

## ABSTRACT

DEASON, GINGER G. Fostering Climate Readiness within Community-based Ecotourism Organizations: Shifting Demand, Community Resilience, and Adaptation Planning. (Under the direction of Dr. Erin Seekamp).

Ecotourism is often suggested as a strategy for conservation and economic development and is growing in popularity worldwide. However, the Intergovernmental Panel on Climate Change recognizes that one of the greatest dangers to tourism is climate change, and indigenous ecotourism operations in developing countries are particularly at risk. To sustain themselves in the future, ecotourism operations must be resilient to shifting tourism demand from climate-related changes to the natural and cultural resources that draw visitors. This study adds to the dearth of literature on ecotourism and climate adaptation in the Global South and helps to fill the gap in current research on ecotourism adaptation at the organizational level. Specifically, the goal of this multi-phased research project was to document potential changes to tourism demand and assess community adaptive capacity in an effort to build climate readiness within a community-based mountain ecotourism organization in southern Mexico. Results from a visitor survey indicate that tourists were more likely to change their plans under more extreme climate scenarios and that natural beauty, biodiversity, and culture are the top three pull factors to the study area, making the area extremely vulnerable to climate change impacts. Results from semi-structured, in-depth interviews and observations of community members, analyzed using an Actor-Network Theory lens, indicate that while the communities have a medium to high level of social capital, out-migration is jeopardizing the lifestyle and culture of the people left behind. While climate change will play an important role in the future of the ecotourism organization, out-migration poses a more immediate, and perhaps larger, threat to the community resilience. As this study is rooted in pragmatism, results from the quantitative and qualitative studies were

shared with the communities in participatory workshops to co-create an adaptation plan to enhance climate readiness within the ecotourism organization.

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Fostering Climate Readiness within Community-based Ecotourism Organizations: Shifting  
Demand, Community Resilience, and Adaptation Planning

by  
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## **DEDICATION**

This dissertation is dedicated to all of the people of the *Pueblos Mancomunados*. You opened your doors and your lives to me. I hope this research helps you achieve your tourism goals.

## BIOGRAPHY

Ginger Deason was born in Birmingham, Alabama and spent part of her childhood in rural Alabama and part in Birmingham. Nature art and long walks outdoors in rural Alabama with a retired science teacher for a grandmother inspired in her a love of the natural world.

Ginger graduated from Auburn University in 1993 with a bachelor's degree in Latin American Studies and shortly thereafter became a Peace Corps Volunteer in Guatemala. As a Peace Corps Volunteer, Ginger worked with rural farming families in agroforestry and home gardens.

After Peace Corps, Ginger moved to Raleigh, NC to pursue a master's degree in natural resource management at North Carolina State University. Her thesis work was in Belize where she worked with a local conservation non-governmental organization and surveyed lodge owners about the use of a particular palm leaf for thatching roofs. After obtaining her master's degree in 2000, Ginger worked for the Peace Corps for several years in different capacities in Ecuador, Guatemala, and Washington, DC. She then moved back to Raleigh, North Carolina where she worked as the Curator of Special Populations at the NC Museum of Natural Sciences. It is there that she developed an affinity for birding.

In 2006 Ginger started work for Heifer International's USA Country Program as a Field Coordinator and spent the next five years working with primarily rural groups in community development projects. Immediately before returning to NC State for her PhD, Ginger worked at the South Atlantic Landscape Conservation Cooperative where she gained an interest in climate change and its impacts on rural communities. In 2016 Ginger started working for the Inter-American Foundation in Washington, DC where she is still the Foundation Representative for Ecuador and Panama. Ginger's research interests remain in community development, nature-based tourism, birding tourism, and the impacts of climate change on all of them.

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## Chapter 1: Introduction

Climate change is already affecting many communities worldwide, and it is widely agreed that adapting to change is a critical aspect for community sustainability (Adger, Barnett, Brown, Marshall, & O'Brien, 2013; Berkes & Jolly, 2002; Magis, 2010). Human communities are inextricably linked to natural communities, and vice versa. Thus, the study of climate change impacts requires the study of complex social-ecological systems (SES), or human-environment systems, to assess their ability to address future change. The concepts of “resilience” and “adaptive capacity” are critical when studying SES and climate change (Walker & Salt, 2006). Resilience has been defined as the ability of a system to confront change and “still maintain the integrity of [its] functions” (Gunderson & Holling, 2002, p. 18). Adaptive capacity is the ability to withstand, adapt to, and learn from change or stressors (Folke, Colding, & Berkes, 2003). Stressors come in many forms, but climate change is considered to be a particularly transformative stressor, as it can cause systems to completely shift (Walther et al., 2002).

Some SES are more vulnerable to climate change than others, given who and what inhabit them and where they are located. For example, mountainous regions, due to their fragile ecosystems and complex topography, are expected to warm much more rapidly in the 21<sup>st</sup> century than in the 20<sup>th</sup> (Nogués-Bravo, Araújo, Errea, & Martínez-Rica, 2007) leading to a wide decline in biodiversity (Forero-Medina, Joppa, & Pimm, 2011; Rojas-Soto, Sosa, & Ornelas, 2012; Ruiz-Labourdette, Nogués-Bravo, Ollero, Schmitz, & Pineda, 2012). The tourism industry is also at risk from disturbances due to climate change, and the Intergovernmental Panel on Climate Change (Field et al., 2007) has recognized that one of the greatest dangers to mountain tourism is climate change. Community-based ecotourism organizations in developing countries are particularly at risk, given their dependence on other climate-sensitive economic activities

(e.g., rain-fed agriculture) that are often an important pull factor for tourists (e.g., agritourism) and their comparatively weak institutions that may limit adaptive capacity (Ranger & Garbett-Shiels, 2011).

These real world challenges must be met with real world solutions. Thus, the research in this dissertation is based on a pragmatic worldview and methodology. It isn't driven by the importance of methods but by the importance of understanding the problems (Creswell, 2007), and by a "focus on the way in which human beings deal with the *situations* in which they find themselves" (Watson, 2013, p. 24, emphasis in original). Almost 25 years ago, a group of communities in the Mexican state of Oaxaca, the *Pueblos Mancomunados*, collectively formed a community-based ecotourism organization, *Expediciones Sierra Norte*. This ecotourism business, which operates in six mountainous communities, receives approximately 16,000 tourists per year (A. Martínez Pérez, personal communication, December 2014). Via survey research, in-depth interviews, observations, and participatory workshops, this study contributes to a broader understanding of tourism responses to climate change impacts and how mountain ecotourism enterprises can enhance their adaptive capacity in the face of climate change. The study also makes a substantial contribution to the limited literature on climate change and adaptation in Latin America (Palomo, 2017).

## **Key Concepts**

### **Mountain social-ecological systems**

Climate change is widely regarded as the most important environmental and societal issue of our time, and the impacts of climate change have been given extensive coverage in the literature. However, most scholars agree that determining impacts and changes in mountain regions is more challenging than in other lower altitude areas due to topographical complexity

(Gilbert & Vincent, 2013; Gobiet et al, 2014; Zubler et al, 2014). Of the recent global studies that have addressed that challenge, most of them are focused on ecosystems or a particular species or group of species (Krishnaswamy, John, & Joseph, 2014; Wang, Fan, & Wang, 2014; Rojas-Soto, Sosa, & Ornelas, 2012). Conversely, inclusion of human dimensions in research on climate change threats to mountain regions is under-represented in the literature, and this is particularly true in developing countries (McDowell, Ford, Lehner, Berang-Ford, & Sherpa, 2013; Palomo, 2017). More attention is now being given to climate change impacts on mountain SES (Aryal, Cockfield, & Maraseni, 2014; Garbarino et al., 2014; Luthe, Wyss & Schuckert, 2012; McDowell et al., 2013; Pandey & Bardsley, 2013; Xu & Grumbine, 2014); yet, many of the studies are focused in Asia or Europe, and those that utilize Latin America as the study context are predominantly focused in the Andes (Carey et al., 2014; Valdivia et al., 2010). To date, studies of climate change impacts on mountain tourism in Mexico focus on redistributions of tourism resources and flows at larger spatial scales (e.g., Scott, McBoyle, & Schwartzentruber, 2004; Hamilton, Maddison, & Tol, 2005; Amelung, Nicholls, & Viner, 2007).

### **Indigenous Communities**

Climate change will affect people in different ways because, “climate change vulnerability depends on who you are, where you are and what you do” (Aryal, Cockfield, & Maraseni, 2014, p. 193). Indigenous people, who are often dependent on natural resources for their livelihoods, are some of the most vulnerable to negative impacts of climate change (Aryal, Cockfield, & Maraseni, 2014; Bardsley & Wiseman, 2012; Brown, Smit, Somorin, Sonwa, & Nkem, 2014; Devkota, Maraseni, Cockfield, & Devkota, 2013; Xu et al., 2009; Salick & Byg, 2007). Indigenous people in developing countries face greater risks from climate change than do those in developed countries (Ranger & Garbett-Shiels, 2011), and climate change will

exacerbate other threats that indigenous peoples already face, such as cultural erosion due to loss of traditional cultivation practices, loss of traditional ecological knowledge, and out-migration to cities (Kronik & Verner, 2010).

Indigenous people worldwide have often established cultural institutions through generations of practice that have been determined to be a positive factor in their communities' ability to cope with stress and change (Berkes, Colding, & Folke, 2000). Cultural practices, including traditional ecological knowledge and ceremonies, play a valuable role in information sharing, and help establish the cultural institution of an indigenous community (Ross, Pickering Sherman, Snodgrass, Delcore, & Sherman, 2011). In agriculture-based communities where people regularly work the land, community members are able to note changes in environmental patterns. This information is important for enhancing adaptive capacity of indigenous communities, as local knowledge is the foundation of how a SES functions. Thus, the inclusion of local ecological knowledge in climate adaptation planning is critical (Berkes, Colding, & Folke, 2000).

The communities in this study are indigenous, but their culture is fading. No one wears the traditional clothing that used to be typical of the area, and few speak Zapoteco, the native language. Additionally, their culture is threatened by youth outmigration. However, many cultural traditions still exist, especially the unique system of governance, *usos y costumbres* ("uses and customs," in English). It was through this system of governance that the 6 of the 8 communities developed and continue to implement *Expediciones Sierra Norte* as a strategy to retain youth and preserve their cultural practices.



## **Ecotourism**

According to Ceballos-Lascuráin (1993), ecotourism is “environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features—both past and present) that promotes conservation, has low visitor impact, and provides for beneficially active socio-economic involvement of local populations”. Although many ecotourism scholars may not view all of *Expediciones Sierra Norte*’s offerings as truly embracing the concept of ecotourism, the term is used in this dissertation because it is how this indigenously owned and operated company identifies itself. As such, the ecotourism concept used in this dissertation varies from theoretical definitions, despite aspects of ecotourism at *Expediciones Sierra Norte* truly embracing the full theoretical definition. Climate change can directly affect ecotourism through changes in temperature and precipitation, and indirectly affect it through physical changes to the natural areas involved, such as “perceived attractiveness” of mountain vistas (Scott, Jones, & Konopek, 2007, p. 571). Seasonal demand could be affected by changes in temperature, precipitation, and/or alterations in phenological cycles traditionally associated with certain seasons and of particular interest to ecotourists, such as changes in fruiting season of trees that attract birds (Prideaux, Coughlan, & McNamara, 2010). Depending on the expected climate change impacts to a particular area, ecotourism will be affected in different ways. For example, some studies have predicted that tourism will increase in areas where normally cold or cooler temperatures will rise to make outdoor recreation more attractive (Amelung, Nicholls, & Viner, 2007; Ciscar et al., 2011; Scott, Jones, & Konopek, 2007).

Some indigenous peoples have opted to include tourism in their diversification portfolio as a way to provide extra income and support if their other livelihood strategies fail (Kronik &

Verner, 2010). Yet, given the potential for significant impacts to ecotourism in the face of climatic change, understanding the climate-related risks to ecotourism, as well as the resilience of communities facing changes in tourism, is needed. Specifically, understanding how ecotourists perceive potential climate change impacts and how those impacts may affect their travel plans is critical for enabling communities' capacity to adapt to changes in tourism demand.

### **Adaptive Capacity**

The concept of adaptive capacity is commonly used in discussions of climate change and its impacts. It is closely related to other terms often seen with it in the literature, such as adaptability, resilience, and flexibility (Gallopín, 2006; Smit & Wandel, 2006), and can be defined as the ability of a system to learn from the past, co-create new knowledge, use innovative problem solving, retain flexibility, and develop long-term strategies to address problems and opportunities (Folke, Colding & Berkes, 2003). Adaptive capacity can be assessed at any scale (e.g., household, community, business, nation), and its assessment is necessary in a climate change adaptation planning process to help determine what actions an entity might take to reduce potential risk related to future change (Simpson, Gössling, Scott, Hall, & Gladdin, 2008).

The climate change literature is replete with methods and concepts related to the assessment of adaptive capacity (Adger & Vincent, 2005; Brooks & Adger, 2005; Brown et al., 2010; Eakin & Luers, 2006; Engle, 2011; Eriksen & Kelly, 2007; Mijatović, van Oudenhoven, Eyzaguirre, & Hodgkin, 2013; Pelling & High, 2005). Given the specificity of context that adaptive capacity requires, indicators of adaptive capacity are wide ranging and their use depends on the scale at which assessment is desired. However, there has been agreement on some general indicators that could be used in a wide variety of circumstances. Typical indicators of adaptive capacity include: social and economic capital, governance and institutions,

technology, infrastructure, information, knowledge, agricultural and economic diversification, and social norms and values (Adger, 2003; Nelson, Adger, & Brown, 2007; Engle, 2011; Mijatović et al., 2013; Næss, Bang, Eriksen, & Vevatne, 2005; Nielsen & Reenberg, 2010; Robledo, Fischler, & Patiño, 2004).

### **Pueblos Mancomunados Overview**

Mexico is among the top ten countries in international tourist arrivals and is ranked 14th in earnings from tourism (Mexico Tourism Secretary, 2016). While many of Mexico's tourists are bound for the "3S" (i.e., sun, sea, sand; Skoczek, 2003), cultural tourism and nature-based mountain tourism thrive, particularly in southern Mexico, in such states as Oaxaca and Chiapas. The state of Oaxaca, with a capital city of the same name, is nestled in the convergence of three mountain ranges—the Sierra Madre del Sur, Sierra Madre de Oaxaca, and the Sierra Atravesada. The rugged geography from these ranges is responsible for much of the preservation of the area's cultural and biological diversity, enhancing the pull of nature-based tourism to the area.

In the early 1990's, the communities that make up the *Pueblos Mancomunados* developed an ecotourism business, *Expediciones Sierra Norte*, as a way to promote cultural survival through highlighting their culture and their natural resources (see Table 1). Currently, the *Pueblos* receive about 16,000 visitors per year who arrive to enjoy and learn about both natural and cultural resources. Local community members are actively engaged in the ecotourism business. Positions in each community include those of leadership (the ecotourism committees) and those that are service related (e.g., guides, cleaning staff, and cooks). Some positions are voluntary according to the local governance system, and others are paid, providing residents income that they otherwise would not have. For at least some, this allows them to stay in their home villages and partake in traditional activities, helping to maintain their culture. Over 100

kilometers of trails zig-zag between and through the communities, offering visitors the opportunity to engage in a variety of types of touristic ventures from horseback riding and hiking, to wildlife viewing and picking coffee. Many domestic tourists come to mountain bike along the trails, while international visitors usually prefer to hike, view wildlife, or participate in cultural tourism activities such as learning to weave, learning the Zapotec language, or learning about traditional medicines (A. Martínez Pérez, personal communication, August 2013).

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Table 1. Objectives of ecotourism in the *Pueblos Mancomunados*.  
(Source: [www.sierranorte.org.mx](http://www.sierranorte.org.mx))

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- Increase the capacity of community members to protect and administer its natural heritage sustainably
  - Establish a development strategy that promotes the conservation rather than exploitation of natural resources
  - Integrate alternative modes of production and development into traditional community knowledge
  - Generate employment opportunities for members of the community
- 

While some debate exists on whether or not ecotourism in this region has satisfied all of the objectives of the project (Palomino Villavicencio & López Pardo, 2009), the *Pueblos Mancomunados* receive many ecotourists each year who go to explore the natural and cultural resources within the largest intact montane forest of southern Mexico. Various NGOs are working with communities in the central valley of Oaxaca to develop climate change vulnerability assessments and adaptation strategies (WWF, 2013). However, no one is as of yet working with the *Pueblos Mancomunados* on such planning and capacity building activities. Developing countries are more likely to be severely impacted by climate change than developed countries (Ranger & Garbett-Shiels, 2011), and with no climate impact assessments, no evaluations of adaptive capacity, and no adaptation strategies planned, this is a group of communities whose lives and livelihoods are likely vulnerable to the negative effects of climate change.

## **Study Justification**

To date, only a handful of studies have looked at visitors' perceptions of the effects of climate change in nature-based mountain tourism areas, and they are all focused in developed countries (Scott et al., 2007; Prideaux et al., 2010; Richardson & Loomis, 2004). Those studies use different techniques to identify tourists' perceptions. For example, Scott et al. (2007) used a visitors' survey along with regression models using historical climate data to determine the direct and indirect influences of climate change on national park visitation in the western US and Canada. Prideaux et al. (2010) developed their own Climate Change Impacts Model to determine how various climate-related changes will impact tourism in Australia and what adaptation strategies can be used to mitigate them. Richardson and Loomis (2004) estimated the role of climate variables and their effects on visitation at national parks, again in the western US and Canada, using the contingent visitation method.

Predicting tourist flows under a changing climate is difficult (Gössling & Hall, 2006), but is something that is necessary if tourism enterprises are to plan for, and adapt to, environmental changes that occur as a result of a warming planet. Discovering the adaptive capacity of an indigenous community to global changes, as well as resultant changes in a growing economic sector (tourism) is also difficult. Further, there is still little research upon which to assess the impacts of climatic change on nature-based tourism in mountain areas (Scott, 2006), and recent studies of community adaptive capacity in Mexico have focused on impacts to agricultural policy and farmers, not tourism (Luers, Lobell, Sklar, Addams, & Matson, 2003; Eakin, 2005; Saldaña-Zorrilla, 2008).

## Dissertation Overview

This dissertation employs a modified multi-level sequential mixed methods design (Teddlie & Tashakkori, 2009) to address tourism demand, community resilience, and adaptation planning with an indigenous community-based ecotourism organization in the mountains of southern Mexico. Only through the exploration of tourists' future travel decisions and the adaptive capacity of the communities that make up *Expediciones Sierra Norte*, will the ecotourism organization be able to engage in adaptation planning to prepare itself for future climate-related change. Specifically, this study aims to answer the following research questions:

*Research Question 1:* How might climate change and visitors' responses to projected changes affect tourism in the *Pueblos Mancomunados*?

*Research Question 2:* What type of capacity exists in the *Pueblos Mancomunados* for responding to climate-related changes in tourism demand?

*Research Question 3:* What are the key strategies for building climate readiness within the community operated ecotourism business *Expediciones Sierra Norte*?

These research questions are answered in separate chapters that are structured as manuscripts to be submitted to peer-review journal articles. Chapter Two addresses *Research Question 1* by presenting the results of survey research conducted with tourists in the *Pueblos Mancomunados*. Chapter Three addresses *Research Question 2* and assesses community adaptive capacity in the *Pueblos Mancomunados* from community member interview data that were analyzed through the lens of Actor-Network Theory. Chapter Four addresses *Research Question 3* by presenting the ORID process employed in community outreach and engagement workshops and an adaptation planning workshop with *Expediciones Sierra Norte*, and is the culmination of

the previous two studies. Chapter Five is a discussion chapter of the key findings and implications of the dissertation research and process. Brief overviews of Chapters Two, Three, and Four are provided below.

Chapter two, addressing *Research Question 1*, presents the results of survey research conducted with tourists in the *Pueblos Mancomunados*. The survey instrument was developed from the literature and initial semi-structured interviews of tourists and community members. It incorporated this information with climate projections into two hypothetical, yet plausible, future scenarios from which tourists were asked questions about future visitation. Other questions examined tourists' travel decisions (i.e., pull factors) and focused on the importance of nature and culture to their decisions. Non-parametric statistical analyses were run to explore tourists' decisions and relationships between different types of tourists. Key findings include the importance of nature *and* culture to ecotourists of all types in the *Pueblos Mancomunados*, but also of note is the preference of domestic tourists to ease of travel over culture, signifying that perhaps cultural saturation has been reached for domestic tourists. Perhaps the most important implication is that a significant number of respondents stated they would change their plans to visit under scenario two, likely creating a change in tourism flows for which *Expediciones Sierra Norte* will want to plan.

Chapter Three addresses *Research Question 2* and analyzes community adaptive capacity in the *Pueblos Mancomunados* through the lens of Actor-Network Theory. Data generated through semi-structured interviews of community members and members of the ecotourism committees within each of the participating pueblos detailed the strengths and weaknesses in the *Pueblos Mancomunados* regarding adaptive capacity. Actor-Network Theory provided a robust analysis and this is the first time it has been used as a theoretical framework for analyzing

adaptive capacity in a tourism organization. Findings indicate that the *Pueblos Mancomunados* possess strong social capital and are somewhat resilient to climate change, but both are weakening with out-migration. The greatest implication from this is that out-migration could affect the culture and environment of the *Pueblos Mancomunados* more than climate change.

Chapter Four addresses *Research Question 3* and is the culmination of the previous two studies. It utilizes ORID, a method used to encourage group discussion and collect local knowledge, to facilitate a participatory adaptation planning process with community members and with the ecotourism committees. Using observation, reflection, interpretation, and decision questions (ORID) workshop participants in five communities identified their most important tourism assets, reflected on what threats climate change poses to them, and decided what types of adaptation actions *Expediciones Sierra Norte* and the communities could take to increase resiliency and adaptive capacity in their communities and tourism organization. At the end of this process, *Expediciones Sierra Norte* had a list of prioritized objectives to help the ecotourism organization begin writing an adaptation plan. While specific to the culture, climate, and unique concerns of this area, many of the results and techniques from this research can be productively applied to research on adaptive capacity and adaptation planning in other community-based ecotourism organizations in other parts of the world.



