualize and implement emissions reduction and efficiency projects.

Växjö, Sweden: Becoming fossil fuel free with citizen and stakeholder involvement

Växjö, Sweden is often recognized as a model city in terms of renewable energy and sustainable living programs. The city has designed and implemented numerous projects that have been successful in large part due to the emphasis on community and stakeholder participation. All told, the city has reduced per capita carbon dioxide emissions by 35 percent and achieved an overall carbon dioxide reduction of 26 percent since its baseline year of 1993 (Marzok July 2010).

A specific project that is demonstrative of the city's commitment to community engagement and participation is the installation of photovoltaic solar panels at the Teleborg School in 2008. The goals of this program were two-fold: (1) to provide a reliable source of energy to the school, and (2) to incorporate the installation into the learning curriculum to inform students about renewable energy. This project has been extremely successful, with students and many community members actively involved. Additionally, since their installation, the panels have led to an overall reduction of emissions equaling 60 tons of carbon dioxide (Marzok July 2010).

Appendix F: Chumash Resort Casino – The Case for Greening Hospitality and Pursuing Green Marketing

The Chumash Resort Casino has already implemented extensive and impressive energy efficiency, water conservation, and waste management initiatives, but it is not capitalizing on these efforts in terms of public relations. Consequently, the business is losing out on a significant source of free publicity. Media coverage comes with an associated cost benefit. Imagine a feature on the Chumash Resort Casino in Sunset magazine, or a web episode on Big Ideas for a Small Planet on The Green Sundance Channel. Some companies have quantified the green marketing benefit of these features and found a cost benefit of hundreds of thousands of dollars. Benziger Family Winery, located in Northern California, found that if they had paid for the marketing benefits of multiple free media spotlights it would have cost them in excess of a million dollars!

Many people who follow marketing trends see evidence that greening/sustainability is becoming a new norm – something enduring. Broad segments of American consumers are receptive to green business measures. In an article in *Cornell Hospitality Quarterly* in 2008 Jim Butler provided multiple examples of how green messaging is permeating public consciousness:

- It is hard to pick up a newspaper or magazine, or to watch television, without seeing coverage of some new "green" development or event. Every publication, from Vanity Fair to Kiplinger, now has a "green" issue;
- Consider Al Gore's Academy Award–winning "An Inconvenient Truth", Leonardo DiCaprio's film "The 11th Hour", and Sheryl Crow's "Stop Global Warming College Tour";
- Look at the passage of AB-32 California Global Warming Solutions Act in 2007 and similar actions being taken by at least 21 states and hundreds of municipalities;
- Consider that Toyota has reached a milestone of more than a million hybrid vehicles sold.

The Chumash Resort Casino is in a prime position to become a green casino and resort leader. All of the efforts that have already been undertaken in the casino and hotel, and the management commitment to continued resource efficiency investments, in many cases already exceed the green hospitality initiatives that many companies are publicizing and using as marketing tools. Take for example the fact that the Chumash Resort Casino is one of the first participating members in PG&E's CasinoGreen Program. Of the 27 casinos in California (http://www.casinogreen.org/mapofproperties.html) the Chumash Casino Resort is one of three pioneer participants. Less than two months after receiving the audit recommendations the facility has already saved more than 490,000

kWh of energy, which translates into more than 275,000 pounds of avoided CO2 emissions.

Evidence of Consumer Response

There are multiple sources of statistics providing evidence that hotel and restaurant guests are interested in sustainability, and that hotel guests specifically already expect hotels to be going green. In 2008, *Restaurants & Institutions* published the results of a survey by Information Resources Inc. that found that at least one of four key features: eco-friendly packaging, organic status, eco-friendly status or fair-treatment status is a consideration of 50% of consumers **(**Mills and Rudd 2009**).** Similarly, in 2007 *Green Lodging News* published the results of a survey conducted by an Atlanta-based market research company; 75% of these survey respondents said that it was important that the hotel they chose followed environmental practices (Graci and Dodds 2008). The J.D. Power and Associates 2007 North American Hotel Guest Satisfaction Study also found that nearly 75% of all hotel guests are willing to participate in their hotel's environmentally friendly programs. Kimpton Hotels & Restaurants published a report revealing that 16% of their guests stayed with them because of their eco-minded practices, such as the use of non-toxic cleaning supplies and in-room recycling bins (Butler 2008). Hsieh and Jeo (2010) assert that, "More and more customers have sustainable-development-related expectations when traveling. A 2008 survey by Deloitte's Tourism, Hospitality, and Leisure research group found that 38% of the business travelers they interviewed had taken steps to determine whether a hotel was 'green'. The hotel industry must grasp this trend if it wants to appeal to this market segment."

In 2010, the four-diamond W San Francisco became the first hotel belonging to a major brand to earn LEED certification for an existing building. The hotel earned LEED Silver certification, making it only the seventh hotel in the U.S. to receive LEED recognition. Michael Pace, W San Francisco's General Manager, says, "For our guests, the green experience at W San Francisco is a seamless part of their overall W experience…Green has become part of modern living and is expected by our guests, who can feel our team's true passion for green practices, which are infused in everything we do, everyday" (Hotel News Resource 2010). An additional reflection of the more and more mainstream environmental expectations is the fact that the American Hotel and Lodging Association has released green guidelines for the hospitality industry, including 11 Minimum Green Guidelines (AH&LA 2011). Here in California, where adequate water availability is already a considerable concern and energy prices are steadily rising, consumers are likely to be even more receptive to hotels that are saving water and energy. Customers may actually begin asking for evidence of environmental management practices.

The Business Case

Clearly, the Chumash Resort Casino already sees financial benefits to going green, but there may be additional considerations that have not yet been taken into account. One of the major considerations for many companies trying to improve corporate social responsibility is risk and liability. Many insurance companies have already begun requiring that businesses account for their carbon footprint and take potential climate change impacts into account (see http://www.climateandinsurance.org/?page_id=64). As early as 2002 the World Wildlife Fund (WWF) partnered with the International Business Leaders Forum to study this trend and found that, "Companies that integrate the environment into their business decisions, thus reducing their environmental risks and potential liabilities, can tap into this shift of emphasis, thereby safeguarding their access to credit." One example is accounting for the increasing risk of wildfire here in central California. At the Whistler Resort in British Columbia a series of wildfires led the facility to analyze the risk of wildfire and develop recommendations to protect the community in the event of future wildfires. They also implemented a plan to address some facility risks, such as requiring that "FireSmart" roofing materials be used on all new construction and buildings/structures where the roof is being replaced (Graci and Dodds 2008).

There are also market shifts that may occur that are beyond operational control. What happens when electricity or concrete costs increase by 50%, or even double due to greenhouse gas legislation? While the Santa Ynez Band of Chumash Indians, whose members are effectively the "shareholders" of the Chumash Resort Casino, represent a sovereign nation, the reservation is reliant on outside utilities for energy and water, and private companies that are subject to state laws for other resources. Consequently, the casino facilities are far from immune to resource price volatility and implementation of new legislation and policies that may drive up costs in some industries. This provides an additional incentive to keep investing in resource efficiency. While the casino cannot be LEED certified due to indoor smoking the hotels and other facilities could potentially be retrofitted to achieve LEED certification. Technological improvements, new materials, and increasing experience on the part of contractors has reduced the cost premium of LEED-certified construction to only 1-2% of project costs. "Offsetting any remaining premium are hard savings of 30 to 50 percent in energy use, 35 percent in carbon emissions, 40 percent in water, and 70 percent for solid waste. These savings [typically] produce a payback of the green premium, if any premium remains, in under twenty-four months" (Butler 2008). Numerous studies have also shown that green buildings have associated employee health benefits and lead to increases in employee productivity and retention (Boue 2010, Singh et al. 2010). In addition, consider the following:

- The savings listed above are based on energy, water, and waste disposal costs in 2007, with little or no pressure yet on carbon emissions from new state or federal legislation;
- Some think that, as laws like AB 32 gain traction, the cost of energy could increase [at an even more rapid rate];
- [In 2007 and 2008] the entire region of the Great Basin and western states [faced] shortages in water due to drought. Already, water is an issue of contention among the states, notably, California, Arizona, and Nevada with regard to the Colorado River;
- Disposing of solid waste will become more expensive as diesel to haul the waste [becomes more expensive] and locations to put it reach capacity and are closed—meaning that waste must travel greater distances (Butler 2008).

As mentioned at the beginning the business case for environmental management involves not just costs savings and near-term internal rates of return, but also recognition and certification (Hsieh and Jeo 2010). "Company image and hotel corporate reputation, are one of the most intangible yet priceless assets a business can have. For hotels located in environmentally or socially sensitive regions of the world, maintaining a good reputation is particularly important…Having a good company image can lead to competitive advantage in the market" (Graci and Dodds 2008). This observation definitely applies to the Chumash Resort Casino, located in the midst of the bucolic Santa Ynez Valley, and attracting customers from Santa Barbara and other surrounding communities that have a long history of environmental advocacy. Green recognition and certification could increase attractiveness to customers, allow higher price premiums for resort facilities, and improve company image.

In many hotels and resorts environmental programs have generated employee enthusiasm and motivated staff to work as a team to achieve a common purpose. Some hotel companies use environmental programs as staff incentives, with financial savings translated into cash bonuses or other rewards such as staff events or trips. One renowned example is the Fairmont Hotels' development and implementation of Green Committees that have proven critical to the success of their environmental programs. These committees are made up of volunteers that take on responsibility for implementing environmental policies and achieving the hotels' goals. Each Green Committee makes recommendations to operations management (Graci and Dodds 2008, Scanlon 2007). Hyatt Gainey Ranch in Scottsdale, Arizona has also had positive results with their environmental program allowing staff to use returns on bottle and can recycling to fund activities, or donate these monies to causes of their choice (Scanlon 2007).

In addition to domestic examples there are also several examples of environmental achievements in hotels in Canada, along with associated cost savings:

- The Holiday Inn on King in Toronto reports saving Cdn $14,852 per year through the installation of low flow showerheads and faucet aerators;
- The Fairmont Royal York in Toronto invested Cdn $25,000 in an energy conservation program to replace leaky steam traps and fix leaks, which resulted in an annual savings of over Cdn $200,000;
- The Comfort Inn and Suites in Red Deer, Alberta has implemented a roof-based solar energy system to reduce large energy costs. The system heats and cools the hotel and converts waste energy from the hotel's other systems. The installation of the solar energy system cost the hotel owner USD $1.4 million however the hotel can last up to 14 days without sun and the system will have enough energy stored to heat and cool the property. Maintenance of the system is also minimal resulting in an extremely cost efficient energy system;
- The Holiday Inn in North Vancouver, British Columbia has saved approximately USD $16,000 annually and reduced 28 percent of its energy consumption through installing an in room energy management system. The system features occupancy sensors that automatically monitor and adjust individual room temperatures. The system was able to ensure a return on investment within 14 months (Graci and Dodds 2008).

Taking a Page from Other Casinos and Hotels

In terms of public relations and green marketing the Chumash Casino resort should consider a few initial steps:

- Adopt an official environmental policy;
- Develop a green page on the website;
- Place a pamphlet with a brief Chumash history and overview of facility environmental initiatives at information stations in the casino, as well as in all hotel rooms (an example of pamphlet layout and content is included in **Appendix Q**);
- Place cards in hotel rooms that encourage guests to participate in environmental initiatives (**Appendix I** looks at studies on influencing guest and consumer behavior, and provides templates for cards using the results of these studies.

There are several examples of both casinos and hotels with green web pages. One of the most recent and engaging examples is from the **MGM Mirage CityCenter** – the world's largest hotel mixed-use project covering 76 acres in

Las Vegas. This entire facility is LEED certified. The developers have created a website where local residents and customers can explore their environmental commitment. Topics include energy, water, wellness, recycling, materials, transportation, and "transformation" – exploring continuous employee education, creating expanded recycling capacity, and development of new products and technologies that are both environmentally-friendly and aesthetically pleasing. To learn more visit: http://www2.citycenter.com/environment/

Another example of a green casino webpage can be found on the **Palazzo** website. In 2008 the casino hotel was the largest single building to be LEED certified for new construction. Their green webpage discusses transportation, water, natural lighting, energy efficiency, air quality and materials. To learn more visit: http://www.palazzo.com/greenpalazzo.aspx

The **Turtle Creek Casino & Hotel** in Michigan provides a simple but extensive bulleted list of eco-friendly measures: http://www.turtlecreekcasino.com/eco-features.html In 2008, the Associated Press included their greening efforts in an article on "Casinos going green to save energy, money": "During daytime, half the casino's lighting comes from skylights. Drinks are served only in glasses: no cans or bottles. Some gamblers are smoking, but the air isn't thick with smoke. And, outside, the roof of Bourbons 72 restaurant sports day lilies, ferns and leafy hostas." Stephen Knowles, the designer for Turtle Creek, said, "The sustainability mind-set is affecting all kinds of choices, including what places you want to visit for entertainment."

