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UNDERSTANDING TOURISM WITHIN A SOCIAL-ECOLOGICAL SYSTEM: OMETEPE
ISLAND, NICARAGUA

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Thesis

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for the degree of

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ABSTRACT

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Resource Conservation

UNDERSTANDING TOURISM WITHIN A SOCIAL-ECOLOGICAL SYSTEM: OMETEPE ISLAND, NICARAGUA

Chairperson: Dr. Keith Bosak

Tourism endures as a major component of development strategies worldwide, despite a dearth of documented successes. Tourism failures arise in part from simplistic and reductionist approaches to sustainability and tourism. Successfully implementing tourism to support sustainable futures requires, at a minimum, a more holistic and complex conceptualization than tourism currently receives, including recognition of how human values shape a system. To achieve a more complex understanding of tourism, I analyzed tourism through a social-ecological system (SES) perspective using the paradigm of resilience thinking. Through a case study in Ometepe, Nicaragua, my research considered opportunities for tourism contributions to sustainable futures and resilience of valued system attributes. First, I evaluated a novel use of concept mapping as a method to conceptualize tourism within the greater SES of Ometepe. Concept mapping offers a participatory method to visually represent how the tourism sector functions within an SES. The case study demonstrated that concept mapping provides a tool for rapidly assessing complexity of a tourism destination in a manner that is accessible, adaptable, and achievable, even amongst a socio-political crisis that erupted in Nicaragua during the study. Second, I analyzed how the tourism sector functions within the SES using eight unique concept maps produced by 39 participants. I systematically evaluated the concept maps through analyzing and comparing fundamental system properties derived from the data. Properties included nonlinear dynamics, feedback loops, historical legacies, uncertainty, resilience, and cross-scale interactions. I supported my analysis with secondary research, field observations, and informal interviews. Results suggest that tourism might contribute to sustainable development on Ometepe if tourism development strategies recognize and adapt to the functions of domestic tourism, livelihood diversity, local government, and the informal tourism sector. Increasing knowledge exchange between islanders, tourists, and outside resources offers potential to enhance tourism socioeconomics and reduce disaster risks. However, tourism and the greater SES are also vulnerable to transformation initiated beyond the scale of Ometepe Island. Looking forward, my analysis of tourism could provide the foundation for intentional planning that includes a recognition of complexity and can leverage appropriate strategies to strengthen resilience of valued attributes of Ometepe.

Keywords:

Latin America, Nicaragua, Resilience, Social-ecological system, Sustainability, Tourism

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CHAPTER 1. INTRODUCTION

Sustainable tourism, particularly when emphasizing natural areas and low-GDP countries, is envisioned as an activity that can provide local livelihoods, protect nature and cultural heritage, promote social development, and enhance equity (UNWTO and UNDP 2017; World Travel & Tourism Council 2017). However, studied examples of sustainable tourism as a form development are rife with negative outcomes, and identifying what is to be ‘sustained’ remains problematic (Honey 2008; Nepal, Verkoeyen, and Karrow 2015; Espiner, Orchiston, and Higham 2017; McCool 2019). In spite of this, the drive for sustainable tourism persists. My research begins with the premise that struggles for sustainability in tourism stem from two things. First, there is a failure to conceptualize tourism as part of a coupled social-ecological system (SES) (Farrell and Twining-Ward 2004; Cochrane 2010; Strickland-Munro, Allison, and Moore 2010; Bosak 2016; Espiner, Orchiston, and Higham 2017). Second, sustainable tourism research takes a static, reductionist approach to environmental, social and economic impacts, rather than viewing sustainable development as a process across scales of time and space and focusing on resilience within complex and dynamic systems (Nepal, Verkoeyen, and Karrow 2015; McCool 2019). In this introductory chapter, I present an overview of the global significance and ongoing challenges of sustainable tourism development, and the conceptual framework of my approach to address some of these challenges. I follow with a reflection upon my position as a researcher, an introduction to my case study location, and the research questions that drive the remainder of this thesis.

Tourism on the global scale

Tourism is an influential global force socially and environmentally. Tourism comprises one of the world’s fastest growing and largest economic sectors (UNWTO and UNDP 2017; World Travel & Tourism Council 2017), and is regarded by some of the foremost

intergovernmental organizations as a method to support three pillars of social, economic, and environmental goals. However, these three pillars generally remain out of reach, particularly in low-GDP countries where tourism development receives substantial promotion from external development organizations like the United Nations and World Bank. Tourism development repeatedly fails to preserve ecological integrity, to locally distribute economic benefits, or to uphold local social values (Belsky 1999; Meletis 2007; Honey 2008; Hunt and Stronza 2011; Das and Chatterjee 2015; Hall 2019). My review of tourism research and on-the-ground experience indicates that development of tourism enterprises is often done haphazardly, with no comprehensive strategic plan. Furthermore, tourism development often lacks diverse representation of local understanding and input (Fletcher 2009; Hunt and Stronza 2011). Specific critiques of tourism development lead to a central problem: a three-pillared concept of sustainability goals oversimplifies the dynamic relationship between social, economic, and environmental conditions (McCool 2019). Simplification, then, might contribute significantly to poor results.

Sustainable tourism may offer a more successful tool of development if we first understand the complex system in which tourism functions. A more holistic understanding will include the specific context of a destination, aided by local knowledge; recognize uncertainty and non-linear dynamics; and consider consequences and feedbacks across scales of time and space. With this study, I present a more holistic understanding of tourism by using a SES perspective to analyze the function of tourism.

Social-ecological systems

SES perspectives suggest holistic approaches that increasingly bridge gaps between disciplines and connect academia and practice. SES theory has foundations in research on complex adaptive systems, ecology, and sociology (Holling 1973, 1986; B. Walker and Salt

2012; Quinlan et al. 2015), and acknowledges that any “delineation between social and natural systems is artificial and arbitrary” (Berkes and Folke 1998:4). An SES perspective comprises a variety of schools of thought (Bousquet et al. 2015). Within SES school of thought, a resilience thinking paradigm most influences this study because the paradigm highlights approaches that are needed, but underrepresented, in tourism scholarship and development. Resilience thinking emphasizes complexity and focuses on practical applications (B. Walker and Salt 2012; Folke 2016), and contains close parallels with sustainability (Espiner, Orchiston, and Higham 2017); Resilience thinking also promotes the use of local participation and knowledge (B. Walker and Salt 2012; Sharifi 2016). Resilience thinking therefore offers a useful paradigm with which to improve current analyses and conceptualizations of tourism.

SES is not so much a novel concept as a new language for analyzing the coupled dynamics and interconnected identities of humans and their environment. Indigenous and traditional ecological knowledge and practice as well as other forms of knowledge outside western science do not artificially separate humans from the non-human world. Within academic research, disciplines such as geography, sociology, anthropology, and others have offered approaches that couple human and environmental dynamics. Complex global problems, such as climate change, biodiversity loss, and forest conservation, require new approaches towards analyzing and managing complex challenges (Ludwig 2001). To address complexity, SES perspectives are increasingly prevalent across academic disciplines and among managers and practitioners within diverse professions.

SES approaches are also gaining traction within tourism studies. Any destination-based tourism is fundamentally based upon the connections between humans and their surroundings, yet general analysis of the nature of tourism has been quite linear (Farrell and Twining-Ward 2004; Cochrane 2010). My research uses a case study approach to analyze tourism in a holistic and transdisciplinary manner, while recognizing my limitations to achieve a truly ‘holistic’

analysis or to include all voices and knowledge. I conducted my study on the island of Ometepe, Nicaragua, to support local questions regarding future tourism development as well as to assist the global need for more complex, holistic understanding of how the tourism sector functions.

Researcher positionality

To explain this Ometepe research, it is appropriate and important to acknowledge limits of objectivity and my own position in conducting and presenting qualitative research, in order to reflect upon my own perspectives and how my role might affect the study (Malterud 2001; Babbie 2008; Brian 2014). My interest in conducting this research stems directly from my experiences as a global traveler combined with working as a professional in nature-based tourism for eleven years. I question the potential for the tourism sector to contribute to local goals and sustainable futures, as I have witnessed many instances of failures, yet retain hope that there are beneficial opportunities through tourism. I specifically elected to work on Ometepe Island because of personal friendships with the directors of a small start-up project on the island who requested assistance in designing their ongoing work. The project, a combination of Guías Unidos (a project of the Earth Island Institute, a 501(c)3 nonprofit) and Centro PUMA (an ecotourism resource library and community space in Altagracia, Ometepe), is jointly spearheaded by two U.S. citizens and a team from Ometepe. The project aims to build local capacity within a broadly defined arena of tourism and conservation. Concurrently, my background is in Geology, and I connected with Nicaraguan and international volcanologists interested in tourism development as a form of disaster risk reduction on Ometepe. With both audiences in mind, I initiated research hoping to offer the projects' leaders some considerations regarding tourism development.

I strived to collect diverse viewpoints in my study, but recognize that my ability to gain access and trust within local communities also depended on personal relationships, which

ultimately originated with my connections to tourism industry workers. To an extent, these connections helped privilege me to some insider views to Ometepe. I lived in Altagracia for the majority of my research. In the small town of Altagracia, where word-of-mouth travels rapidly and no resident seemed to be more than two degrees of separation from another, I believe I was the only resident from outside Latin America for the majority of my stay. My participation in local life (for example, through joining the soccer team) and formation of genuine friendships helped lead to some surprisingly frank conversations that helped me understand local perspectives.

My outsider status was readily apparent in Ometepe: I am white, United States middle class, educated, and well-traveled. I have only a broad basis for understanding Ometepe society and culture, based upon approximately two total years living and working in Latin America since 2003. Nicaraguans repeatedly vocalized certain aspects of my identity as different from the local norms: I was a female in my 30s who was living away from family, unmarried, without children, and athletic. This meant my preconceptions and values surrounding livelihood possibilities and family life differed from local perspectives, thus I actively sought to accurately represent local views through my study. Additionally, my understanding of local perspectives was further challenged by linguistic and cultural challenges. I conducted all research in my professional level of Spanish fluency, but do not have native (nor local) command of the language. I conducted literature searches in both English and Spanish, but ultimately have a bias towards English-language manuscripts.