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## **Chapter 2: Tourists' perceptions of climate change impacts in a mountain tourism destination in southern Mexico**

### **Introduction**

The current and potential effects of climate change on the tourism industry, in terms of changes to natural attractions and shifts in the length and quality of available seasonal activities, are well documented (Amelung, Nicholls, & Viner, 2007; Ciscar et al., 2011; Field et al., 2007; Richardson & Loomis, 2005; Scott, Jones & Konopek, 2007). However, the bulk of extant research has focused on ski and beach tourism, where measurable environmental changes linked to climate change have direct and dramatic effects on tourism revenue. Although non-ski and nature-based mountain tourism accounts for almost 20% of tourism worldwide and represents an increasingly important sector of the industry (Scott et al., 2008), there is a dearth of research on the effects of climate change on tourism in these locales. The vast majority of existing studies that address climate change and mountain tourism focus on sites in Europe or Asia and often analyze data concerning season length, habitat and species impacts, and other aspects of tourism that ignore human dimensions (for a review, see Palomo, 2017). Although important for determining potential impacts of climate change *in situ*, these site-based findings from research conducted in European and Asian mountain tourism sites may not necessarily translate to comparable tourism destinations in the Americas due to differences in pull factors (i.e., attributes that attract tourists; Klenosky, 2002) in different regions, such as culture and ecology. Additionally, the focus in most of these studies leaves unaddressed the perceptions of the tourists themselves concerning climate change impacts and the pivotal role these perceptions play in their decision-making processes.

Knowing tourists' perceptions is important for tourism-related businesses to plan successfully for potential changes in tourism flows due to a changing climate. As pointed out by

Gössling, Scott, Hall, Ceron, and Dubois (2012), understanding how tourists' beliefs about the effects of climate change might impact their travel and recreational activity decisions is “essential to anticipating the potential geographic and seasonal shifts in tourism demand, as well as the decline or increase of tourism markets” (p. 37). The range of beliefs that tourists hold concerning the impacts of climate change on potential destination sites has received limited attention (Scott, 2006), and the importance that tourists give these considerations in making travel decisions is, to date, an understudied phenomenon. Thus, there remains a gap between what researchers know of tourists' perceptions of climate change impacts and how these perceptions affect travel choices, particularly at non-ski mountain tourism sites. This study, conducted within the tourist destination of the *Pueblos Mancomunados* in the mountains of southern Mexico, aims to fill that gap and identify important pull factors and how climate change impacts might affect their travel decisions.

## **Literature Review**

### **Climate change in mountain regions of Mexico**

The Intergovernmental Panel on Climate Change has recognized that one of the greatest dangers to mountain tourism is climate change (Field et al., 2007). Although climate science is enabling projections of the severity of ecological change in mountainous regions, the topographical complexity of these regions complicates the study of climate change impacts in them (Gilbert & Vincent, 2013; Gobiet et al., 2014; Zubler et al., 2014). Of the recent global studies that have addressed the challenge of climate change impacts in mountainous regions, most are focused on ecosystems or a particular species or group of species (Krishnaswamy, John, & Joseph, 2014; Wang, Fan, & Wang, 2014; Rojas-Soto, Sosa, & Ornelas, 2012). More attention is now being given to human dimensions of climate change impacts in mountains (e.g., Aryal,

Cockfield, & Maraseni, 2014; Garbarino et al., 2014; Luthe, Wyss & Schuckert, 2012; McDowell et al., 2012; Pandey & Bardsley, 2013; Xu & Grumbine, 2014), but this human dimensions research is under-represented in the literature, particularly in developing countries (McDowell, Ford, Lehner, Berang-Ford, & Sherpa, 2012; Palomo, 2017).

A few scholars have assessed the impacts of climate change on nature-based tourism in mountain areas (Scott, 2006), including research on tourists' perceptions of the impacts of climate change on nature-based tourism in mountainous regions (Scott, Jones, & Konopek, 2007; Richardson & Loomis, 2004) and how those changes might affect visitation (Gössling & Hall, 2006b). There is also limited research on how community-based tourism enterprises will adapt to these changes (Gössling & Hall, 2006a). Scott (2006) states that “research on visitor responses to environmental change needs to be conducted in mountainous regions around the world, particularly in developing nations where tourism is a vital component of local or regional economies” (p. 72). To date, studies of climate change impacts on mountain tourism at sites in Mexico focus on redistributions of tourism resources and flows at larger spatial scales (e.g., Scott et al., 2004; Hamilton et al., 2005; Amelung et al., 2007).

The *Pueblos Mancomunados*, or “Commonwealth Communities”, are a group of eight indigenous communities located in the Sierra Norte region of the Sierra Madre de Oaxaca Mountains in the Mexican state of Oaxaca. Following social and political traditions linked to their Zapotec culture, the natural resources of these communities are managed communally and the indigenous inhabitants of six of these have invested a large amount of collective energy and capital in developing a nature-based tourism business. With elevations ranging from 1200 meters above sea level to 3300m, biodiversity in the different ecosystems found among the *Pueblos* is extraordinarily high and provides a recreational focus for visitors. Persistent, low-level cloud

cover over much of the higher elevation forests provides habitats for many endemic species of flora and fauna, but these cloud forests are extremely vulnerable to long-term changes in seasonal temperatures and rainfall (Rojas-Soto, Sosa, & Ornelas, 2012).

Climate change models predict that mountainous regions, including the *Pueblos Mancomunados*, are expected to warm much more rapidly in the 21<sup>st</sup> century than in the 20<sup>th</sup>, due to fragile ecosystems and complex topography (Nogués-Bravo, 2007). Multiple studies demonstrate that this accelerated warming will lead to a wide decline in biodiversity (Forero-Medina, Joppa, & Pimm, 2011; Rojas-Soto, Sosa, & Ornelas, 2012; Ruiz-Labourdette, Nogués-Bravo, Ollero, Schmitz, & Pineda, 2012). Research also shows that developing countries like Mexico are more likely than developed countries to have a higher vulnerability to the negative effects of climate change, due to factors such as higher dependence on climate-sensitive economic activity (e.g., rain-fed agriculture) and limited adaptive capacity due to weaker governmental institutions (Ranger & Garbett-Shiels, 2011). In addition, indigenous peoples' dependence on natural resources for their livelihoods can increase vulnerability to climate change impacts (Aryal, Cockfield, & Maraseni, 2014; Bardsley & Wiseman, 2012; Kronik & Verner, 2010).

### **Climate change and indigenous communities**

Climate change will affect people in different ways because, “climate change vulnerability depends on who you are, where you are and what you do” (Aryal, Cockfield, & Maraseni, 2014, p. 193). Indigenous people, who are often dependent on natural resources for their livelihoods, are some of the most vulnerable to negative impacts of climate change (Aryal, Cockfield, & Maraseni, 2014; Bardsley & Wiseman, 2012; Brown, Smit, Somorin, Sonwa, & Nkem, 2014; Devkota, Maraseni, Cockfield, & Devkota, 2013; Xu et al., 2009; Salick & Byg,

2007). People in developing countries face greater risks from climate change than do those in developed countries (Ranger & Garbett-Shiels, 2011), and climate change will exacerbate other threats that indigenous peoples already face, such as cultural erosion due to loss of traditional cultivation practices, loss of traditional ecological knowledge, and out-migration to cities (Kronik & Verner, 2010). Kronik and Verner (2010) identified five key changes—specifically, rising temperatures, rising sea surface temperatures, increase in the frequency and severity of natural hazards, changes in precipitation patterns, and rising sea levels—occurring in Latin America from climate change and associated environmental and social impacts to indigenous peoples (see Table 1).

Table 1. Key climate change challenges in Latin America and some of their expected impacts (From: Kronik & Verner, 2010).

<b>Key Challenges</b>	<b>Environmental Impacts</b>	<b>Social Impacts</b>
1. Rising temperatures	<ul style="list-style-type: none"> <li>a. Melting glaciers</li> <li>b. Altered range of disease vectors</li> <li>c. Changes in crop production (e.g. range &amp; yield)</li> </ul>	<ul style="list-style-type: none"> <li>a. Changed water regimes for agriculture and livestock</li> <li>b. Possibly more humans at risk from malaria and other mosquito-borne diseases</li> <li>c. Traditional crops could be at risk of not growing; general food production; food security</li> </ul>
2. Rising sea surface temperatures	<ul style="list-style-type: none"> <li>a. Changes in fish stocks, coral reefs and mangrove forests</li> </ul>	<ul style="list-style-type: none"> <li>a. Affect livelihood of those who depend on them</li> </ul>
3. Increases in frequency/severity of natural hazards (e.g. hurricanes)	<ul style="list-style-type: none"> <li>a. Changes in crop production</li> <li>b. Destruction of natural resources (forests, reefs) &amp; production systems</li> </ul>	<ul style="list-style-type: none"> <li>a. Leads to food insecurity</li> <li>b. Leads to food insecurity &amp; inability to use resources</li> </ul>
4. Changes in precipitation amounts & patterns	<ul style="list-style-type: none"> <li>a. Droughts</li> <li>b. Floods</li> </ul>	<ul style="list-style-type: none"> <li>a. Food insecurity &amp; risk of vector-borne disease</li> <li>b. Food insecurity &amp; risk of vector-borne disease</li> </ul>
5. Rising sea level	<ul style="list-style-type: none"> <li>a. Increased flooding &amp; storm surge</li> <li>b. Saltwater intrusion</li> </ul>	<ul style="list-style-type: none"> <li>a. Affects homes &amp; production systems</li> <li>b. Contaminates drinking water aquifers</li> </ul>

Indigenous people worldwide have often established cultural institutions through generations of practice that enhance their communities' ability to cope with stress and change (Berkes, Colding, & Folke, 2000). Cultural practices, including traditional ecological knowledge and ceremonies, play a valuable role in information sharing and help establish the cultural institution of an indigenous community (Ross, Pickering Sherman, Snodgrass, Delcore, & Sherman, 2011). Yet, climate change has the potential to negatively affect these indigenous



cultural institutions through a variety of impacts including glacial decline, change in hydrological regimes, or a change in traditional agricultural practices that are climate-dependent (Palomo, 2017; Waila, Mahero, Namusisi, Hoffman, & Robertson, 2018). In many tourism destinations, culture plays an important role in attracting tourists; however, studies of cultural heritage climate adaptation are scant (Fatorić & Seekamp, 2017). Thus, climate change can doubly impact indigenous communities that engage in tourism by altering traditional cultural practices and ecotourism attractors.

### **Climate change and ecotourism**

Ecotourism usually integrates natural and cultural heritage protection through recreational and educational opportunities organized around showcasing and protecting localized ecosystems that contain interesting or unique terrain, flora, or fauna (Orams, 1995). Marketed to visitors as a way of enjoying the attractions of a site without damaging the elements that make the site compelling, this type of tourism has been touted as a strategy for conservation and economic development (Nyaupane et al., 2006). However, the ability for ecotourism to provide sustainable livelihoods and protect resources requires development models that incorporate direct participation of local populations who are, ideally, already invested in maintaining the stability of the local environment (Barkin, 2000). The indigenous inhabitants of mountainous regions of Mexico, with long-held traditions of corporate decision-making and dependence on local ecological stability, are ideally positioned for this type of tourism development. However, successful ecotourism operations in mountain regions must not only be driven by local interests but must also be resilient to climate-related change, as this represents one of the greatest dangers to mountain tourism (Field et al., 2007).

Ecotourism, by definition, takes place in natural areas (Ceballos-Lascurain, 1993). As such, ecotourism operations are particularly vulnerable to climate change. Climate change can directly affect ecotourism through alterations to the temperature and precipitation ranges required by the flora or fauna that tourists come to see. Climate change can also have an indirect effect on ecotourism sites through physical changes to the natural areas involved, such as “perceived attractiveness” of mountain vistas (Scott, Jones, & Konopek, 2007, p. 571), which can impact a tourist’s decision to visit. Expected seasonal demand for access to ecotourism sites and attractions could be disrupted by climate change-induced alterations in the phenological cycles traditionally associated with certain seasons, and of particular interest to ecotourists, such as changes in fruiting season of trees that attract birds (Prideaux, Coughlan, & McNamara, 2010) or changes in fall color in the northeastern United States (Archetti, Richardson, O’Keefe, & Delpierre (2013). Climate change-related alterations in bird migratory patterns have already been documented (Botero, Weissing, Wright, & Rubenstein, 2015; Both & Marvelde, 2007; Gordo, 2007; Şekercioğlu, Primack, & Wormworth, 2012).

Ecotourism also typically includes some type of cultural experience or interaction, and many ecotourism destinations promote the importance of culture and nature to attract tourists who value both (Bjork, 2000; Fennell, 2001). A study of international tourists to New Zealand revealed that, “individuals favouring nature-based activities often also have a propensity for ... cultural activities” (Feiger, Prayag, Bruwer, 2017; p. 7). In the Great Lakes region of the United States, just over a third (35.5%) of outdoor tourists surveyed reported also engaging in historic or cultural tourism (Smith, et al., 2016). In the context of national parks in Germany, Butzmann and Job (2017) concluded that one category within their tourism product typology should be renamed to “occasional nature experience” so that it can include cultural tourism. Indeed, according to

Mehmetoglu (2007), cultural tourism and nature-based tourism are so closely intertwined it is often not necessary to distinguish between the two.

All forms of tourism entail the choice of an international or domestic visit. International tourism travel is often planned further in advance than domestic travel (Falk, 2013; Taylor & Ortiz, 2009) and often involves travel by air (Becken, 2002). Reasons for choosing international over domestic travel, or vice versa, are myriad and can be based on factors such as home country climate, destination offerings, or cost (Eugenio-Martín & Campos-Soria, 2010; Nunes, Cai, Ferrise, & Moriondo, 2013). When considering the potential for climate-related changes to these factors, some tourists may opt to modify their travel plans (Scott, Jones, & Konopek, 2007). Future tourists will most likely be attracted to cooler destinations instead of warmer ones (Bigano, Hamilton, & Tol, 2006), and tourists from countries with a temperate climate will be more likely to choose domestic travel than international (Rosselló-Nadal, 2014).

Some indigenous communities, traditionally dependent on natural resources for their livelihood, are beginning to include ecotourism in their diversification portfolios as a way to provide extra income and support if some of their crops fail (Kronik & Verner, 2010). Yet given the potential for significant impacts to ecotourism in the face of climatic change, these communities have a need for understanding not only the climate-related risks to ecotourism but also their options for adapting to climate-related changes in tourism patterns. A critical component of this information is an understanding of how ecotourists perceive potential climate change impacts and how those impacts may affect their travel plans. This knowledge is essential for enabling indigenous communities to successfully adapt their ecotourism enterprises to accommodate potential changes in tourism demand.

## Research Questions

This study's objectives are to identify tourists' perceptions of climate impacts on a specific ecotourism destination, the *Pueblos Mancomunados*, and explore how those perceptions, as well as the expected changes to climatic and environmental conditions, will impact future travel decisions. The overarching questions of the research are:

- 1) *What are the primary pull factors that bring tourists to the Pueblos Mancomunados?*
- 2) *What are the primary pull factors for different types of tourists (i.e., festival-goers and non-festival goers, and domestic and international visitors)?*
- 3) *How will future climate scenarios affect tourists' decisions to visit, particularly in relation to trip timing and duration?*
- 4) *Are there any differences between different types of tourists and their reported behavioral responses to the different climate scenarios?*

## Contextual Overview

According to the Mexican Tourism Board, Mexico is among the top ten countries in international tourist arrivals and is ranked 17th in earnings from tourism (Mexico Tourism Board, 2013). While many of Mexico's tourists are bound for the "3S" (i.e., sun, sea, sand; Skoczek, 2003), cultural tourism and nature-based mountain tourism thrive, particularly in the states of Oaxaca and Chiapas in southern Mexico. Southern Mexico is as diverse geographically as it is biologically and culturally. Nestled among the three mountain ranges of the Sierra Madre del Sur, Sierra Madre de Oaxaca and the Sierra Atravesada, the state of Oaxaca is considered to be the most biologically diverse in the nation (Foucat, 2002). Oaxaca is also rich in cultural diversity, with the second highest number of indigenous people in Mexico. The National Commission for the Development of Indigenous Peoples recognizes at least thirteen different

indigenous cultures in the state (CDI, 2013). In their IUCN report, Duran, Robson, Briones-Salas, Bray and Berkes (2012) explained the links between biodiversity conservation and indigenous ecotourism. They found that Indigenous and Community Conservation Areas form an important part of the conservation landscape by preserving cultural, agricultural, and biological diversity.

The state of Oaxaca, with a capital city of the same name, is nestled among three mountain ranges: the Sierra Madre del Sur, Sierra Madre de Oaxaca and the Sierra Atravesada (Figures 1 & 2). The rugged geography from these ranges is responsible for much of the preservation of the area's cultural and biological diversity, key pull factors for ecotourism in the region. The indigenous groups of Oaxaca are traditionally agrarian, with a thorough and practical knowledge of their local natural resources (Luna-José & Aguilar, 2012). Many of these groups also maintain traditional art and craft practices that have for some time involved many individuals and families in commercial networks catering to the vibrant tourism sector centered in the capital city of Oaxaca (Goertzen, 2010). Most individuals from indigenous Oaxacan communities today engage in subsistence agriculture, although this pattern is changing due to such factors as out-migration and globalization (Robson & Berkes, 2011). Many young men and women from these communities have migrated to large cities in other states or to other countries in search of reliable income (Wohlgemuth, 2014; Robson & Wiest, 2014). In the early 1990's, six of the eight "commonwealth communities" within the *Pueblos Mancomunados* region made the collective decision to form an ecotourism business with the hopes of creating jobs to protect their culture and stem out-migration, as well as provide more reasons to protect their abundant natural and cultural resources. They established a development strategy that promotes conservation, rather than the exploitation of natural resources, while generating employment

opportunities for community members (A. Martínez Pérez, personal communication, August 23, 2013).



Figure 1. General location of study area.



Figure 2. The communities that make up the Pueblos Mancomunados.

This collective tourism development endeavor, established as the business *Expediciones Sierra Norte*, has grown and become a model of community-based tourism in the Americas. *Expediciones Sierra Norte* currently hosts about 16,000 tourists per year. Local community members engage in the tourism business in a variety of ways. The most common types of positions are guides and hospitality-related positions including, food preparation workers, and janitorial service workers. All communities have an ecotourism coordinator, and most have an

assistant. Variations occur between the different communities in the types of positions needed and the remuneration strategy for those positions. Some communities retain paid positions, others use predominantly workers performing voluntary (unpaid) community service who work only for tips, and others use both where some positions perform voluntary community service and others are on reserve for high season and are paid only when used.

With over 100 kilometers of trails between and through the communities, visitors engage in a variety of activities from horseback riding and hiking, to wildlife viewing and picking coffee. Many domestic tourists come to mountain bike along the trails, while international visitors usually prefer to hike, view wildlife, or participate in cultural tourism activities such as learning to weave, learning the Zapotec language, or learning about traditional medicines (A. Martínez Pérez, personal communication, August 2013). While some debate exists on whether or not ecotourism in this region has satisfied all of the objectives of the project (Palomino Villavicencio & López Pardo, 2009), *Expediciones Sierra Norte* continues to grow in the number of tourists hosted and activities offered, frequently updating its tourism packages to attract more visitors. It has also developed a summer internship program through which students from Mexican universities gain skills and assist in developing new tourism offerings. Additionally, *Expediciones Sierra Norte* capitalizes on the popularity and proximity of the *Guelaguetza*, an internationally renowned traditional dance festival that takes place in the city of Oaxaca, by hosting two of its own festivals that correspond with the timing of the *Guelaguetza*. With the ecotourism office being located in Oaxaca, the business can widely publicize the festivals and offer special promotional packages for tourists interested in attending. The festivals are located in Cuajimoloyas and Latuvi, which are as close as two hours to downtown Oaxaca.



Cuajimoloyas, the most visited of the *Pueblos Mancomunados*, hosts a mushroom festival and Latuvi hosts an apple festival.

### **Research Methods**

On-site survey research methodology was used in this study to intercept visitors traveling within the *Pueblos Mancomunados*, as well as those attending one of the festivals. The survey questionnaire was designed to elicit the importance of key pull factors and the ways in which visitors may change their travel behaviors given alterations to the climatic and environmental conditions of the region, using a contingent visitation analysis to estimate changes in future tourism demand. It was also designed to determine if pull factors and contingent behaviors differ depending on tourist type (i.e., domestic versus international tourists, and festival goers-versus non-festival goers). The contingent behavior model has been used in various studies on tourists' perceptions and climate change (Becken et al., 2010; Brownlee, Hallo, Wright, Moore, & Powell, 2013; Richardson & Loomis, 2004; Scott et al., 2007).

### **Sampling**

Researchers utilized convenience sampling methods to intercept visitors on-site at various locations throughout the *Pueblos Mancomunados*. This sampling method was chosen due to the dispersed nature of tourists and tourism activities in the region. During a four-week period of data collection in July 2015, two researchers stayed in the *Pueblos Mancomunados* and intercepted tourists at popular attractions, restaurants, and ecotourism offices, as well as at the two large festivals (Table 3). These locations were determined during a preliminary visit in December 2014 and in conversations with the ecotourism coordinator and other members of the ecotourism offices. Tourists were approached at sampling locations and asked if they would like to participate in the study.

*Table 3. Sampling locations for administering surveys in the Pueblos Mancomunados.*

<b>Cuajimoloyas</b>	<i>Expediciones Sierra Norte</i> ecotourism office Central plaza during mushroom festival Forest location of mushroom festival Two restaurants
<b>Benito Juárez</b>	<i>Expediciones Sierra Norte</i> Ecotourism office Main restaurant El Mirador/Zipline
<b>Llano Grande</b>	<i>Expediciones Sierra Norte</i> Ecotourism office Main restaurant Lodge complex
<b>Latuvi</b>	<i>Expediciones Sierra Norte</i> Ecotourism office Main restaurant Central plaza location of apple festival
<b>La Nevería</b>	Lodge complex
<b>Amatlán</b>	Lodge complex Main restaurant

## Instrument

A paper survey instrument was developed in English and Spanish based on existing literature, expert review, and structured interviews with tourists in December 2014. It was pilot tested on native and non-native speakers of both languages prior to data collection with necessary changes made to enhance clarity, reduce burden, and increase the likelihood of completion. The survey instrument included items designed to identify patterns in tourism, key factors that draw tourists to the Pueblos, and responses to projected climate change impacts on the area, among other questions not reported in this paper.