Other examples from non-casino hotels include Wyndham Hotel Group's **Wyndham Green** website, with core initiatives focused on recycle/reuse, innovation, energy conservation, education, water conservation, and community. Among other resources they have a Policy Statement, a Green Brochure, and a Green Scorecard. In 2009 they were ranked as a Top 10 Company in the Newsweek Green Rankings for Media Travel Leisure. They have an entire page devoted to green media and awards: http://www.wyndhamgreen.com/media-and-awards/

Fairmont Hotels & Resorts has a webpage on "Growing Environmental Stewardship". Like Wyndham they have an extensive range of resources including an Environmental Policy, a Green Partnership brochure, and an Awards page for both corporate and hotel recognition: http://www.fairmont.com/EN_FA/AboutFairmont/environment/Awards/EnvironmentAwards.htm

Kimpton Hotels & Restaurants has an EarthCare Program that includes a Mission Statement, an Environmental Partnerships program, and their own set

of Awards and Recognition:
http://www.kimptonhotels.com/programs/earthcare-awards.aspx

The Hilton website also has statements reflecting sustainable development, environmental policy, goal achievement, and environmental commitment, as do those of Starwood, Hyatt, and Barcelo Hotels (Hsieh and Jeo 2010).

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Appendix G: Green hotel examples and resources

Proximity Hotel in Greensboro, NC is featured as a LEED case study. It was designed and built to be LEED platinum certified. Like CCHR, Proximity has a Four Diamond rating. (Sustainable Green Hotel Practices 2010) Many of its features can be applied to a pre-existing hotel:

- Variable speed kitchen hoods with sensors adjust the power to be appropriate for the kitchen's needs.
- High-efficiency Kohler plumbing fixtures have reduced water usage by a third, saving two million gallons of water in the first year.
- Low-emitting volatile organic compound adhesives, paints, carpets, etc. reduce indoor air contamination.
- An on-site Education Center offers tours of the green features of the hotels, symposiums on sustainable practices, and outreach programs for students.
- Bicycles are available for guests to use.

Gaia Napa Valley Hotel & Spa in American Canyon, CA is a 132 room hotel and spa located near wine country and is LEED gold certified. (Services & Features at Gaia 2011)

- Environmentally sensitive toiletries.
- Organic fair trade complimentary coffees and teas in each room.
- Local, organic, and sustainably grown food used as much as possible.
- Carpet backing, fiber, and pad all made from post-consumer recycled material.
- Low-flow toilets and showerheads.
- Solartube tubular skylights magnify sunlight to deliver abundant light to interior spaces.
- Chemical free landscaping uses no fertilizers and local and climate-adaptive plants.
- GreenTouchscreen kiosks show guests how much water and electricity is being saved and how much CO_2 is being emitted.

Super 8 Ukiah Hotel in Ukiah, CA is located near the Redwood forests and wineries and is the most pet-friendly and eco-friendly hotel in the region (Green Hotel 2011).

- Continental breakfast features organic coffee, teas, and oatmeal as well as biodegradable silverware and dishes.
- Energy Star appliances including washing machines, ice machines, lighting, and printers.
- Occupational sensor light systems.
- Employee carpooling.
- Eco-friendly chemicals supplied by EcoLab for cleaning.

The Ambrose in Santa Monica, CA is a 77-room boutique hotel with a LEED silver certification (Internal Operations 2011).

- Composting on site as well as a recycling program addresses 75 percent of waste.
- Preferred parking for alternative fuel vehicles.
- Complimentary bus passes for employees.
- Water saving aerators added to faucets.
- 15 percent of annual energy use is offset with renewable energy credits.

Resources

The Green Hotels Association is a member organization that provides information, money-saving opportunities, advertisement and other benefits. Information can be accessed at http://greenhotels.com/index.php

The CERES Green Hotel Initiative is a program designed to create and satisfy demand for environmentally responsible hotel services. Information such as tools and networking opportunities can be accessed at http://www.ceres.org//Page.aspx?pid=761

Pineapple Hospitality and Greensuites are two vendors that sell environmentally friendly hotel products such as toiletries, cleaners, and amenities. Their websites can be accessed, respectively, at http://www.pineapplehospitality.net/products.html and http://www.greensuites.com/.

Appendix H: Sample guest survey

1. Is it important to you that the hotel you are staying at is considered eco-friendly, energy-conscious, environmentally preferred, and/or sustainable?

- Yes, high priority
- Yes, but not a priority
- No
- NA

2. Do you find water efficient fixtures such as low-flow toilets, sinks, and showerheads to be less luxurious?

- Yes
- No
- NA

3. Do you prefer attractively displayed bulk soaps or individual portion soaps?

- Bulk
- Individual
- No Preference
- No Preference because I bring my own toiletries
- NA

4. When you stay at hotels in warm weather, which of these choices reflects your thermostat use?

- I do not adjust the thermostat
- I adjust the thermostat colder than I would at home
- I adjust the thermostat to the same temperature I would at home
- I adjust the thermostat to a warmer temperature than I would at home

5. If free newspapers were available in the lobby or by request would you take one?

- Yes, but I would prefer it automatically delivered to my room
- Yes, I would be just as satisfied with this as automatic delivery to my room
- No, it would be too inconvenient
- No, because I do not read the newspaper

Appendix I: Influencing guest and consumer behavior
& Templates for hotel room cards

Influencing Guest and Consumer Behavior

In 2006, a set of psychologists and researchers evaluated common appeals used by hotels to try to persuade guests to reuse their towels. The authors listed two main reasons hotels should pursue linen-reuse programs – a.) Reduce laundry expenses, and b.) Beyond the direct savings "a growing segment of consumers reward businesses that attend to environmental issues through their business practices". They found that the message most commonly used focused on basic environmental protection. Two other common appeals tried to invoke the guests' sense of social responsibility to future generations, or inform guests of the substantial potential savings to the hotel. Another message that appeared to be used with increasing frequency was based on the concept of cooperation through incentives. In these messages guests were told that by reusing their towels they would be partnering with the hotel in furthering its conservation efforts, and that if they reused their towels the hotel would donate some percentage of those savings to environmental causes. The authors then set up a study to determine how effective each of these commonly used messages was in creating the desired behavior. They worked with management at a Phoenix-area hotel to test four signs using each of the different types of appeals they had observed - environmental protection, social responsibility, environmental cooperation, and benefits to the hotel.

"In sum, the data revealed that the two environmental appeals and the social responsibility appeal elicited approximately the same degree of participation, averaging about 30 percent. In contrast, the appeal based on benefit to the hotel drew a participation rate of less than 16 percent." The authors expected the environmental partnerships strategy to be most effective, but they realized that what this appeal was missing was the concept of social obligation. In our day-to-day lives we consistently act on the norm of reciprocation (i.e. we are expected to cooperate with individuals who do something for us first, and then later be willing to do a favor in return). "Consumers are motivated to reward companies that they perceive to have put a great deal of effort into their product, even when the consumers themselves do not directly benefit from that effort. Moreover, the norm of reciprocity is one element that is crucial to the development and maintenance of relationships, including exchanges between consumers and firms."

Based on this reasoning the authors thought it would be more effective if the hotel gave the donation first and then asked the guests to participate in this

effort. They tested another card with a revised appeal, stating that the hotel had already donated to an environmental protection organization on behalf of the hotel's guests and asking guests to reciprocate this gesture by reusing the towels (see **Card template #1** below). This reciprocation-norm card yielded a participation rate of 45.2%, far more effective than the previous environmental-cooperation card (30.7%). "The results indicate that making the donation prior to and regardless of guests' participation elicited greater towel reuse than did making the donation contingent on guests' participation."

These results are consistent with other research on descriptive norms; the behavior of others in the social environment influences and shapes our own interpretations and responses to the situation. "When individuals perceive sufficient social support for a particular behavior, they tend to follow the lead of others because, according to this theory, a decision-making shortcut of this type saves them time and cognitive effort while providing an outcome that has a high probability of being effective." Given the body of research that supports this observation the researchers decided to create and test a few additional cards. The hotel staff that tracked the response to the linen-reuse cards was able quantify that nearly three-quarters of hotel guests participated in the program at least once during their stay (this is higher than study results because the authors only recorded behavior on the first eligible day and only those linens hung on "official" specified items). Based on this information they tested another card using this percentage as a descriptive norm (see **Card template #2** below). In this case the researchers found that the descriptive norm card also yielded substantially higher participation rates (44.1%).

Finally, they took the test one step further and communicated the descriptive norm specifically based on the participation of guests who had previously occupied the new guests' very room. "The social psychology literature suggests that sharing commonalities with another individual, even seemingly irrelevant characteristics, has been found in most cases to increase one's affinity toward that other person." This final card stated: "75% of the guests who stayed in this room (#xxx) participated in our new resource savings program by using their towels more than once. You can join your fellow guests in this program to help save the environment by reusing your towels during your stay." While the rise in participation was not dramatic, the authors pointed out that this message provided "a nearly costless 10 percent increase in savings".

Source: Goldstein, N., Griskevicius, V., & Cialdini, R. (2007). Invoking Social Norms: A Social Psychology Perspective on Improving Hotels' Linen-Reuse Programs. *Cornell Hospitality Quarterly,* 48(2): 145-150.

One of the main researchers on the linen reuse study, Dr. Robert Cialdini, who is known for his work on social and descriptive norms, carried out a similar study

on the relative success of different messages in motivating household energy conservation. San Diego area residents were given one of four messages advocating home energy savings. Three of the messages used typical appeals to reduce household energy usage: "(1) conservation will save the environment, (2) conservation will save you money, and (3) conservation will preserve resources for future generations. The fourth message, which has been rarely if ever employed in the past, simply provided survey-based information demonstrating that it was the neighborhood norm to attempt to conserve energy in the home." There was also a control message that urged conservation but didn't provide a reason. Meter readings revealed that the fourth (normative) message generated significantly higher energy savings than any of the other messages (10% more than the control group, while no other group exceeded 3% more than the control group). (To see an example of a card that could be used in hotel rooms to encourage guests to conserve energy see **Card template #3** below)

"I would bet that if you went into a residential neighborhood and put a red, green or yellow light on peoples' mailboxes to show who's an energy hog and who's not, people would start to change their behavior," says Paul Hamilton, a senior vice president at Schneider Electric, a global energy consulting firm.

In his book "Fostering Sustainable Behavior" Psychologist Doug McKenzie-Mohr describes a similar study: A college gym's shower room displayed a prominent sign urging students to conserve water by turning off the shower while they soaped up. Only 6% did so initially. But when researchers planted an accomplice who shut off his water mid-shower, 49% of students followed suit. When there were two accomplices, compliance jumped to 67%, even though the accomplices didn't discuss their actions or make eye contact with other students.

Dr. Cialdini argues, "People don't recognize how powerful the pull of the crowd is on them. It's a fundamental cue as to what we should be doing… We can move people to environmentally friendly behavior by simply telling [or showing] them what those around them are doing" (Simon 2010).

Card template #1:

WE'RE DOING OUR PART FOR THE ENVIRONMENT. CAN WE COUNT ON YOU?

Because we are committed to preserving the environment, we have made a financial contribution to a nonprofit environmental protection organization on behalf of the hotel and its guests.

If you would like to help us in recovering the expense, while conserving natural resources, please reuse your towels during your stay.

Card template #2

JOIN YOUR FELLOW GUESTS IN HELPING TO SAVE THE ENVIRONMENT!

Almost 70% of guests who are asked to participate in our new resource savings program do help by using their towels more than once. You can join your fellow guests in this program to help save the environment by reusing your towels during your stay.

Card template #3:

Our guests' popular choice!

70% of guests are already reducing the chill factor, keeping the room temperature set at an energy efficient 72°F. Join your fellow guests in this simple action to save energy.

Appendix J: Environmentally preferred options

Low VOC carpets, furniture, and paints

Volatile Organic Compounds (VOCs) are chemical gases that are emitted from a variety of products such as paints, glues, varnishes, solvents, and waxes. These chemicals can have short- or long-term adverse effects on human health. There are many products available that have lower levels of VOCs than the traditional options. Hotel management should consider these alternatives when feasible. The EPA has a useful online resource, the Database of Environmental Information for Products and Services, which provides information on low VOC products (Database of Environmental Information 2011).

Carpet tiles

Carpet tiles are a specialized carpeting system where a large continuous sheet of carpet is replaced with smaller squares of carpet. The benefit is that when stains or wear necessitate changing the carpet, a single tile can be replaced instead of a whole room. This system is much easier and cheaper for facilities, and reduces waste.

Low-flow fixtures

Installing low-flow fixtures such as sinks, toilets, and showerheads saves water, energy, and money. The National Resource Defense Council offers information and resources on low-flow products (Green Business Guide 2011). Dual flush toilets are also a water-saving option that should be considered.

Bulk Soaps

Bulk soaps that are placed in dispensers in rooms reduce waste by eliminating the disposal of the small containers and wrappers as well as the product remaining in those containers. If concerns about aesthetics make bulk soaps a less appealing option, alternative packaging for small bottles should be considered. Green Suites, a company that provides green products for hotels, offers a variety of these products for management's consideration (Personal Care Amenities 2011).

Organic/Non-Toxic Soaps

Whether bulk or individual-sized, soaps that are healthier for people and the planet should be considered. Soaps that are organic, plant-based, or non-toxic are less harmful when used by people, and also less harmful for the environment as they are discharged into wastewater systems.

Less Toxic and Non-Toxic Cleaners

Cleanliness is imperative in hotel rooms, both for the safety of guests and for the reputation of the hotel. Unfortunately, many of the most popular cleaners used in hotels contain strong and harmful chemicals. The hotel should consider products that provide the same level of cleanliness with less toxic chemicals. In addition, the hotel should evaluate which surfaces in guest rooms need to be disinfected and which areas only need surface cleaning. Where only surface cleaning is necessary, less stringent chemicals should be considered. Additionally, education and auditing of the employees should be carried out to ensure that the minimum necessary amounts of chemicals are being used, which ensures that extra chemicals are not introduced to the environment and excess product is not used.