Case study geography: Ometepe Island, Nicaragua

Ometepe, Nicaragua, is a 277 km² island located in Lake Cocibolca (Lake Nicaragua) in the tropics of the Central American isthmus. The island's approximately 44,000 residents live among 39 communities, divided into two municipalities that each have a commercial, urban hub

(GPCTO, n.d.). The island is renowned for its beauty, tranquility, and rural lifestyle, and is nicknamed “Oasis de Paz” (Oasis of Peace). Ometepe livelihoods have increasingly switched to tourism in recent years. Tourism provides income to rural residents on an island recognized for biodiversity and geologic heritage (Gleeson and Egerton 2016), in the second poorest country in the western hemisphere (CIA 2019). The Gabinete del Poder Ciudadano de Turismo de Ometepe (GPTCO, the local branch of the federal Tourism Council) tracked Ometepe visitation from 2006-2011, tallying a rise from 28,905 to 40,845 foreign visitors during that period (GPCTO, n.d.). In comparison, in their most recent statistics from 2011, they tallied 205,509¹ domestic visitors to the island (GPCTO, n.d.).

“Ometepe” derives from the indigenous Nahuatl words *ome* (two) and *tepetl* (mountain) (Silva Monge 1995). Ometepe claims stronger ancestral connections and more archaeological sites than other parts of Nicaragua. *Ome - tepetl* is a straightforward reference to the twin volcanoes that comprise the island. These volcanoes are a foundational entry point for understanding the SES because they create the base for a rich and biodiverse ecosystem, provide beneficial resources that support inhabitants’ main livelihoods of agriculture and tourism, and also present environmental hazards that threaten human lives and livelihoods.

SES thinking is readily graspable on Ometepe because of the island’s volcanic nature. Humans and the environment are obviously integrated. The integration is particularly evident through tourism. The volcanic landscape of Ometepe attracts international tourism, as substantiated by general tourism marketing (e.g., www.ometepenicaragua.com, www.vianica.com) and international guidebooks such as *Lonely Planet: Nicaragua* (Gleeson and Egerton 2016) or *Moon Nicaragua* (Perkins 2015). The volcanoes present opportunities for adventure and geoheritage tourism. The volcanoes also form the base for diverse topography and

¹ It is unclear how many of the domestic visits actually include island residents, due to the manner in which visitation is monitored by the government.

habitats that support a rich indigenous history and biodiversity, as recognized by the 2010 UNESCO declaration of the Ometepe Island Biosphere Reserve (UNESCO 2015).

Tropical paradise is accompanied by hard realities on Ometepe. The island is prone to natural hazards including volcanic eruptions, hurricanes, and lahars (hereafter generalized as “landslides”). Consequences of natural hazards and human abilities of mitigation intertwine with human behavior, long-term hazards (e.g., sea-level rise), human-made hazards (e.g. conflict), and social context and constraints (White 1945; Hewitt 1992, 2017; White, Kates, and Burton 2001), so human relationships to natural hazards on Ometepe is largely determined by social, economic, and political context.

Armed conflict and corruption characterize Nicaragua’s modern political history (World Bank 2017). The nickname “Oasis de Paz” was originally bestowed upon the island in 1980, signaling refuge that the island offered from violent national conflict, and the nickname became renowned in the peace following war (Joaquín Chamorro 2017). For citizens from Managua and across Nicaragua, Ometepe is a place for family visits (particularly during the holidays), second homes, investment opportunities, and escape from the urban rush. “Oasis de Paz” is a nickname that the island still celebrates, despite the reality that recent civil unrest has interfered with the island’s peace.

The recent unrest began in April 2018, when the nation of Nicaragua erupted in sociopolitical upheaval. At the national scale, citizen discontent with the government reached a tipping point, triggered by widespread disapproval over back-to-back government actions regarding natural resource management and social security (Ripley 2018). Clashes between a student-led protest movement, paramilitaries, and the country’s leadership have resulted in hundreds of deaths, the dismantling of significant public and private services, the unhinging of the economy (Alonso Lugo 2018; Ripley 2018), and devastation of the tourism industry (Holman 2018; Otis 2018).

The crisis began between my two field research campaigns. Based upon frequent consultation with contacts in Ometepe, I returned to the island to finish my research once we deemed that my presence would not create extra hardships for islanders and it was safe for my return. Ultimately, the crisis offered a penetrating lens through which to analyze tourism within the SES of Ometepe because visitation and tourism industry earnings plummeted following the onset of the crisis.

Socio-economically, Nicaragua has the second-lowest gross domestic product (GDP) in the western hemisphere (Central Intelligence Agency (CIA) 2019), with remittances accounting for over 10% of GDP (World Bank 2019b) . Approximately one quarter of citizens were living below national monetary poverty level in 2016 (World Bank 2017), with over one half of citizens experiencing intense multidimensional social poverty (Duryea and Robles 2016). The majority of poverty is rural (World Bank 2017), in places such as Ometepe. Ometepe has no advanced medical facilities. Island citizens are malnourished but overweight, and have minimal knowledge of modern medical care and health (personal observation).

Nicaragua's low score on the Human Development Index (United Nations Development Programme 2018), prevalent poverty and health issues, lengthy history of political instability, rich biodiversity, and exposure to natural hazards indicate a place where the promoted outcomes of sustainable tourism could offer consequential benefits. Practitioners, such as the leaders of Guías Unidos/Centro PUMA and international volcanologists, justifiably wonder if tourism might be used as development tool on Ometepe to bring benefits including poverty alleviation, social inclusion, environmental protection, and increased adaptive capacity that will support present and future generations.

Tourism proponents particularly push tourism as a tool of sustainable development in low-GDP countries (Stonich 1998; Honey 2008; WTO and OAS 2018). However, it is difficult to assess the effects of tourism development on disadvantaged populations, particularly in a

manner that is meaningful and expeditious, because of the complex interactions between tourism development and other local and global factors (Hummel and van der Duim 2012). Furthermore, I found few studies conducted in low-GDP, non-democratic nations with an emerging tourism sector, and even fewer among these studies that employ an SES perspective. To understand tourism as tool of sustainable development, we need more case studies outside of highly-developed destinations. We also need to analyze how tourism development changes a system, and its interrelated feedbacks with other parts of the system.

Ometepe provides a particularly valuable opportunity for contributing to these research needs because tourism development is still in early phases, so its impacts and feedbacks within the system are more obvious to observers. Additionally, the role of tourism on Ometepe has been illuminated by the loss in visitation and tourism revenues resulting from the crisis. Ometepe is an emerging destination in a low GDP nation where citizens are experiencing multidimensional forms of poverty. Ometepe defines the type of destination where the potential for sustainable tourism is lauded, and thus should provide valuable data.

For individuals and organizations of Ometepe, the present moment might offer a particularly valuable opportunity amidst anguish and true hardship. Results from my study indicate potential benefits from tourism. The current loss of tourism has created space that could be used for intentionally planning the future of tourism to the extent that local capacity permits.

Analyzing tourism on Ometepe: Research questions and objectives

To provide data for local needs and contribute to larger theoretical aims, my study has two parts. First, my research addressed a need for appropriate methods to analyze tourism in a system. My study evaluated the implementation of concept mapping as a method that uses a holistic approach and privileges local knowledge. The details of this method and its strengths comprise Chapter 2.

Chapter 3 details the results derived from the concept mapping activities. These results answered the research question: How do local research participants describe the role of tourism within a SES? Nested within the question were two sub-questions: What can be highlighted about how tourism functions in an SES by looking at the cascading effects of a significant disturbance? What opportunities might a significant disturbance generate at various scales?

Finally, Chapter 4 summarizes the combined findings from this research and looks forward to how the results can help us move forward not only in Ometepe, but also in our understanding of tourism as a tool of sustainable development around the world. Supporting data and the English version of a short professional report prepared for organizations in Ometepe are provided as appendices.

CHAPTER 2. CONCEPT MAPPING: AN EFFECTIVE AND RAPID PARTICIPATORY TOOL FOR ANALYSIS OF THE TOURISM SYSTEM?

Introduction

In order for tourism development to contribute to global sustainability agendas, the functioning of tourism within its greater SES must be better understood. Unfortunately, much of the literature that links tourism with systems thinking analyzes the persistence of the tourism industry, rather than describing the SES in which tourism functions as a livelihood, form of economic development, and socio-cultural exchange. Sharpley (2000), Moscardo (2008), and Bosak (2016) advocate for tourism to be reframed as a strategic tool for achieving desired goals or states within the system, rather than as the goal in itself. In order for tourism to be used as a tool of development, researchers and practitioners must first understand components and relationships of the greater SES in which tourism functions. However, my review of tourism scholarship revealed a lack of effective and efficient methods to analyze tourism development within a complex SES. My study evaluates the method of concept mapping as a novel method to rapidly analyze how the tourism sector functions within SES dynamics of a specific destination.

This chapter first provides a background of systems thinking within tourism scholarship and ongoing challenges of conceptualizing tourism holistically. Then, this chapter introduces the concept mapping as a manner to address the limitations in current methodologies, before contributing a detailed explanation of the method as used in a case study in Ometepe, Nicaragua. Results from my case study demonstrate that concept mapping offers a rapid assessment tool that is accessible, adaptable, and achievable. This paper finishes with a discussion of the benefits and challenges of this method, and suggested opportunities for future use.

Sustainable tourism within social-ecological systems

The need for tourism development to contribute to sustainable social and environmental objectives is increasing with ongoing and projected growth for the tourism sector. Tourism comprises approximately 10% of global jobs, 10% of global GDP, and the world's third-largest export market (UNWTO, 2017; WTTC, 2017). In 2018 there were 1.4 billion overnight tourists, with expected growth of 3-4% for the near future (UN World Tourism Organization (UNWTO) 2019). Large international organizations recognize the potential of tourism to contribute to sustainable development. For example, the United Nations World Tourism Organization (UNWTO) and United Nations Development Programme (UNDP) propose that the tourism sector can make significant global contributions towards achieving the 2015-2030 Sustainable Development Goals (UNWTO & UNDP 2017). The promotion of tourism is indicative of international pressure for the tourism sector to improve social, environmental, and ecologic conditions worldwide, while also contributing to sustainable futures.