Trip purpose was first measured by determining if attending a festival was the primary reason for the visit (binary response option), and then asking respondents to indicate the importance of several decision factors related to tourism (7-point Likert-type scale, anchored at not at all important and extremely important). The factors were determined from conversations with tourists and *Expediciones Sierra Norte* staff during the preliminary visit in 2014 and included *Temperature, Rain, Biodiversity, Extent of forest fires, Extent of cloud forest, Zapotec*

*culture, Ease of travel to/within the Pueblos Mancomunados, Working landscapes, and Natural beauty.* Short definitions were provided for technical words include in the scale (i.e., *Biodiversity, Working landscapes*). Another series of two questions sought to assess the pull factors of cultural activities relative to nature-based activities, using a nine-point semantic differential scale. The first question measured which attracted them to the *Pueblos Mancomunados* the most, the environment or the culture. The second question asked them to distinguish between the natural environment and the working landscapes in terms of importance related to their decision to visit. Both questions were asked twice to assess which was more important when this visit was planned and which would be more important in planning a future trip. Working landscapes were defined as visible agriculture or use of forest products. To assist with analysis these data were transformed by condensing responses of one through three into “culture” or “natural environment,” respectively, responses four through six into “equally important,” and responses seven through nine into “environment” or “working landscape,” respectively.

To determine how tourists’ perceptions of climate change impacts affect their decisions, we employed the contingent visitation method of data collection. Similar to Scott, Jones, and Konopek (2007), we developed a table of two different hypothetical yet plausible scenarios describing potential future impacts of climate change on the *Pueblos Mancomunados* environment and attractions. Respondents were asked to rate the likelihood of future visits to the site based on these two hypothetical scenarios. The survey included a table describing current climatic and environmental conditions and two different future scenarios (Figure 3). The future scenarios used in the survey instrument were developed from data provided by a custom climate data server created by the USDA Forest Service and Virginia Tech (Crookston and Rehfeldt,

2008). We used an ensemble of global climate models (GCMs) to provide a more robust estimate of climate change (Kreienkamp, et al, 2012) and the Representative Concentration Pathway forcing scenario of 8.5 W/m<sup>2</sup> (RCP 8.5) for the years 2030 (scenario one) and 2060 (scenario two) to reflect a future based on increasing greenhouse gas concentration levels,<sup>2</sup> similar to rates of increase being experienced now (Riahi et al, 2011). These future dates were not revealed to the tourists surveyed.

	Current Conditions	Scenario 1	Scenario 2
Average maximum temp in warmest month (April)	21°C (70°F)	23°C (73°F)	24°C (75°F)
Average maximum temp in coolest month (January)	17°C (63°F)	18°C (64°F)	19°C (66°F)
Seasonal variation (Oct-April)	Cool & sunny	Warmer & sunny	Warm & sunny
Season variation (May-Sept)	Cold & moderately rainy	Cold & moderately rainy	Cool & less rain
Biodiversity (plants & animals)	High - over 1,870 species present	Fewer overall numbers & species	Far fewer overall numbers & species
Occurrence of forest fires (in the state of Oaxaca)	Average of 257 fires per year, with 44,000 Ha or more burned in a bad year	Somewhat higher chance for more fires	Much higher chance for more fires
Extent of cloud forest (in the state of Oaxaca)	516,000 Ha (1.28 million acres)	Moderate decrease	Large decrease

Figure 3. Scenarios table from survey instrument.

The variables that described ‘*Seasonal variation*’ were worded to make them easier to understand thus reducing response effects (Tourangeau, Rips, & Rasinski, 2000). The variable ‘*Biodiversity*’ included the number of species of plants and animals native to the state of Oaxaca (Binford, 1989; Ceballos et al., 1998; Myers et al., 2000; Foucat, 2008; McAndrews and Montejó Diaz, 2010; Soto and Brena, 2011). A ‘*bad year*’ for occurrence of forest fires was defined as years with at least 44,000 hectares burned--the top 10% of fire size in Oaxaca over the past 20 years (CONAFOR, 2017). Current and future estimations of the extent of cloud forest were based on available measurements and projections (Rojas-Soto, Sosa, & Ornelas, 2012). Lack of detailed information on forest fires and cloud forest extent for the region precluded more comprehensive descriptions in the scenarios table.

To understand tourists’ perceptions of how these alternative climate futures might impact their decisions to return, the survey included a series of questions that asked them to look at the table and then determine their behavioral response (i.e., “*Would you change your [travel] plans?*”, with response categories of *No*, *Maybe*, and *Yes*). Respondents who answered *Maybe* or *Yes* were instructed to then answer questions on length of stay (“*Would you stay...?*” *Longer*, *Shorter*, *No Change*) and the number of days they would stay shorter, longer, or no change. The survey also included questions about current length of stay (with response options of either *For the day* and *For more than one night*, which was followed by an open-ended response for entering the number of nights). Additionally, the survey included questions to record prior visitation, the *pueblos* visited during the current trip, and the types of activities during the current trip. The survey concluded with a series of demographic questions that included sex, age, origin and number in party.

## **Analysis**

After concluding sampling, results were entered into an Excel spreadsheet, cleaned, and uploaded to SPSS v. 24. Due to the ordinal nature, and the non-normal distribution, of most of the responses, we performed non-parametric statistical analyses. Specifically, Wilcoxon Signed Rank Tests, Mann Whitney U Tests, and a Kruskal-Wallis Test to test for statistically significant differences in response options *yes*, *no*, and *maybe* (Moss, Seekamp, & Sparling, 2013).

## **Results**

During data collection, 238 requests were made to take the survey with 32 refusals, giving a response rate of 74%. Of those that were returned, 188 were used in the analyses (23 were removed for missing data). The majority of refusals (29, or 91%) were from festival goers who didn't want to take the survey due to time constraints. Although a non-response bias check was not conducted, the proportion of international and domestic tourists included in our sample reflects a similar proportion to the annual visitation numbers reported by *Expediciones Sierra Norte*. Of note was the fact that another researcher was sampling tourists at the same festivals, and it is likely that there was survey fatigue among festival tourists (Porter, Whitcomb, & Weitzer, 1981).

### **Tourist characteristics**

According to data provided by *Expediciones Sierra Norte*, approximately 70% of their tourists are domestic and 30% are international. This was in agreement with survey results (67% domestic, 33% international). The survey data revealed the median age of respondents to be 37 years old. About 48% were female, 67% were domestic travelers, and about one-half were returning visitors (51%). The returning visitors were overwhelmingly domestic tourists (91%). The majority of respondents (92%) were staying in the *Pueblos Mancomunados* five days or less

(52% of total sample were day visitors), and most were planning to visit just two communities (60%), predominantly Cuajimoloyas (67%) and Benito Juárez (52%) (Figure 4). Over 75% of respondents were planning on hiking during their visit and 28% planning to partake in cultural activities. Just over one-third of the sample (37%) planned to partake in festival activities (i.e., festival goers).

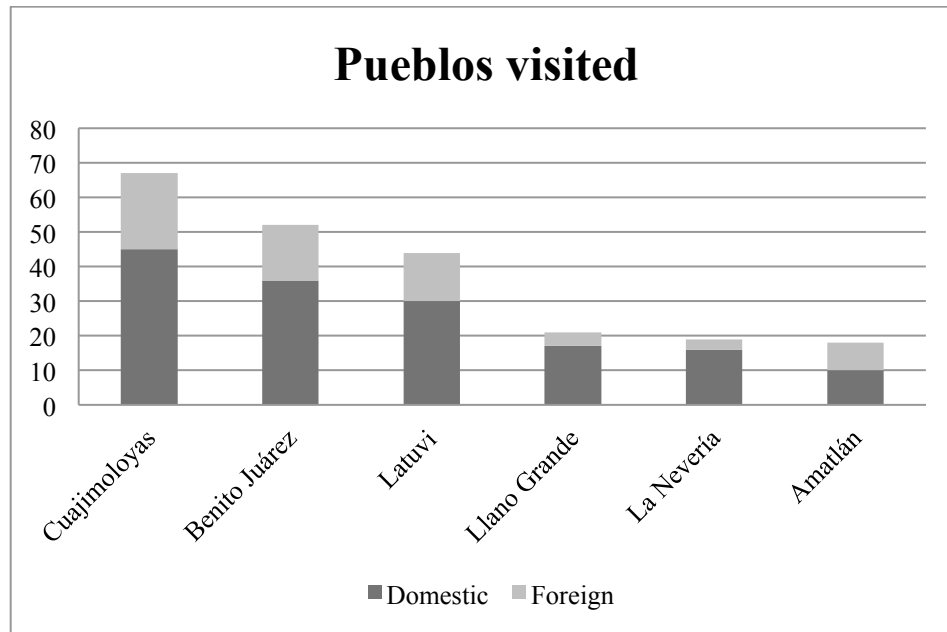


Figure 4. Percentage of tourists (domestic and foreign) who visited each pueblo on this trip (Many tourists visited more than one pueblo, will not total 100%).

### Visitor type and decisions to visit

Survey responses identified natural beauty ( $\bar{x} = 6.6, SD = 0.96$ ), biodiversity ( $\bar{x} = 6.0, SD = 1.40$ ), and the Zapotec culture ( $\bar{x} = 5.5, SD = 1.56$ ) as the three most important factors tourists considered when deciding to visit the *Pueblos Mancomunados* (Table 4). To determine differences between tourist types (i.e., festival tourists and non-festival tourists, international and domestic), we compared means from each group and found that both festival tourists and domestic tourists consider all variables more important than do non-festival tourists and international tourists. A Mann Whitney U Test revealed a statistically significantly higher

importance of culture in the decision to visit for festival tourists (Md = 6,  $n = 91$ ) than for non-festival tourists (Md = 5,  $n = 91$ ),  $u = 3401$ ,  $z = -2.146$ ,  $p = .03$ ,  $r = .16$  (small effect size), and it was the only variable in which there was a statistically significant difference between the two groups (Table 4). A Mann Whitney U Test comparing international and domestic tourists revealed that all variables—temperature, rainfall, biodiversity, fire, cloud forest, ease of travel, working landscapes, and natural beauty—*except* culture were found to have a statistically significant higher importance for domestic visitors than for foreign tourists when making a decision to travel (Table 4).

Table 4. Decision factors and tourist type.

Decision factor	Total sample			F		NF		MW U* <sup>1</sup>	D	I		MW U <sup>1</sup>	
	n	x	SD	x	SD	x	SD	p (r)	x	SD	x	SD	p (r)
Temperature	182	4.34	1.94	4.47	1.96	4.2	1.92	3768 0.282 (0.08)	4.71	1.99	3.59	1.68	2383 <.01 (0.27)
Rain	177	4.35	1.81	4.51	1.61	4.19	1.98	3646 0.417 (0.06)	4.79	1.72	3.48	1.71	2108 <.01 (0.31)
Biodiversity	182	6.04	1.40	6.16	1.27	5.91	1.51	3820 0.322 (0.07)	6.32	1.32	5.46	1.39	1949 <.01 (0.40)
Extent of fire	173	3.42	2.11	3.48	2.17	3.37	2.07	3608 0.682 (0.03)	3.65	2.17	2.89	1.82	2586 <.05 (0.17)
Extent of cloud forest	179	4.88	1.93	5.07	1.89	4.70	1.97	3590 .221 (0.09)	5.21	1.85	4.25	1.91	2398 <.01 (0.24)
Culture	182	5.45	1.56	5.67	1.50	5.23	1.60	3401 <b>0.032</b> (0.16)	5.54	1.64	5.33	1.41	3008 0.11 (0.12)
Ease of travel	182	5.28	1.69	5.46	1.65	5.11	1.71	3619 0.132 (0.11)	5.58	1.64	4.64	1.62	2275 <.01 (0.30)
Working landscapes	182	5.10	1.83	5.29	1.73	4.90	1.91	3665 0.171 (0.10)	5.40	1.74	4.43	1.84	2367 <.01 (0.27)
Natural beauty	184	6.63	0.96	6.70	0.82	6.55	1.08	4001 0.374 (0.07)	6.78	0.74	6.29	1.25	2600 <.01 (0.31)

F=festival tourist; NF=Non-festival tourist; D=Domestic tourist; I=International tourist

\*Mann Whitney U statistics are rounded

<sup>1</sup>Mann-Whitney U test (Z) significant at the  $p < .05$



When asked whether they were attracted more to the culture or the environment when “planning this visit” to the *Pueblos Mancomunados*, more respondents chose the environment (39.4%) than culture (18.1%). Close to one-half of respondents (42.6%) felt that culture and environment were equally important in their travel decisions for this visit. Over one-half of respondents (58.4%) indicated that the natural environment was more important to their decision to visit the *Pueblos Mancomunados* than were working landscapes. Almost one-third (29.7%) of respondents thought they were equally important for planning this visit. A relative small percentage of respondents (11.8%) felt working landscapes were more important than the natural environment. Respondents were also asked how important these factors (culture/environment and natural environment/working landscapes) would be if they “planned another trip” to the *Pueblos Mancomunados*. There was little change in all response categories. Environment (34.8%) was more important than culture (18%), with almost one-half the respondents (47.3%) stating they were equally important; and the natural environment (59%) was more important than working landscapes (8.6%), with about one-third of respondents (32.4%) identifying them as equally important.

### **Climate change and tourists decisions**

Another important question was how different future scenarios might affect tourists’ decisions to visit, particularly in relation to duration and trip timing. Under scenario one, over one-third (39%) of respondents indicated that they would (*yes*) or might (*maybe*) change their trip plans. Under scenario two, almost two-thirds of respondents indicated that they would (*yes*) or might (*maybe*) change their trip plans. Three percent of tourists surveyed would not visit under scenario one and 19% would not visit under scenario two. A Chi-square goodness of fit

test revealed that there was statistical significance in the distribution of the answers for both scenario one ( $\chi^2 = 101.719, p = <.01$ ) and scenario two ( $\chi^2 = 10.247, p = <.05$ ; Table 5).

Table 5. Impact of climate change scenarios on tourists' decision to visit.

Climate scenario <sup>1</sup>	N (%)	$\chi^2$	<i>p</i>
Scenario 1		101.719	<.01
Yes <sup>a</sup>	6 (3)		
No <sup>b</sup>	18 (64)		
Maybe <sup>c</sup>	61 (33)		
Scenario 2		10.247	<.05
Yes <sup>a</sup>	39 (23)		
No <sup>b</sup>	73 (43)		
Maybe <sup>ab</sup>	58 (34)		

<sup>1</sup>One sample Chi-square test ( $\chi^2$ ) significant at the  $p < .05$ . Response categories that do not share superscripts differ at  $p < .017$  (Bonferroni correction) in post-hoc Chi-square test ( $\chi^2$ ) comparisons.

A Chi-square Test was run to evaluate differences in responses to scenarios by tourist type, domestic and international, non-festival and festival tourists (Table 6). No significant difference was found between domestic and international tourists under either scenario (S1,  $\chi^2=2.889, p=.236$ ; S2,  $\chi^2=4.524, p=.104$ ), nor were there significant differences between festival tourists and non-festival tourists under either scenario (S1,  $\chi^2=1.207, p=.547$ ; S2,  $\chi^2=1.453, p=.484$ ).

Table 6. Comparison of tourist types by decision to visit under different scenarios.

	Scenario 1				Scenario 2			
	D n (%)	I n (%)	F n(%)	NF n (%)	D n (%)	I n (%)	F n(%)	NF n(%)
<b>Behavioral Response'</b>								
Yes	4 (3)	1 (2)	4 (4)	2 (2)	21 (19)	18 (31)	16 (19)	23 (26)
No	84 (68)	34 (57)	61 (66)	57 (61)	53 (48)	19 (33)	36 (44)	37 (43)
Maybe	35 (29)	24 (41)	28 (30)	33 (36)	37 (33)	21 (36)	31 (37)	27 (31)
Chi-square	2.889		1.207		4.524		1.453	
<i>p</i>	.236		.547		.104		.484	

D=Domestic tourist; I=International tourist; F=Festival tourist; NF=Non-festival tourist

To further explore how the scenarios would impact their visitation behaviors, respondents who indicated that they would (*yes*) or might (*maybe*) change their trip plans under each scenario

were asked if they would change their length of stay or the timing of their trip. Similar changes were noted for duration and trip timing. Forty-three percent of respondents said they would have a shorter stay under scenario one, while that percentage rose to 70% for scenario two (Figure 5). A Wilcoxon Signed Rank Test revealed a statistically significant reduction in the number of days a respondent would stay under scenario two ( $z=3.87, p<.001$ ), with a medium effect size ( $r=.36$ ). There were no significant differences between trip duration response categories in relation to scenario one. When asked if they would change the timing of their trip, 45% stated they would not change under scenario one, while 52% said they would visit at a different time of year, and three percent said they would not visit. Under scenario two, 45% of respondents stated they would not change their trip timing, 54% said they would, and the percentage that would not visit at all rose to 19% (Figure 6). However, a Wilcoxon Signed Rank test revealed no significant difference in the timing of visits ( $z=-1.53, p=.126, r=.21$ ).

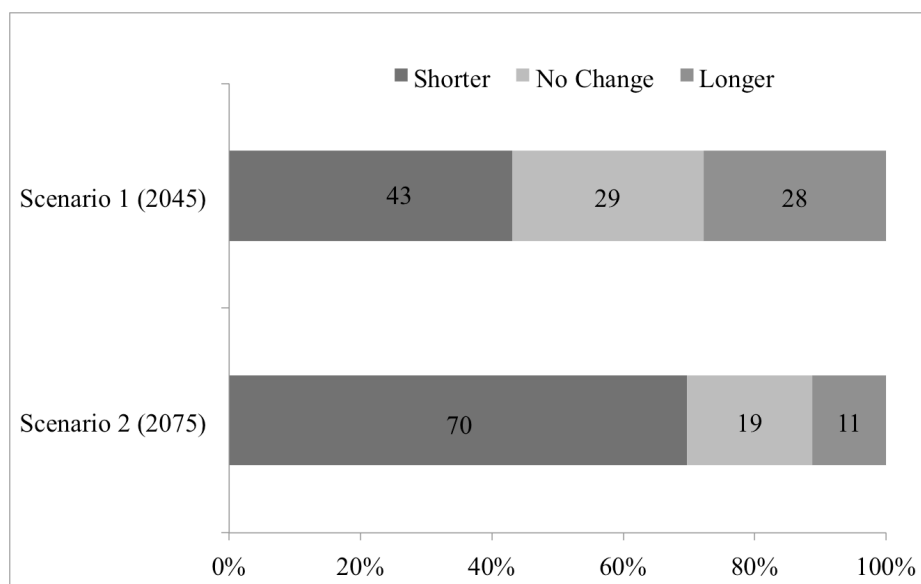


Figure 5. Would you change your length of stay under these scenarios?

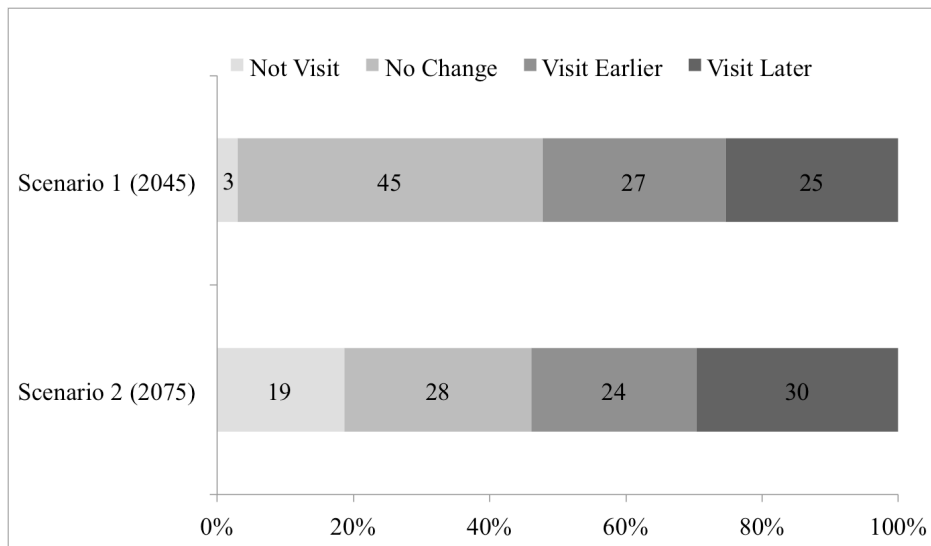


Figure 6. Would you change the timing of your visit under these scenarios?

To examine differences in festival tourists' and non-festival tourists' perceptions, a Mann-Whitney U Test was conducted to discover if different future scenarios would affect the number of days these types of tourists would stay (Table 7). Distribution of number of days for both groups were similar, as assessed by visual inspection. Median number of days spent under scenario one was not statistically significantly different for either group (origin,  $U=162$ ,  $z=-.580$ ,  $p=.562$ ; festival,  $U=218$ ,  $z=-.559$ ,  $p=.576$ ), nor was it for either group under scenario two (origin,  $U=324$ ,  $z=-1.355$ ,  $p=.176$ ; festival,  $U=392$ ,  $z=-.872$ ,  $p=.383$ ).

Table 7. Comparison of tourist types by number of days spent under different scenarios.

	Scenario 1				Scenario 2			
	D	I	F	NF	D	I	F	NF
Median	2	2	2	2	1	2	1	2
U	162		218		324		392	
Z (u)**	-.580		-.559		-1.355		-.872	
Sig.	.562		.576		.176		.383	
(r)	0.06		0.06		0.14		0.09	
n	41		44		60		60	

D=Domestic tourist; I=International tourist; F=Festival tourist; NF=Non-festival tourist

## Discussion

This study assessed the effects of potential climate change impact scenarios on the travel decisions of visitors in the ecotourism site of the *Pueblos Mancomunados* in the southern Mexican state of Oaxaca, an area with one of the highest concentrations of biodiversity in the world and the highest cultural diversity in the country. The study used visitor surveys to identify what pulls tourists to the site, and to assess potential climate change impacts and related factors that might affect future travel decisions of the respondents. We also looked at different types of tourists: those with an affinity for cultural festivals or not (festival tourists and non-festival tourists), and their country of origin (international or domestic). The findings not only provide additional information about climate change impacts in mountainous regions, particularly in an area with indigenously owned ecotourism businesses in Latin America, but also specific information for the community ecotourism business, *Expediciones Sierra Norte*, that might assist them in developing strategies for future climate adaptation planning.