Ozone Laundry Systems

Ozone laundry systems use ozone(0_3) instead of bleach and other detergents. Ozone is an effective disinfectant, works faster than other detergents, and can be used with cold water. This system saves water and energy as well as reduces the need for other chemicals. The hotel should also consider complementing an ozone washing system with a high-efficiency drying system.

Increasing On-site Processing of Laundry

Currently, the on-site laundry facility is too small to process all of the hotel's linens. Rather than being processed at the hotel linens are sent off-site to a Los Angeles-based laundering facility. The required trucking is expensive and consumes large amounts of fuel. A carbon footprint and cost-benefit analysis should be conducted to determine if increasing the amount of laundry done on-site is environmentally preferable and/or less expensive.

Appendix K: Descriptions of selected culturally important plant species

Toyon

The toyon ("qwe'" in the Barbareno language) was chosen because the Chumash used several parts of the toyon plant in their traditional life. The berries were gathered in cloth sacks from the canyon above where the Santa Barbara Mission is today. The Chumash say that raw toyon berries stuck in the throat, so the berries were either dried in the sun or roasted over hot coals before eating(Timbrook 2007).


Source: Bryant 2010


Source: Kozak 1999

The hard wood of toyon was valuable for making tools such as fishhooks, harpoons, fishing spears, digging sticks, and thatching needles. They also used the hard wood to straighten other materials such as the elderberry sticks used for flutes. The elderberry would be softened with heat and water, and then placed in a straight groove of the toyon and latched until it dried. Furthermore, toyon had important spiritual significance to the Chumash. Since toyon wood was durable and resistant to rot, it was used for making offertory poles, ceremonial sticks, and headdresses (Timbrook 2007).

Coast Live Oak

The coast live oak trees (ku'w) provided acorns, which were a staple in the Chumash diet. Acorns were ground, leached and then made into a mush that was eaten with every meal. Acorns from *Quercus agrifolia* were preferred over other varieties for their nutritional value. There are many traditions that have developed around the process of making acorn mush. Chumash doctors often prescribed special diets, which included acorn mush, to people who were ill (Timbrook 2007).


Source: Holland 1999


Source: Arbor Day Foundation

The Chumash also used coast live oak for firewood. The bark from this oak was favored for firewood because it fell off the tree easily and produced long-lasting coals. Oak bark and oak galls were both used for medicinal purposes. The green bark was burned until it was charcoal, mixed with water, and then allowed to sit overnight. The Chumash drank this mixture to relieve indigestion. The liquid from the oak galls was used to treat all types of boils and wounds. Coast live oak was also used for making boxes, bowls, and other vessels in which to store food. The Chumash chewed oak to for dental hygiene (Timbrook 2007).

Valley Oak


Source: Scope 1998

Valley oak (ta') produces large acorns that are not very bitter, but these acorns were a less desirable food source due to their low fat content. Valley oak was not known to be good firewood since it did not produce the same long-lasting coals as coast live oak. Wagon axles were made from valley oak in historic times (Timbrook 2007).


Source: Stoller 2003

The Chumash used the coffee berry plant (puq') for medicinal purposes. The leaves were rubbed on the skin to relieve rheumatism. People would boil water with the leaves of coffee berry and then bathe in it to relieve rashes caused by poison oak. The Chumash boiled the bark of the coffee berry plant to make a laxative tea for stomach ailments. This plant was known to be poisonous to humans in any significant quantity, so it was only used for its medicinal properties (Timbrook 2007).


Source: Breen 2011

Appendix L: Educational handout on climate change and tribal significance

What is climate change?

Imagine climate change as a blanket of gas surrounding the earth and trapping heat underneath it. As power plants, cars and trucks, and industrial facilities have released more and more gases like carbon dioxide (CO_2) into the air this blanket has gotten thicker, causing global average temperatures to rise. But climate change does not just impact temperature, and just like the weather, the results of climate change are very different in different parts of the world.

We can think about the impacts of climate change in relation to the four elements – water, wind, earth and fire.

One of the biggest impacts of climate change is on water. Here in California rising temperatures are causing more snow to fall as rain, reducing snowpack, and causing the remaining snowpack to melt earlier. This is leading to higher spring streamflows, and lower flows in the summer and fall, when water needs are greatest. Sea level is also rising along the coast, threatening the San Francisco Bay, and other low lying coastal areas. In other parts of the world rain patterns are changing, causing more frequent and/or severe flooding in some places, and more frequent and/or severe droughts in others.

Climate change relates to the winds as warming sea temperatures are linked to more frequent and/or severe hurricanes, such as Katrina, as well as changes in the patterns and intensity of typhoons and tropical storms.

Climate change is impacting the land in so many ways. Changing rain patterns and higher temperatures are causing reduced agricultural yields in many parts of the world, threatening food security. The changing climate is also leading to the migration of some native species, and facilitating the spread of some non-native species.

Climate change is linked to fire as higher temperatures and droughts are fueling forest fires, and there have been dry lightening storms in places where they have not occurred before - including California.

How do we know humans are causing these earth changes?

Looking at ancient air bubbles in Arctic ice we have been able to measure how much CO_2 has been in the air for the past 650,000 years. Current levels of CO_2 are the highest they have been in all that time. The rapid rise in the level of CO_2 has paralleled the rise in the use of fossil fuels since the start of the Industrial Revolution, 150 years ago. There is consensus among thousands of climate scientists around the world that humans are causing current changes in the earth's climate.

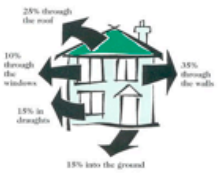
But not all countries or communities are equally responsible for climate change. While American Indians have contributed relatively little to the climate change problem, these communities are particularly vulnerable to climate change impacts.

Why should American Indians take action on climate change?

Climate change threatens the future of many indigenous communities, altering the availability of many of the plant and animal species upon which they depend, and jeopardizing cultural integrity. Just as there is tremendous diversity in tribes throughout North America, the impacts of climate change are highly diverse.

In California and the Southwest the biggest concern is reduced freshwater availability and quality. With increasing regional competition for water, securing and protecting water rights will be important for western tribes to cope with climate change.

What can American Indian tribes do to reduce the risks of climate change?



Usually climate actions are divided into two categories – mitigation and adaptation. Mitigation means reducing CO_2 emissions. For many tribes this means implementing strategies to improve energy efficiency, such as improving building insulation, and developing plans for renewable energy resource development. With rising energy prices increasing energy independence can support tribal sovereignty.

Adaptation involves the recognition that some climate change impacts are already underway, so in addition to mitigation actions vulnerable communities need to increase their ability to withstand climate change. For tribal communities this can involve protecting culturally significant lands and natural resources.

Inter-tribal and inter-governmental initiatives are forming to pool financial resources and knowledge, and build a collective voice and unified front to advocate for tribal climate policy, federal and state financial incentives and support, and recognition of the right to environmental self-governance. American Indian wisdom and nature-centered beliefs can help guide all peoples towards life-enhancing cultures that respect and honor nature and diversity.

Climate action in the Swinomish Indian Tribal Community "Unity guides the plan to survive."

The Swinomish Indian Tribal Community is located in the Pacific Northwest. Much like California this region is facing rising temperatures and changing rain and snow patterns that are altering stream and river flows and threatening culturally important species, particularly salmon.

The Swinomish Community's approach to climate action consists of three components: 1) mitigation of climate change, 2) adaptation to climate change, and 3) preservation of tribal life ways. Their plan involves assessment and improvement of infrastructure, policies, green building codes, business practices, funding and investment, and science. In order to protect sensitive areas the Swinomish are identifying critical resources for cultural adaptation and maintenance of traditional ways.

The Swinomish Community also recognizes that climate change impacts and solutions extend beyond the reservation, as everyone in the Skagit Watershed faces the same consequences. The Swinomish have helped bring together local, state and federal governments, academics and other tribes into a long-term partnership that is engaging in joint planning at the watershed level.
(Excerpt from Tribal White Paper)

<u>Appendix M</u>: Article for *Samala* magazine

ENVIRONMENT

UCSB Students Helping Chumash Address Climate Change

Bren Student Amber Giroux at Chumash Community Environmental Fair.

WHAT IS CLIMATE CHANGE?

Imagine climate change as a blanket of gas surrounding the earth and trapping heat underneath it. As power plants, vehicles, and industrial facilities release more and more "greenhouse" gases like carbon dioxide (CO_2) into the atmosphere this blanket is getting thicker, causing global average temperatures to rise. This greenhouse gas blanket is linked to changing precipitation patterns resulting in more droughts in some areas and increased flooding in others. Higher temperatures are also melting ice sheets and glaciers, warming the ocean, and causing sea levels to rise. In addition, climate change is forcing some plants and animals to relocate.

WILL CLIMATE CHANGE AFFECT OUR COMMUNITY?

Climate change threatens the future of many indigenous communities, altering the availability of species upon which they depend, and jeopardizing cultural integrity. Just as there is tremendous diversity in tribes throughout North America, the impacts of climate change are highly diverse.

In California and the Southwest the biggest concern is reduced freshwater availability and water quality impacts. With increasing regional competition for water, securing and protecting water rights will be important for western tribes to cope with climate change.

WHAT CAN WE DO?

<u>Reduce CO_2 Emissions</u>: This usually means finding ways to improve energy efficiency (such as improving building insulation), addressing transportation impacts, and developing renewable energy resources like wind and solar. With rising energy prices, increasing energy independence can support tribal sovereignty.

<u>Adaptation</u>: Some climate change impacts are already underway, so in addition to reducing CO_2 emissions, vulnerable communities need to increase their ability to withstand climate change. For tribal communities this can involve working to protect culturally significant lands and natural resources.

WHO ARE WE?

We are a group of master's students from the UCSB Bren School of Environmental Science & Management. Our group is working with the Environmental Office and others to calculate the "carbon footprint" of your community (basically how much CO_2 was produced from energy use, transportation, etc.) for 2009 through 2010. This will provide a baseline so that as the tribal community takes action to increase energy efficiency

6

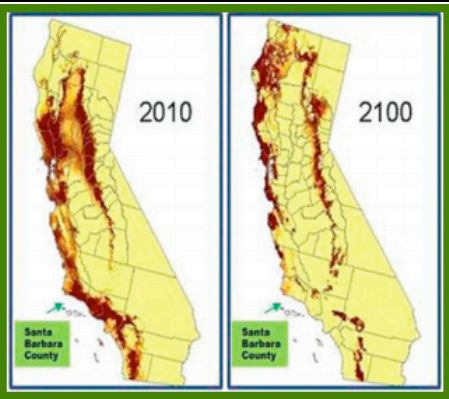
Different issues impacted by changes in California's water supply. Image provided by California Department of Water Resources.

and reduce harmful emissions you can keep track of your progress year-by-year. We will also provide recommendations for climate action strategies that address identified tribal needs and priorities. As students, we are committed to assisting your community, and we understand that communication is essential in this process. So please feel free to contact us - we would love to hear from you!

"Based on our work with the tribe so far, we believe that the Santa Ynez Band of Chumash Indians can become a leader in climate action and serve as a model for other Native American communities."

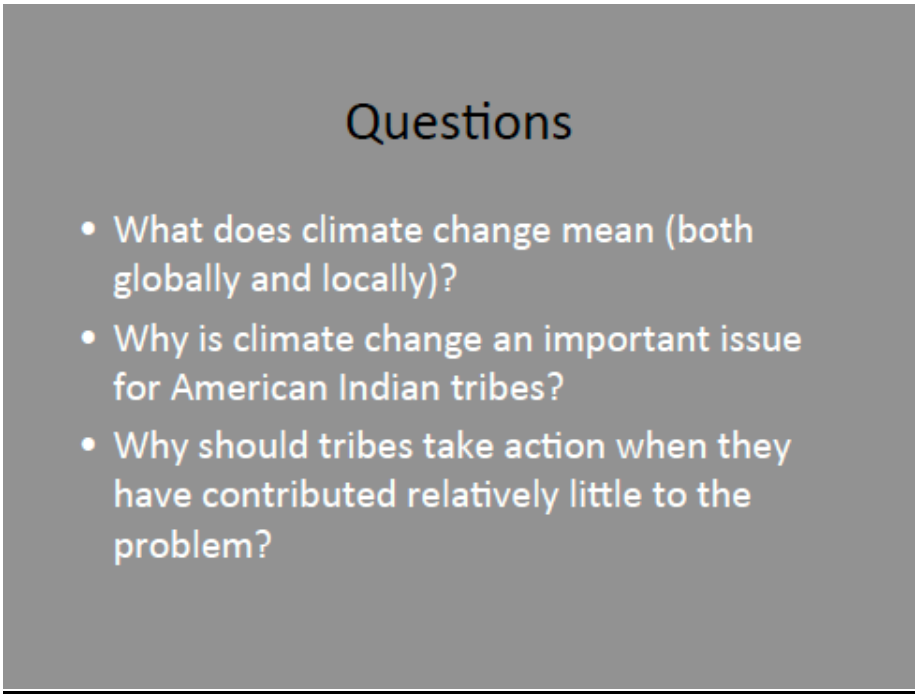
– Bren Students
(Amber, Amy, Anna, Becca, Brock, and Sheena)