However, the realities of tourism outcomes are complex and include significant failures (Hunt et al. 2015; Honey 2008, 1999; Das and Chatterjee 2015; Belsky 1999; Meletis 2007; Hall 2019). For example, Hunt and Stronza (2011) found negative perceptions surrounding a highly regarded ecotourism project in Nicaragua and a failure of social, environmental, and economic benefits to reach local residents. Conservation aspects of this tourism project resulted in loss of local access to resources and a violent anti-trespassing stance, including the fatal shooting of a local man. The authors found little of the project's "conservation" work, such as monoculture tree farms, environmentally justifiable. The tourism project bypassed socioeconomic opportunities that could benefit surrounding community, such as hiring local workers or selecting a route to install electricity that would make electricity more accessible to local households. Overall, the realities of this particular tourism project exhibited a severe disjunct with the goals promoted by international actors. Local actors understood the broader context of

social, environmental, and economic outcomes, yet were not involved in the development or ongoing operation of this tourism project. Nevertheless, despite criticizing the project's unethical business, the overall perception of tourism growth was consistently positive among all groups that the authors interviewed. The failure shown by Hunt and Stronza (2011) indicates a broader trend in which local voices are overlooked, complex dynamics and feedbacks are misunderstood or ignored, and yet tourism as an economic development sector and livelihood still receives a positive perception. Even while social, environmental, and economic goals lauded in the rhetoric of sustainable tourism are not realized, local and external actors continue to promote the tourism sector.

Failures to achieve sustainable development goals through tourism may in part reflect systemic limitations in how tourism is conceptualized and enacted. Berkes and Folke (1998) assert that general considerations of sustainability require a systems-level approach that emphasizes the humans within the system. Similarly, Liu (2003) asserts that sustainable tourism requires an approach that is interdisciplinary and takes a systems perspective, as well as integration of local communities into tourism development. Local integration is essential because tourism has complex local impacts and the tourist experience relies on local participation, yet tourism enterprises are often propelled by actors outside the destination (Hunt and Stronza 2011; Koutra 2010; McGehee et al. 2013; Pizzitutti et al. 2017) . As exemplified by Hunt and Stronza (2011), outsiders' perceptions can dramatically conflict with what is happening locally. However, methods that coproduce knowledge with representative local actors can effectively describe a SES (B. Walker and Salt 2012). A more holistic approach to conceptualizing how the tourism sector functions, which builds from an understanding of complex systems and incorporates local viewpoints, might better anticipate potential failure points and foster successes.

Tourism scholarship is starting to embrace a SES perspective (Butler 2017; Hall 2017; Lew and Cheer 2018). Tourism destinations tend to conspicuously display traits of SESs: interconnected human and environmental dynamics (Berkes and Folke 1998) and complex system behavior such as nonlinear and cross-scalar relationships, the potential for alternative outcomes, and system capacity to learn, evolve, and adapt (Levin 1998; B. Walker and Salt 2012). Within SES schools of thought, resilience thinking provides practical approaches to conceptualizing SESs that are rooted in ecological theory (Folke 2006, 2016; B. Walker and Salt 2012). Whereas *resilience* is a system property, describing capacity to retain identity and structure amidst disturbances (Holling 1973; Folke 2016), *resilience thinking* is a paradigm that “deals with complex adaptive system dynamics and true uncertainty and how to learn to live with change and make use of it” (Folke 2016, 2). Resilience thinking focus on relationships within a system rather than individual system components, because a complex adaptive system is more than a sum of its parts (Levin 1998; Meadows 2008; B. Walker and Salt 2012). Resilience thinking emphasizes interactions across scales of time and space and the unpredictability and surprises inherent to SESs (Berkes and Folke 1998; Folke 2016; Gunderson and Holling 2002). Resilience thinking posits that SESs have the possibility to exist in different configurations, with configurations reflecting alternative dynamics between social and ecological components (Holling 2001). (To exemplify the potential for alternative system configurations, one can imagine an example of a destination with livelihoods based in tourism, versus an alternative configuration in which livelihoods are based in agriculture.)

With the robust theoretical and practical background of resilience thinking, it is unsurprising that resilience thinking is at the forefront of progress in conceptualizing the tourism sector (Butler 2017; Hall 2017; Lew and Cheer 2018). In reflecting upon previous conceptualizations of tourism, Butler (2017) predicts that resilience thinking offers valuable insight into tourism, and that tourism will increasingly be conceptualized through resilience

thinking. Across current scientific texts that link tourism and resilience, most consider how a resilience approach might lead to management interventions that can increase resilience and/or sustainability within an SES, particularly through maintaining the tourism industry.

In one of the earliest examples of tourism scholarship to engage resilience thinking, Farrell and Twining-Ward (2004) present a model of “tourism panarchy.” Their model builds upon a theory from resilience thinking described as “panarchy,” which explains SES dynamics with particular attention to nested and hierarchal scales across time and space (Gunderson and Holling 2002). The tourism panarchy model makes notable progress in holistically conceptualizing tourism within the greater systems that encompass it. However, the model remains conceptual in nature, without empirical applications.

More recent scholarly literature engages resilience in a more applied manner. Lacitygnola et al.(2007) formulate a mathematical model derived from the theory of resilience in order to analyze a tourist resort as an SES. Schianetz and Kavanagh (2008) urge the need to consider the complexity of tourism. The authors link the resilience of an SES with sustainability, and employ resilience thinking and community participation to create sustainability indicators in a case study tourism destination. Cochrane (2010) applies a resilience approach to a set of tourism destinations in Asia, with a focus on cyclical dynamics. From her results she offers a model called the “Sphere of Tourism Resilience,” with an aim of future application to policy and intentional interventions. Lew (2014) positions resilience as a replacement for the paradigm of sustainability, and uses the concept of resilience to create the model of “Scale, Change and Resilience” for tourism planning. These texts make notable progress in utilizing resilience thinking for a more complex understanding of tourism development. However, these texts consider tourism as the system itself, rather than as a part of a larger SES. Espiner, Orchiston, and Higham (2017) recognize that tourism exists within the complexity of greater SESs, and suggest that a resilience approach is needed for addressing and planning for complexity.

However, all of these texts proceed with an assumption that the tourism industry itself needs to be resilient and/or sustained. Furthermore, there is limited integration of local viewpoints in the methods.

Within tourism research, some studies integrate local knowledge with resilience thinking. Strickland-Munro, Allison, and Moore (2010) offer a novel and non-linear assessment framework that they derive from Resilience Alliance methodology. Their goal is to recognize tourism impacts on local communities, and they emphasize the iterative, participatory, and transdisciplinary requirements of effective research. The authors' engagement with resilience thinking is useful, but limited in that the framework is conceptual and specifically focused on protected-area tourism.

Calgaro, Lloyd, and Dominey-Howes (2014) position tourism within a greater SES through the creation of their Destination Sustainability Framework. They argue that the specific context of vulnerabilities within a tourism system do not receive adequate attention in SES analysis derived from resilience thinking. Preexisting vulnerabilities in a destination may prevent achievement of social, economic, and ecological goals if ignored, thus it is imperative to assess vulnerability (Calgaro, Lloyd, and Dominey-Howes 2014). Attention to vulnerability also enriches understanding of spatial, temporal, and social scales that affect a system (Maru et al. 2014; Calgaro, Lloyd, and Dominey-Howes 2014).

Bosak (2016) suggests a resilience approach at the level of the SES. The frequent assumption the tourism industry itself ought to be resilient focuses primarily on linear economic growth of tourism (Bosak 2016). A confined focus upon economic sustainability of tourism has been shown to undermine social, environmental, and economic goals because of the complex interactions and feedbacks inherent in SESs (Bosak 2016).

With the terms sustainability and resilience deeply intertwined in tourism studies (Espiner, Orchiston, and Higham 2017; Redman 2014), a recent literature review by

Kristjánsdóttir, Ólafsdóttir, and Ragnarsdóttir (2018) offers relevant insight into systems thinking within tourism studies, with attention to sustainability rather than resilience. The review specifically looks at methodologies that used sustainability indicators within studies that considered tourism as part of the SES as a whole. Results indicate that tourism studies still need to move towards holistic SES approaches. In particular, social dimensions are overlooked. To fill this need, the authors suggest an emphasis on local participation and an increase in qualitative research. The review also found that the variety of indicators continues to expand. An accessible method for collecting data to fill indicators is required. Such a method ought to integrate local viewpoints and quantitative research in order to better account for the social dimension.

In summary, a review of the scientific literature shows that resilience approaches are predicated on understanding system dynamics, and local perspectives are necessary to understand tourism and the SES. Most tourism scholarship looks at the resilience of specific factors of the tourism sector (for example, the tourism economy) without first engaging local perspectives on the structure and function of the SES. The scientific articles that do acknowledge the importance of understanding system dynamics are conceptual. My study attempts to develop a methodology to understand structure and functions of an SES, which can in turn be used by resilience approaches.

Addressing limitations in methods to analyze tourism

Using a qualitative methodology, my study sought to address a series of limitations regarding systems-based studies of tourism. First, much of the literature that links tourism with systems thinking proceeds to analyze the persistence of the tourism industry itself, despite longstanding critique of this practice (Sharpley 2000). In contrast, my research sought to holistically analyze the SES in which the tourism sector functions, with explicit attention to tourism-related context. My study did not assess only a single variable, such as industry

persistence. Consequently, my study proceeded under two assumptions, including: (1) sustainable development and resilience are both unstable targets, which change based on normative goals and the best available science; and (2) tourism is a potential tool of sustainable development, but may not be the correct tool to use in any given context. With this in mind, I needed a field method that could analyze and explain complexity.