### **The culture of nature and the nature of culture**

In our analysis of decision factors for what brings tourists to the *Pueblos Mancomunados*, natural beauty, biodiversity, and culture were rated as the top three pull factors. Natural beauty and biodiversity as important factors for visitation is hardly surprising, as those factors help define ecotourism (Ceballos-Lascuráin, 1993). This connection to nature by visitors to the *Pueblos Mancomunados* is also illustrated by the fact that 80% of tourists surveyed indicated that during their visit they either participated in or planned to participate in hiking, a common way to enjoy natural beauty and biodiversity (Kim, Lee, Uysal, Kim, & Ahn, 2015). As such, managers at *Expediciones Sierra Norte* should emphasize conserving natural beauty and biodiversity when

planning for climate adaptation, and continue to develop marketing materials that highlight these aspects of the area.

The observance of culture as the third most important pull factor is consistent with the notion of culture being considered a part of ecotourism (Bjork, 2000; Fennell, 2001; Mehmetoglu, 2007), but the domestic tourists in our study listed it lower than travel ease for importance in their decision to visit. Elsewhere, culture has been shown to be the primary reason for a domestic travel experience (Wu, Wall, & Zhou, 2014). Given the abundance of culture in the study region, and that the majority of tourists surveyed were from the same region (34% from the state of Oaxaca), perhaps the domestic market has arrived at cultural tourism saturation (González, 2008) and prefers the ease of access over cultural offerings. Two key planning implications emerge related to the importance of travel ease versus culture to regional tourists: (1) ensure travel infrastructure is adequate and well maintained, especially around high season events such as the festivals in July, and (2) develop a larger variety of tourism products that highlight and conserve the natural amenities for regional tourists to help sustain or increase visits by regional visitors.

Domestic tourists, in general, could be considered as “easier tourists” since they often contribute to the host community economy without requiring special treatment—they often speak the same language as the hosting communities and they can more easily get around often using their own vehicles (Seckelmann, 2002). Even though the *Pueblos Mancomunados* are located in a more temperate region of Mexico, the country is still considered a tropical destination and international travel to those destinations is expected to decline in the face of a warming planet (Bigano, Hamilton, & Tol, 2006); hence, the domestic tourism market may become much more important for *Expediciones Sierra Norte*. There is a scant amount of

literature that exists on domestic tourism consumption of culture, and it is conflicting (Molinillo & Japutra, 2016; Richards, 2002; Wu, Wall, & Zhou, 2014). This topic deserves further exploration, especially in Latin America and indigenous mountain tourism destinations such as the *Pueblos Mancomunados*.

Because culture is ranked high with natural beauty and biodiversity, climate change impacts could have a larger effect on tourism in the *Pueblos Mancomunados*. Richardson and Loomis (2004) and Scott et al. (2007) have found that slightly warming alpine environments will probably not dissuade tourists from visiting, and on the contrary, may cause visitation to rise. Scott et al. (2007) and Gossling et al. (2012) also hypothesize that “future tourists” may not have the same frame of reference for natural beauty or biodiversity given the climatic changes that are underway, potentially reducing the impact of climate change on future tourism flows. However, the *Pueblos Mancomunados* receives visitors who are interested in both nature and culture. Part of the cultural tourism pull from this area is dependent on traditional agricultural production, which is highly dependent on climate. Therefore, changes in agricultural production due to climate change could mean that tourism in this mountain destination could be more heavily impacted by climate change than destinations that are visited purely for natural beauty and biodiversity. Since the mountain environment in the study area is not considered alpine, even small increases in temperature may alter the ability to continue traditional agricultural practices, especially in the lower-elevation communities. This topic also deserves further study, as out-migration for employment has been steady in this region for decades (Robson & Berkes, 2011) and a change in food production due to climate change may drastically decrease the number of community members able to support tourism.

## **Shifting climates, shifting demands**

Results from this study indicate that tourists who come to the *Pueblos Mancomunados* are not likely to change their travel plans based on changes in climate projected for the region by the year 2030. Thus, in the near future, climate change impacts may not affect visitation patterns (but this does not indicate that there is no risk in the near term). However, descriptions of the more pronounced environmental changes projected for 2060 demonstrated that significantly more visitors would shorten their travel duration and some would no longer visit the destination. This finding is consistent with similar studies on tourists' perceptions and decisions in nature-based mountain tourism settings (Prideaux, Coghlan, & McNamara, 2010; Richardson & Loomis, 2005; Scott, Jones, & Konopek, 2007). Another key insight was that about one-half of visitors would change the timing of the visit, both in the near-term and long-term, as climate change alters the conditions of the region (nearly equal amounts visiting earlier and later than the peak season). These results provide the ecotourism committees in the *Pueblos Mancomunados* with information on potential tourism flows that are essential for developing their organizational climate adaptation plan. Since one of the main goals of tourism in the *Pueblos Mancomunados* is to increase employment opportunities for communities, economic studies of tourists' expenditures related to expected length and timing of stay would help *Expediciones Sierra Norte* determine when and where it would need to change staffing patterns to better accommodate these potential changes in tourism flows.

The high response percentage of "maybe" under both scenarios (33% for scenario one and 34% for scenario 2) is worthy of further consideration. It is possible that those who answered "maybe" didn't think the scenarios were plausible, or they lacked sufficient detail to inform decisions. Yet, this substantial level of indecision could have drastic impacts on tourism flows,



particularly as no significant differences were found for contingent visitation between festival goers and non-festival goers or between domestic and international visitors. On-going monitoring of seasonal visitation numbers is needed as climate change impacts are realized to enable adaptive responses by ecotourism businesses such as *Expediciones Sierra Norte*.

### **Study limitations**

Survey research is self-reported data and respondents may exaggerate or under-report their answers, be unable to remember the information needed to answer the question, and may not want to answer truthfully because of sensitivity to particular questions (Veal, 2011). Social desirability bias, the desire of the respondent to look good in the eyes of the surveyor or interviewer, is also a possibility in any face-to-face survey situation (Oppenheim, 2000). Informed consent scripts were used to stress the importance of answering honestly as a strategy to reduce this type of bias. Lastly, the sample of this survey is limited to tourists who are visiting the *Pueblos Mancomunados*, decreasing generalizability of results (Vaske, 2008). However, the findings of the study are relevant to other indigenous ecotourism businesses in other mountainous regions of Latin America, as changes in tourism flows will likely follow similar, and uncertain, trends. Continued research on climate change impacts to ecotourism in mountainous regions is necessary to increase the resilience of community-owned ecotourism businesses, particularly with indigenous communities facing high outmigration and loss of cultural practices.

### **Conclusion**

Previous studies on climate change and tourism have had similar results as those presented here, finding that near term, non-drastic effects of climate change do not have much of an effect on tourists' perceptions of the desirability of visiting nature-based tourism sites (Prideaux,

Coghlan, & McNamara, 2010) and do not result in considerable changes in tourism demand (Smith et al., 2016). However, these results do not preclude the possibility that more severe changes can take place in the near term. Based on tourists' responses to the long-term climate model projections for the region in our survey, the *Pueblos Mancomunados* and *Expediciones Sierra Norte* may need to alter tourism offerings to accommodate a different type of visitor than those seeking ecotourism experiences or focus tourism in a certain time of the year, as communities that innovate are more likely to sustain their tourism options (Kuščer, Mihalič, & Pechlaner, 2017).

This study begins to fill the gap in tourism and climate change research regarding tourists' perceptions by examining potential changes to tourism patterns in a tropical mountainous region with an indigenously owned and operated ecotourism business. It contributes to the theoretical understanding of tourists' decisions by using a contingent visitation approach to enhance knowledge of the effects of climate change impacts in a mountain tourism setting where nature and culture are both important, particularly to international visitors. An important methodological contribution is its geographical focus. This study broadens the discourse of climate change impacts on tourism by including research on tourism in Latin America, as few climate change studies have taken place in mountainous regions of Latin America (Palomo, 2017) and those that are focused on tourism were predominately conducted in the Andes (Carey et al., 2014; Valdivia et al., 2010). Practically, our findings highlight actions that *Expediciones Sierra Norte* managers could take to enhance visitor experience under changing climatic conditions, and we provided suggestions for further study in this area. We hope that the people of the *Pueblos Mancomunados* will be able to use the results of this research, as well as other businesses similar to *Expediciones Sierra Norte*, to protect their

environment, sustain their culture, and provide jobs in their communities. Ultimately, the uncertainty of the timing and severity of climate change impacts, as well as tourist responses to those impacts, necessitate ongoing research to enhance adaptive responses and build climate readiness.

<sup>1</sup> Although the climate scenarios used in this study describe more drastic impacts in 2060 than 2030, this doesn't preclude the possibility of risk in the near-term scenario. Therefore, while it is more likely that there are more severe impacts from climate change in the long term, this does not mean that the *Pueblos Mancomunados* should not consider planning for adaptation in the short term.

<sup>2</sup> The years 2030 and 2060 represent multi-year averaging periods, 2026-2035 and 2056-2065, respectively. There are 17 GCMs used in the ensemble. Results were averaged using one latitude/longitude coordinate for each of the six pueblos shown in Figure 2. "Current conditions" are based on the climate normal period of 1961-1990. More details of the Crookston and Rehfeldt (2008) custom climate data server used in this study can be accessed at: <http://charcoal.cnre.vt.edu/climate/customData/> [Last accessed July 15, 2018]

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## **Chapter 3: Actor-Network Theory and organizational resilience to climate change in community-based tourism**

### **Introduction**

The tourism industry is witnessing disturbances due to climate change and is certain to witness more (Schliephack & Dickinson, 2017; Wang, He, & Song, 2010). Arguably the largest industry in the world, tourism is often climate-dependent (Scott, Jones, & Konopek, 2007) and because of that dependency, many tourism destinations are grappling with what to do in the face of a changing future (Becken, 2005; Brown, Martin-Ortega, Waylen & Blackstock, 2016; Trawöger, 2014; Turton, et al., 2010). Tourism-dependent economies and community-based tourism enterprises are already suffering from the effects of climate change to the point that it has been called a “vector of vulnerability for household livelihoods” (Bury, et al., 2017; p. 179).

More resilient destinations are able to innovate and change to preserve their tourism economies under the threat of an altered climatic future (Kaenzig, Rebetez, & Serquet, 2016; Palomo, 2017), and resilience is important when communities engaged in tourism are confronted with an unknown future climate. Often, resilience studies focus on a social-ecological system and its ability to adapt or respond to climate change impacts (Krishnaswamy, John, & Joseph, 2014; Rojas-Soto, Sosa, & Ornelas, 2012). Most tourism resilience research targets resilience to tourist pressure on a tourism destination (Tyrrell & Johnston, 2008) or the resilience of environmental systems in a destination to greater forces such as climate change or natural disasters (Becken & Hay, 2007; Veecken et al., 2016). Additionally, tourism researchers are beginning to focus on communities’ “climate readiness” (i.e., adaptive capacity and destination risk; e.g., Bitsura-Meszaros et al., 2015). Yet, few studies assess the resilience of tourism *organizations* (Dahles & Susilowati, 2015) and some researchers have identified the study of

resilience at the organizational level in tourism as “an emergent area of scholarship” (Orchiston, Prayag, & Brown, 2016; p.145).

Although different theories have been employed to study resilience in tourism (e.g., Complex Systems Theory [Farrell & Twining-Ward, 2004]; Chaos Theory [Faulkner, 2000]; Grounded Theory [Ruiz-Ballesteros, 2011]), Actor Network Theory (ANT) “offers new ways of thinking about actors and agency in the scientific fields of tourism, development, and conservation” (van der Duim, Ampumuza, & Ahebwa, 2014; p. 597). As such, researchers are integrating ANT in tourism studies due to its inclusion of non-human actors in a network (e.g., Beard, Scarles, & Tribe, 2016; Rodger, Moore, & Newsome, 2009). However, to the best of our knowledge, ANT has yet to be applied as a lens to assess the resilience of tourism at the organizational level despite scholars recognizing that there is a gap in tourism resilience research and a need for more robust studies on the topic (e.g., Becken, 2013; Luthe & Wyss, 2014). In this paper, we attempt to fill that gap by applying an ANT framework to analyze an ecotourism organization and study its resilience in the face of climatic change. This study aims to answer the overarching question: How might climate change affect a stabilized tourism actor-network in an indigenous tourism organization in southern Mexico?

## **Literature Review**

### **Actor-Network Theory**

With foundations in post-structuralism, Actor-Network Theory (ANT) was developed in the early 1980’s by science and technology studies scholars Bruno Latour and Michel Callon, and the sociologist John Law (Law, 2009). Their original use of the theory focused on large-scale technological developments and how the developments were networked by not only people



but through the inclusion of non-human objects as well. They wanted to know how these developments (networks) arose (Ren, Jóhannesson, & van der Duim, 2012).

ANT assumes that all relationships are both material and semiotic, and breaks down the dichotomies that have heretofore bound sociological ways of thinking. Instead of looking at relationships such as human-nature and local-global, ANT states that researchers should focus on the networking of all of the parts of a relationship to understand how they perform, are translated, and define each other and the network. This networking leads to the different concepts inherent in the use of ANT. As Latour states, “[ANT] refers to ... the summing up of interactions through various kinds of devices, inscriptions, forms, and formulae, into a very local, very practical, very tiny locus” (Latour, 1999, p. 17).

ANT is concerned with the actants<sup>1</sup>, human and non-human, in a network and states that it is “via the networks in which they associate that actants derive their nature” (Ritzer, 2004, p. 1). Law (2009) refers to actor networks as, “scaled down versions” of Foucauldian discourses (p. 145) because ANT emphasizes the *work* in networks. This emphasis is achieved through several key concepts that are used in a unique way in ANT: translation, ordering, and performativity (Ren, Jóhannesson, & van der Duim, 2012).

Translation is the act of translating meaning from object or person to another. It defines roles of actants and can define relations between those in a network as well as among different networks (van der Duim, 2007). Translation builds at least a temporarily stable relationship between different actors and networks. As Murdoch (1998) explained, “translation refers to the processes of negotiation, representation and displacement which establish relations between actors, entities and places” (p. 362). In 1986, Michel Callon introduced the “four moments of

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<sup>1</sup> Latour (2005) explains that the term “actant” is borrowed from literary theory as it

translation” (p. 201), which further described how the translation process takes place. The four moments are problematization (i.e., the emergence of a problem that allows the translator to help overcome it), interesement (i.e., actors become interested in the problem), enrolment (i.e., roles are defined), and mobilization (i.e., actors are enrolled and aware of their parts). After arriving at mobilization, the network is stabilized (Pinto, Cruz, & Gonçalves, 2011). This stabilization through translation is referred to as ordering, or modes of ordering since “there is no single master plan of translation” (Ren, Jóhannesson, & van der Duim, 2012: 16). Performativity, then, is the idea of actors performing through these networks. While translation, ordering, and performativity may seem to be roles of the actants in a network, the actants are actually described through their translation, ordering and performance (Ritzer, 2004).

### **ANT in Tourism Studies**

Since the 1990’s, ANT has become a popular theoretical basis for a number of scientific disciplines including geography (Murdoch, 1998), health studies (Prout, 1996), anthropology (Oppenheim, 2007), and tourism (van der Duim, 2007). According to van der Duim, Ren, and Jóhannesson (2013) at least thirteen tourism studies were published since 2005 that used ANT as a theoretical basis. Tourism studies based in ANT began with O’Neill and Whatmore’s study on place (2000) in which they use ANT to examine the relationships between the social connections, a building, and the food network of a hospitality business in New South Wales, Australia. Since 2000, the number of tourism studies using ANT has grown (Figure 1). Franklin (2003), while not using ANT directly in his work, devoted an entire book section to tourist objects and rituals, “because they are absolutely essential for [tourism’s] very existence; because tourism is comprised of necessary and important links and relationships between humans, machines, animals and plants and an enormous universe and variety of objects, and because their

interrelationship produces effects that ought to interest us” (p. 98). Jóhannesson (2005) then published a study in which he argues that ANT is an effective approach to study tourism because it bases materiality on relationships between people and objects, and can draw different spatial aspects of tourism into an analysis. Beard, Scarles, and Tribe (2016) point out that when applying ANT to tourism research, “[ANT] is better seen as a translation device—an ‘architecture’ of concepts through which a story is constructed (Oppenheim, 2007), rather than a philosophical and epistemological ‘force-field’ (Tribe, 2004)” (p. 98).

In 2005, van der Duim (2005) wrote his dissertation on Actor-Network Theory and tourism, further demonstrating the theoretical relevance of ANT with tourism studies. He believed that, in particular, there are three elements of ANT that are relevant to tourism. First is the principle of symmetry, which allows for the inclusion of non-human objects, because “tourist things” (Franklin, 2003) are as much a part of tourism as the tourists themselves. Second is a focus on actor-networks and “dissolving dualisms” (van der Duim, 2005, p. 90) in tourism because, as in any other field/sector, the actor and the network are linked and cannot be separated. He provided the example of a family taking a camping trip through France using a car and an RV. The actors include the family, the automobile, the RV, the countryside, the gas station, etc. and all together they make up the network of the “nice holiday” (p. 90). Third is the emphasis on translation, which identifies what enables actors to act and thus represent a relationship or network through the definition of roles. In his discussion of translation, van der Duim addresses its “four moments” and states that they do not have to happen in that order, but they each need to happen for the actor-network to proceed to the next moment.

Mohamed (2013) took a more focused approach to the use of ANT in tourism studies and employed the four moments of translation as the crux of his analysis of tourism organizations

and environmental protection in a coastal city in Egypt. Using a mixed methods approach, he concludes that the different tourism organizations did not fully perform the first three moments of translation (*problematization, interressement, and enrolment*). Although they were still able to complete the fourth moment (mobilization), the difficulties faced in performing the first three led to inadequate formation of a network, weak ties between tourism organizations, and eventual failure of the actor-network. Thus, using ANT as an analytical lens helped to elucidate the roles of the actors involved (including natural resources), and how they managed, or did not manage, the environmental impacts of tourism.

In their ANT-based study, Rodger, Moore, and Newsome (2009) analyzed scientific research on wildlife tourism in Antarctica. Involving actors such as groups of scientists, penguins, strategic plans, and committees in their analysis, they also focused on the moments of translation. They used ANT to explain the importance of the roles of the actors in the network as it developed and declined. They concluded:

*For tourism research with its numerous stakeholders and researchers, often with differing paradigmatic positions and normative beliefs, actor-network theory provides a powerful way of revealing and then understanding how these differences affect scientific practices and success. And even more importantly for an applied area of research such as tourism, this theory potentially provides insights into how these differences can be successfully managed and optimized. The future of sustainable tourism depends on being able to manage these differences. (p. 662)*

### **ANT in Climate Change Studies**

ANT enables researchers to extend agency beyond human-only intentionality to include non-human objects or ideas, such as the environment, into a field of study. Rocheleau and Roth

(2007) called for a “new situated science” (p.433) to help us better understand the complexities of social-ecological systems (SES), recognizing the benefit of the use of a theory like ANT to help bridge the human-nature divide in order to better understand the complex systems in which we live. However, they criticized ANT for what they mistakenly interpreted as a distinction of human and non-human actors by the use of the term “actant,” believing that its use gave more power and influence to the human actors. This is not the case and the term “actant” is used for both human and non-human actors (see footnote 1).

More recently, Dwiartama and Rosin (2014) explored non-human agency and assessed the possibility of using ANT to study resilience in an SES. Through a review of two case studies, rice agriculture and the kiwifruit industry, they determined that the ANT perspective offered, “a different understanding of resilience by focusing on the relational effect shaped by the interaction of humans and non-humans” (p. 7). One benefit of using ANT in studying social-ecological systems (SES) is that it “is more sensitive to emergent properties within systems” (Dwiartama & Rosin, 2014, p. 1). Variations that climate change brings can be thought of as the emergent properties within an SES.

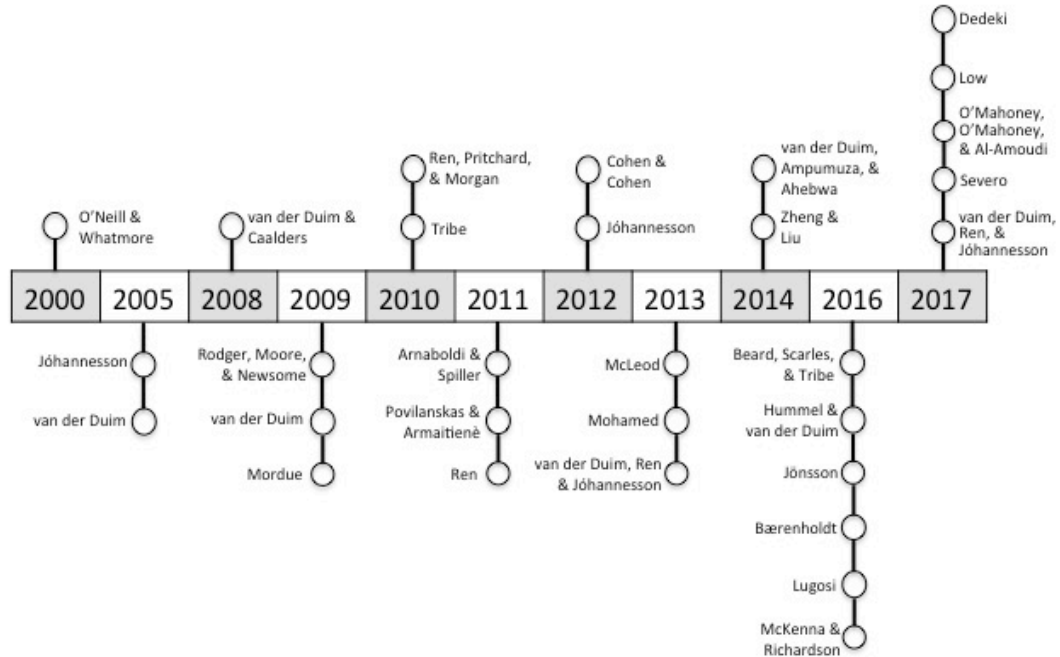


Figure 1. Timeline of ANT used in tourism studies.