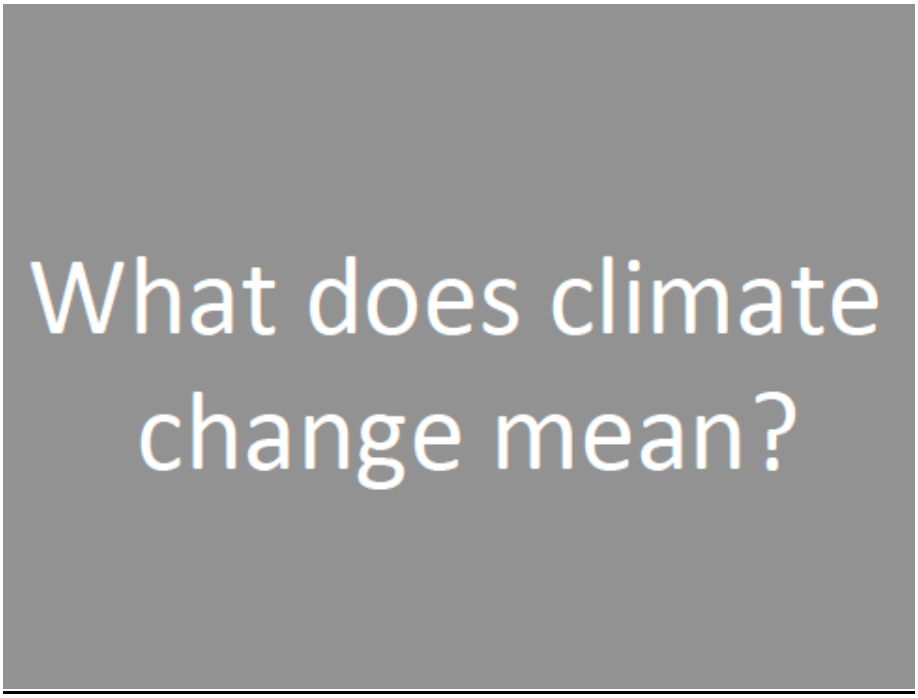
To get in touch with us and share your questions, comments or suggestions please email Anna Brittain at abrittain@bren.ucsb.edu.

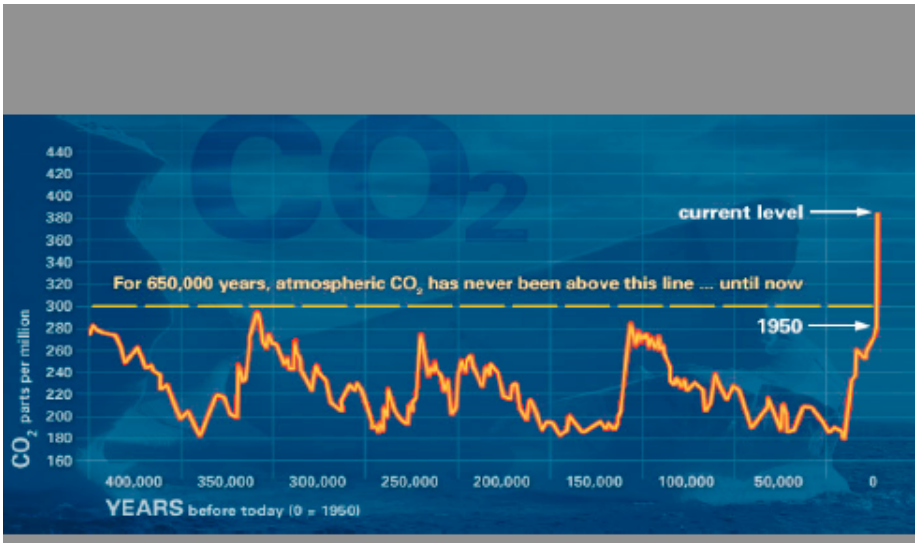


These maps show the change in suitable habitat locations for Toyon (a plant significant to the Chumash culture) from 2010 to 2100 (in red). The projections are based on data provided by the U.N. Intergovernmental Panel on Climate Change. Notice the difference in Santa Barbara County.

Appendix N: Adaptable presentation

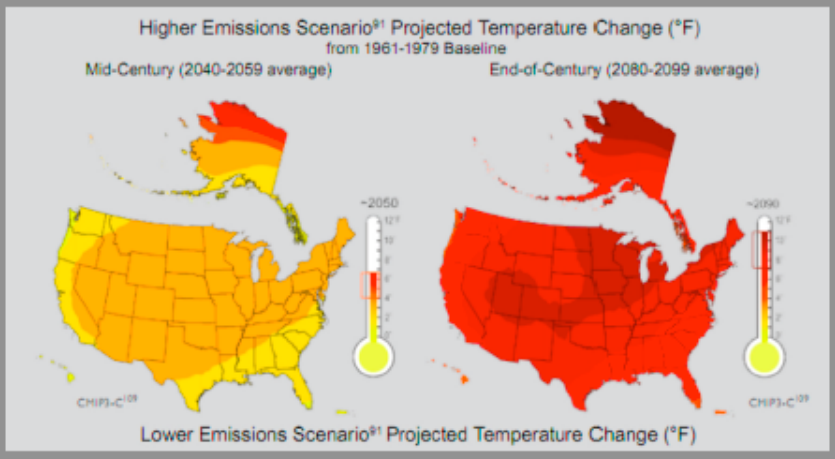






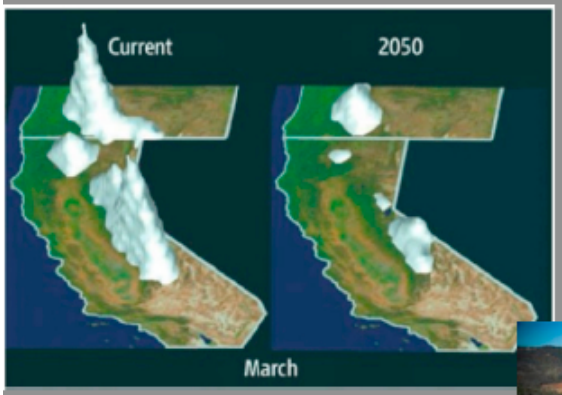
Global average temperature rise of 2-4°C (3.6-7.2°F) likely by the mid- to late-century...

How will climate change impact you?

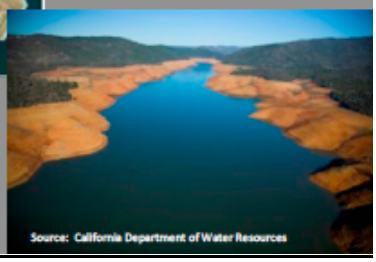


Source: NOAA National Climate Data Center "Global Climate Change Impacts in the United States" 16.6.09

Higher temperatures at elevation = more precipitation falling as rain and earlier spring snowmelt and runoff

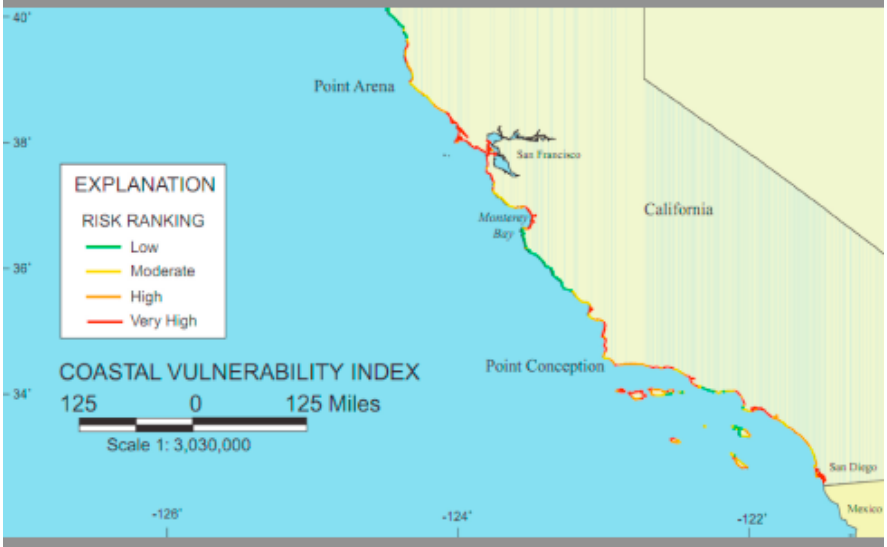


Source: Scripps Institution of Oceanography "'Climate Crisis' in the West Predicted with Increasing Certainty" 17 December 2007



Source: California Department of Water Resources

Higher temperatures = increased melting of sea ice and glaciers, as well as ocean warming = sea level rise

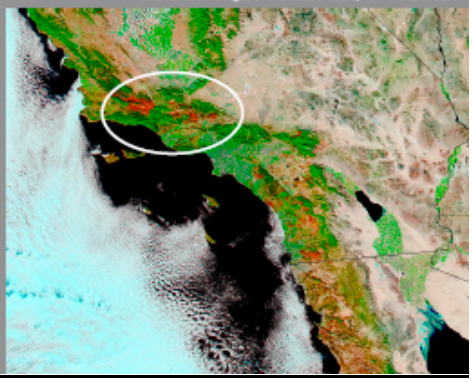


Source: U.S. Geological Survey "National Assessment of Coastal Vulnerability to Sea Level Rise: Preliminary Results for the U.S. Pacific Coast" 2000

Higher temperatures = warmer summers and drier foliage and groundcover, increasing the risk of fire

Source: California Department of Forestry and Fire Protection, Fire and Resource Assessment Program (FRAP) Maps

Source: NASA Images of California Wildfire, 05 November 2007



Higher temperatures and changing precipitation patterns = plant stress and changes in vegetation

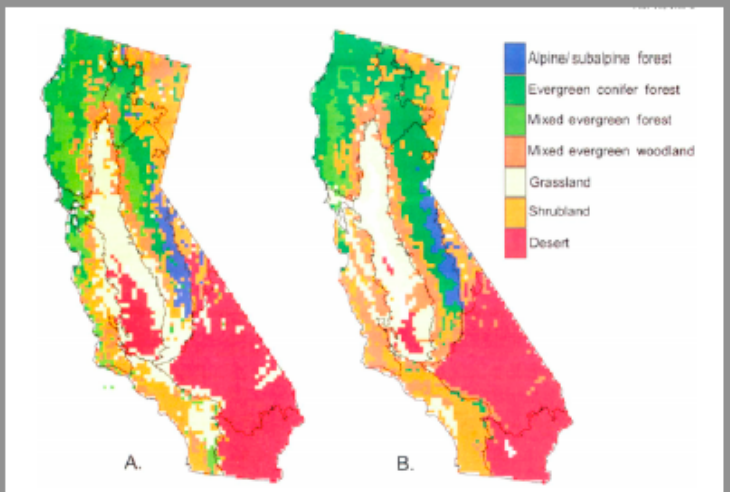
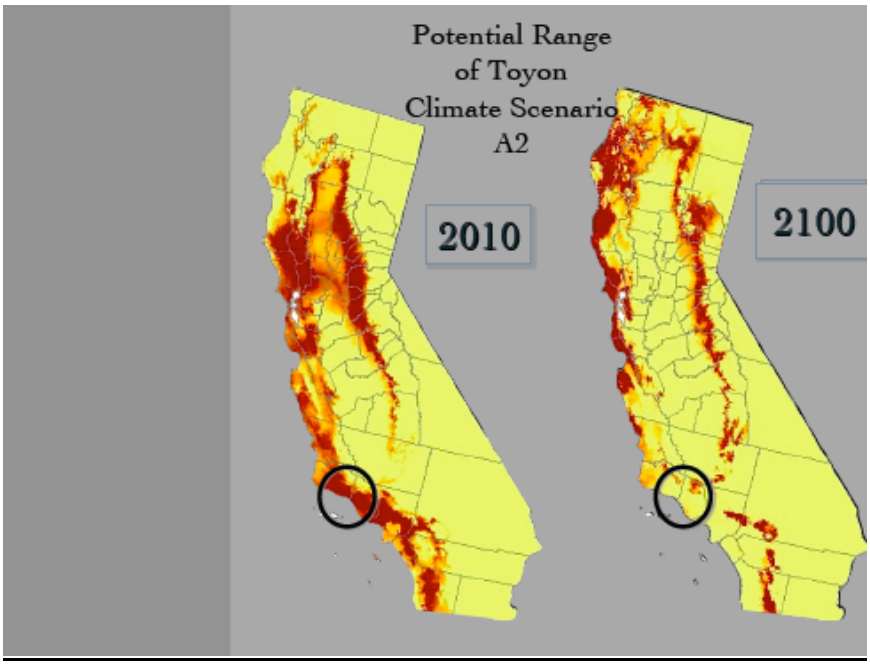
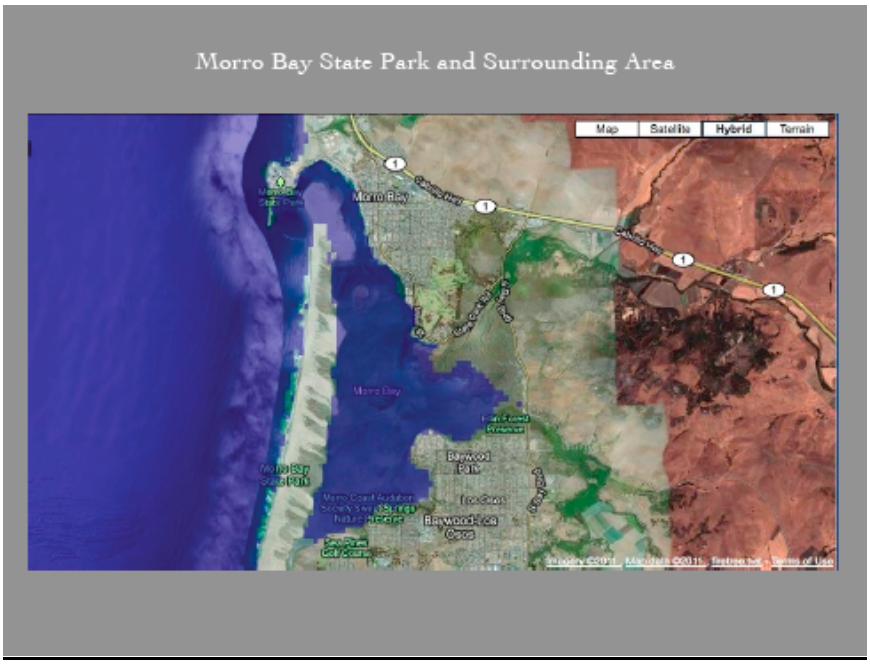


FIG. 4. (A) Map of the distribution of the simulated vegetation classes for the historical period (1961–1990) and (B) baseline vegetation map. The vegetation class mapped at each grid cell in (A) is the most frequent class simulated during the historical period.