The second limitation is that, despite a proliferation of SES methods and frameworks in recent decades (Binder et al. 2015; Rissman and Gillon 2017), application of SES thought to tourism destinations is relatively new (Butler 2017). Unfortunately, many of the SES methods are unwieldy in the resources they demand, such as time, money, or expertise. Additionally, tourism development is often rapid, and destinations are prone to large variety of hazards that can halt tourism. Therefore, I sought a field method that could function as a rapid assessment tool while being feasible for a range of researchers and practitioners to use.

The third limitation is that local viewpoints are secondary, superficial, or absent from many studies. This lack of local participation directly conflicts with established evidence that local representation is essential for successful tourism outcomes (Nault and Stapleton 2011; Hunt and Stronza 2011; Lupoli et al. 2015). Local goals and values need to be explicitly addressed in order to understand the functioning of the system, increase awareness of power dynamics and inequalities, and better anticipate potential failure points. In addition, if resilience thinking is to offer value to tourism planning, locals must partake in specifying the resilience *of what, to what, and for whom* that is foundational to resilience planning. Therefore, I sought a field method that privileged diverse local knowledge and could include input from local citizens throughout the research process.

This research builds upon prior applications of resilience thinking to tourism development and research while aiming to address these limitations. These limitations derive substantially from a lack of empirical methods to analyze complexity. I sought a method that

would be logistically simple for field application while also collecting rich data. Such methods are possible, as humans demonstrate an intuitive ability to think about complex systems (Meadows 2008; Stockholm Resilience Center 2015; B. Walker and Salt 2012). Furthermore, proliferation of Internet-use might enhance humans' non-linear thinking (Meadows 2008). Subsequently, the modern tourism sector is primed for methods that take advantage of humans' innate capacity for systems thinking. This study looks at a novel application of concept mapping as a qualitative field method to enhance understanding of SES dynamics and privilege local knowledge. Concept mapping offers a participatory method to visually represent how the tourism sector functions within an SES.

A brief review of knowledge visualization through concept mapping

This research aims to represent the tourism sector within a social-ecological system, based upon the understanding of people inside the system, through a method called concept mapping. To counter the frequency with which local knowledge is overlooked in resilience-based tourism studies, I collected data directly from people who live their daily lives within the system. Additionally, concept mapping activities can specifically address weaknesses, disturbances, and interactions within the system, allowing space for the sociopolitical dynamics surrounding vulnerability to be represented.

Concept mapping evolved in the 1970s and 80s (Rico 1983; Trochim 1989; Novak and Cañas 2006) as a way to visually represent complex knowledge, and has continued to develop as an interdisciplinary tool with a variety of forms and diverse users. Concept mapping is used as an instrument for education, psychological assessment, conservation measurements, and planning and evaluation. Related methods of visually representing complex knowledge include institutional and stakeholder mapping (Aligica 2006; Smith 2002); participatory environmental modeling (Gray et al. 2017); fuzzy cognitive mapping (Steven A. Gray et al. 2015); the dilemma

cube (Matos Castaño et al. 2017); and mental models for decision-making (Kolkman, Kok, and van der Veen 2005) or organizing complex knowledge of experts (Bridges et al. 2013). Many of these methods require high levels of expertise and complicated forms of data analysis, and are most easily performed in highly democratized, first world nations.

For tourism research a method must be practical in the field, accessible to the researcher or a practitioner conducting the mapping as well as participants. A straightforward form of concept mapping can meet these needs. Nonetheless, there is little evidence of its use within tourism studies. Strickland-Munro, Allison, and Moore (2010) suggest that verbal and visual forms of concept mapping can contribute to understanding SES focal scale and cross-scale interactions. However, that presents a limited view of what concept mapping can offer. Other data within these authors' framework can also be collected through concept mapping, including system components, key issues, historical profile, disturbances, system drivers, and key players.

Lupoli et al.'s (2015) research into volunteer tourism utilized concept maps with a methodology called "the compass of sustainability." Their results support the accessibility and effectiveness of concept mapping as a way to privilege local knowledge and better understand tourism impacts. Furthermore, the authors advocate the continued use of concept mapping as a tool that can help organizations and community members to evaluate and monitor process.

Concept mapping allows researchers to gather local knowledge including a complex understanding of the SES in a rapid and efficient manner. For SES understanding it is important to distill a system, but not oversimplify it (Bossel 2001; Schianetz and Kavanagh 2008; B. Walker and Salt 2012). The method's intuitive and reflexive nature makes it easy to engage local residents and directly represent the participants' understanding of essential components, connections, and drivers of the SES, including those unexpected for the researcher.

Methods for concept mapping that are approachable to diverse audiences are most readily found in the gray literature. Techniques to explain resilience thinking and concept mapping in

accessible language for participants derive from B. Walker and Salt's *Resilience Practice* (2012) and the Resilience Alliance's *Workbook for Practitioners* (2010). Additionally, I gained practical experience with the technique through a workshop led by Paul Ryan, Director of the Australian Resilience Center (University of Idaho, 2018), and a workshop led by the United States Forest Service International Programs and the University of Montana

To confront limitations in current conceptualizations of tourism, concept mapping provides a tool that takes advantage of humans' natural capacity for systems-thinking, is practical for field research, and privileges local knowledge. My study evaluates the implementation of concept mapping in a case study. Concept mapping activities were supplemented by three months of living on Ometepe, making local contacts, conducting informal interviews, and reviewing secondary sources. Results from the case study show that concept mapping can provide holistic and expeditious insight into tourism. From the case study, three main benchmarks emerge regarding the effectiveness of the method: (1) accessibility, (2) adaptability, and (3) achievability.

Case study: Using concept mapping to analyze tourism in Ometepe, Nicaragua

To evaluate the capability of concept mapping to transcend the limitations of other methods, I studied the tourism sector on Ometepe, Nicaragua, an island in Lake Cocibolca (Lake Nicaragua). The tourism sector is a growing part of the broader SES, and there are obvious social and ecological components. Twin volcanoes geologically formed Ometepe in prehistoric times. One remains active, and both provide rich volcanic soils to support agriculture and biodiversity. Tourism includes activities directly related to the volcanos, such as summit treks, and pursuits that take advantage of volcanic geography, such as birding, beachgoing, and permaculture farming. Tourism had been incrementally eclipsing agriculture as a primary economic driver on the island. However, in April 2018, violent sociopolitical unrest erupted in Nicaragua and

tourism visitation and revenue plummeted industry (Holman 2018; Otis 2018). I conducted concept mapping activities during this crisis. Concept maps were able to not only provide data producing a complex conceptualization of the tourism sector, but also to capture the crisis, leading to valuable insight regarding the role of tourism in Ometepe.

The remainder of this section outlines how study locations and participants were selected, followed by a detailed explanation of how the concept mapping was conducted, and concludes with a briefing regarding data analysis.

Methodology

Study activity locations

Data were collected through concept mapping activities conducted in four communities. In selecting study locations, feasibility of access, geographic diversity, and security were paramount. The meeting location for each activity provided a safe setting for all participants to engage, with explicit consideration of the ongoing sociopolitical situation. Accordingly, activities were conducted in public places without political affiliations (either hotels or a library), and which provided comfort and amenities for participants. The four communities were selected based on geographically distinct relationships to the volcanoes, diversity of local livelihoods, and viability of conducting research. Communities included: Moyogalpa and Altagracia, the two largest cities on the island and the hubs for transportation and local government; Ciudadela, a community of approximately 200 families that was relocated from the neighboring location of Los Ramos in 2014, following multiple devastating landslides; and Santa Cruz, a beach community sprawled across the isthmus that links the two volcanoes.

While the selected study locations were targeted for geographic differences, the close social networks on the island complicated the geographic representation. For example, some participants lived in one of the four communities, but worked in another, or vice versa. In other

instances, a participant who could not attend sent an unexpected substitute from a different community. The concept map activity in Santa Cruz was not scheduled originally, but university students studying tourism learned of the study and asked to participate in a research session. Despite this lack of original intent, data from Santa Cruz ultimately were included for analysis, because the same methodology was followed and the additional maps enriched the study.

Inviting research participation

A total of 39 citizens participated in the data collection. Participants were found via a mix of purposive sampling, which is constructed from knowledge of the population and study purpose, and snowball sampling, in which participants recommend additional participants (Babbie 2008). I began purposive sampling prior to initiating the mapping activities, based upon discussions with local key informants. Local informants suggested individuals and specific demographics that would represent the diversity of Ometepe citizens and occupations, including varied social status, age (all 18+), and gender. Next, I used snowball sampling to accumulate more participants. Snowball sampling continued during each research session, as present participants were asked to consider what voices from the island were not represented at the activity. Example suggestions included transportation workers and university students, and I actively sought and invited participants representing these demographics to ensuing activities. Despite sampling procedures, the rather capricious nature of island schedules combined with crisis-induced economic hardships resulted in unannounced arrivals and absences at every mapping session. I collected basic demographic data in order to consider who was being represented in participation and to have the option to compare demographics between maps if results varied greatly. Demographic information of participants can be viewed in Figure 2.1.