In a more recent study, Nhamo (2009) explicated the role of “global warming and climate change and narrative” (p. 105) as a token that he traced through different relationships and iterations as it gained status through its political role. As Beard, Scarles, and Tribe (2016) pointed out, following a token in ANT research is one of a group of methods to ensure trustworthiness in a qualitative study. Other than these examples, to date there have been few studies that use ANT to explore resilience and none to our knowledge that use ANT to explore the resilience of a tourism organization facing climate change-related disturbances.

### Methods

Almost all ANT studies use qualitative methods including interviews, observations, and memos to determine how a network performs. To explore the tourism actor-network and elicit information on adaptive capacity and adaptation strategies, we used a phenomenological research design and conducted semi-structured interviews with members of the *Pueblos Mancomunados*, leaders in the ecotourism business, and tourists to the area. The *Pueblos Mancomunados* are a

group of eight indigenous communities in the Sierra Norte Mountains of southern Mexico. In the late 1990's, six of the communities collectively decided to open an ecotourism business, Expediciones Sierra Norte, with the goals of providing jobs and preserving their natural and cultural resources. The communities formed the *Expediciones Sierra Norte* network using bridging social capital to elevate their representation and improve their abilities to negotiate among the tourism community (Gittell & Vidal, 1998; López Guevara, 2014).

### **Data generation**

One bilingual researcher conducted exploratory semi-structured interviews in three communities (Benito Juárez, Cuajimuloyas, and Latuvi) in December 2014, which were used to develop an interview guide for the following summer. In July 2015, two bilingual researchers used purposive convenience sampling (Patton, 2005; Flick, 2014), chain-referral sampling (Biernacki & Waldorf, 1981), and negative case sampling (Johnson, 1997) for data generation.

We used ANT to frame our interview guide and determine how the tourism network developed, who and what actants were performing, and how climate change may affect the stability of this actor network. The concept of adaptive capacity is commonly used in discussions of climate change and its impacts. It is closely related to other terms often seen with it in the literature, such as adaptability, resilience, and flexibility (Gallopín, 2006; Smit & Wandel, 2006), and can be defined as the ability of a system to learn from the past, co-create new knowledge, use innovative problem solving, retain flexibility, and develop long-term strategies to address problems and opportunities (Folke, Colding, & Berkes, 2003). To assess the stability of the tourism network, we asked questions to reveal perceptions of the adaptive capacity of the ecotourism business. The business is itself both an actant and what Latour (2012) calls a *token* in the network. It can be considered a token because it “both constructs the network and is

simultaneously transformed by the developing network” (Gaskell & Hepburn, 1998: 65). A resilient ecotourism organization will be able to transform itself, through developing new tourism packages, changing its structure, or other means, to adapt to future change. As a token, it would also play a role in the structure, or construction, of the network.

All interviews were conducted in Spanish, most were audio recorded, transcribed in Spanish, and analyzed by bilingual researchers with QSR NVivo v 11. The quotes provided as evidence in this paper were transcribed back to English. Community members interviewed (n=41) included participants from seven communities, of varied ages, some currently or previously involved in the tourism business and some who were not directly involved in *Expediciones Sierra Norte* operations (Table 1). Additionally, we conducted 14 interviews with tourists throughout the communities. Handwritten notes were taken in interviews with participants who declined to be audio recorded, which were also transcribed and entered into NVivo for analysis.

Table 1. Participant demographics.

<i>Number</i>	<i>Location</i>	<i>Female</i>	<i>Male</i>
7	Amatlán	4	3
9	Benito Juárez	4	5
10	Cuajimoloyas	8	2
5	Llano Grande	2	3
5	La Nevería	4	1
1	Lachatao*	1	0
5	Latuvi**	5	3
14	Tourists***	8	6

\*Negative case. This pueblo does not participate in the tourism organization.

\*\*Three of these interviews were conducted as group interviews (three couples).

\*\*\*Tourists were interviewed in December 2014 primarily to help inform the interview script for July 2015. Interviews took place in various locations throughout the *Pueblos Mancomunados* in Spanish or English.



## **Data analysis**

Indicators of adaptive capacity are wide ranging, but given the specificity of context that adaptive capacity requires, indicator use should depend on the scale at which assessment is desired, or upon theoretical and statistical relationships (Adger, Brooks, Bentham, Agnew, & Eriksen, 2004; Brown et al., 2010). However, there has been agreement on some general indicators that could be used in a wide variety of circumstances, and typical indicators of adaptive capacity include: social and economic capital, governance and institutions, technology, infrastructure, knowledge, agricultural and economic diversification, and social norms and values (Adger, 2003; Brooks, Adger, & Kelly, 2005; Engle, 2011; Nelson, Adger, & Brown, 2007; Nielsen & Reenberg, 2010). Due to assessment at a community-level scale (Adger, 2003) where the actor-network has already mobilized (van der Duim, 2007), we chose to look at a subset of these indicators focused on social and economic capital, social norms and values, governance and institutions, and tourism, as well as other themes that emerged from the data during coding (Table 2). This list was modified and expanded as coding began and interviews were coded iteratively as the coding themes were modified.

Table 2. Themes and sub-themes.

<i>Themes</i>	<i>Sub-themes</i>
Agricultural diversity	
Climate change	Impacts
Community change	Out-migration
	Population
Governance & institutions	Confidence in governance
	Justice in governance
Information & knowledge	
Social & economic capital	Jobs
	Migration
	Remittances
Social norms & values	Women participation
Technology	
Tourism	Fairness
	Ownership
	Negative perceptions
	Tourism jobs
	Tourism stops out-migration

Data were coded using open and theoretical coding (Flick, 2014; Emerson, Fretz, & Shaw, 2011) and analyzed using a combination of inductive and theoretical thematic analysis (Clark & Braun, 2014). Thematic coding assisted in determining the four steps of translation of the actor-network, as well as analyzing the adaptive capacity of the *Pueblos Mancomunados*. Memos, persistent observation, and prolonged engagement were employed to enhance dependability and credibility of findings (Flick, 2014). The use of rich description, including use of power quotes and proof quotes, enhance transferability (Pratt, 2009). Daily reflective journals were kept to address research bias, and peer debriefing (Spillett, 2003) was conducted on an ongoing basis before, during, and after data generation to critically examine the research methods and conclusions and help improve the trustworthiness of the research. We present our results and discussion together to illustrate the utility of ANT as a theoretical lens for assessing the resilience of a tourism organization.

## Results and Discussion

### Modes of ordering in the tourism actor-network

Ordering, or stabilization in the tourism actor-network in the *Pueblos Mancomunados*, has taken place over the last two and a half decades as translation has occurred and defined the relationships of all of the actants (Callon, 1986). The four moments of translation, as posited by Callon, and resulting ordering are evident in the data generated. *Problematization* occurred when some community members first recognized the problems stemming from out-migration and resource use that led to the need to develop alternative job creation strategies and methods for conserving their forests. A man working in ecotourism in Llano Grande shared, “*Years ago the economy was not strong, there was not so much work, there were no jobs here. That was the purpose [of starting the ecotourism business], to create small jobs for our people.*” Another man who had previously worked in ecotourism in Cuajimoloyas stated,

*But when the project began, we realized that [the forest] is something that the people that come here enjoy. So, we decided not to continue [cutting trees] like we had before because it is a benefit ... So, we do not cut down trees for the market anymore, but we leave them to reproduce and we have the forest to show to the people who visit us.*

As the world urbanizes, out-migration continues to be a challenge facing rural areas. It is a particularly difficult challenge in the southern Mexican state of Oaxaca where out-migration has left many rural communities with fewer working age men and women, changing their structure and historical community institutions (Robson & Berkes, 2011). Members of the communities in the actor-tourism network recognized the need to address this emerging problem. Creating new jobs in a community is one way that the actants in the *Pueblos Mancomunados* thought they could help slow the pace of out-migration.

*Interestment*, actants becoming interested in the problem, was not hard to accomplish. With high out-migration and burgeoning interest among foreigners in the natural beauty of the

*Pueblos Mancomunados*, one former ecotourism coordinator said that, “it was a decision of everyone” to stop cutting the forests and leave them for tourists to enjoy. Community members also wanted to provide jobs to stem the flow of people leaving. According to a current ecotourism coordinator, “So, that’s it, that’s what we wanted: We wanted our people ... we wanted our people to feel rooted here so that they would not leave.” Other actors such as governmental agencies including the Secretary of Tourism (SECTUR), the National Commission for Knowledge and Use of Biodiversity (CONABIO), and the National Forest Commission (CONAFOR), non-governmental organizations like North American Commission for Environmental Cooperation, and tourists also became involved through the continued development of tourism in the *Pueblos Mancomunados* and interested in the newly-forming actor-network.

*Enrolment*, or definition of roles, was easily fit into the historical community structures that the pueblos used: *usos y costumbres* (uses and customs). *Usos y costumbres* refers to the governing principles of the *Pueblos Mancomunados*. It dictates that every citizen<sup>2</sup> plays a, usually unpaid, role in the way the community works, taking time off from his or her daily duties to hold a position that is important for the community to function. In most communities in the *Pueblos Mancomunados* that means taking one year out of every three for community service. In 2007, Robson described the uniqueness of certain features of governance in Oaxaca, including *usos y costumbres*, and said that those features “exhibit many of the characteristics of ‘polycentric governance’ (Ostrom, 2005), where each decision-making unit has considerable autonomy to experiment with rules for using a particular resource. In experimenting with rule

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<sup>2</sup> Here the word used in Spanish is “ciudadano” (male) or “ciudadana” (female) and can have a different meaning in different pueblos. In some pueblos only men and unmarried women are allowed to be “citizens” and have full responsibility. In others, women are allowed even if they’re married. This is important for analyzing adaptive capacity.

combinations, users have access to local knowledge, obtain rapid feedback from their own policy changes and can learn from the experience of other units” (p. 12). *Usos y costumbres* is an important actant that we will revisit when discussing adaptive capacity (for a much more detailed treatment of *usos y costumbres*, see Robson, 2007). Further, tourists and tourism also readily became enrolled as *actants* in the tourism actor-network. According to an actor in the tourism-network in Llano Grande, ecotourism was established in 1997 when “*the first tourists arrived, they came to camp because there was no cabin, there was nothing... We didn’t even know what tourism was!*”

*Mobilization* followed with actors being enrolled and aware of their parts. “[*The ecotourism coordinator*] is fulfilling his community requirements... *the guides are fulfilling their community requirements... I’m fulfilling mine,*” said the ecotourism assistant in one community. With the arrival of *mobilization*, the tourism actor-network in the *Pueblos Mancomunados* was temporarily stabilized and *ordering* occurred (Ren, Jóhannesson, & van der Duim, 2012).

### **Adaptive capacity in the tourism actor-network**

After learning how the tourism actor-network was translated, ordered, and performed in the *Pueblos Mancomunados*, our next step was to determine if and how climate change would influence that already-stable network and potentially change its translation. Tourism, social capital, governance and institutions all became actors in this network with agency and a role to perform in its translation (Dwiartama & Rosin, 2014). Using those actors and others as themes, we analyzed interviews with community members in the *Pueblos Mancomunados*.

#### *Social capital*

Social capital, or the “shared knowledge, understandings, norms, rules, and expectations about patterns of interactions that groups of individuals bring to a recurrent activity” (Ostrom,

2000: 172), is often used as one indicator of resiliency in communities (Aldrich & Meyer, 2015; Pelling & High, 2005; Orchiston, Prayag, & Brown, 2016). The historical roots and traditional customs of the communities of the *Pueblos Mancomunados* result in strong social capital. One man in Amatlán stated, *“But in the end, the things that are done, or the things that have to be done, the social benefit of all is sought here. The personal benefit of someone is not sought.”*

Others talked about the way decisions are made, and how everyone helps each other:

*[We make decisions] in general assemblies of comuneros. We have the assemblies in this place called Las Vigas, it's about an hour down the road. There we have assemblies and make agreements [about our pueblos/governance]. For the most part, everyone attends.*

*- male community member in Amatlán*

*If, for example, someone dies and that person is poor, then we all help as a pueblo. If we see [the family] needs help for the burial, we'll pitch in for the coffin or for the other expenses. Other times people come by with tortillas, with beans, rice, sugar, corn, whatever they can to help out.*

*- female community member in Benito Juárez*

However, things are changing in the *Pueblos Mancomunados* and among them is out-migration. As one man in Amatlán lamented, *“...here in the community there is no source of employment except for agriculture. There are no sources of work. There is no factory. There is not. So people are leaving.”* A woman currently working in ecotourism in Cuajimuloyas admitted that, *“I left to get a job and didn't live in the community for 18 years.”* A different male member of the community in Amatlán felt the same way when he stated, *“I think that, generally, in almost all the towns ...that's how it is. Now the jobs are a bit scarce [here] and especially the youth has migrated to Mexico City, to different parts of the country, or abroad.”*

Some migrants return to their pueblo, but many do not.

*Well, they say they will return, but they do not have papers so [they probably won't] ... they are used to having money, to live well, and if they come here they will see everything so different and poor and they will leave again.*

*- female community member in Amatlán*

Others agreed that many people, especially youth, who leave do not return. A man who works in ecotourism in Benito Juárez said, “*And then the young people who leave school, then, instead of staying here, they leave to continue studying. Sometimes they will work instead, and they do not stay here.*” And another from Llano Grande lamented, “*...and then they go, they go away ... they abandon the pueblo ... and people are leaving. And many say: ‘Here, in our land, in our place, there is nothing to do.’ Then, many people go to the cities.*”

The social structure is changing in these communities. However, change isn’t considered “bad” in an actor-network; it just “is.” Actants in a network can leave or change without changing the stability of a network (Latour, 2012); some actor-networks are constantly in a state of flux. However, the loss of too many people from a community can weaken previously strong institutions (García-Barrios et al., 2009) and have a deleterious effect on governance.

#### *Governance and institutions*

Governance is through the system of *usos y costumbres*—a system that has been used for generations and has been carried down, in part, from pre-Columbian times (Robson, 2007). This governance system that calls for involvement by almost all citizens is very respected and widely accepted as a good system for providing for the benefit of all. All decisions are made in town assemblies and those decisions are shared at the level of the *comisariado*, the group of leaders from each community.

*...that’s why [every pueblo] has [its] representative. And they have their meetings at the top level called the comisariado. And the [pueblo] authorities have meetings. And there maybe a topic that is going to be discussed, then the agente municipal<sup>3</sup> comes and calls a meeting at the village level and comments on the matter that is going to be discussed. He calls the meeting with the whole town. Then from there, the whole town makes a decision or some decisions and again all the leaders come together to discuss what the people in each town have decided.*  
*- female store owner in Cuajimoloyas*

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<sup>3</sup> The *agente municipal* is the equivalent of the mayor in each pueblo.

*We have assemblies so that everyone can decide what is needed, what is lacking, what is going to be done; for that the assemblies are made... In the assemblies it is decided what will be done with the money [from tourism]. When there is money then they decide what they are going to do with that money; if the school needs help then we give it. If the town needs it for some reason, the assembly decides it.*  
- female who currently works in tourism in La Nevería

When asked about their confidence in their governance system to provide for the wellbeing of all citizens, overwhelmingly the response was positive. *“Yes...because every decision is transparent,” “Yes... because at the end of the year all reports are made public in the meetings,” “Yes...because all of the decisions are made by everyone,” “Yes, for the good of everyone! Everyone united.”*

However, not “everyone” attends the assemblies in all of the pueblos, or has a community service position. In Latuvi, for example, a woman currently working in tourism explained that *“Only single women have community service positions.”* In Cuajimoloyas it is the same.

*For example, there are women who ... leave school, are of legal age, and are not married. They have to serve the pueblo. But in my house, since I am married, my husband is the one who serves. If my husband dies or he leaves me and I am alone here, I become a comunera [and must serve].*  
- female community member in Cuajimoloyas

The communities of La Nevería, Benito Juárez, Amatlán, and Llano Grande, however, allow women to participate in community decisions and hold service positions. One man in Llano Grande explained, *“In some communities, including this one, women have the right to participate because they have a lot of experience and want to help their communities.”* A woman in Amatlán expressed, *“I like it because I get to learn different things and also help out in the pueblo,”* but admitted, *“because now we are very few people here and there just aren’t people to do the jobs. So that’s why women have started participating in community service.”* One man who works in tourism in La Nevería mentioned how beneficial it is that women can now participate in the community, *“Now all women participate in the assemblies and in community*



*service... Before only men reviewed receipts and were part of handling the money, but now it's fortunate that women are able to participate in this.*" When asked about why it changed, he replied that it was because *"the number of comuneros has been reduced through out-migration, so we decided that women should participate too."*

While currently four of the six pueblos allow women to work, there are mixed feelings about it. One woman in Benito Juárez was effusive in her praise for women being able to work, especially in tourism, *"Before it was all cook, wash, and stay in the house. Now we can have jobs and earn our own money. It is really good for women."* Yet some other women who were currently working in tourism in the same community said, *"We work in the fields, we plant flowers, potatoes, beans, and everything. But we have to abandon it when we have a community service position. Then at the end of our service, we start all over. We prefer to work in our fields and in the house than have to come to work here."* Some of the differences in opinion about having community service positions, especially tourism positions, are likely due to the fact that some positions are paid and some are not. Each community makes its own decisions about having paid positions, while the standard is that most tourism positions are non-paid community service positions. Similar to the recommendations of López Guevara (2014), it may benefit to having paying positions in ecotourism to provide jobs and lessen out-migration.

### *Tourism*

Tourism is an important actant in this actor network, but it could also be considered a token in ANT. Like the tourism business, tourism is both an actor that is part of this actor-network and is also influenced by how the network develops (Latour, 1996). Unlike Beard et al. (2016) and Nhamo (2009), we will focus on tourism as an actant in the network instead of tracing it as a token, and examine how community members view this actant in their community.

Community members in all pueblos overwhelmingly stated that tourism was positive. Many participants expressed similar sentiments to those of a woman working in tourism in Cuajimoloyas who said, “[Tourism] benefits everyone. Everything is more organized and cleaner since tourism has come here. Everything is in order and I like it very much.” Several community members said that they liked seeing tourists walking around, “we learn from them about their countries when they come to learn about us.” One man in Benito Juárez said:

*“I like the fact that we are able to show people that we can live in harmony with each other. And when the tourists come we tell them that the money they spend isn’t just so that we can have more, but so we can invest it in doing something good for our community like planting more trees, or paying someone to do things, like, for example, take care of a certain area of the community. That way when they return they won’t see the same thing in the community, but something better.”*

Many community members and those who were working in tourism talked about how they liked tourism because they learned from the tourists who visited. Also, many participants talked about how tourism helps the communities economically: “Take me, for example. I have my small business and when tourists come they always buy things from me.” Many said that everyone benefitted economically because “Our pueblo divides the tourism earnings and some of it goes to support things like the school or the health center that we used to have to contribute to. Now our contributions have gone down and we can spend that money on something else.”

When we asked specifically about tourism providing jobs so that people stay in the pueblos and don’t leave, answers were mixed. Many participants mentioned that guide jobs and housekeeping jobs were beneficial; “[Tourism] in generating jobs. For example, someone has to wash sheets and clean the cabins,” and “As a guide I get called on when a tourists wants to go on a hike. I make money from that.” Many participants also said that tourism did provide jobs that keep people from leaving, “If there weren’t tourism here, well, there would be no more opportunities or more development because those of us who work in [it] benefit. Those who are

guides, and the ones who clean the cabins, they would not have a job and they would have to leave the pueblo.” We asked one woman who owned a restaurant in Cuajimoloyas what she would be doing if tourism hadn’t come to her town, “*I don’t know. I would probably be living and working in Oaxaca or Mexico City. I probably wouldn’t be here.*” In La Nevería, “*Now not as many young people are leaving... We are now creating permanent jobs, thanks to tourism. We have five permanent jobs in the project.*”

Although tourism was perceived as positive by the majority of participants, several mentioned the inequity in the ecotourism business. A man employed in ecotourism in Benito Juárez stated,

*“If I go do a guided tour, if I am not doing my community service, I will get paid for the tour. And that resource I get to take to my house and keep. But now that I am doing community service [in ecotourism] I do not get paid. I cannot charge. A whole year is free service.”*

Another man in Amatlán stated, “*I don’t think tourism helps many people here. Not much. That’s the truth. There are few who benefit... It’s worse now that they put the cabins in and put everything near the cabins. It no longer benefits the rest of the community.*” A man who currently works as a part-time guide in Benito Juárez shared:

*“What if I were a coordinator and you were part of my family and I said to you, ‘Go work in tourism!’ I could do it, but I also have to give everyone a chance. Everyone has a need, not only you. In the tourism office here they’re only giving jobs to one or two people. But there are six or seven of us who have also worked as guides before [and want to work more], but they don’t give us the jobs.”*

Tourism’s role in the tourism actor-network of *Expediciones Sierra Norte* is obviously a prominent one. Tourism, through its provision of jobs and economic capital, could affect the adaptive capacity of *Expediciones Sierra Norte* to be resilient in the face of climate change. However, climate change would have impacts on more than tourism in the *Pueblos Mancomunados*.

## *Climate change*

Climate change is affecting every part of the globe and is now commonly recognized as the biggest threat to development and livelihoods in developing countries (Ranger & Garbett-Shiels, 2011). Mountainous regions, due to their fragile ecosystems and complex topography, are expected to warm much more rapidly in the 21<sup>st</sup> century than in the 20<sup>th</sup> (Nogués-Bravo, Araújo, Errea, & Martínez-Rica, 2007). Nature-based tourism has been recognized as a potentially useful livelihood strategy to add to a rural community's toolbox of adaptive actions to mitigate climate change (Kronik & Verner, 2010). The *Pueblos Mancomunados* have adopted tourism as a livelihood strategy, yet they are still indigenous communities whose culture is tightly intertwined with agriculture. Almost everyone still practices agriculture in some fashion in the pueblos and most have a diversity of crops.