Neilson, R., Pitelka, L., Solomon, A., Nathan, R., Midgley, G. (2005). Forecasting Regional to Global Plant Migration Response to Climate Change. *American Institute of Biological Sciences*, 55(9), pp. 749-750.


Potential Range
of Toyon
Climate Scenario
A2
2010
2100


Morro Bay State Park and Surrounding Area
Map
Satellite
Hybrid
Terrain
Morro Bay

Morro Bay After a 3 Meter Sea Level Rise

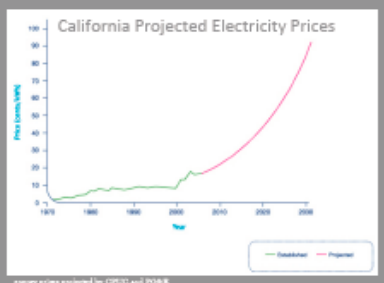
The case for taking action

Energy Independence & Security

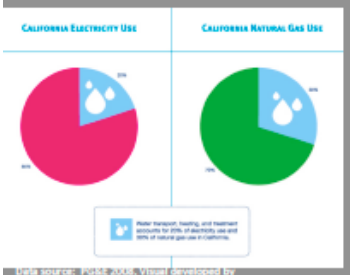
"The only reason gasoline prices dropped was the recession, the joblessness. That reduced the demand, that dropped the price, but we are on the same path. We're going to go back to four dollar, five dollar gas."

-John Hoffmeister, former Shell Oil President

In Southern California gas prices are up $0.20 cents a gallon in the past month and $0.60 cents a gallon over last year.



Water Independence & Security



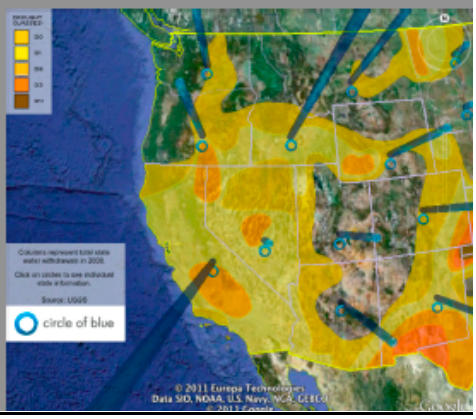
Data source: PG&E 2008. Visual developed by communitypulse.org

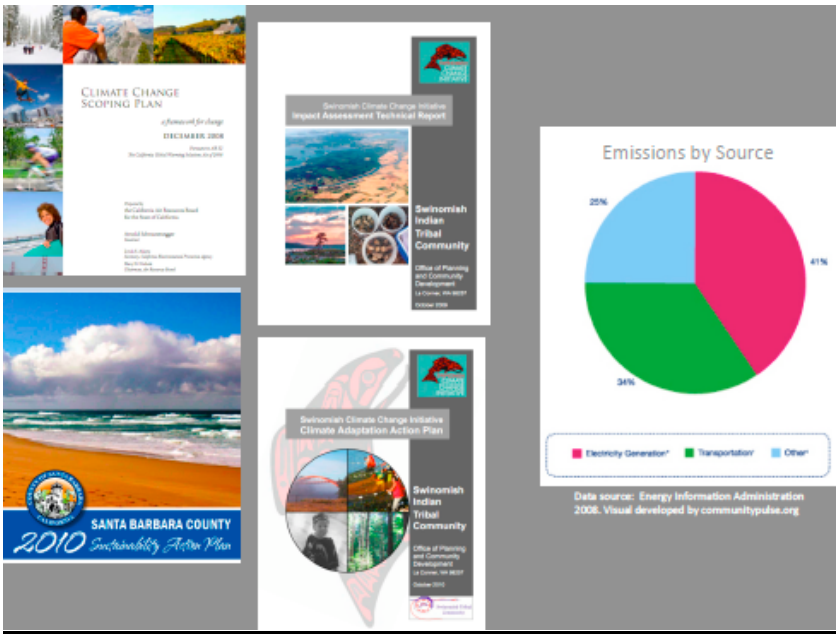
In arid regions and agricultural areas (such as the Southwest and California) water withdrawal is greater than 100% of available precipitation.

Almost all of California's groundwater aquifers are being used up faster than they are being refilled.

"Even without climate change, much of California is at high risk of water demand exceeding supply by 2050"

-Natural Resources Defense Council, August 2010





Partnerships & Collaboration

- Native American Environmental Protection Coalition
- University of Colorado Law School – Natural Resources Law Center "Native Community and Climate Change Project"
- Northern Arizona University – Institute for Tribal Environmental Professionals "Tribes & Climate Change"
- Indigenous Environmental Network – "Native Energy & Climate Campaign"
- National Congress of American Indians – Climate Change Initiative
- Swinomish Indian Tribal Community
- American Indian and Alaska Native Climate Change Working Group


It is the sacred responsibility of indigenous peoples to ensure a healthy environment to sustain our cultural lifeways. We have been the keepers of Mother Earth from time immemorial and in our different ways look far backwards to listen to the wisdom of our elders and ancestors, and into a distant future to protect our children and the children to come.
-Intertribal Working Group on Climate Change, 2009
Tribal White Paper on Climate Change Adaptation and Mitigation

Appendix O: Communication with Institute for Tribal Environmental Professional and National Congress for American Indians

Northern Arizona University – Institute for Tribal Environmental Professionals

Susan Watkyns – Climate Change Program Manager (Personal communication, 03/14/2011)

The Institute for Tribal Environmental Professionals (ITEP) officially launched its Tribes & Climate Change program in December 2009, but began helping tribes understand climate change risks and vulnerabilities and potential responses in 2008. ITEP provides environmental support services to all 500+ federally recognized tribes. They offer trainings on "Climate Change on Tribal Lands", as well as "Climate Change Adaptation". In addition, they have developed a website of information and resources on "Tribes and Climate Change" and send out monthly newsletters on climate change meetings, Federal agency actions and policies, and other resources relevant to tribes. Recently, they received an EPA grant to focus on tribal adaptation planning. This grant will support further trainings and maintaining and expanding the website and newsletter. They have organized a Tribal Steering Committee to help guide grant uses. ITEP wants to explore other ways of delivering trainings, including remotely through webinars, and other means of reaching a broader audience. In addition to Susan Watkyns, the Climate Change Program Manager, they also have a staff member focused solely on Outreach & Education – Mancel Nelson. Mr. Nelson visits tribal communities; tribes can request his support and he will come and work with them directly.

ITEP began its trainings on "Climate Change on Tribal Lands" in 2008. These introductory trainings cover the basic science of climate change, the role of traditional knowledge, and community outreach and education. As part of these trainings they have participants develop a mock presentation on climate change for a tribal council. They also have them develop an outreach presentation for their tribe. Ms. Watkyns says that based on the community these mock presentations take many forms. In one instance a workshop member wanted his community to develop a "green" demo house – spotlighting energy efficiency, resource conservation, and renewable opportunities. For the mock presentation the representative developed a small model of a demo house. He also used this model in the mock presentation to the tribal council to help explain the role that the community could play in climate change mitigation and adaptation and the utility of the demo house. Ms. Watkyns points out that you really have to know the specific community to determine the best method of outreach and engagement. Many environmental representatives try to work with schools.

More recently ITEP has launched "Climate Change Adaptation" trainings. The first was held in the Pacific Northwest in May 2010, and the second was held at Northern Arizona University the week of March 7th. This training focused on tribes in the Southwest region. There were twelve representatives from tribes in Arizona, Nevada and California, as well as one representative from Alaska, and another from Montana. The participants from California included the La Posta Band, the Kashia Band and the Campo Band. This training included an overview of climate change and then narrowed the focus to climate change impacts in the Southwest. They facilitated group discussions exploring the meaning of adaptation, whether/in what ways tribes are already adapting to climatic changes, and how tribes can go about planning for impacts. There was a group activity each day using a computer spreadsheet laying out different sectors likely to be impacted (e.g. transport). Participants had to think about expected impacts, potential timeframe, community vulnerabilities and risks, capacity for addressing impacts, and finally goals for addressing impacts and actions the tribe could take. These activities helped them think through the process of adaptation planning. There was also a half-day fieldtrip to the Tohono Nation. The group looked at a riparian restoration project and learned about plans to develop a large-scale solar installation and LEED certified administration building. In all of ITEP's trainings they also have talking circles for tribal representatives to share thoughts and concerns.

In the discussion with Ms. Watkyns she validated the need to start climate change planning with community outreach and education. Tribal environmental staff members consistently mention this as a challenge during the trainings. As these staff members attempt to incorporate climate change into environmental initiatives it has become increasingly clear that there is a lack of awareness among tribal community members and government bodies about the kinds of impacts that will happen, and how the community can prepare for these impacts. In terms of greening of tribal casinos Ms. Watkyns mentioned the Pechanga Tribe as another community with a thriving casino that has been implementing extensive green measures.

National Congress for American Indians (NCAI)

Jose Aguto – Policy Advisor on Climate Change, Energy, Natural Resources, Environment, REDD, and Agriculture (Personal Communication, 03/15/2011)

The NCAI is the largest, oldest tribal organization started in 1944 and led by tribal leaders. The organization focuses on legislative issues (e.g. a need is stated

by a tribal leader and then NCAI helps develop a policy position and lobbying strategy). NCAI has four tiers, with environment ranked last, as other issues are higher priorities: Economic Development, Health, Public Safety, and Environment. The goal is to attach environmental issues to things tribal leaders already understand and prioritize.

NCAI developed positions in the proposed Waxman-Markey bill to include tribes in adaptation, highlighting the specific concerns and uniqueness of tribes. They pointed to the fact that the IPCC recognizes the unique vulnerability of indigenous peoples to climate change. NCAI also developed a resolution on Tribal Equity in the Department of Interior Climate Change Adaptation Initiative (http://www.tribesandclimatechange.org/wp-content/uploads/2010/11/NCAI-Resolution-Tribal-Equity-in-DOI-CC-Adaptation-Initiative.pdf). They partnered with the National Wildlife Federation and developed a model letter for tribal leaders to personalize and submit. As of December 2010 more than 40 tribes had submitted letters (*model letter included below*).

One of NCAI's priority legislative issues is water. In 2011, just 40 tribes have water quality standards while all municipalities have standards in place; there is a clear regulatory gap. Mr. Aguto believes tribal water programs are a good example of failed capacity building in the past because the programs were implemented without proper equipment and support. Moving forward, Mr. Aguto points to the need to establish a baseline for water needs and availability for climate change. The same is true for plant and animal species counts. Major concerns and connections include climate change and water, natural resources and culture, and air quality and health.

In terms of all of NCAI's climate change efforts staff is working to integrate traditional knowledge, close the generational gap, and overcome organizational cultures and power structures that have not historically engaged tribes.

Mr. Aguto recommended the following resources:

Tribal Leader Briefing Book for Tribal Nations Summit 2010

Section 4 covers:

Tribal Land, Cultural Protection, and Natural Resources

a. Land into trust
b. Water rights
c. Cultural protection
d. Environmental protection

e. Alaska Native subsistence
f. Climate change
g. Energy
h. Natural resources
i. U.S. Department of Agriculture program

Climate Change Recommendations to Obama Administration:

1. Provide tribes with formal consultative roles in developing federal climate change policy
2. Ensure equal access to climate change adaptation funding and program
3. Protect and advance the contribution of tribal lifeways to climate change adaptation efforts

http://www.ncai.org/fileadmin/ncai_events/2010_WH_Summit/Tribal_Leader_Briefing_Book_for_Tribal_Nations_Summit_2010.pdf

Indian Nations and the 2009 Presidential Transition

Climate Change is one of 18 Issue Areas

http://www.ncai.org/fileadmin/NCAI2009PresidentialTransitionPlan3.pdf

Pew Center on Global Climate Change – Climate Change Adaptation: What Federal Agencies are Doing (November 2010)

(*Three measures specifically related to tribes*)

Secretarial Order 3289 - Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources. Secretarial Order 3289 was signed September 14, 2009 and amended February 22, 2010. The Order established a Climate Change Response Council, renamed Energy and Climate Change Council, within the Office of the Secretary to coordinate the development of an integrated strategy across Department agencies and bureaus to respond to the impacts of climate change on tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages.