Because the concept mapping centered on the tourism sector, participants comprised a mix of workers from within the tourism sector (e.g., guides, hotel personnel) and those who did not work directly with tourism (e.g., farmers, schoolteachers). My local informants and I

Mapping Session Location		Sex	Age	Primary employment	Town of residence	Town of employment		
		Altagracia		M	25	Fishing	Altagracia	Playa Taguizapa
Altagracia		M	29	Tourism	Urbaíte	Moyogalpa		
		M	32	Tourism	Altagracia	Altagracia		
		M	36	Tour guide, Spanish teacher	Altagracia	Altagracia		
		M	38	Tourism	Mérida	Mérida		
		M	38	Teacher	Pull	Altagracia		
		M	40	Tourism	Altagracia	Altagracia		
		M	53	Tourism	Altagracia	Altagracia		
		M	78	Museum historian	Altagracia	Altagracia		
		Ciudadela		F	18	Student	Ciudadela	Ciudadela
		Ciudadela		F	18	Student	Ciudadela	Ciudadela
F	34			Door-to-door salesperson	Ciudadela	Ciudadela and nearby		
M	35			Carpenter, cabinetmaker	Ciudadela	Ciudadela		
F	38			Homemaker	Ciudadela	Ciudadela		
F	41			Farmer	Ciudadela	Ciudadela		
F	43			Homemaker	Sta Teresa (Ciudadela)	Sta Teresa (Ciudadela)		
M	44			Commercial driver, Farmer	Ciudadela	Ciudadela and Ometepe		
M	48			Builder	Ciudadela	Las Pilas		
M	?			?	Ciudadela	Farm near Ciudadela		
Moyogalpa				F	22	Business	Moyogalpa	Moyogalpa
Moyogalpa		M	26	School	Moyogalpa	Moyogalpa		
		F	27	Tourism	Altagracia	Moyogalpa		
		F	28	Agronomy technician	Moyogalpa	Moyogalpa		
		M	30	Tour guide, Plantain cultivator	Moyogalpa	Ometepe Island		
		F	34	Restaurant	Moyogalpa	Moyogalpa		
		M	39	Tour guide	Santa Teresa	throughout Nicaragua		
		F	43	Non-governmental org.	Altagracia	Moyogalpa		
		F	48	Employed	Moyogalpa	La Paloma		
		M	52	Rents homes	Moyogalpa	Moyogalpa		
		F	59	Federal employee	San Jorge	Across Rivas Department		
Santa Cruz		F	19	Tour business, student	Moyogalpa	Moyogalpa		
Santa Cruz		F	19	Tourism student	Urbaíte	Urbaíte		
		F	20	Student, bartender	Balgüe and Altagracia	Balgüe		
		F	21	Agriculture, tourism student	Mérida	Mérida		
		M	28	Guide, Farmer	Mérida	Mérida		
		M	30	Guide, Educational facilitator for non-governmental org.	Sintiope	Altagracia		
		M	34	Guide	Balgüe	Ometepe Island		
		M	42	Tour guide	Balgüe	Balgüe		
		F	68	Business owner	Moyogalpa	Moyogalpa, Santa Cruz		

Figure 2.1. Combined demographic information for all participants. No strong trends surfaced between demographic information and concept map data. Potential differences in tourism understanding relating to participant geography might have been minimized because few participants both worked and lived in the same community where the mapping session was conducted. Only in Ciudadela did 100% of participants consider the study location as the primary community where they conduct their personal and professional lives. I also asked participants to list their town of birth, suspecting that people who had experienced greater personal movement might have different views of tourism. However, no correlation was indicated and few participants had relocated far, if at all, so town of birth is not listed above.

anticipated that representation of a range of livelihoods would reflect more diverse viewpoints regarding tourism than a group of participants entirely within or outside the tourism sector, and therefore provide a richer understanding of the sector. However, the distinction between livelihoods is not entirely straightforward, as many residents live in family compounds in which some members participate in the tourism sector while others do not. Additionally, it is typical for residents to engage in multiple economic and subsistence activities to create their livelihoods. Despite these complexities, participants themselves showed little difficulty in declaring whether they did or did not work in tourism.

I personally invited the majority of participants, but some were invited by local informants or other citizens interested in the research. An initial script describing the research activity was both spoken to potential participants and presented in text. This was followed by an informal question and answer period, and all participants were given the same opportunity for informed consent. Participants were given a formal letter of invitation that explained the research and concluded with a short series of questions. The questions were intended to get participants thinking about system components and drivers, particularly drivers that might occur over varied temporal scales and therefore be less at the forefront of their thinking during the workshop itself. Pre-determined phrasing was in Spanish, corrected and verified by a local professional. This invitation process was repeated at the start of each mapping session to ensure that the same information was presented to all participants.

Participation was anonymous, voluntary, and could be discontinued by the participant at any time. Participants were not compensated, but were reimbursed for related costs (such as bus fare) and provided with meals and refreshments during the study in order to alleviate potential hardship. Research was conducted with approval under the Exempt category of review by the University of Montana Institutional Review Board, IRB #202-18.

Conducting mapping activities

In conducting the concept mapping activities, creating an environment in which participants felt secure was paramount. Physical security included comfortable facilities and refreshments. Intellectual security was promoted through the assurance that participant responses were not “right” or “wrong.” Emotional security was accomplished through explicit recognition of the importance of everyone’s viewpoint, a relaxed atmosphere, and a prohibition against political discussion. I observed power dynamics and social norms during participant selection and during each research activity, proactively aiming to counteract ways in which social context might prohibit representative participation. These provisions followed Maslow’s hierarchy of needs (Maslow 1943), with the intent that concept mapping would be most productive if participants could function at the highest level of the hierarchy, which is associated with development, creativity, and problem solving.

Another priority for this study was to engage local community members in a research process that was useful for them. Participatory methods that reflect true co-production of knowledge require full participation during all phases of research, from defining the research to interpreting and using the results (Robinson and Tansey 2006). My study does not reflect true co-production because I did not fully engage local residents in the complete process of designing the research through interpreting and communicating results. Nonetheless, my study honored diverse local perspectives and engaged local citizens in every stage of the research process to some extent.

A local professional familiar with SES thinking and forms of concept mapping reviewed the initial outline for the research activity, and amended the activity to promote clearer communication within cultural and linguistic nuances of local context. However, the basic premise, of visualizing concepts with nodes and relationships with links, did not change. Next, I conducted two pilot studies, with four participants apiece. Neither the maps produced in these

pilot studies nor the participants are reflected in the tally of maps and participants or the results. Pilot studies can pre-test the method in order to establish whether the process effectively collects the data needed to support the study and to identify practical concerns in applying the method (van Teijlingen and Hundley 2001). These pilot studies gathered constructive feedback from participants and highlighted some logistical problems, allowing me to revise the method for successful application during the four formal research sessions.

Each concept map activity spanned approximately 6 hours, the maximum feasible time that most participants could allocate to study participation. Two maps were produced at each study location, for a total of eight maps. I facilitated each activity in Spanish alongside a local co-facilitator. Local co-facilitators had been introduced to the activity in advance and were invaluable for local nuances of culture and language. Importantly, co-facilitators were trusted by participants due to lack of political affiliations and their social positions. Appendix C contains the outline

Upon beginning each mapping session, I transparently explained the aims of the research and emphasized that we were not *leading* a rigid procedure. Rather, we were *facilitating* the activity as an adaptive research process that welcomed ongoing participant feedback. Then I initiated “warm-up exercises” to acknowledge participants’ individual roles within the system and their personal importance to the study. These introductory exercises promoted systems thinking, preliminarily determined a focal scale for the concept map, and achieved a common level of understanding among participants in regards to specific terms and ideas. Notably, the warm-up exercises offered expansive room for flexibility and innovation, and should be adapted to the local cultural context wherever concept mapping is used.

One introductory exercise derived from the activity “Draw How to Make Toast,” (Wujec 2013). Participants illustrated “How to make *gallo pinto*” (*gallo pinto* is the local traditional dish), then deconstructed the activity as a group. This light-hearted exercise carried heavy merit

by promoting systems thinking, demonstrating how naturally everyone broke a complex process into components and relationships, and reinforcing that responses were not wrong just because they were different.

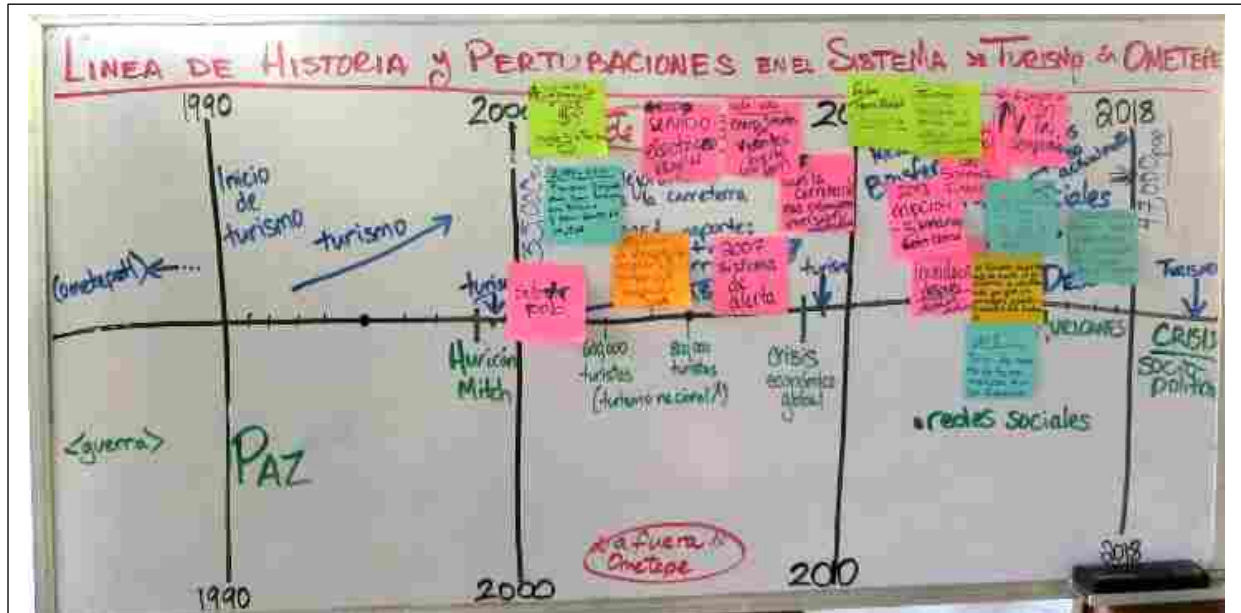


Figure 2.2. Timeline of disturbances in the tourism system of Ometepe. Example from Moyogalpa. I pre-populated the whiteboard timeline based on information collected during the pilot studies. Participants attached paper notes reflecting their personal connection to the history of tourism. Photo by C. Leven.