Given the prominence of agriculture, *Expediciones Sierra Norte* has developed a tourism package that highlights the agricultural heritage of the area, expanding their tourism offerings and capitalizing on the growing interest in agritourism worldwide (Gao, Barbieri, & Valdivia, 2014). To further explore the importance of agriculture as an actant, we asked participants about agricultural diversity and how climate change may impact it. Many participants had similar responses when asked about agricultural diversity: “*Not only do we produce potatoes, we also produce flowers. We plant corn, squash, fruits. Various things. We produce a lot of things, not just one.*” However, when asked about how climate change was affecting their production, almost everyone agreed that it is. “*We’re producing less ... because of lack of water, and the climate affects us a lot,*” said one woman in Benito Juárez. A woman in Cuajimoloyas said, “*This year we haven’t had a lot of water and we didn’t have a very good harvest.*” A man in La Nevería concurred:

*Now, it's not the same. For example, potatoes were a good crop back in '88, '90, and '91. But now we hardly produce potatoes because the climate has changed so much. It's hotter and it rains less, so we produce less of the crops that we produced 30 years ago.*

Yet, some participants explained that not all of the effects of climate change are negative. “*Now corn grows here. Before it didn't grow very well,*” said a woman from La Nevería. She also explained, “*Before we didn't grow fruit trees here, but now we grow apple, peach, and pear... It's quite a change.*”

With the changes in production there is often a change in how subsistence farming families provide for themselves (Altieri, Anderson, & Merrick, 1987). This is occurring in the *Pueblos Mancomunados* as well. For example, a male store owner in Amatlán explained “*We have to go buy corn in the stores ... People who dedicate themselves to agriculture would have to change. They'd have to migrate to find work to be able to find a job to buy food.*” A woman in Amatlán talked about farming families that don't have irrigation and how they are affected by changing rain patterns:

*Yes, they get affected a lot because they have to figure out where they're going to get the money to purchase corn. Here the most important food crop to have is corn because we eat tortillas more than any other type of food. The basics, when living in the pueblos like this one, are to have your corn and beans. Why? Because they're indispensable. If you have your corn, you can make tortillas and have them at least with salt, and you get full. For that reason, corn is indispensable.*

She added that these families, “*...have to find another way to work or they emigrate so that they can support their families.*” A woman in Benito Juárez stated it bluntly, climate affects the crops, “*...and this is what causes people to migrate.*”

It is very likely that the impacts of climate change will also affect the “perceived attractiveness” of this tourism destination (Scott, Jones, & Konopek, 2007: 571). *Expediciones Sierra Norte* and the people of the *Pueblos Mancomunados* now value the forest and natural beauty because they know that is what the tourists want to see. One man in La Nevería said, “*We*

*used to cut the trees and get money from them just one time... but now the idea is to sell the trees standing to tourists many times.*” In Benito Juárez, a male participant stated, “*We depend on nature. Totally... But nature also depends on us.*” Another man in Benito Juárez who worked in ecotourism said that, “*Tourists come and see that we conserve our natural world. And they like that a lot.*” Seasonal tourism demand could be affected by changes in temperature, precipitation, and/or alterations in phenological cycles traditionally associated with certain seasons and of particular interest to ecotourists, such as changes in fruiting season of trees that attract birds (Prideaux, Coughlan, & McNamara, 2010).

### **Conclusions**

In this study, we applied Actor-Network Theory (ANT) to the analysis of an ecotourism organization as a means to determine that organization’s adaptive capacity to the effects of climate change. Following the translation, ordering, and performativity (Ren, Johannesson, & van der Duim, 2012) of the tourism actor network in the *Pueblos Mancomunados*, and including non-human actants in the network, allowed us to study resilience in ways that have heretofore rarely been used in the tourism field (Dwiartama & Rosin, 2014; Orchiston, Prayag, & Brown, 2016).

Actants in this tourism network include the citizens of the *Pueblos Mancomunados* (both those who currently work in tourism and those who do not) and the tourists, as well as tourism, social capital, governance and institutions, and climate change itself. Climate change will affect the “perceived attractiveness” of the mountain communities (Scott, Jones, & Konopek, 2007, p. 571), potentially threatening community-based mountain tourism such as found in the *Pueblos Mancomunados*. Yet, communities with high adaptive capacity—particularly, the presence of strong social capital, fair governance and strong institutions, social norms and values that are

followed and respected, and economic capital—are able to better withstand some of those threats (Adger, 2003) and, as such, have enhanced climate readiness (Bitsura-Meszaros et al., 2015).

As seen here, the *Pueblos Mancomunados* and their ecotourism organization, *Expediciones Sierra Norte*, appear to have strong social capital, which functions as a major actant in the network. Pretty and Ward (2001) described social capital as being comprised of “trust, reciprocity, common rules, norms and sanctions, and connectedness in institutions” (p. 209). Social capital is embedded in the way the pueblos function and most community members feel a strong sense of responsibility for their communities and their tourism organization. Almost all study participants agreed that they are responsible for the success of tourism in their communities, showing connectedness in the tourism organization.

Good governance and strong institutions are made up of elements such as participation, empowerment, social justice, and accountability (Lebel et al, 2006). The governance system of *usos y costumbres* ensures participation of almost all adults. Yet, a large segment of community members are left out of the decision-making processes and participation inherent in *usos y costumbres*: women. While participants almost unanimously agreed that they have confidence in the community to make good decisions for the wellbeing of everyone, not everyone is allowed equal opportunity to make those decisions. The four pueblos that now allow women to participate in governance have only done so as their populations declined through out-migration. However, enrolment of other actors is part of the mobilization of any actor-network. As van der Duim, Ampumuza, and Ahebwa (2014) noted, “When a fracture in a network occurs, new actors emerge, while other actors pull out, and actors start to enact different roles or even change their status” (p. 595). Robson and Berkes (2011) suggest that enrolment of other actors could be, “a proactive, adaptive strategy towards reducing community vulnerability to the negative impacts of

demographic change.” Although such change is occurring, this change alone does not indicate that women have equal access to participation in government or that they are empowered. Thus, we conclude that the governance and institutions actant is not strong.

A man in Amatlán responded to a question about the future with, “*I worry, not about myself. I’m 61; I’ve already lived my life. But I worry about my children, my grandchildren; I worry about them a lot. Because of the warming that’s happening, the shortage of water we sometimes have, the rain, what is going to happen to them?*” Our findings suggest that the tourism actor-network in the *Pueblos Mancomuados* is somewhat resilient to impacts from climate change. However, our findings also suggest that with out-migration high and predicted to continue, fewer people will be left to work in tourism or to hold a leadership position in their community. Culture is a very important part of tourism in this region. If members of the communities are unable to perform culture to fulfill the desires of future tourists, it is likely that tourism would decline. As impacts to cultural practices may have implications more profound than those of climate change, strategies to mitigate outmigration may be the cornerstone for building climate readiness within *Expediciones Sierra Norte*.

This application of ANT demonstrates how resilience can be analyzed in a community-based tourism organization, highlighting its theoretical importance and filling a gap in the literature. Through its principle of symmetry (van der Duim, 2007), we were able to examine non-human actants’ roles in a network and provide a more robust explication of how climate change might affect a stabilized tourism actor-network in the mountains of southern Mexico. When considering the description of the research context in this study, the results are likely transferable to other indigenous-owned ecotourism organizations in Latin America; however, the methods employed should be applied in other community-based tourism settings to enhance our



understanding of drivers of organizational resilience and climate readiness. Additionally, studies that apply varied resilience indicators will provide a broader palette of information from which other tourism organizations could learn about their own adaptive capacity, how to increase it, and how to better withstand disturbances from climate change.

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## **Chapter 4: Participatory climate adaptation planning with rural communities:**

### **An application of ORID method with the *Pueblos Mancomunados***

#### **of southern Mexico**

#### **Introduction**

Communities and businesses worldwide are planning for adaptation to climate change as a strategy to remain viable as they look to the future (Adger, Huq, Brown, Conway, & Hulme, 2003). The tourism industry is predicted to be heavily affected by climate change impacts (Becken & Hay, 2007) and many tourism organizations and destinations have already begun taking adaptation measures to increase their resilience to future threats (Honey & Hogenson, 2017; Scott & McBoyle, 2007). Beach and ski tourism destinations are obvious targets for adaptation—given the predictions for sea level rise and changes in precipitation patterns—and most of the literature on tourism and climate change adaptation is devoted to these types of destinations (Palomo, 2017; Scott, Gössling, & Hall, 2012; Steiger, Scott, Abegg, Pons., & Aall, 2017). Ecotourism destinations are also predicted to experience environmental change driven by climate change, and those in mountainous regions are considered to be particularly vulnerable (Field et al., 2007; Saarinen & Tervo, 2006). Further, tourism destinations in developing countries, especially those that are small-scale and community-based, will potentially be those most affected by climate change (Ranger & Garbett-Shiels, 2011).

Adaptation planning takes various forms and uses many different frameworks (Füssel, 2007); it can take place at the individual, community, regional, or organizational level (Adger, Arnell, & Tompkins, 2005), but requires different techniques depending on the level of planning and the audiences involved (Mimura et al., 2104.). Participatory planning at the community level is gaining traction in development circles as a way to ensure the incorporation of residents'

values, visions, and ideas, which increases the probability that plans will be put in place and followed (Carlsen, Dreborg, & Wikman-Svahn, 2013; Regmi, Star, & Filho, 2016). Yet participatory planning for climate adaptation in the tourism sector—especially in a developing country context—is limited in the academic literature (Bujosa, Riera, & Torres, 2015). Other than Daconto and Sherpa’s (2010) contribution on participatory adaptation planning (via scenario planning) for tourism strategies in a national park context in Nepal, there are few other examples (e.g., Behringer, Buerki, & Fuhrer, 2000; Kaján & Saarinen, (2013).

Planning with rural and indigenous communities in a developing country context—especially when facilitated by cultural outsiders—must incorporate local values, visions, and ideas (Athayde, Silva-Lugo, Schmink, Kaiabi, & Heckenberger, 2017). Therefore, we contend that rural and indigenous tourism enterprises adaptation planning efforts should use input and decision-making from a variety of community residents and stakeholders. One facilitation framework that has yet to be used in climate adaptation planning within the realm of community-based ecotourism is the ORID method. The ORID method, commonly used in educational situations, has been used to enhance and stimulate conversation and knowledge-sharing in group settings (Baptiste, 1995; Carson, 2006; Wee, 2008). Developed by the Institute of Cultural Affairs in Canada, ORID uses focused observation, reflection, interpretation, and decision questions to elicit information and knowledge in groups that are sometimes hesitant to talk (Carson, 2006), and has been used successfully in other community-based natural resource planning initiatives (e.g., Mahon, Almerigi, McConney, Parker, & Brewster, 2003). Although ORID has yet to be used in climate adaptation planning, its methodical treatment of focused questions allows for deep discussion and reflection, making it a useful approach for this process.



In this paper, we present an adaptation planning process with a rural and indigenous community-based tourism organization in southern Mexico, using ORID as the guiding methodology.

## **Research methods and analysis**

### **Study area**

According to the UN World Tourism Organization (2017), Mexico ranked eighth in the world in international tourist arrivals in 2016. While many of Mexico's tourists are bound for the "3S" (i.e., sun, sea, sand; Skoczek, 2003), cultural tourism and nature-based mountain tourism thrive, particularly in southern Mexico in the states of Oaxaca and Chiapas. Oaxaca, with a capital city of the same name, is nestled in the Sierra Madre de Oaxaca Mountains of southern Mexico. The rugged geography from this range is responsible for much of the preservation of the area's cultural, agricultural, and biological diversity, enhancing the pull of ecotourism to the area. North and east of the capital city eight communities known as the *Pueblos Mancomunados* ("commonwealth communities") manage their natural resources communally and have done so for generations (Figures 1 & 2). In 1993, six of the eight communities collectively developed a community-based ecotourism organization, *Expediciones Sierra Norte*, as a way to combat out-migration of younger community members and promote cultural survival through highlighting their culture and their natural resources.



Figure 1. General location of study area.



Figure 2. The communities that form the *Pueblos Mancomunados*.

Currently, the *Pueblos* receive about 16,000 visitors per year who arrive to enjoy and learn about natural, agricultural, and cultural resources (A. Martínez Pérez, personal communication, August 23, 2013.). Some local community members are actively engaged in the ecotourism business (as guides, cleaning staff, cooks, etc.), but the benefits from the ecotourism activities vary by community. In some communities, individual community members participating directly in the ecotourism business earn extra income, while in other communities,

profits are pooled and shared collectively among all community members. Regardless, engagement in the ecotourism business is providing a new reason for community members to stay in their home villages and partake in traditional activities, which is helping to maintain their culture.

Over 100 kilometers of trails zig-zag between and through the communities, offering visitors the opportunity to engage in a variety of types of touristic ventures from horseback riding and hiking to wildlife viewing and picking coffee. Many domestic tourists come to mountain bike along the trails, while international visitors usually prefer to hike, view wildlife, or participate in cultural tourism activities such as learning to weave, learning the Zapotec language, or learning about traditional medicines (A. Martínez Pérez, personal communication, August 2013). Two communities, Cuajimoloyas and Latuvi, host annual festivals in July that each attract hundreds of visitors. The communities engaged in tourism range from 1600 to 3200 meters above sea level in elevation, providing a variety of ecosystems for tourists to visit. The closest community, Cuajimoloyas, is two hours from Oaxaca by bus and the farthest, Amatlán, is about three hours from Oaxaca. Two of the communities, Benito Juárez and La Nevería, are not accessible by a paved road, making them more difficult to visit despite their closer proximity to Oaxaca.

### **Preliminary work**

This paper provides an overview of the final stage of a mixed-methods research project designed to culminate in participatory climate-adaptation planning workshops. In order for the workshop participants to have the information they needed to develop adaptation strategies, they had to have an idea of (i) what types of climate impacts are predicted for this area, (ii) how those impacts might cause changes to tourism flows, and (iii) what type of adaptive capacity they

possess as a network of communities that could help them to be more resilient. First, we requested information on climate projections for this area from a custom climate data server developed by the USDA Forest Service and Virginia Tech (Crookston and Rehfeldt, 2008). These projections were then developed into two future scenarios that were included in an on-site visitor survey. In May 2015, two bilingual researchers spent four weeks in the *Pueblos Mancomunados* to administer the survey to tourists and document perceptions of adaptive capacity using semi-structured interviews conducted with community members. The team intercepted tourists throughout the communities and during a festival to determine the primary attractors (pull factors) of their visit and to explore how tourists' perceptions of climate change impacts might influence future travel behaviors (Deason & Seekamp, 2018a). Community members from all six communities, as well as one community that is not engaged in the ecotourism business and served as a negative case (Johnson, 1997), were interviewed. Interviews were later analyzed to for measures of adaptive capacity (Deason & Seekamp, 2018b). The preliminary results of those studies, as well as the projected climate change impacts, were presented to the communities in the participatory adaptive planning workshops.

### **Workshops**

In May 2016, a team of three bilingual researchers traveled to the *Pueblos Mancomunados* to facilitate participatory workshops that served as a first phase of an adaptation planning process with the communities and their ecotourism business. We conducted two types of workshops: (i) community member workshops and (ii) a final synthesis and prioritization workshop with *Expediciones Sierra Norte* tourism staff from each of the six communities. Community workshops were held in Amatlán, Cuajimoloyas, Benito Juárez, and Latuvi (Table 1). Due to time constraints, we were unable to hold a workshop in each of the six communities.

To include voices from Llano Grande and La Nevería, those communities were invited to attend the workshops in Cuajimoloyas and Benito Juárez, respectively. For the final workshop, the *Expediciones Sierra Norte* tourism team, which included tourism coordinators, administrators, guides, and others who work in tourism in every community were invited to participate. All workshops were conducted in Spanish, and notes were recorded on flip-chart paper as well as in the form of loose (not verbatim), in-situ transcriptions and observations. Additionally, the research team debriefed after each workshop, which served as an additional source of data regarding key findings.

Table 1. Community characteristics of the *Pueblos Mancomunados* and number of community workshop attendees.

Community	Amatlán <sup>1</sup>	Benito Juárez <sup>1</sup>	Cuajimoloyas <sup>1</sup>	La Nevería	Latuvi <sup>1</sup>	Llano Grande <sup>2</sup>
Approx. population <sup>3</sup>	450	380	950	90	600	110
Elevation (masl)	1600	2800	3000	2700	2400	3000
Workshop attendees	28	14	22	3	12	0

<sup>1</sup>Community workshops (community members from La Nevería were invited to participate in the workshop in Benito Juárez, and community members from Llano Grande were invited to participate in the Cuajimoloyas workshop)

<sup>2</sup>Site of ecotourism team workshop

<sup>3</sup>Population data from 2015

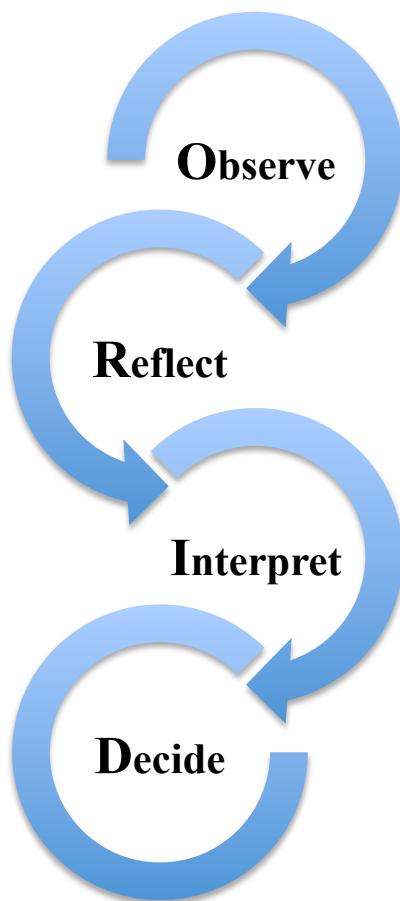
In order to elicit information that would be helpful for developing the adaptation plan, we used the ORID approach (Hogan, 2003) in all workshops. To do this, we presented information about climate change and its impacts to community members for them to *observe*; we then asked specific questions to have them *reflect* on what that might mean to the *Pueblos Mancomunados* and their tourism business; they then had to *interpret* what type of threats they may be faced with; and finally, *decide* on what actions to take to mitigate those threats (Figure 3).



- What do you agree/disagree with?
- How can you reduce risk to your tourism assets?



- What actions can you take as an organization?
- What actions do you want to prioritize?



- What did you see or hear?
- What is climate change?
- What brings tourists to the *Pueblos Mancomunados*?



- What are the implications of climate change for these tourism assets that you listed?
- What could happen to them?



Figure 3. The ORID process with examples of questions we used in each step. Photos clockwise from top left: a group in Cuajimoloyas interpreting information about tourism assets; a community map of Latuvi; decision-making in Llano Grande; map-making before interpretation in Benito Juárez

## Results and discussion

### Community workshops

The researchers and the *Expediciones Sierra Norte* ecotourism general coordinator collaboratively planned the workshops. The tourism coordinator within each community solicited participation among community members. The goal of each community workshops was to elicit information about priority tourism assets, potential climate threats, and adaptation actions in each community. Using a presentation of climate change predictions and results from

the previous phases of the project, a mapping exercise, and ORID-focused questions and conversation, we were able to educate the most important tourism assets to community members, an important component of community-based adaptation planning.

At the beginning of each workshop we introduced ourselves and shared the agenda for that workshop. This was followed by a short presentation and discussion of climate change, its causes, and predicted impacts for the region (Crookston & Rehfeldt, 2008; Sáenz-Romero, et al, 2010). We then presented preliminary results from the tourist survey and community-member interviews from 2015. In accordance with the ORID methods, we asked the participants objective questions about what they heard in the discussion about climate change such as, “*What did you see or hear in this presentation?*” “*What is climate change?*” “*What brings tourists to the Pueblos Mancomunados?*” The next questions were reflective questions about how the participants felt about the presentation and if they agreed with what was presented: “*Do you agree with everything?*” “*Do you believe our analysis of your community’s resilience?*” “*Do you have anything to add?*”

To get to the interpretive questions, we divided the participants into small groups and asked them to consider the implications of this information for their community. After they divided into groups, we used an icebreaker (a quick participatory activity) to help everyone feel more comfortable and facilitate conversation (Hogan, 2003) (Figure 4). We then had each group draw a map of its community and include what it considers to be the biggest assets to their ecotourism business. After the mapping exercise the groups came back together and each small group presented its map and spoke of the assets that it included in the map. After each group presented, the facilitator asked, “*What are the implications of climate change and tourism for these assets that you listed? What could happen to them in the future given the impacts of climate*



*change?”* After all the assets and their potential threats were listed, we asked decisional questions such as, *“What can you do about it? How would you go about protecting these assets?”* We closed each workshop by asking how the participants will use the information and thanked everyone for their participation.



Figure 4. Participating in an ice-breaker in the workshop in Cuajimoloyas.

In the following subsections, we present results from each community, as we found them to perceive some unique ecotourism assets, climate change threats, and suggested actions for adaptation. However, we also found commonalities among the communities and, therefore, present the list of all assets, threats, and actions in Appendix A. We use text formatting to denote the different levels of commonality found between the assets, threats, and actions identified in each community.

## *Amatlán*

This workshop was held on May 21, 2016. As participants slowly filtered in, we delayed the start time to 11:30. It lasted for about two hours. There were 28 adult participants, primarily women. The *Expediciones Sierra Norte* ecotourism general coordinator attended this workshop, in which she introduced the research team and helped facilitate dialogue. This was the only workshop in which she participated. The attendees were quiet at first, but eventually most participated by sharing ideas and examples of climate change impacts they've experienced or noticed. The mapping session was well-received. Tourism assets, threats, and actions were recorded on paper and discussed while recording them. Assets listed included historic mines and haciendas, a river, a bridge, tourism cabañas, and a monument at the entry to the town. Threats were not specifically linked to each asset, but included deterioration of the haciendas and mines; the river dries up or the river floods; strong rains, winds, or storms; drought; fire; and pests. Recommended adaptation actions to address these threats consisted of forming work groups (or “*tequios*”) to pick up trash, repairing structures that get damaged, incorporating conservation measures into community planning; raising awareness in the community of climate change and its impacts, planting trees, reforesting watersheds; saving water, using water capture systems, reusing gray water; return to traditional planting systems such as using magueys (large agave-like plants) instead of wire fencing to help prevent soil erosion and water run-off, and increasing the use of native seeds. This group was somewhat knowledgeable about climate change and its impacts, but often lumped many negative environmental impacts together (e.g., including trash on the side of the road as an impact of climate change).