National Fish and Wildlife Climate Adaptation Strategy (In-Progress). The Service has defined the proposed adaptation strategy as a collaborative framework (among major conservation interests such as local governments,

states, tribes, conservation organizations, federal agencies, industry and private landowners) that "identifies and defines principles and methods to maintain key terrestrial, freshwater and marine ecosystems and functions needed to sustain fish, wildlife and plant resources in the face of accelerating climate change." Strategy development was initiated from Conservation Leadership Forums focused on climate change adaptation that occurred in June 2009 and January 2010.

Wildlife Habitat Improvement Program (WHIP) - The Wildlife Habitat Incentive Program (WHIP) is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, non-industrial private forest land, and Indian land. The Natural Resources Conservation Service administers WHIP to provide both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat.

http://www.pewclimate.org/docUploads/FederalGovernmentLeadershiponAdaptation_Nov2010.pdf

Council on Environmental Quality – Climate Change Adaptation Task Force

Recommended actions include:

Build strong partnerships to support local, state, and tribal decision makers in improving management of places and infrastructure most likely to be affected by climate change.

One of the **guiding principles**:

Prioritize the Most Vulnerable: Adaptation strategies should help people, places, and infrastructure that are most vulnerable to climate impacts and be designed and implemented with meaningful involvement from all parts of society.

http://www.whitehouse.gov/administration/eop/ceq/initiatives/adaptation

Model Letter for Submission to DOI

###, 2011

Secretary Ken Salazar

Department of the Interior
1849 C Street, N.W.
Washington DC 20240

Dear Secretary Salazar,

On behalf of the XX Tribe or XX Tribal Organization, I'm writing to you to express my views about the involvement of Indian tribes and Alaska Natives in the Department of Interior's (DOI) Climate Change Adaptation Initiative (Initiative). I am concerned about the relative lack of outreach to Indian tribes on the formulation of the Initiative and its overall implementation, and the lack of Initiative funding made available to tribes via the Bureau of Indian Affairs (BIA) or any other channel. I am also concerned with the current lack of tribal involvement in the ongoing establishment of DOI Climate Science Centers (CSC) and Landscape Conservation Cooperatives (LCC) as part of the Secretarial Order No. 3289 entitled *Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources.*

Through your Secretarial Order 3289, the Interior Department began a Climate Change Adaptation Initiative in September 2009, an undertaking that my tribe or tribal organization generally supports. The Administration's fiscal 2011 budget request for the Initiative is $171.3 million, an increase of $35.4 million over 2010 levels. The $136 million for the Initiative in 2010 did not include **any** funding for tribes. Despite a substantial increase in the overall funding request, the situation for tribes is nearly as dire in the 2011 budget. Of the $171.3 million, **only** $200,000 would go to the BIA to involve and assist Indian tribes, and the funding is specifically available only for the Pacific Northwest and Alaska region. This is highly inequitable, especially considering the disproportionate effect of climate change on tribes and their homelands and the fact that Indian Trust lands make up a significant portion of DOI's land management responsibilities. The health of our homelands is integral to upholding our sovereign rights and cultural belief systems, and also is critical in ensuring the economic prosperity and health of our people.

Tribal lands comprise 4 percent of the U.S. land base and 16 percent of the lands that fall under the reach of the Initiative (tribal lands represent 16% if compared to the federal lands involved in this initiative; tribal lands constitute 95 million acres divided by 593 million acres of federal land and tribal land in the Initiative which equals 16 percent). Given that the federal government has historically under funded tribal natural resource efforts and the fact that there is no federal program or funding that specifically supports tribal climate adaptation efforts, I respectfully request that the allocation to tribes via the BIA be increased to **no less than** $8.55 million (or 5% of DOI's Climate Change Adaptation Initiative) to support tribes to address and adapt to the impacts of climate change. In addition, I respectfully request that the allocation to tribes via the BIA should be maintained at no less than 5% in all futures years.

In addition to the funding inequity, I am concerned about the lack of tribal involvement in formulating and implementing the Initiative and related DOI programs, despite the clear acknowledgment in your Order of Interior's responsibilities to tribes and its commitment to involve tribes meaningfully in these matters. It is imperative that DOI incorporates the perspectives and needs of Indian tribes. Moreover, it is not clear if and how Indian tribes will be involved in the development of the Initiative's regional CSCs and LCCs. I understand that LCCs and CSCs are currently in the process of laying the groundwork for setting regional climate change research agendas, yet tribes do not have a formal seat at the table. It is in the early stages of the development of the LCCs and CSCs that DOI has the opportunity through this Initiative to properly engage and involve tribes in responding to climate change. The objectives of Secretarial Order 3289 will fall short without the inclusion of tribal governments, lands, resources, and peoples. Each of the Initiative's regional planning groups should include tribal representation. As such, I formally request that DOI conduct government-to-government consultation with Indian tribes on all aspects of the Initiative to equitably involve tribes. This consultation must be conducted in all regions of the U.S. to gather the full input of the nation's 565 federally-recognized tribes.

Sovereign Indian tribes deserve an opportunity to participate more broadly in the DOI Climate Change Adaptation Initiative and require a more equitable share of the funding. Many tribes still lack basic information that quantifies the current range of climate change impacts on tribal lands. We require assistance in capacity building to monitor these impacts so that we can make informed decisions about adaptation strategies and provide for a more comprehensive analysis of potential cultural impacts. This gap in knowledge leaves tribes (and rural communities) at a significant disadvantage and compromises the overall state of knowledge about climate change impacts.

Thank you for your time and consideration of these requests. I look forward to hearing back from you as soon as possible.

Sincerely,

XXXXX

Chairman/Chairwoman/President

XX Tribe

Cc: Larry Echo Hawk, Assistant Secretary for Indian Affairs
Donald (Del) Laverdure, Deputy Assistant Secretary for Indian Affairs
Thomas Armstrong, DOI Senior Advisor for Climate Change
Doug Beard, Chief, USGS National Climate Change and Wildlife Science Center

Appendix P: Communicating climate change – key points from recent studies

Communication and Marketing As Climate Change–Intervention Assets (2008)

Key points:

- Historically, when people fail to behave in ways that are in their own or society's best interest—as judged by public health professionals, environmental scientists, and other similar experts—the tendency has been to assume that the cause must be either a lack of relevant knowledge on their part (i.e., an information deficit) and/or misguided attitudes. The prescription that has tended to follow this diagnosis is: to change people's behavior, we must provide them with the knowledge they lack and/or persuade them to change their attitudes.15
- This "information deficit" view of population behavior—although appealing in its simplicity and apparent face validity— has been largely supplanted by ecologic views of population behavior. The "people and places" framework is one example of an ecologic model.16,17
- The people-related factors that influence population behavior are organized into three levels of analysis: individual-level factors (such as beliefs and skills), social network-level factors (such as behavioral modeling and social reinforcement), and group-, community- or population-level factors (such as social norms and collective efficacy). The place-related factors— as identified by Farley and Cohen18 —are described in broad terms as the availability and cost of products and services, the attributes of physical structures, social structures (i.e., laws and policies), and the cultural and media messages in our communities.
- Relatively few studies have attempted to influence population behavior through social network–level interventions. One important exception is a series of studies in which block leaders were recruited in neighborhoods to model household recycling behavior and exhort and assist neighbors to recycle. The approach resulted in significant neighborhood-wide increases in recycling.41–43 Opinion-leader interventions of this type deserve considerable additional research attention because of their potential to influence a wide range of climate change–mitigation and adaptation behaviors.44
- Communication interventions that influence people's normative beliefs—that is, people's beliefs about the behavior of others—have been shown to promote a range of relevant behaviors including recycling,45 reduced household electrical use,46 and reduced hotel towel use (which has direct water-use implications).47
- There is a rapidly growing literature suggesting that community-level variables can be far more powerful than individual-level variables in shaping population behavior.49
- The effectiveness of incentive programs to promote the purchase of energy-efficient household appliances has varied by a factor of 10, depending on how aggressively they were promoted to members of target households.59 In short, active communication plays an important role in stimulating the uptake of

useful new products and services.

- Leiserowitz and Slovic conducted a nationally representative survey of adults in the U.S. (n810) in 2005 and identified five distinct interpretive communities based on people's perceptions of ten varied hazards (terrorism, the Iraq War, global warming, nuclear power, pesticides, genetically modified food, gun control, marijuana, legal abortion, and homosexuality) (AL, unpublished observations, 2008).
- Focusing specifically on the issue of global warming, three audience segments, representing 63% of people in the U.S., were found to have high perceptions of risk associated with climate change:
    - **The Liberal Left** (14% of the total sample). These people tended to be high SES, nonreligious, white, Democratic women with egalitarian values and a liberal political orientation. They also were much more likely to perceive a high degree of risk associated with environmental and technologic threats, and a low degree of risk associated with moral threats (homosexuality, abortion, and marijuana use).
    - **Alarmists** (12% of the total sample). This interpretive community tended to be religious, low SES, minority women who were politically disaffected. They perceived a higher than average degree of risk associated with all of the risks assessed (environmental, technologic, national security, and moral).
    - **Mainstream Americans** (37% of the total sample). This segment tended to have a high school education, be politically independent, and hold moderate political views. They tended to perceive all hazards as relatively moderate risks, with the exception of global warming, the Iraq War, and terrorism, which they rated as high to very high risks.
- Although polling data indicate that the vast majority of U.S. residents believe climate change is happening, many do not understand the science underlying the phenomenon (e.g., there is a persistent erroneous belief that the hole in the ozone is letting in too much heat),77 the human causes of climate change, or the scientific consensus on this point.63 Clearly, there is a great deal that could be taught… It should be noted, however, that in the absence of structural changes that make the promoted behaviors considerably easier, knowledge changes are likely to be ineffective, except among those who are already strongly motivated.
- Many researchers have identified the need for an effective metaphor to explain climate change.
- The metaphor of the greenhouse effect has been criticized because many people aren't familiar with how greenhouses work, and greenhouses are generally perceived as good things. Likewise the warming metaphor embedded in the term global warming may sound like a positive change to some individuals.84 In response, Lovelock85 has suggested the name global heating. One research paper that has been influential in the environmental community argues that describing climate change as "a blanket of carbon dioxide around the world that is trapping heat" is easily understood and improves people's understanding.72
- "Myth-busters" research has found that when a false statement is repeated in order to refute it, the repetition merely serves to reinforce the false belief.89 Over time the refutation is forgotten, but the false belief has been reinforced

simply because the audience member has heard it repeated again. New assertions that make no reference to the false claims are more effective for refuting myths.90

- Krosnick and colleagues92 conducted research to identify specific cognitions or beliefs that predict people's perception of climate change as a serious national issue that warrants federal public policy response. In essence, they demonstrated five key beliefs that predispose people to support an aggressive public policy response: (1) climate change is real, (2) I am certain it is real, (3) is it human caused, (4) it is harmful to people, and (5) the problem can be solved. These beliefs, therefore, can be considered important objectives for climate change–communication campaigns.
- At the social-network level there is an urgent need to identify and activate popular opinion leaders within all strata of society, including the government and commercial sectors. Personal influence, especially that of community opinion leaders, is a powerful source of social change that will be needed to engage U.S. residents in responding rapidly to the issue of climate change.
- Social norms campaigns, which have been shown to be an effective way to influence population rates of a range of conservation behaviors, should be made a high priority both for their potential effectiveness and low cost. Campaigns that specifically address people's collective efficacy—the belief that this is a problem we can solve—may help overcome the tendency to continue to overuse common resources.

How much should the public know about climate science? (2011)

Dr. Richard Somerville, climatologist and sought after expert on communicating climate change, argues that scientists should focus their messaging on six key principles:

1. The essential findings of mainstream climate change science are firm. The world is warming. There are many kinds of evidence: air temperatures, ocean temperatures, melting ice, rising sea levels, and much more. Human activities are the main cause. The warming is not natural. It is not due to the sun, for example. We know this because we can measure the effect of man-made carbon dioxide and it is much stronger than that of changes in the sun, which we also measure.
2. The greenhouse effect is well understood. It is as real as gravity. The foundations of the science are more than 150 years old. Carbon dioxide in the atmosphere traps heat. We know carbon dioxide is increasing because we measure it. We know the increase is due to human activities like burning fossil fuels because we can analyze the chemical evidence for that.
3. Our climate predictions are coming true. Many observed climate changes, like rising sea level, are occurring at the high end of the predicted range. Some

observed changes, like melting sea ice, are happening faster than the anticipated worst case. Unless mankind takes strong steps to halt and reverse the rapid global increase of fossil fuel use and the other activities that cause climate change, and does so in a very few years, severe climate change is inevitable. Urgent action is needed if global warming is to be limited to moderate levels.