A subsequent exercise involved the co-creation of a timeline of disturbances to the tourism sector on Ometepe (Figure 2.2). This exercise communicated three essential ideas. It demonstrated how a “disturbance” was not necessarily good or bad. It provided background for both participants and researcher to understand historical legacies and time lags in the system. And, the timeline introduced ideas of temporal and spatial scales. For the final part of this exercise, participants wrote their first interaction with tourism along the timeline, thereby helping individuals to recognize their own relationship to the tourism sector and reinforcing the value of everyone’s individual system understanding. As part of my data analysis, I included these disturbances in my spreadsheet.

The final exercise before mapping included a full group discussion about supply and demand of the local tourism industry. This exercise introduced tangible and intangible components within the tourism system and interactions between components—a foray into complexity, heterogeneity, and relationships of a system, with components and relationships comprising the “concepts” of the concept map. During this exercise, in order to focus the ensuing mapping activity and make data more directly comparable across maps, I offered groups a preliminary designation of “volcano-based tourism” as the type of tourism to discuss. I based the designation upon the considerable extent to which volcanos attract tourists (particularly foreign), the significance of the volcanoes to the majority of island livelihoods, and the national and international interest they draw as a hazard. All groups opted to begin with this designation, though it would change for some as the research activity progressed.

This final exercise easily transitioned to creating concept maps. To offer examples of what finished maps could look like, I provided participants with a diverse mix of Spanish-language examples from a relevant workshop (USFS-IP and UM 2018). For Stage One of the concept map creation, each study group was split into two smaller teams of 3-5 people each. Teams were divided based upon those who worked directly in the tourism industry vs those that did not, acknowledging the imprecision of this division as explained previously. Then I provided teams with large paper and a variety of supplies to create the map, and gave teams the map title: “Conceptual map of the volcano-based tourism system.” Teams were encouraged to begin with components (concepts) most fundamental to volcano-based tourism and work outwards to describe how volcano-based tourism functions within Ometepe Island (or the determined focal scale). Each component comprised a tangible or intangible concept, creating a “node,” with relationships drawn between nodes. Teams were encouraged to simplify the system into the most important components and drivers, but not to oversimplify, following the advice of B. Walker and Salt (B. Walker and Salt 2012).

Once each group completed a basic map of the system, Stage Two of the concept mapping commenced. Stage Two sought deeper understanding of current system dynamics by asking teams questions developed from current understanding of SESs and tourism research. This case study asked questions in Stage Two that derived from basic properties of SES, derived from Liu et al. (2007) and Preiser et al. (2018), combined with tourism-specific systems thinking from the Destination Sustainability Framework (Calgaro, Lloyd, and Dominey-Howes 2014).

Participants responded to Stage Two questions by visually modifying their maps with answers. Purposefully designed for this case study, Stage Two questions targeted SES properties through considering the effects of the sociopolitical crisis upon the SES broadly and the tourism sector specifically. As an example, teams were asked to show on the map “Where have people demonstrated the capacity to adapt or respond to the current situation?” In response, they might have highlighted a section of their map, or added a brief description. To aid in later analysis, I asked teams to put a (c), for “capacity,” beside their response. Figures 2.3 and 2.4 show examples of maps at the end of Stage One and at the end of Stage Two.

At the conclusion of each concept mapping activity, all team members attached anonymous, basic demographics to their maps. Participants were given the opportunity to present their maps, view the other team’s map, and to reflect upon the activity. Suggestions that did not fundamentally alter the methodology were implemented in subsequent study sessions. Through each mapping activity, data were collected via the following products:

- (1) “How to make *gallo pinto*” drawings and the tourism disturbances timeline
- (2) Photos taken of the maps during the process, particularly at the end of each Stage
- (3) The completed, large paper concept maps
- (4) Extensive notes recorded during and within 24 hours of each activity

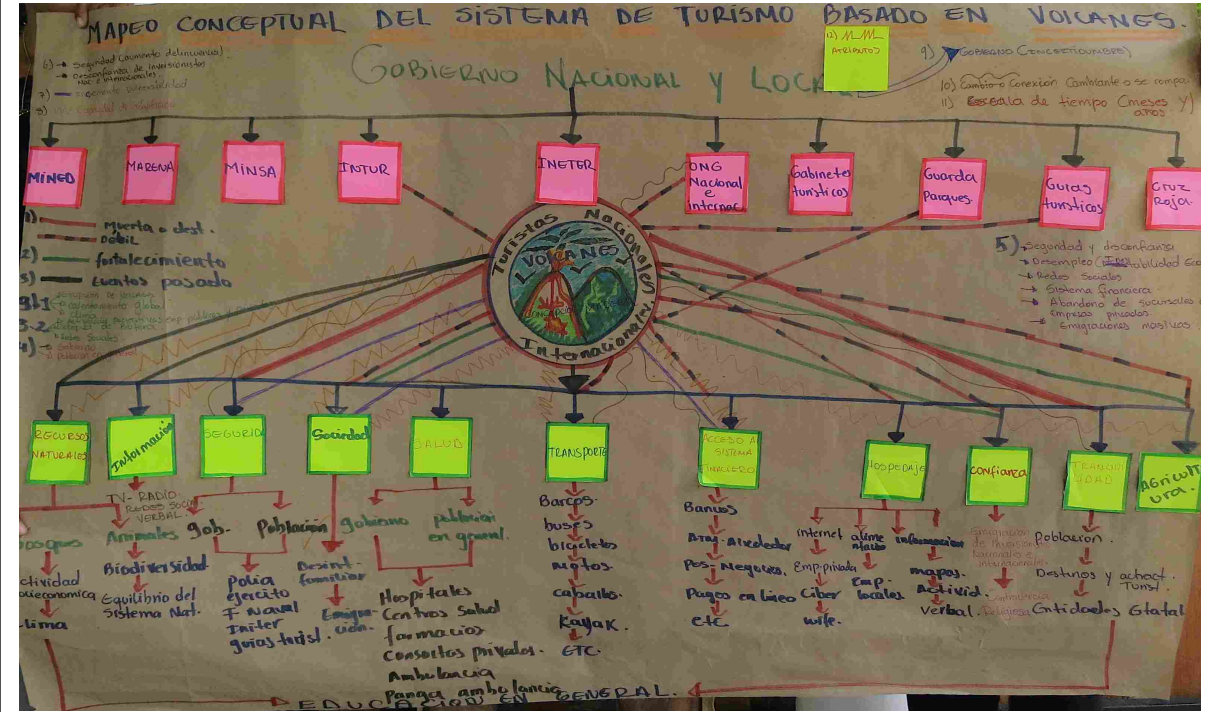
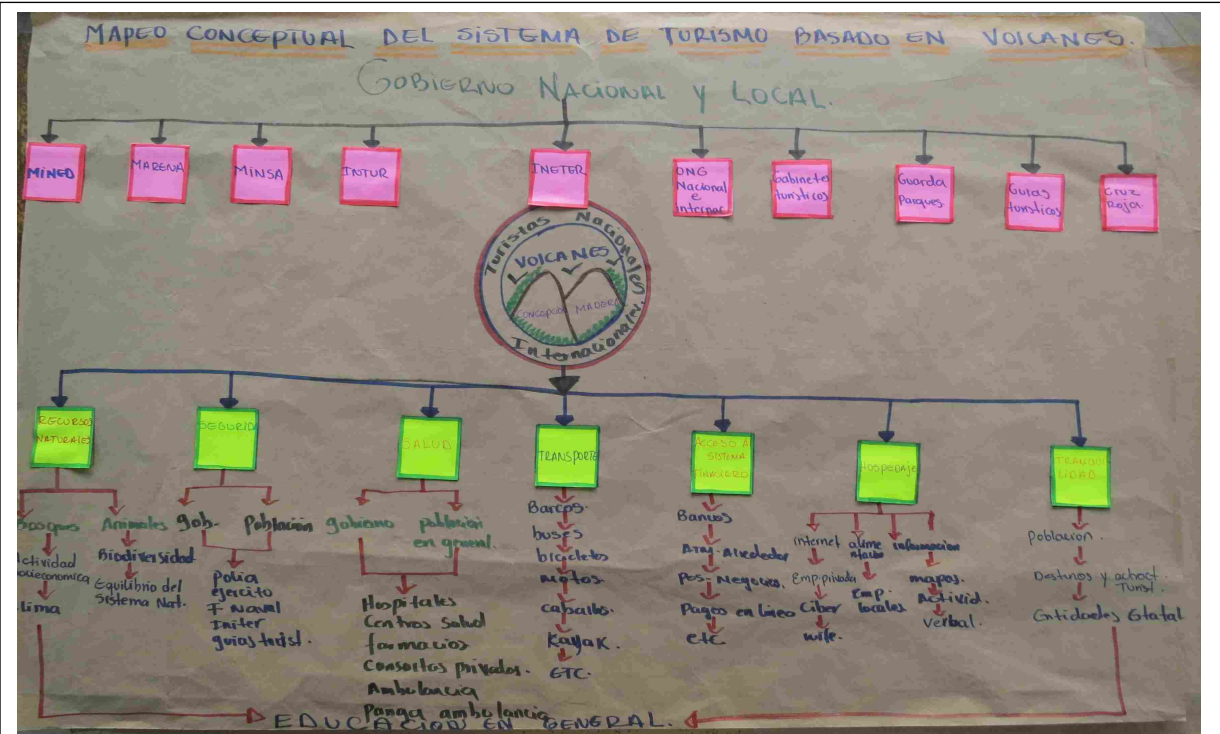


Figure 2.3. Concept map from Moyogalpa. Participants present their maps at the end of Stage One (upper map) and at the end of Stage Two (lower map). Photos by C. Leven.