### *Cuajimoloyas*

The workshop in Cuajimoloyas was held on May 22, 2016. This workshop had 12 participants at the beginning and 22 by the end. Perhaps due to the limited number of participants in the beginning, there was limited engagement by those present. By the time of the mapping exercise, however, there were more participants and, as in the previous workshop, mapping was well-received and quite participatory. An interesting note in this workshop was the community's focus on human resources: employment opportunities for youth and the service quality that those working in ecotourism provide. The Cuajimoloyas group listed the following as its assets: trails and other tourist attractions, tourism infrastructure, *temazcal* (a traditional steam bath or sauna), transportation (this community is on the highway with good transportation infrastructure that makes it easy to access from Oaxaca), trout, trees, and mushrooms that attract hundreds of visitors each year in July for its mushroom festival. Threats included: too much rain, too little rain, mudslides, animals disappearing, lack of tourists, storms, pests, fewer mushrooms, and fires. Recommended adaptation actions included: improved forest management, teaching youth about traditions, training, reforestation, and crop diversification.

### *Benito Juárez*

This workshop was held on May 23, 2016 in the afternoon. There had been some confusion about the start time among those in the ecotourism office, as the community ecotourism coordinator didn't share the workshop details with others in the office or in the community. As such, a community work event was scheduled in Benito Juárez for the same time as the workshop; we tried to accommodate the conflicting schedules for Benito Juárez community members by delaying the start of the workshop by several hours. Community members from La Nevería were also invited to participate; however, some La Nevería had not

received notification of the workshop's delayed scheduled, and decided to return to their community instead of waiting in Benito Juárez for the workshop to begin. There were 17 participants at this workshop, most from Benito Juárez and three from La Nevería. Two of the participants in this workshop were summer interns working with *Expediciones Sierra Norte*. While they weren't members of the community, they were very engaged and provided different insights about the tourism business than the local participants.

All participants seemed very interested in the workshop information and facilitated discussion, with several taking notes during this workshop and one asking for a copy of the presentation on a flash drive. Although these participants were very excited to create and present their maps, our observations indicated much side-bar discussion among break-out groups during the presentations. This group only mentioned tangible assets such as its main tourist attractions, trout, and individual farms that attract agritourists; noteworthy was that human resources were not mentioned as assets. Threats were similar to those in the other communities and included: flooding, drought, storms, pests, crop and animal loss, poor water quality, erosion, less tourism, and damage to trails. Most of the recommended adaptation actions focused on maintenance and modernizing or learning new techniques.

### *Latuvi*

The workshop in Latuvi was held on May 24, 2016. A group of 31 school children (ages 12-16 years) attended and almost filled the meeting space. We decided to adapt our workshop format and host a discussion with the youth first, followed by a separate discussion with the adults. After the youth left there were 12 adults that engaged in the workshop. Both the children and the adults asked many questions following the climate change information presentation. For example, the youth wanted to know what our university specifically, and the United States

generally, are doing to address climate change. Adults asked why we were working on climate change in Mexico. Assets that emerged during the workshop included many of the same assets mentioned in previous meetings, such as: forests, animals, bicycles, and infrastructure. This group was the first to mention camping areas as an ecotourism asset, despite all communities having camping areas for tourists. Like the participants in Cuajimoloyas, this group also listed human resources as an asset. It also specifically mentioned re-routing trails as an adaptation strategy, which no other community had mentioned. Threats were directly related to assets and included: drought, flooding, mudslides, changes in forest structure, and water quality. This group also mentioned hail that could damage their fruit trees, including apples, which are important for this community's apple festival. Recommend adaptation actions included: forming work groups to repair and maintain infrastructure, planting trees, and better managing forest resources. This group also recommended establishing family gardens as a way to provide more local food for the tourism restaurants, using solar energy to provide a surer source of electricity for the tourism office, and "voluntourism" as a means of improving and maintaining the camping areas.

### **Expediciones Sierra Norte workshop**

#### *Workshop overview and integration of ORID method*

The final workshop was held with the ecotourism team in Llano Grande on May 26, 2016 from 11:00am until 5:30pm. The goal of this workshop was to develop the basis of an adaptation plan for *Expediciones Sierra Norte* using information gathered in the earlier workshops and studies. Again, we used the ORID method to structure the workshop. Specifically, participants *observed* preliminary results from the prior survey research, community interviews, and community workshops; they then *reflected* on this information during a gallery walk that included community maps and lists of ecotourism assets, climate threats, and adaptation actions

the communities had developed; they *interpreted* the information they had received by developing specific objectives and actions in small group work; and finally, participants *decided* on priority objectives for an adaptation plan. These steps are explained further in the following paragraph. Five of the six communities involved in the ecotourism business participated (Llano Grande, Benito Juárez, Cuajimoloyas, Latuvi, and Amatlán), and the participants were ecotourism coordinators, guides, housekeepers, cooks, and student interns. One community's mayor attended (Llano Grande). There were a total of 24 participants, although some did not participate in all activities.

#### *Workshop details*

After a review of the purpose of the community workshops and the agenda for this workshop, we facilitated an exercise to develop a climate adaptation vision for *Expediciones Sierra Norte*. The purpose of this vision is to call people to action and better frame their adaptation plan based on a shared desired future (Beaulieu, Santos Silva, & Plante, 2015). As *Expediciones Sierra Norte* already has a vision as a tourism organization, this new climate adaptation vision is based on the business' vision. We then reviewed the results from the previous research phases (i.e., tourist surveys and community interviews), as well as the findings from the four community workshops. After workshop participants *observed* these findings, we asked questions similar to what we asked in the community workshops (e.g. “*What did you see?*” “*What brings tourists to the Pueblos Mancomunados?*”) and added, “*What were some of the climate threats that your your community members perceived?*” We then had a gallery walk during which participants could *reflect* on all of the tourism assets, perceived threats, and adaptation actions that were developed in the community meetings. We asked them, “*What would you add or take away from these lists?*” “*Do you agree with what was listed?*” Results of

the previous research paired with the gallery walk of workshop findings allowed these participants to *observe* what transpired during the community workshops and *reflect* on how tourism demand may shift in the future from climate change impacts.

After the gallery walk, we broke for a mid-afternoon lunch. When we returned, we conducted a listing exercise of what the participants thought were the most important assets mentioned in the community workshops. Then, we asked participants to add anything that they felt was missing from the asset list before using nominal group technique to prioritize tourism assets (Delbecq, Van de Ven, & Gustafson, 1975). After prioritization (Table 3), we divided participants into four mixed community groups to facilitate focus on the regional, instead of community, level. Each group had one intern, at least one tourism coordinator, and was assigned an asset for which it was to develop specific objectives and associated adaptation actions. We provided specific instructions for how to develop the objectives and actions, and walked the participants through an example so everyone could experience the task prior to working in small groups. This group work allowed participants to *interpret* the information on which they had earlier reflected (e.g. “*What actions can you take to reduce vulnerability and risk for your most important tourism assets?*”).

Table 3. Prioritized tourism assets.

<b>Asset</b>	<b>Score</b>
biodiversity	19
customs and traditions	16
attractions	15
place history	14
water	12
human resources	11
cabins & restaurants	10
agritourism	9
trails	3

Each group then presented its adaptation objectives and actions. Although some groups developed two objectives, most groups developed one. We listed all of the objectives on a screen and asked participants to *decide* what objectives to prioritize using an evaluation matrix (Table 4). An evaluation matrix is a recommended tool to use to compare options in a transparent adaptation planning process (Simpson, Gössling, Scott, Hall, & Gladin, 2008). Participants voted on each objective on a 1-5 scale (one being lowest in each category) according to the following criteria: economic feasibility, effectiveness, social acceptability, difficulty, and sustainability. Criteria for the evaluation matrix were selected based on those commonly used for adaptation planning and from other participatory planning processes (e.g., AIACC, 2007; USAID, 2007). The highest rated objectives were ones that would be prioritized in the adaptation plan. ‘Reforest around natural springs’ was the most highly rated objective. ‘Documentation of place history’, ‘conservation of biodiversity’, and ‘implementation of water reuse’, and ‘implementation of water capture’ had the next highest score (tied) and ranked second. Third and fourth ranked were ‘having the tourism attractions in good shape’ and ‘the implementation of workshops for teaching youth about customs and traditions,’ respectively. We had a short discussion on next steps, asked if there were any questions, and closed the workshop with that activity, thanking the group for its time. The coordinator gave closing comments and explained how the research team would work with her and others in the ecotourism office to further develop the plan.



Table 4. Evaluation matrix with prioritized objectives.

Objective	Criteria					Score	Rank
	Affordable	Effective	Acceptable	Difficult	Sustainable		
Implemented workshops on customs & traditions	4	4	3	3	5	19	4
Attractions in good shape	4	5	5	3	4	21	3
Finished documenting history	5	4	5	3	5	22	2
Biodiversity conserved	5	5	5	3	4	22	2
Water capture implemented	4	5	4	4	5	22	2
Water reuse implemented	4	5	4	4	5	22	2
Springs reforested	5	5	5	5	5	25	1

### **Next steps**

After wrapping up the workshop, the research team took photos of all of the products developed in the workshops (e.g., maps, group brainstorming notes, nominal process votes). The following day we met with the ecotourism coordinator in the office in Oaxaca to discuss next steps. Specific tasks for the research team included: writing up the results of the workshops; drafting an outline of an adaptation plan, including opportunities and barriers to project implementation; and working with the coordinator and the rest of the ecotourism team to refine the final version. In the long-term, *Expediciones Sierra Norte* will need to regularly update the adaptation plan as their assets, impacts, and capacity change in the future. The most immediate next step for the tourism organization and members of the six participating communities is to decide if and when they want to begin implementation of the plan. This will require additional community meetings and the type collaborative decision-making that has traditionally occurred within and between the communities. Another important step in adapting to climate change will be obtaining the necessary financing for implementing selected adaptation strategies (Bouwer & Aerts, 2006). Ultimately, the intention of this multi-stage research project and participatory adaptation planning workshops is to provide *Expediciones Sierra Norte* with an adaptation plan that will help them secure external funding to adapt and build climate readiness.

### **Summary and conclusions**

In this study, we conducted a community-based, participatory adaptation planning process with a rural ecotourism business in southern Mexico. The communities involved are similar culturally because they belong to a group of communities with a common heritage and a unique governance system (Robson, 2007). In the *Pueblos Mancomunados*, participatory decision-making is part of the way these communities govern and ecotourism is an economic

activity about which all citizens in participating communities make communal decisions. Using the ORID method, we invited community members to *observe* the information about climate change and its impacts, *reflect* on what that might mean to them and their communities, *interpret* what type of threats they may be faced with, and *decide* on what actions to take to mitigate those threats. Through various participatory processes (Tague, 2005), including mapping, listing, visioning, and modified nominal group technique, we developed a list of priority objectives for a climate change adaptation plan. The process of using the ORID methodology and the lessons learned can be applied to other adaptation planning efforts with rural and indigenous communities in developing countries. In the following paragraphs, we present our own ORID process to comment on what we *observed* and *reflect* upon what those observations mean in terms of identifying and *interpreting* the positive aspects of this study, as well as *deciding* what lessons we learned could help future researchers, climate adaptation practitioners, and tourism providers considering similar participatory community planning efforts.

Of primary importance to the success of our process, we developed a level of trust with the communities during the previous research phases. We spent substantial time during those field visits getting to know the people currently involved in the ecotourism business, including homestays. As cultural outsiders, a level of trust within the community was necessary for the researchers and workshop facilitators to be able to successfully conduct research, as well as for workshop participants to feel that their input mattered (Kerstetter, 2012). After establishing contact with the ecotourism coordinator in 2013 and making a preliminary visit at the end of 2014, the lead researcher had frequent communication with the coordinator and other community members throughout the research process, particularly during the 2015 field season. Additionally, it was also helpful that two of the researchers were fluent speakers of Spanish and

one was a proficient listener, as it would have been challenging to interact and facilitate these workshops having to use an interpreter, particularly during the interactions with small group activities.

Another positive aspect is that the ecotourism organization, *Expediciones Sierra Norte*, wanted to start an adaptation planning process. The ecotourism coordinator and others in the organization realized the need to prepare their relatively small tourism business for potential changes in tourism flows that may occur with climate change driven alterations to future weather and environmental conditions. A final beneficial aspect was that the organization also had student interns (majoring in tourism management) from national universities working in each community while we were conducting research and some interns participated in the workshops. It is likely that these student interns contributed insights that perhaps helped the local participants think more critically about their communities' tourism future.

Despite these positive aspects, there were certain elements of the process that could have been improved. Some were outside of the researchers' control, while others were not and were oversights on our part. One unintended oversight was the timing of the workshops. After the research team arrived on site, we realized more community members could have participated if the workshops had been held in the evenings. Another improvement related to timing would have benefited attendance and participation in the workshop in Cuajimoloyas. Cuajimoloyas has a well-attended mushroom festival every year in July and, although our workshop was held in May, a talk on sustainable mushroom collection was to be held immediately after our workshop in the same community space. Some residents were clearly confused about the timing and sequencing of both activities, as those residents who only wanted to participate in the sustainable mushroom collection talk wandered in and out during our workshop. Similarly, the timing of the

community work project in Benito Juárez hindered not only attendance but the ability to begin that workshop as scheduled, which resulted in a few individuals electing to leave and not participate.

Lack of clear communication on who should participate and when the workshop would occur was a limiting factor for in almost every workshop. In Latuvi, while we felt it was important for the youth to be exposed to research on climate change and to provide them with an opportunity to envision key ecotourism assets, the large youth presence challenged facilitation and resulted in essentially two separate workshops (one for youth and one for adults). Further, the large youth presence in the meeting space may have kept some adults from participating in the workshop, as the facilitators observed some adults standing at the doors and never entering. In this case, clearer communication on who should attend could have made a difference in adult participation. In both Cuajimuloyas and Benito Juárez, the ecotourism coordinators did not communicate clearly to residents about the workshops causing low turnout and some last-minute changes that could have affected the results of the workshops. Additionally, there was no representation from Llano Grande until the last workshop (and that participation only included individuals directly involved with some aspect of ecotourism provision); as such, that community's voices were not represented in our reporting of community workshop results. Lastly, not all of the ecotourism staff participated in the final workshop. The coordinator from La Nevería decided that it wasn't worthwhile to attend (potentially a consequence of us not scheduling a workshop within that community), which limited decision-making ability to those from the other five communities. While the unique governance structure of the *Pueblos Mancomunados* is advantageous in many aspects of participatory planning, it also allows for

independent decision-making at the community level, which ultimately negatively affected workshop participation.

The key lessons we learned related to communication and timing include: the need to clearly convey and confirm recruitment plans, and to be flexible with cultural norms that lead to less structured participation. Overall, better communication and planning could have made considerable differences in participation. However, we observed genuine interest and engagement of those individuals who fully participated and found similarities and uniqueness across communities. Collectively, we feel confident in reaching data saturation (similar patterns in the themes; Flick, 2014), as the culminating workshop with the *Expediciones Sierra Norte* organizational members and ecotourism providers resulted in the listing of few additional tourism assets, and the key objectives reflect the concerns and strategies raised in the community workshops.

This planning process presents a framework for climate adaptation planning in indigenous and rural communities worldwide. Our paper fills gaps in the literature related to the climate adaptation planning process in tourism, the geographic focus of adaptation planning (as there are few studies conducted in Latin America), and the use of a novel methodology (ORID) for facilitating that process. We found that the ORID method worked well for engaging participants and developing the framework for a climate adaptation plan in a communally operated ecotourism organization. Further research can benefit from our lessons learned, and future adaptation planning that uses this methodology can help other ecotourism organizations and destinations enhance their climate readiness.

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## Chapter 5: Conclusion

Worldwide, rural communities are hoping that ecotourism will help them create jobs, preserve natural resources, and maintain their ways of life (Das & Chatterjee, 2015). While ecotourism has been shown to increase income and foster local community development (Hunt, Durham, Driscoll, & Honey, 2015), an ecotourism business must consider risks to the sustainability of both its culture and its operations (Becken & Hay, 2007). Additionally, ecotourism businesses must be ready to prepare for and respond to those risks as they appear. An important risk to ecotourism businesses—especially those in indigenous mountain communities—is climate change. This dissertation took a pragmatic approach to work with a group of indigenous communities, the *Pueblos Mancomunados*, in the mountains of southern Mexico and helped them develop a climate adaptation plan for their communities and their ecotourism business, *Expediciones Sierra Norte*. The research plan involved three distinct but related steps to collect and generate data that were used to start a participatory adaptation planning process. Through survey research with tourists, semi-structured interviews with community members, and participatory workshops with community members and the ecotourism committee, this dissertation presents a framework for working with rural communities/ecotourism organizations to help them become more prepared to confront future climate risks (i.e., build climate readiness).

### Summary of findings

The second chapter (first manuscript) focused on tourists' perceptions of climate change impacts and how those perceptions might affect their decisions to visit the *Pueblos Mancomunados* under different climate scenarios. It used climate projection data, a literature review, and interview data to develop a survey instrument that was administered to tourists

during the month of July 2015. Survey results provide insight into what features most attract tourists to the area (natural beauty, biodiversity, and culture) and how the tourists might change their plans in the face of future climatic change. In the near future, a large shift in tourism demand is less likely, but sixty years in the future it is more likely that there will be a significant shift that *Expediciones Sierra Norte* should address sooner rather than later. The Representative Concentration Pathway used in this study (RCP 8.5) is the scenario with the highest concentration of greenhouse gas, and the upper range for “baseline scenarios” (Pachauri et al., 2014, p.8) (those in which nothing is done to constrain emissions from their present day levels), providing a worst-case scenario for the future of the area. While the projections are not as drastic for the near term, it is possible that changes that fall within the tail of these projections (i.e., more drastic, near-term or less drastic, longer-term impacts) could be experienced. As such, developing strategies at any time to sustain tourism flows in anticipation of shifting demand will enhance *Expediciones Sierra Norte’s* and the *Pueblos Mancomunados’* adaptive capacity.

Another interesting finding is that domestic tourists consider ease of travel more important than culture to their decision to visit. Since one-third of the tourists surveyed were from the region, it is incumbent upon ecotourism staff to develop products that will continue to attract domestic tourists. The ecotourism committee in the *Pueblos Mancomunados* will be able to use this information to better market to different types of tourists, plan what new tourist products they should offer, and to search for funding to implement adaptation measures that may help their tourism business adapt to changes in climate, as well as in tourism flows.

The roles of culture and nature were highlighted in this manuscript as being very important to tourism to the area, particularly to international tourists. This paper contributes to the theoretical understanding of tourists’ decisions when confronted with possible scenarios of a

changed mountain environment. The geographic focus in Mexico is novel, as very few studies on tourists' perceptions of climate change have taken place in mountainous regions of Latin America, and the results, while not generalizable outside of the pueblos that make up the study area, could be used to stimulate investigation in other similar rural tourism communities. Such research could not only assist additional communities in building climate readiness but also advance understanding of common trends in ecotourism demand studies.

The second manuscript employed semi-structured interviews of community members, and through the lens of Actor-Network Theory, analyzed adaptive capacity in the *Pueblos Mancomunados*. The governance system in the study area is unique and participatory; however, it has also been considered as hindering the progress of the ecotourism organization as leaders change regularly and frequently, diminishing knowledge of and experience in the ecotourism business. The emergence of out-migration as a theme was a notable finding, and it carries with it many implications for the future of the pueblos, regardless of climate change impacts. Thus, out-migration could be a more pressing threat to the sustainability of the pueblos than climate change. However, while projections show no drastic changes in the near term, the risk of drastic change in the near term does exist.

From a theoretical standpoint, this paper contributed as the first to use Actor-Network Theory to analyze an ecotourism organization's adaptive capacity. The theoretical underpinning of ANT was a useful choice for this analysis, and it is recommended that ANT be used in other adaptive capacity research. Again, the geographical context of the study contributes substantially to the literature, as there are few studies of adaptive capacity that focus in Mexico or Latin America and this paper uncovered themes that are relevant in many countries in this region (e.g., migration, cultural heritage).

The final manuscript is a process paper that helps to elucidate and provide an example of an adaptation planning process with a rural ecotourism organization. It uses the ORID (observe, reflect, interpret, and decide) methodology to elicit information and encourage participation in groups. Using this method, the data collected and generated in the first two manuscripts were collated and presented to community members and the ecotourism team to get their perceptions and begin an adaptation planning process. The ORID method is also used self-reflectively at the end of the manuscript to present key learning and suggestions for future use of this method.

The ORID method has not been documented as being used in climate adaptation planning in the past. Thus, the contribution of this paper is the methodology employed. The use of ORID provided for robust and informative discussion in every workshop. This method is recommended for use in future climate adaptation planning, especially with groups that are hesitant to talk, yet have a wealth of local knowledge to share.

### **Limitations and future research**

Limitations to this research include generalizability and transferability of results to tourists and communities in any locations other than the *Pueblos Mancomunados*. The sample of tourists surveyed for this study are only representative of the tourists to this area, they cannot be considered representative of tourists in other locations or generalized to a larger population (McCready, 2006). With few studies conducted in Latin America, it is recommended that future research include other mountainous tourist destinations to add to the knowledge of how climate change could affect tourists' decisions and allow for enhanced planning of adaptation strategies, particularly among indigenously-owned and operated ecotourism businesses.

Regarding transferability of qualitative findings, Lincoln and Guba famously stated, "the only generalization is: there is no generalization" (as cited in Flick, p. 495). However, in



qualitative research, “the selection of groups, units, cases, and so forth to study is made on the basis of their relevance to the theoretical account” (Schwandt, 2007, p. 127). Therefore, the use of rich description in the second manuscript, including use of power quotes and proof quotes, effectively enhances transferability (Pratt, 2009) and contributes to the theoretical understanding of adaptive capacity of similar communities in Mexico.