4. The standard skeptical arguments have been refuted many times over. The refutations are on many web sites and in many books. For example, the mechanisms causing natural climate change like ice ages are irrelevant to the current warming. We know why ice ages come and go. That is due to changes in the Earth's orbit around the sun, changes that take thousands of years. The warming that is occurring now, over just a few decades, cannot possibly be caused by such slow-acting processes. But it can be caused by man-made changes in the greenhouse effect.
5. Science has its own high standards. It does not work by unqualified people making claims on television or the Internet. It works by expert scientists doing research and publishing it in carefully reviewed research journals. Other scientists examine the research and repeat it and extend it. Valid results are confirmed, and wrong ones are exposed and abandoned. Science is self-correcting. People who are not experts, who are not trained and experienced in this field, who do not do research and publish it following standard scientific practice, are not doing science. When they claim that they are the real experts, they are just plain wrong.
6. The leading scientific organizations of the world, like national academies of science and professional scientific societies, have carefully examined the results of climate science and endorsed these results. It is silly to imagine that thousands of climate scientists worldwide are engaged in a massive conspiracy to fool everybody. It is also silly to think that a few minor errors in the extensive IPCC reports can invalidate the reports. The first thing that the world needs to do to confront the challenge of climate change wisely is to learn about what science has discovered and accept it. The IPCC Fourth Assessment Report at www.ipcc.ch is a good place to start.

Medical Metaphors for Climate Issues (2007)

Key points:

- Most people won't listen to, or act on, medical advice from a quack who can talk plausibly about medicine but who isn't really a physician. Everybody accepts this situation. Even the least enlightened members of the U.S. Congress don't hold hearings to denounce modern medical science as a hoax. Yet, a few politicians and hard-core skeptics do attack climate science in exactly this way.
- At your annual checkup, if you're sensible, when the doctor tells you to lose weight and exercise more, you don't argue. You don't insult your doctor by complaining that medical science is imperfect and can't yet prevent cancer or cure AIDS. You don't label your doctor a radical alarmist. You know, and your doctor knows, that medical science, while inevitably incomplete, is still good enough to provide advice well worth following… Of course, some people just will not do what experts tell them. Non-compliance by some patients is a big problem for physicians.
- The most important aspects of climate change are local, not global, and are not confined to warming. Global warming is just a symptom of planetary ill health, like a fever.
- Everybody knows that a body temperature only a few degrees above normal is a symptom that can indicate medical problems that may have serious consequences, sometimes including death. Yet we still haven't educated most people to understand that a planetary fever of a few degrees can mean melting ice caps, rising sea level, massive disruptions in water supply, killer heat waves, and stronger hurricanes.
- Journalists covering a medical discovery aren't usually suspicious of researchers and don't inevitably insist on hearing from "the opposing view." When reporting on research showing the need for people to eat sensibly and be physically active, the media do not frame the story of these scientific advances in terms of a debate or dispute. Journalists don't feel obliged to seek out medical contrarians "for balance."
- Quitting smoking, like quitting using fossil fuels, is not easy to do, and in both cases the difficulty in quitting is immediate, while the most important benefits are all long-term.
- Medical decisions frequently involve substantial risk. People tend to be realistic about the consequences of serious medical problems. They know that a coronary artery bypass operation is major surgery. They accept the cost and the risk, understanding clearly that doing nothing also entails real costs and dangerous risks. They don't expect that a simple bandage will cure a potentially fatal disease. As a climate scientist, I sometimes fear that we are wasting time arguing about which type of bandage is most attractive as a climate remedy, instead of facing the hard decisions, and the risks, that climate change demands of us.
- As is often the case with medical decisions, our planetary well-being is ultimately in the hands of the patient.

The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public (2009)

Key points:

- Research shows that most Americans do not feel a personal connection to climate change. They are aware of it, they may even rank it as a concern, but according to a 2008 Pew Research Center for People and the Press, they do not perceive it as a near-term priority on par with, say, the economic downturn or the need to reform health care. In fact, despite scientists' calls for urgent action, climate change has slipped to the bottom of the list of American priorities.
- In order for climate science information to be fully absorbed by audiences, it must be actively communicated with appropriate language, metaphor, and analogy; combined with narrative storytelling; made vivid through visual imagery and experiential scenarios; balanced with scientific information; and delivered by trusted messengers in group settings.
- Sometimes a mental model serves as a filter, resulting in selective knowledge "uptake," i.e., people seek out or absorb only the information that matches their mental model, confirming what they already believe about an issue. This poses a potential stumbling block for climate change communicators… communicators should first do their best to discover what climate change misconceptions the audience may have in its mental models. Communicators can then disconnect the erroneous climate change information from other parts of the model and replace it with new facts.
- CRED researchers polled a large national sample about a program that would raise the cost of certain products believed to contribute significantly to climate change (such as air travel and electricity) and use the money to fund alternative energy and carbon capture projects. The identical program was described as a "carbon tax" to half the respondents, and as a "carbon offset" to the other half. This simple change in frame had a large impact on people's preferences. When considering a pair of products, 52% of respondents said they would choose a more expensive product when the cost increase was labeled a "carbon offset," but only 39% when it was labeled a "tax." Support for regulation to make the cost increase mandatory was greater when it was labeled an "offset" than when it was labeled a "tax."
- People approach goals differently. People with a promotion focus see a goal as an ideal and are concerned with advancement. They prefer to act eagerly to maximize or increase gains. People with a prevention focus, however, see a goal as something they ought to do and are concerned with maintaining the status quo. They prefer to act vigilantly to minimize or decrease losses. Research shows that tailoring messages to people's natural promotion and prevention orientations increases the level of response for both groups, regardless of whether their response was positive or negative. These findings support the idea of framing messages from multiple perspectives to accomplish environmental goals.

- Although the majority of U.S. residents consider climate change a serious problem, they generally think of it in geographically and temporally distant terms… In a July 2007 national survey, respondents believed that climate change was a "very serious threat" for "plants and animals" (52%), "people in other countries" (40%) and "people elsewhere in the United States" (30%). However, far fewer saw it as a "very serious threat" to "you and your family" (19%) and "your community" (18%). In other words, people perceive climate change impacts as a threat to plants and animals and people in other parts of the world, but do not see it as a local issue affecting themselves, their family, and their community. To counteract this problem, an effective communicator should highlight the current impacts of climate change on regions within the U.S.
- The numerous examples of extreme events that may occur in a given year provide recurring "teachable moments" communicators can use to relate climate change to the experience of a local audience.
- People tend to discount the importance of future events. Indeed, many social scientists believe that this is one of the top reasons that it is hard to motivate people to take action to prevent climate change… Fortunately, communicators can make this predisposition (to heavily discount future larger losses) work to help people overcome a reluctance to take on immediate losses. For example, if a communicator wants audience members to sign up for weatherizing their homes (which increases a home's energy efficiency), he or she may have more success by having them commit to an evaluation of their home's efficiency three or six months into the future rather than immediately.
- The negative feelings associated with losing $100 outweigh the positive feelings associated with gaining $100. Thus people have a natural tendency to avoid losses rather than to seek gains. When a gain vs. loss frame is combined with a now vs. future frame, people discount future gains more than future losses… when communicators talk to homeowners, they could frame energy efficiency appliances as helping the homeowners to avoid losing money on higher energy bills in the future, instead of helping them save money in the future.
- Audiences may be more likely to make changes to their behavior if climate change information is framed as 'losing less now instead of losing more in the future'. For example, during hot summer months, a smaller reduction in daily energy use can prevent having to deal with larger and prolonged energy blackout.
- "We will pay for [climate change] one way or another. We will pay to reduce greenhouse gas emissions today and we'll have to take an economic hit of some kind. Or we will pay the price later in military terms. And that will involve human lives." —Gen. Anthony C. Zinni, retired marine and former head of the central command.
- National security concerns deriving from climate change include the reduction of global food supplies, leading to large migrations of populations; increased risks for infectious disease, including pandemics that could destabilize economies and governments; and increased fighting over already limited resources like water and land.
- Some of the health implications related to climate change are relatively well understood (e.g., an increased likelihood of heatstroke), while others are less

obvious (e.g., the rapidly rising rates of asthma and respiratory conditions). Drawing awareness to the connections between climate change and human health may be an effective method for elevating public concern about climate change in the U.S. By articulating its serious individual health consequences, communicators can help frame climate change as a concrete, personal concern for everyone.

- Many audiences leave…analytically focused presentations with a higher awareness that climate change is happening, but without the matching higher motivation to do anything about it. Despite evidence from the social sciences that the experiential processing system is the stronger motivator for action, most climate change communication remains geared toward the analytical processing system. Personal or anecdotal accounts of negative climate change experiences, which could easily outweigh statistical evidence, are rarely put into play, despite evidence that even a stranger's past experiences can evoke strong feelings in people, making such communications memorable and therefore dominant in processing.
- Communicators should make use of the following experiential tools in addition to the more common analytical ones when creating presentations on climate change:
    - Vivid imagery, in the form of film footage, metaphors, personal accounts, real-world analogies, and concrete comparisons;
    - Messages designed to create, recall, and highlight relevant personal experience and to elicit an emotional response.
- Balance information that triggers an emotional response with more analytic information to leave a mark in more than one place in the brain;

  Acknowledge that the audience has other pressing issues. Create a balance between pre-existing concerns and the climate change issues to be discussed;

  Gauge an audience's degree of numbing (i.e., ask them questions about their levels of media exposure to climate change, show them well-known images associated with climate change and note their reaction).

- One study found that, to adapt to climate variability, many farmers in Argentina engaged in only one activity to protect against the impact of drought on their livelihoods, despite having numerous options available to them. For instance, farmers who had the capacity to store grain on their farms were less likely to use irrigation or crop insurance although these measures would have added up to even greater protection against the impact of drought… Provide energy-saving checklists that people can place in a prominent spot in their home or office. The checklists will remind and encourage people to go beyond just one tip. More people should take a diversified approach as a result.
- Governor Arnold Schwarzenegger referred to climate change with a metaphor when he said: "If 98 doctors say my son is ill and needs medication and two say 'No, he doesn't, he is fine,' I will go with the 98. It's common sense—the same with climate change. We go with the majority, the large majority....The key thing

now is that since we know this industrial age has created it, let's get our act together and do everything we can to roll it back."

- CRED research suggests that group affiliation may influence whether an individual decides to cooperate in a group decision or not for several reasons:
    - Group affiliation can activate social goals (i.e., concern for others, maximizing the good of the group);
    - Participating in a group allows group norms to exert a stronger influence on individuals;
    - Participating in a group also leads to greater intrinsic reward for individuals when group goals are achieved.
- People who feel an affiliation with a group are thus more likely to cooperate in environmental decisions, such as joining a town's efforts to reduce greenhouse gas emissions. Further, people may continue such behaviors due to the "reward" found in helping the group reach its climate change goal.
- CRED research also suggests that local "messengers" (both individuals and institutions) may be more likely to get a response for calls to action on climate change than emissaries from distant locales. People are more likely to take action when they feel a strong sense of affiliation with the individual or institution making the request. Communicators from "out of town" may want to enlist someone locally known to help create a connection with their audience.
- When organizing meetings with a diverse group of stakeholders, the most vital thing to remember is to allow ample time for discussion. Anecdotal evidence suggests that breaking large groups into smaller groups can help initiate discussion.
- One German study showed that changing defaults could promote green sources of energy. The study also found that the way information is presented, specifically for the default option, can strongly affect people's choice of electricity, and that they tend to use the kind of electricity that is offered to them as the default. In the first laboratory experiment, more participants chose the green utility when it was the default than when the "grey" utility was the default. In the second laboratory experiment, participants displayed an attachment to their default, asking for more money to give up green electricity than the amount they would have paid for it.
- Giving an immediate incentive can serve as an effective driver. For example, when presenting to a church, school, or community center group, climate change communicators can publicize the names of those who sign up for weatherization, thus providing an immediate social incentive to supplement the delayed economic incentive.
- With an issue as complex as climate change, people need to know there are solutions to dealing with it, and that they can be part of those solutions.

ICLEI Outreach and Communications Guide (2009)

Identify a Messenger – Choosing a messenger will traditionally depend on who is most appropriate to address your target audience. For example, if speaking to localists, consider using local leaders who are trusted and well respected, such as Ministers,

Scout Leaders, or neighborhood associations. Your core group of messengers should provide a pool of potential messengers from which to choose. Remember: you can never have enough messengers.

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Appendix Q: Template for guest pamphlet & Mock press releases

(cover)

THE SANTA YNEZ BAND OF CHUMASH INDIANS

&

Environmental Initiatives of the CHUMASH CASINO RESORT


A BRIEF HISTORY OF
CHUMASH PEOPLES

OUR PEOPLE once numbered in the tens of thousands and lived along the coast of California. At one time, our territory encompassed 7,000 square miles that spanned from the beaches of Malibu to Paso Robles, and as far inland as the western edge of the San Joaquin Valley. We called ourselves "the first people," and pointed to the Pacific Ocean as our first home. Many elders today say that Chumash means "seashell people." The Chumash Indians were able to enjoy a more prosperous environment than most other tribes in California because we had resources from both the land and the sea.

As hunters, gatherers, and fishermen, our Chumash ancestors recognized their dependency on the world around them. Ceremonies soon came to mark the significant seasons that their lives depended upon. During the winter solstice, the shaman priests led several days of feasting and dancing to honor the power of their father, the Sun.

Our people distinguished themselves as the finest boat builders among the California Indians. Pulling the fallen Northern California redwood trunks and pieces of driftwood from the Santa Barbara Bay, our Chumash ancestors soon learned to seal the cracks between the boards of the large wooden plank canoes using the natural resource of tar. This unique and innovative form of transportation allowed them access to the scattered Chumash villages up and down the coastline and on the Channel Islands.