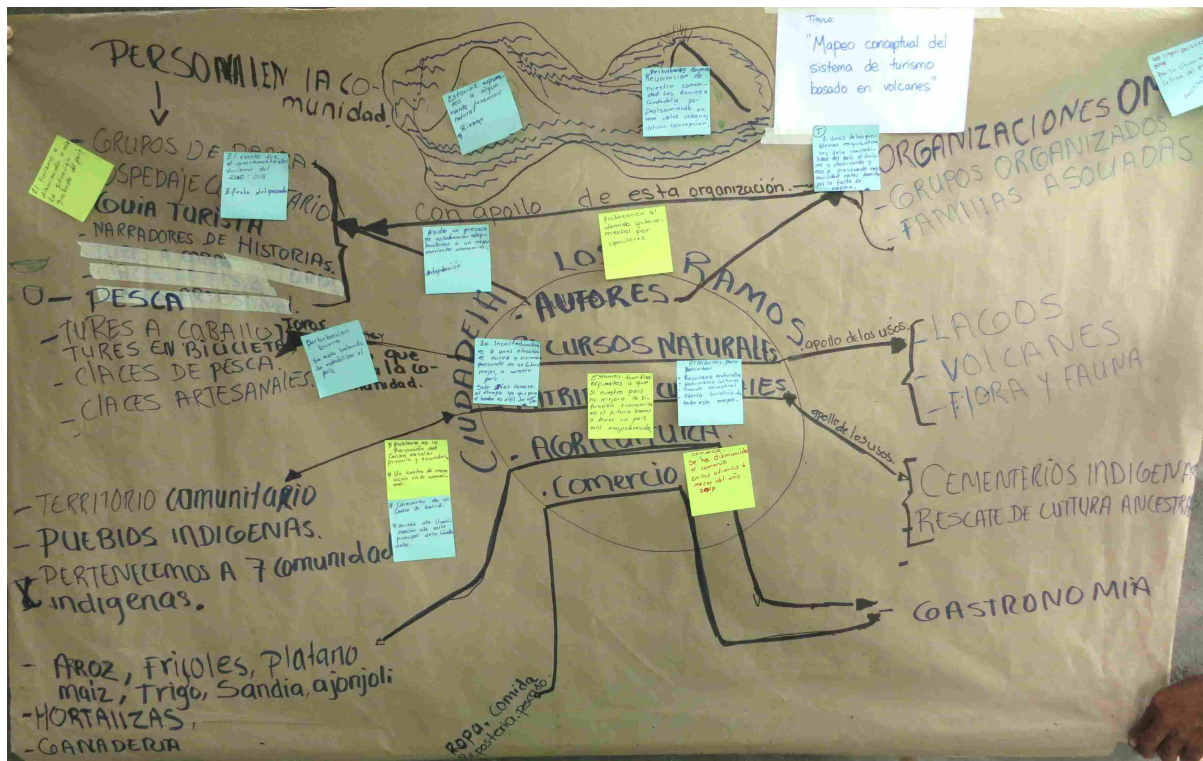
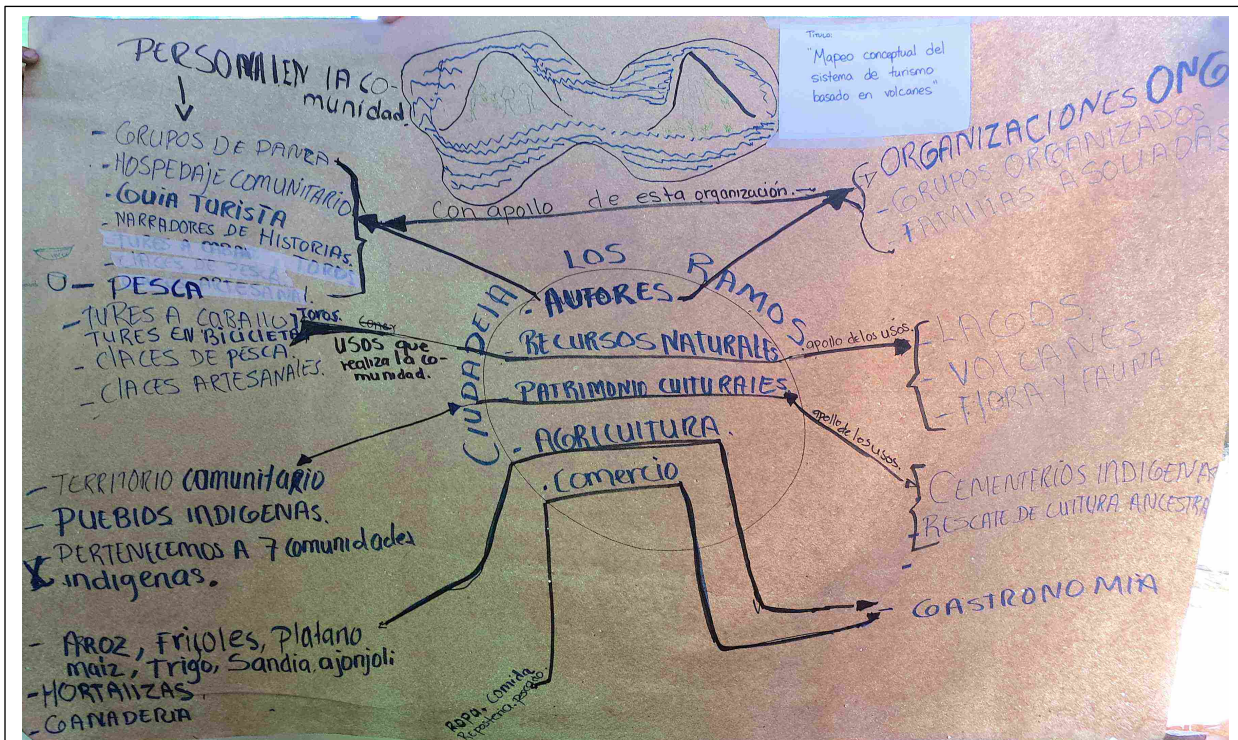


Figure 2.4. Concept map from Ciudadela. Participants present their maps at the end of Stage One (upper map) and at the end of Stage Two (lower map). Photos by C. Leven.

Data Analysis

Because this study sought to validate a rapid assessment tool that would be accessible even to those with basic resources, I ascertained that my data analysis did not require advanced technological tools. I created a spreadsheet listing SES properties and systematically completed the spreadsheet. Specific SES properties directly matched with Stage Two questions, including, for example, “risks,” “uncertainties for the future,” “historical legacies,” and others that I asked participants to directly label on their maps. This allowed trends, outliers, and gaps among the data to be identified.

For example, one column of the spreadsheet contained “adaptive response to the current situation.” Seven out of eight maps listed “agriculture.” Notes and ground-truthing revealed that many residents resumed agricultural livelihoods in place of tourism, for both subsistence and income generation. The capacity to engage in diverse livelihoods is a display of emergent properties within the system, an indicator of historical legacy and system memory, and critical explanation of context. All of these are essential for understanding how tourism functions within the system.

Results: Concept mapping as a method to analyze tourism in a system

For successful use as a method, concept mapping needed to provide a rapid assessment tool that enhanced systems understanding in a meaningful and holistic way while being easy to use in the field. This understanding needed to privilege local knowledge and focus on the relationships within the SES. Through evaluating the case study in Ometepe, Nicaragua against these metrics, concept mapping demonstrated that it could provide a holistic assessment in a manner that was accessible, adaptable, and achievable.

The accessibility of the research was evaluated by its risk and costs, for both researchers and participants. Participants underwent no financial hardship to participate, a low time

commitment alleviated personal hardship, and through research design it was easy to mitigate potential intellectual, emotional, and physical risks. The research budget for each study was small: paper and markers, printing costs, catering, and negligible reimbursements for participant transportation. Data analysis used basic spreadsheet software, and realistically could be handwritten if computer access is not possible. Therefore, this method was accessible because it was low risk and low cost.

Concept mapping is also accessible because it translates easily for diverse cultural and educational backgrounds. Participants ranged from having basic literacy to a doctorate degree, and all were able to contribute. Each participant group agreed on a visual representation of their mental models within about two hours, supporting that concept mapping accesses humans' inherent capacity for systems thinking. Additionally, accessibility was enhanced by the assistance of a local co-facilitator. In each session, a co-facilitator helped to answer questions and translate ideas into the appropriate culture context, so that all steps of the activity were completed by each participant group. Finally, although this study did successfully obtain data from each mapping session, the low expenditure of time and money meant consequences were low had a session not produced useable data. To further this point, participants were highly engaged in every mapping activity, while they expressed less interest in the ultimate output of the research. Many expressed gratitude for the local platform to discuss island issues. One participant said, "Thank you. In my 8 years working as a tour guide, this is the best *capacitación* [training] I have ever attended." Another participant expressed interest to use concept mapping in the future for his own, unspecified projects.

Concept mapping also proved to be a highly adaptable method. The "warm-up exercises" were heavily informed by feedback from local informants and pilot study participants. Lessons learned from each mapping session were easy to incorporate into following sessions, without fundamentally altering the data collection. The concept map activity in Santa Cruz responded to

a request from some local tourism students. These students were interested in how the concept mapping was generating discussion and description of tourism within a system, thus the activity was adapted to include discussion that focused on process. Again, the data collection was not fundamentally altered, and the concept maps were used.

The sociopolitical crisis particularly highlighted the adaptability of concept mapping. Despite the initiation of this project prior to the crisis, the concept mapping was easy to adapt for data collection during a crisis. Following local advice, the location, timing, and group size of mapping activities were arranged so as to avoid suspicion of meeting for subversive political aims. Additionally, local government officials were excluded from joining group concept map activities. This directly resulted from lack of trust between citizens and government associated with the crisis. However, even in a calmer political climate the presence of public officials would have reflected a power imbalance. Separating participants due to power imbalances is supported by the work of Berkes (2007) and Kayat (2002).

Foreigners also did not participate in mapping activities. While this was partly intentional for similar power dynamic concerns, it was also due to the crisis. Many foreigners had fled Ometepe, and of those who were invited to participate, none did. A separate mapping activity ideally would have been conducted with only government officials, and other activities that included foreigners, though this proved unfeasible. Instead, the researcher was able to supplement understanding gained from the concept maps by communicating directly with key public officials and some foreigners that remained on the island.