Other limitations are those that are inherent to survey research. As survey research is self-reported data, respondents may exaggerate or under-report their answers or they may not want to answer truthfully because of sensitivity to particular questions (Veal, 2011). Social desirability bias, the desire of the respondent to look good in the eyes of the surveyor or interviewer, is also a possibility in any face-to-face survey situation (Oppenheim, 2000). Informed consent scripts were used to stress the importance of answering honestly as a strategy to reduce this type of bias. Additionally, survey fatigue (see Porter, Whitcomb, & Weitzer, 2004) could have caused respondents to hurry through the survey or report inaccurate responses, as another researcher was sampling tourists at the same festivals as the research team working on this project.

Conducting this study has proven to be an exceptional experience for me in so many ways. During all stages of research, I discovered that there are an infinite number of ways to add to these methods and findings. Regarding survey research of tourists’ decision-making based on climate change impacts, a take-home survey that tourists could fill out after their visit could provide more thoughtful answers, and could be used to answer more nuanced questions about motivations, which are lacking in the literature (Gössling, Scott, Hall, Ceron, & Dubois, 2012). Interviewing community members for the qualitative study on adaptive capacity opened up further research topics that I didn’t expect. Specifically within the research findings, it was revealed that migration plays a very large role in the function and sustainability of the

communities that make up the *Pueblos Mancomunados*. While there are studies on out-migration in this region regarding governance and social structure (see, Robson & Berkes, 2011; Robson & Weist, 2014), further research on the role of climate change on out-migration may help us better understand how adaptive capacity could fluctuate based on population and gender dynamics. Finally, the adaptation planning workshops provided a model from which other workshops in similar ecotourism destinations could take place. Future pragmatic research in adaptation plan development will add to that study and provide more information and options for other planning efforts.

### **Uncharted waters**

This dissertation, like any, is not a crystal ball. The findings presented here are only possibilities of what may happen regarding climate change and tourism flows in the *Pueblos Mancomunados* in the coming decades. These communities are sailing into uncharted waters, and only time will tell what lies ahead in terms of the sustainability of their ecotourism business and the impact that it has on the communities involved. Community support for and belief in their ecotourism business is strong, yet there are voices of dissent that don't believe tourism is good for the pueblos, or that it unfairly benefits certain people within the pueblos. One young male guide once told me that he felt trapped by his mandatory volunteer service in the ecotourism business. He said as soon as he finished his community service he was leaving for Oaxaca. While this wasn't the most common opinion I heard about ecotourism, it highlights the fact that the business can be seen a threat to opportunity. However, in a few cases, *Expediciones Sierra Norte* has transformed emigration *into* opportunity by taking advantage of the language and cross-cultural skills that some returning migrants from the United States acquired while overseas to provide services to tourists who do not speak Spanish. This mixture of opportunity

and threat is exemplary of the dichotomy that the *Pueblos Mancomunados* are facing: a mixture of traditions and globalization.

As Robson & Berkes (2011) note, communities in this region of Oaxaca, including the *Pueblos Mancomunados*, could be considered ‘post-peasant communities’ (Kearney, 1995); due to out-migration and globalization, their traditional systems have changed and their culture has had to adapt to new family and civic structures. Civic structures are the backbone of the *Pueblos Mancomunados* and what makes them “mancomún” (jointly owned). Some scholars see that, “...the greatest hope for [these types of communities] lies in the establishment and strengthening of transnational ties and the emergence of new institutional arrangements” (Robson & Weist, 2014, p. 110). Perhaps *Expediciones Sierra Norte* can be that new institutional arrangement that brings hope to the future of the *Pueblos Mancomunados*. Further, if the communities have adapted to decades of out-migration, could they be primed to more readily be able to adapt to a changing climate as well?

We know that indigenous communities will be more affected by climate change than non-indigenous ones (Kronik & Verner, 2010). Perhaps this dissertation can provide assistance so that the *Pueblos Mancomunados*, and other communities in similar circumstances, are not sailing blindly into uncharted waters, but have a map to guide them along the way. It is my hope that this dissertation will be useful to the *Pueblos Mancomunados* in their efforts to adapt their tourism business and their communities to future change, so that they may be able to meet their ecotourism goals.

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## APPENDICES

**Appendix A: Ecotourism assets, climate change threats, and adaptation actions**

<b>ECOTOURISM ASSETS</b>		<b>CLIMATE CHANGE THREATS</b>	<b>ADAPTATION ACTIONS</b>
Cultural/ culture related	<i>town hall</i>	<i>no local food</i>	<b>raise awareness of threats</b>
	<b>temazcal (traditional sauna)</b>	crops destroyed	<i>conserve more resources</i>
	cemetery		<i>reduce solid waste</i>
	local food		<i>save and protect water resources</i>
	medicinal plants		<i>store/save plants/food</i>
	school		avail ourselves of links to outside world
	agritourism		care for animals
			control erosion
diversify agriculture			
install family gardens			
more sustainable production			
	new planting techniques		
	new technologies		
	pass down traditional knowledge		
	strengthen government		
	take advantage of voluntourism		
	training		
	use less plastic and chemicals		
	use solar energy		



			use traditional systems (magueyes, seeds) work together/work groups
Infrastructural/ infrastructure related	<u><i>cabins</i></u>	<u><i>less tourism</i></u>	<u><i>repair/maintain tourism infrastructure</i></u>
	<u><i>tourist attractions</i></u>	<i>tourism infrastructure deteriorates</i>	collect rainwater
	<u><i>trails</i></u>	<b>contaminated water/poor water quality</b>	collect trash
	<i>tourism office</i>	lack of gasoline	flood-proof campsites
	<b>bridge</b>	landslides on highway	install canals/drainage for excess water
	<b>overlook</b>	maintenance	manage ponds better
	<b>restaurants</b>	mudslides	modernize
	<i>cycling related</i>		plant shade for trout ponds
	<i>transportation/high way</i>		re-route trails/make new
	greenhouses		
	campsites		
	hotel		
Natural/nature related	<b>animals</b>	<u><i>change in biodiversity</i></u>	<u><i>plant trees</i></u>
	<b>trees/forest</b>	<u><i>drought/rivers dry up</i></u>	<i>forest best management practices</i>
	<b>trout</b>	<u><i>heat</i></u>	compost to improve soil
	<i>river</i>	<u><i>too little rain/ water shortage</i></u>	

---

biodiversity	<i><u>too much rain</u></i>
magueys (large plants)	<i>loss of animals</i>
mushrooms	<i>trees fall</i>
spring	<b>hail</b>
	<b>scarcity of mushrooms/(medicinal) plants</b>
	<i>erosion</i>
	<i>pests</i>
	<i>storms</i>
	<i>strong winds</i>
	fire
	forests dry up
	frequent lightning
	instability of seasons
	lack of firewood
	no fodder
	pollution
	river floods
	trouts die

---

***Bold+italicized+underlined*** text=response from five pueblos

***Bold+Italicized text***=response from four pueblos

**Bold text** = response from three pueblos

*Italicized text* = response from two pueblos

Plain text = response from one pueblo

\*Actions proposed by participants not from the Pueblos

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## Appendix B: Survey Instrument, English Version

### Pueblos Mancomunados Tourists' Perceptions Survey

**NC STATE UNIVERSITY**

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*Thank you for taking the time to complete this survey. It is being administered by North Carolina State University with permission and collaboration from Expediciones Sierra Norte. Your responses will help guide future tourism planning efforts in the Pueblos Mancomunados. Participation is voluntary and all responses will be anonymous.*

---

*For each question, please mark your response with an "X" or write in your response.*

**1. Was attending a festival your primary reason for visiting the Pueblos Mancomunados?**

- No
- Yes

**2. How long is your stay in the Pueblos Mancomunados?**

- For the day
- For more than one day (# of nights \_\_\_\_)

**3. Which pueblos have you visited or will you visit this trip? (mark all that apply)**

- Amatlán
- Benito Juárez
- Cuajimoloyas
- Latuvi
- La Nevería
- Llano Grande

**4. Have you been to the Pueblos Mancomunados before?**

- No
- Yes
  - a) If Yes, what year did you first visit? \_\_\_\_\_
  - b) How many total visits have you made, including this one? \_\_\_\_\_

**5. What do you think is the ideal month to visit the Pueblos Mancomunados and why? (please describe in a few words)**

---

**6. Which of the following activities have you participated in or do you plan to participate in while in the Pueblos Mancomunados? (mark all that apply)**

- Hiking
- Mountain biking
- Zip lining
- Horseback riding
- Cultural activities (e.g. cooking, farm visit, language classes, traditional medicine)  
Please list: \_\_\_\_\_
- Festival-specific activities (e.g. mushroom collection contest, mushroom/apple walk, cooking workshops, painting workshops, tastings)  
Please list: \_\_\_\_\_
- Other (please specify) \_\_\_\_\_

**7. We want to know what drives your decisions to visit the Pueblos Mancomunados. Please mark the circle that corresponds to how important each item is to your decision to visit. Please mark one response for each item.**

In the Pueblos Mancomunados...	Not at all important 1	2	3	4	5	6	Extremely important 7
a. Temperature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Rain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Biodiversity (# of plants & animal species)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Extent of forest fire	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Extent of cloud forest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Zapotec culture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Ease of travel to/within the Pueblos Mancomunados	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Working landscapes (visible agriculture, use of forest products)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Natural beauty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. We are interested in what attracted you most to the Pueblos Mancomunados, the environment and/or the culture, as well as the landscape (natural environment or working landscape). Please mark the dot on the scales below to indicate the extent to which each item influenced your decisions to visit the area. A mark in the middle dot denotes they were both equal in influencing your decisions.

**EXAMPLE:** You felt that the environment was slightly more important than culture when you planned your visit

Culture    ○    ○    ○    ○    ○    ○    **⊗**    ○    ○    Environment

a. Which was more important for your decision to visit the Pueblos Mancomunados when you **planned this visit**?

Culture    ○    ○    ○    ○    ○    ○    ○    ○    ○    Environment

b. Now that you've visited, if you were to plan another trip here, which would be more important for **your decision to return**?

Culture    ○    ○    ○    ○    ○    ○    ○    ○    ○    Environment

c. What was more important to your decision when **planning this visit**, the natural environment or the working landscape (presence of agriculture and use of forest products)?

Natural Environment    ○    ○    ○    ○    ○    ○    ○    ○    ○    Working Landscape

d. Now that you've visited, if you were to plan another trip here, which would be more important for your **decision to return**?

Natural Environment    ○    ○    ○    ○    ○    ○    ○    ○    ○    Working Landscape

Please review the table below, taking a moment to reflect on your preferences and perceptions of the scenarios. After reviewing and reflecting, please answer the questions below the table.

	Current Conditions	Scenario 1	Scenario 2
Average maximum temp in warmest month (April)	21°C (70°F)	23°C (73°F)	24°C (75°F)
Average maximum temp in coolest month (January)	17°C (63°F)	18°C (64°F)	19°C (66°F)
Seasonal variation (Oct-April)	Cool & sunny	Warmer & sunny	Warm & sunny
Season variation (May-Sept)	Cold & moderately rainy	Cold & moderately rainy	Cool & less rain
Biodiversity (plants & animals)	High - over 1,870 species present	Fewer overall numbers & species	Far fewer overall numbers & species
Occurrence of forest fires (in the state of Oaxaca)	Average of 257 fires per year, with 44,000 Ha or more burned in a bad year	Somewhat higher chance for more fires	Much higher chance for more fires
Extent of cloud forest (in the state of Oaxaca)	516,000 Ha (1.28 million acres)	Moderate decrease	Large decrease

9. We are interested in understanding how the conditions in the scenarios above would change your plans to visit the Pueblos Mancomunados. Please mark one response for each scenario.

	Scenario 1			Scenario 2		
	No	Maybe	Yes	No	Maybe	Yes
Would you change your plans?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. If you answered Maybe or Yes, how would your trip change? Please mark one response for each question under each scenario below. If you answered No, skip to question 11.

	Scenario 1			Scenario 2		
	Longer	Shorter	No Change	Longer	Shorter	No Change
a. Would you stay...?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. How many days longer or shorter?	_____	_____	<input type="radio"/>	_____	_____	<input type="radio"/>
c. Would you visit... (please select one)?	<input type="radio"/> Another destination in Oaxaca <input type="radio"/> Another destination in Mexico, but not in Oaxaca <input type="radio"/> Another destination outside of Mexico <input type="radio"/> Still visit Pueblos Mancomunados <input type="radio"/> Not travel at all			<input type="radio"/> Another destination in Oaxaca <input type="radio"/> Another destination in Mexico, but not in Oaxaca <input type="radio"/> Another destination outside of Mexico <input type="radio"/> Still visit Pueblos Mancomunados <input type="radio"/> Not travel at all		
d. When would you visit ... (please select one)?	<input type="radio"/> Earlier <input type="radio"/> Later <input type="radio"/> No change in time of year <input type="radio"/> I would not visit			<input type="radio"/> Earlier <input type="radio"/> Later <input type="radio"/> No change in time of year <input type="radio"/> I would not visit		

11. Thinking about the general trends from the scenarios above, **how do you think that potential changes in future conditions could impact the following?** Please mark a response for each item.

In the Pueblos Mancomunados...	Very negatively impact			No impact			Very positively impact	Unsure
a. Your health, safety, and security during a visit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Your plans to visit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Zapotec culture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. The economy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Travel to and within	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. The natural beauty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**We would like to know a little more about you so we better understand who visits the Pueblos Mancomunados.  
Please answer the following questions.**

**12. What is your sex?**

- Female
- Male
- Prefer not to answer

**13. What is your age? \_\_\_\_\_**

**14. What is your city, state (if applicable), and country of residence?**

**City**

**State**

**Country**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**15. How many people are in your party including yourself? \_\_\_\_\_**

**16. Please provide any comments you would like to make about this survey, your answers, or the Pueblos Mancomunados:**

*Thank you for your time and thoughtful responses!*



## Appendix C: Survey Instrument, Spanish Version

### Encuesta de Percepciones de los Turistas en los Pueblos Mancomunados

**NC STATE UNIVERSITY**

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*Gracias por su tiempo en llenar esta encuesta. Está administrada por North Carolina State University con permiso y colaboración de Expediciones Sierra Norte. Sus respuestas ayudarán a guiar la planificación del turismo en los Pueblos Mancomunados en el futuro. Su participación es voluntaria y todas las respuestas serán anónimas.*

---

*Para cada pregunta, por favor marque su respuesta con una "X" o escriba su respuesta.*

**1. ¿Asistir a la feria fue su principal razón para visitar los Pueblos Mancomunados?**

- No
- Sí

**2. ¿Por cuánto tiempo se queda Ud. en los Pueblos Mancomunados?**

- Por un día
- Por más de un día (# de noches \_\_\_\_\_)

**3. ¿Cuáles pueblos ha visitado o va a visitar en este viaje? (marque todos los que sean aplicables)**

- Amatlán
- Benito Juárez
- Cuajimoloyas
- Latuvi
- La Nevería
- Llano Grande

**4. ¿Ha visitado los Pueblos Mancomunados antes?**

- No
- Sí
  - a) Si la respuesta es Sí, ¿en que año fue su primera visita? \_\_\_\_\_
  - b) ¿Cuántas visitas en total ha hecho Ud. (inclusive esta visita)? \_\_\_\_\_

**5. ¿Cuál piensa es el mes ideal para visitar los Pueblos Mancomunados y por qué? (favor de describir en pocas palabras)**

---

**6. ¿En cuáles actividades ha participado o está planificando en participar mientras esté en los Pueblos Mancomunados? (marque todos los que sean aplicables)**

- Caminata
- Ciclismo de montaña
- Tirolesa
- Cabalgata
- Actividades culturales (ej. cocina, visita a una granja, clases de idioma, medicina tradicional)  
Por favor liste: \_\_\_\_\_
- Actividades específicas a ferias (ej. concurso de hongos, caminata de hongos o manzana, taller de cocinar o pintura, encuentro de gastronomía tradicional)  
Por favor liste: \_\_\_\_\_
- Otro (*liste cual*) \_\_\_\_\_

7. Queremos saber que influye su decisión de visitar a los Pueblos Mancomunados. **Por favor marque el círculo que corresponda a la importancia de cada artículo a su decisión a visitar.** *Por favor marque una respuesta para cada artículo.*

En los Pueblos Mancomunados...	Ninguna importancia 1	2	3	Neutral 4	5	6	Mucha importancia 7
j. La temperatura	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. La lluvia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Biodiversidad (# de especies de plantas y animales)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Extensión de incendios de bosque	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Extensión de bosque nublado	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Cultura Zapoteca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Facilidad de viajar a/ entre los Pueblos Mancomunados	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Paisaje de trabajo (presencia de la agricultura y el uso de productos forestales)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Belleza natural	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Queremos saber que le atrajo a Ud. más a los Pueblos Mancomunados, el ambiente y/o la cultura, tanto como el paisaje (ambiente natural o paisaje trabajado). Por favor marque el círculo en las escalas de abajo para indicar la extensión que cada artículo influyó sus decisiones a visitar el área. Una marca en el medio significa que ambos son iguales.

**Ejemplo:** Ud. siente que el medio ambiente fue un poco más importante que la cultura cuando planificó su

La cultura ○ ○ ○ ○ ○ ○ **✖** ○ ○ El ambiente  
visita.

a. ¿Qué fue más importante en su decisión de visitar los Pueblos Mancomunados cuando planificó esta visita?

La cultura ○ ○ ○ ○ ○ ○ ○ ○ ○ El ambiente

b. Ahora que Ud. ha visitado, ¿si planificara otro viaje aquí, qué sería más importante en su decisión de regresar?

La cultura ○ ○ ○ ○ ○ ○ ○ ○ ○ El ambiente

c. ¿Qué fue más importante en su decisión al planificar esta visita, ¿el ambiente o el paisaje de trabajo (presencia de la agricultura y el uso de productos forestales)?

El ambiente natural ○ ○ ○ ○ ○ ○ ○ ○ ○ El paisaje de trabajo

d. Ahora que Ud. ha visitado, ¿si planificara otro viaje aquí, cuál sería más importante en su decisión a regresar?

El ambiente natural ○ ○ ○ ○ ○ ○ ○ ○ ○ El paisaje de trabajo

Por favor revise el cuadro abajo, tomando un momento para reflexionar en sus preferencias y percepciones de los casos. Después de revisar y reflexionar, por favor responda a las preguntas debajo del cuadro.

	Condiciones Actuales	Caso 1	Caso 2
Temperatura máxima promedio en el mes más caluroso (abril)	21°C (70°F)	23°C (73°F)	24°C (75°F)
Temperatura máxima promedio en el mes más fresco (enero)	17°C (63°F)	18°C (64°F)	19°C (66°F)
Variación estacional (oct-abril)	Fresco y soleado	Caluroso y soleado	Más caluroso y soleado
Variación estacional (mayo-sept)	Frio y lluvioso moderadamente	Frio y lluvioso moderadamente	Fresco y con poca lluvia
Biodiversidad (plantas y animales)	Alta – más que 1,870 especies presentes	Menos especies y números totales	Mucho menos especies y números totales
Frecuencia de incendios de bosques (en el estado de Oaxaca)	Promedio de 257 incendios al año con 44,000 Ha o más quemadas en un año malo	Ligeramente mayor probabilidad de incendios	Mucho mayor probabilidad de incendios
Extensión de bosque nublado (en el estado de Oaxaca)	516,000 Ha (1.28 million acres)	Disminución moderada	Disminución grande

9. Queremos entender cómo las condiciones de los casos arriba cambiarían sus planes de visitar los Pueblos Mancomunados. Por favor marque una respuesta para cada caso.

	Caso 1			Caso 2		
	No	Tal vez	Sí	No	Tal vez	Sí
¿Cambiaría Ud. sus planes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Si Ud. respondió "Tal vez" o "Sí," ¿cómo cambiaría su viaje? Por favor marque una respuesta por cada pregunta bajo cada caso abajo. Si Ud. respondió "No," continúe con pregunta 11.

	Caso 1			Caso 2		
	Más tiempo	Menos tiempo	Sin cambio alguno	Más tiempo	Menos tiempo	Sin cambio alguno
a. ¿Ud. se quedaría...?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. ¿Cuántos días más o menos?	_____	_____	<input type="radio"/>	_____	_____	<input type="radio"/>
c. ¿Dónde visitaría Ud...?	<input type="radio"/> Otro destino en Oaxaca <input type="radio"/> Otro destino en México pero no en Oaxaca <input type="radio"/> Otro destino fuera de México <input type="radio"/> Todavía visitaría Pueblos Mancomunados <input type="radio"/> No viajaría			<input type="radio"/> Otro destino en Oaxaca <input type="radio"/> Otro destino en México pero no en Oaxaca <input type="radio"/> Otro destino fuera de México <input type="radio"/> Todavía visitaría Pueblos Mancomunados <input type="radio"/> No viajaría		
d. ¿Cuándo visitaría Ud. ...?	<input type="radio"/> Más temprano en el año <input type="radio"/> Más tarde en el año <input type="radio"/> No cambio <input type="radio"/> No visitaría			<input type="radio"/> Más temprano en el año <input type="radio"/> Más tarde en el año <input type="radio"/> No cambio <input type="radio"/> No visitaría		

11. Pensando en las tendencias generales de los casos de arriba, ¿cómo piensa Ud. que cambios potenciales en condiciones del futuro podrían afectar lo siguiente? Por favor marque una respuesta para cada artículo.

En los Pueblos Mancomunados...	Impacto muy negativo			No impacto			Impacto muy positivo	No estoy seguro/a
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
g. Su salud y seguridad durante una visita	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Sus planes de visitar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. La cultura Zapoteca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. La economía	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Viajes a y dentro	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. La belleza natural	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Quisieramos saber un poco más de Ud. para entender mejor quien visita los Pueblos Mancomunados. *Por favor responda a las siguientes preguntas.*

12. ¿Cuál es su sexo?

- Femenino
- Masculino
- No quiero responder

13. ¿Cuál es su edad? \_\_\_\_\_

14. ¿Cuál es su ciudad, estado (si es aplicable), y país de residencia?

Ciudad

Estado

País

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

15. ¿Cuántas personas están viajando juntas (inclusive Ud.)? \_\_\_\_\_

16. Por favor provea cualquier comentario(s) que le gustaría hacer acerca de esta encuesta, sus respuestas, o los Pueblos Mancomunados:

*¡Gracias por su tiempo y sus respuestas!*