In the rolling hills of the coastline, our Chumash ancestors found caves to use for sacred religious ceremonies. They decorated these caves with colorful yet simple cave paintings including human figures and animal life. Many of the caves still exist today, protected by the National Parks system, and illustrate the spiritual bond the Chumash hold with our environment.

As with most Native American tribes, the Chumash history was passed down from generation to generation through stories and legends. Many of these stories were lost when the Chumash Indian population was all but decimated in the 1700s and 1800s by the Spanish mission system. Nonetheless, Chumash peoples have persisted, continuously adapting physically, socially and politically to changing environmental conditions on the lands and in the seas, as well as to externally imposed shifts to their way of life.

Today the Santa Ynez Band of Chumash Indians is the only federally recognized Chumash tribe. Thanks to the revenue from our Chumash Casino Resort, we can now implement cultural enrichment programs that we couldn't previously afford. We have also been able to invest in an environmental office. Our culture and connection to the world around us remains strong.

Environmental Initiatives

The SANTA YNEZ BAND OF CHUMASH INDIANS realizes the benefits of greening and is becoming an environmental leader in the casino industry. The Chumash Casino Resort, an 180,000 square foot casino, 106 room hotel with a day spa, and two parking structures, is a model for resource efficiency... ***(Expand more here)***

Energy

Inside the casino and hotel energy efficiency measures are extensive. Examples include:

- Energy Star and energy efficient appliances are used throughout the casino resort facilities;

- Several years ago the Facilities Department replaced all incandescent bulbs with CFLs;
- Even more efficient LED lighting has become more cost-effective. The Facilities Department is upgrading the interior lights, exterior lights and street lights with LED fixtures and bulbs;
- Occupancy sensors are installed in offices and employee restrooms so that lights will shut-off automatically when these rooms are not in use;
- Both the casino and hotel are double-insulated to maintain internal building temperatures and avoid heating and cooling losses;
- The Casino operates a free shuttle bus service for employees and customers, reducing fuel used for transportation. *In **2010 ##*** bus trips were made eliminating over ***## car trips (needs updated #s)***.

As part of PG&E's new CasinoGreen program the facility recently underwent an extensive energy audit. Since February 2011 the operations staff has used the recommendations to save more than ***490,000 kilowatt hours*** of energy and more than ***275,000 pounds*** of carbon dioxide (CO_2) emissions ***(needs updated #s)***.

Water

Water conservation measures include:

- Hotel rooms contain low flow showerheads and low flow toilets have been installed throughout the Chumash Casino Resort;
- Water efficient washing machines and dishwashers are used throughout the facilities as well;
- Inserts have been installed in all of the stormwater inlets around the casino and resort facilities to remove oils, sediment, and debris from road and parking lot runoff that drains into the nearby Zanja de Cota Creek;
- The Casino has invested in creek restoration, clearing out trash and debris and planting native trees and plants that prevent erosion and flooding;
- The entire facility is landscaped with native, drought tolerant plants that use minimal irrigation.

Waste

The Chumash Casino Resort facilities managers have implemented a tremendously successful waste management program. Measures to reduce waste include:

- The Chumash Casino Resort recycles uniform materials and donates furniture to tribal community members, local charities, and businesses;
- Sectional carpeting made of recycled content is installed on the casino floor so that as the carpeting wears out only individual sections have to be replaced rather than the entire carpet. Worn out sections are recycled;
- Paper towel dispensers are being replaced with extremely efficient Dyson Air Blade hand dryers;
- At the Willows, a fine dining restaurant in the casino, the Chumash use a Natura water filtration system to filter and bottle water onsite. This eliminates the environmental impacts of transporting and landfilling/recycling over 100 cases of bottled drinking water each month;

- All food scraps are composted and facilities personnel collect approximately 100 gallons of pre-consumer fats, oil, and grease weekly that are sold to a local biodiesel company;
- Currently, *more than #%* of all waste is being recycled or reused and in *2010* this program diverted *## pounds* of trash from the local landfill (*needs updated #s).*

Awards and Recognition

EPA Region 9 Environmental Achievement Award **(2009)**

California Integrated Waste Management Board Waste Reduction Award **(2009 and 2010)**

One of the first members of **PG&E's** Casino Green Program **(2011)**

(back)

Mock press release #1

Chumash Casino Resort One of the First Members

of the New PG&E CasinoGreen Program

SANTA YNEZ, CA – March 18, 2011

The Chumash Casino Resort recently became one of the first members of a new PG&E program to help improve tribal resort energy efficiency. In order to become a member the casino had to undergo a comprehensive and detailed energy audit that resulted in more than a dozen energy project recommendations – divided into no-cost and low-cost measures, and longer-term investments. Some of the recommendations included new energy controls and motion sensors, installing more efficient outdoor LED lighting, and installing Smart Thermostats and more efficient LCD TVs in hotel guestrooms.

According to Mark Funkhouser, the head of environmental operations improvements, "We are always looking for new, cost-effective ways to improve casino and resort efficiency, which ultimately reduces the bottom-line on our utility bills. This is especially important with rising energy costs. When PG&E approached us about the new CasinoGreen progam we didn't hesitate to get involved."

Since receiving the audit report in early February the casino has already implemented a number of the recommendations, saving more than 490,000 kilowatt hours of energy, more than 275,000 pounds of carbon dioxide (CO2) emissions, and avoiding $60,000 in energy costs. That amount of energy saved is equivalent to a treadmill running 24 hours a day for 93 years! To see the most recent update on energy savings scroll over the Chumash Casino Resort location on this map: http://www.casinogreen.org/mapofproperties.html.

This is just the tip of the iceberg of all the environmental improvements, both big and small, that the casino operations staff has undertaken in the past few years to improve energy efficiency, reduce waste, and save water (which also reduces energy use for transport, heating and treatment). Some of these measures include double insulation to reduce energy loss, Energy Star and energy efficient appliances throughout casino resort facilities, water efficient washing machines and dishwashers, and low flow toilets and showerheads. Measures as simple as replacing paper towel dispensers with Dyson Air Blade hand driers saves the facility more than $100,000 per year, with a payback of less than six months! Currently, ***more than #%*** of all waste is being recycled or

reused (through composting) and in ***2010*** this program diverted ***## pounds*** of trash from the Tajiguas Landfill (***needs updated #s)***. Outside of the casino the entire property is landscaped with native, drought tolerant plants that use minimal irrigation. The Casino also operates a free shuttle bus service for employees and customers. *In **2010** **##***bus trips were made eliminating over *## car trips (**needs updated #s**).*

As Joshua Simmons, the head of the Environmental Office for the Santa Ynez Chumash reservation, observes, "Due to all of these efforts to improve resource efficiency the Chumash Casino Resort is now not only a premier destination in Santa Barbara County wine country, but is also one of the greenest casinos in the world. The CasinoGreen assessment will help facilitate continued improvements."

Mock press release #2

Santa Ynez Band of Chumash Indians Receives
Climate Showcase Communities Grant from U.S. EPA

SANTA YNEZ, CA – April 1, 2011

The EPA Climate Showcase Communities Grant is a competitive grant program to assist local and tribal communities with climate change initiatives. This program was launched just two years ago and this spring the Santa Ynez Chumash Tribe was selected as one of the first 50 communities to receive a $500,000 grant to implement their program. The Environmental Office for the Santa Ynez Chumash Tribe proposed the creation of a training program for local residents, teaching interested community members to retrofit homes to improve energy efficiency. Graduates of the program can then serve as ambassadors to other community members and apply their skills to homes both on and off the reservation. Their work will lead to reductions in the use of non-renewable energy resources, which will translate into less harmful greenhouse gases entering the atmosphere and contributing to climate change.

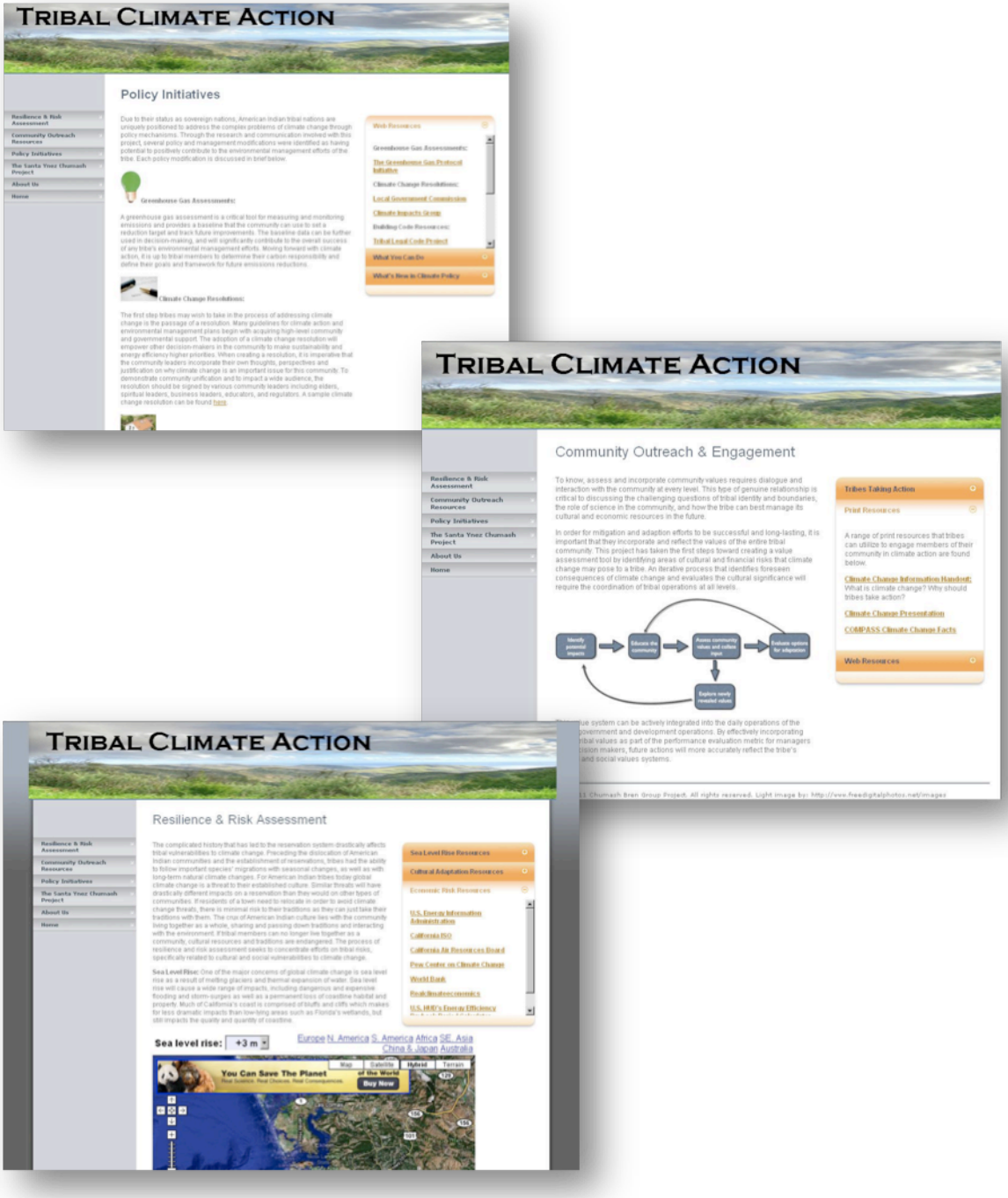
"Many of the homes on this reservation were built in the early to mid-20th century and are poorly insulated, losing valuable air conditioning in the summer and heating in the winter," points out Jesse Patterson, an Environmental Manager for the Tribe. "One of the best ways to improve energy efficiency is to address these leaks. By creating green jobs this program will contribute to

economic resilience within the community, and at the same time help homeowners to reduce their energy bills – a more-and-more significant monthly cost."

The EPA has a few key goals for Climate Showcase grants – the projects must be cost-effective, provide an ongoing means of reducing greenhouse gas emissions, and be replicable in other communities.

Joshua Simmons, head of the Environmental Department, says, "People in this community are interested in doing their part to reduce their environmental footprint, especially if it will save them money, but the ultimate goal is for this program to become a model for other communities, particularly tribal communities. We hope to exchange information and collaborate with other tribes interested in climate action."

Appendix R: Screenshots of Website



Signature Page

Climate Action on Tribal Lands: A Community-Based Approach

As authors of this Group Project report, we are proud to archive this report on the Bren School's website such that the results of our research are available for all to read. Our signatures on the document signify our joint responsibility to fulfill the archiving standards set by the Bren School of Environmental Science & Management.

Group member signatures (*sign & print*): Date:

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The mission of the Bren School of Environmental Science & Management is to produce professionals with unrivaled training in environmental science and management who will devote their unique skills to the diagnosis, assessment, mitigation, prevention, and remedy of the environmental problems of today and the future. A guiding principal of the School is that the analysis of environmental problems requires quantitative training in more than one discipline and an awareness of the physical, biological, social, political, and economic consequences that arise from scientific or technological decisions.

The Group Project is required of all students in the Master's of Environmental Science and Management (MESM) Program. It is a three-quarter activity in which small groups of students conduct focused, interdisciplinary research on the scientific, management, and policy dimensions of a specific environmental issue. This Final Group Project Report is authored by MESM students and has been reviewed and approved by:

_____

ADVISOR

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DATE