Finally, and essentially, concept mapping proved achievable. Concept mapping was able to absorb surprises while retaining the fundamental steps needed to collect data. Surprises included the arrival of unexpected participants to mapping sessions, a high absence rate for confirmed participants at three of four sessions, and the last-minute addition of the fourth study in Santa Cruz.

“Achievability” also necessitates achieving results via furthering systems understanding. Within research constraints that included limited field time, low resources, and a tricky sociopolitical situation, concept mapping produced valid and useful data for analysis. Each case study map captured holistic system understanding as conceptualized by local citizens. The concept maps defined key relationships between different parts of the systems. The maps furthered systems understanding of the tourism sector by clearly providing data for basic properties of SESs as well as tourism-specific context. Figure 2.5 offers examples of systems understanding which arose through analyzing the concept maps. Chapter 3 expounds further upon specific SES data collected from Ometepe.

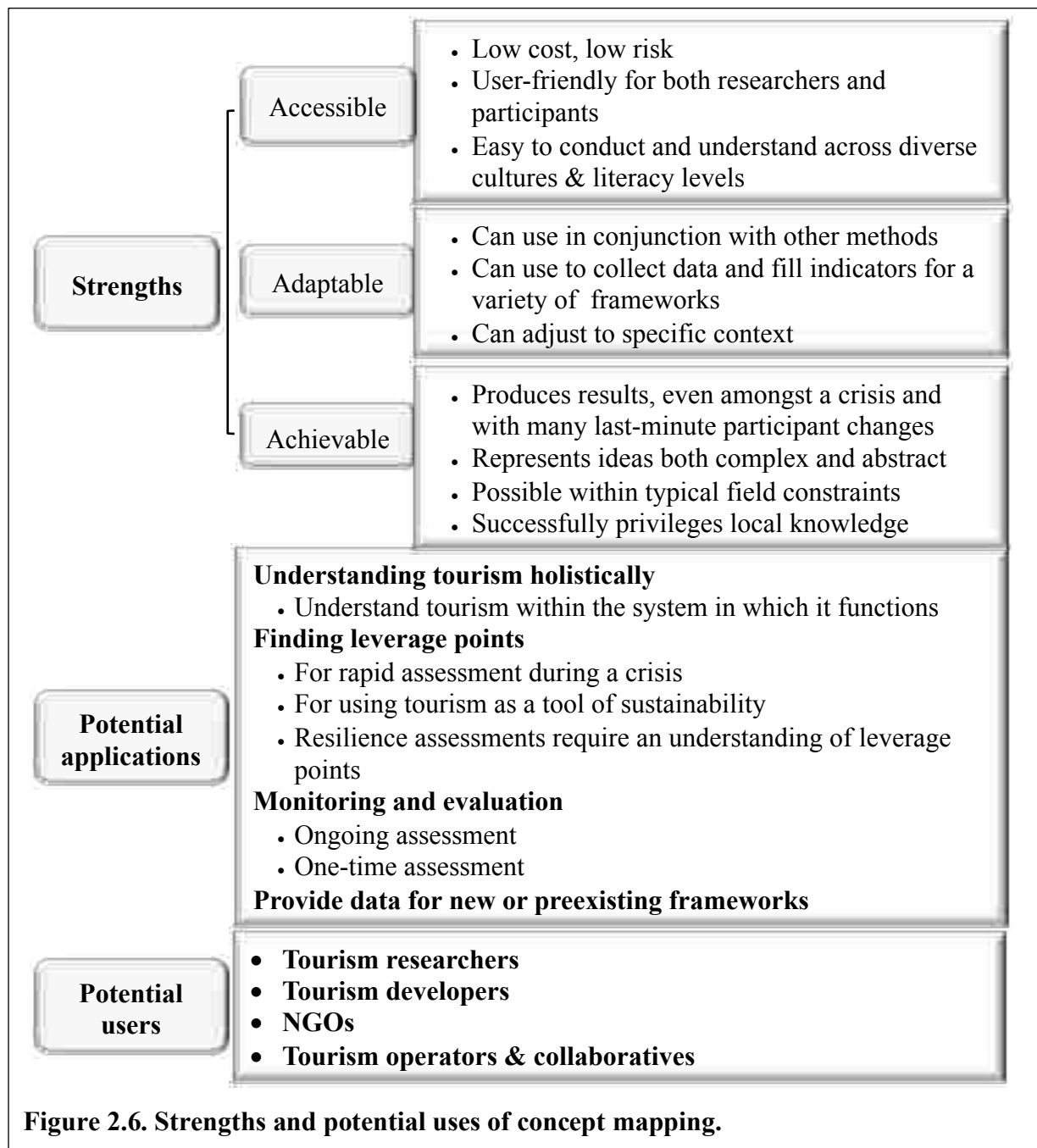
Properties of SESs	Examples from Ometepe Data
Context & heterogeneity	Distinct components comprise system, and relationships between components reorganized following onset of the crisis
Nonlinearity and thresholds	Local enterprises closed and/or abandoned in response to tourism sinking below a critical threshold
Feedbacks	Positive correlation in decreasing relationship between local government and citizens
Surprises and uncertainty	Omnipresent potential for natural hazards
Resilience	Livelihood diversity; citizens reengage with agriculture and fishing after loss of tourism
Historical legacies & time lags	Knowledge and land availability still present that allow for resumed agriculture practices
Cross-scale interactions	National sociopolitical crisis destroys tourism on Ometepe

Figure 2.5. Examples of SES data collected from the Ometepe case study. Properties of SESs are derived from Liu et al. (2007) and Preiser et al. (2018).

Discussion: Concept mapping in practice

Results from the case study in Ometepe show that concept mapping offered an effective and holistic rapid assessment tool that privileged local knowledge. Success derived from three

principle reasons: Concept mapping is accessible, adaptable, and achievable (Figure 2.6). The data situate the tourism sector within the SES that encompasses tourism. The concept maps also elicit important themes specific to tourism development on Ometepe. From the data it is possible to draw out values, social norms, key relationships and interactions in the system. The ability to pull out essential relationships in a system within available research time shows why this is an effective rapid assessment tool.



Unexpected results reinforced the importance of local knowledge. For example, all participants noted the significance of domestic visitation to Ometepe, yet this tourism receives less attention at the national or international level. Locals also were able to easily represent the consequences of lost tourism and islanders' responses via the maps, such as writing "agriculture." During mapping activities, it was easy to solicit additional information immediately from participants if needed. For example, inquiry about "agriculture" offered significant findings on how continuing land tenure arrangements and retention of agricultural expertise has allowed islanders to sustain themselves despite a collapsed economy. The straightforward process of asking participants to explain more about what they drew revealed a great deal about complex SES dynamics and tourism-specific contexts, including adaptive capacities, vulnerabilities, historical legacy, power relationships, and personal values. Though it would be possible to understand these dynamics via other methods, concept mapping proved very efficient.

Accessibility was enhanced for me by the available support of local contacts. These contacts were generated through local partnerships I established prior to my arrival, in addition to three months of immersion in the field over the course of one year. When analyzing the maps, these contacts proved helpful for the occasional question of translation, or to offer greater context when I, as an outsider, could not understand an abbreviated relationship on the map. Presumably, retaining local contacts would be helpful anytime concept mapping is used.

Notably, there were challenges to make the method accessible to all participants. Though I focused on minimizing my influence upon the maps, I ultimately opted to offer participants some formulaic ways of addressing repeated challenges. The most challenging aspect of the exercise for participants was to make explicit for an outside researcher the system relationships

that they implicitly took for granted. One way solution implemented after the first set of maps was to make certain that groups specifically labeled every response to questions from Stage Two of the mapping process. Additionally, it proved immensely useful that a co-facilitator or I monitored the maps during the activity to see whether the visual representation both matched and expressed the participants' discussion. Participants sometimes needed specific urging to clarify concepts, such as "Can you write what that arrow represents about the relationship between those components?" The heterogeneity among the finished concept maps is one measure of successfully minimizing my influence. These lessons learned and other observations are recorded in Figure 2.7.

- Creative freedom is essential, but imposing some conventions aid analysis: e.g., labeling responses to Stage Two questions with a predetermined symbol
- Early activities shouldn't be rushed, but pilot studies can determine shortcuts that do not undermine participation (e.g., creating timeline in advance)
- Intuitive, reflexive thinking encouraged by concept mapping will overlook certain aspects of the system (e.g., risk of interoceanic canal)
- The group nature of participation is unlikely to deeply and critically question social constructs and power dynamics, even in areas with less political risk, but maps can lend insight for further research.
- Co-facilitating with a local may result in minor loss of methodological rigor, but the value for fully understanding the local context makes up for it
- Making concepts explicit is difficult! Hovering and pressure required
- Participants enjoy the activity
- Retain some participant contacts for questions that may arise while analyzing maps

Figure 2.7. Lessons learned. Key observations from using concept mapping in field research.

Nonetheless, some important SES dynamics likely remain absent from the maps, even with the considerations given to participant anonymity, a safe setting, and cultural nuances. This partly results from time constraints and the intuitive nature of the maps, but other absences likely result from the sensitive and precarious political nature of certain topics. It is also a consequence

of the topics and questions selected. Supplementing concept mapping with secondary research, field observations, and informal interviews allowed me to note some of these absences. For example, no map noted the severe disturbance that would result if the interoceanic canal gets built through Lake Nicaragua, nor did any map specify who and what caused hazardous land use practices. Recognizing these absences and uncertainties are significant for analysis, and could help inform future research in a destination.

Additionally, there are limits to accessibility. Concept mapping will not be accessible to all cultures. This method is heavily based in specific conceptualizations of temporal and spatial scales. For cultures that do not conceive of time or space in the same manner, such as Australian aboriginals who do not conceive of time as linear, this method would be ineffective or need heavily altered (Ryan 2018). Additionally, it is possible to envision scenarios in which political concerns, state censorship, security, or other situations would prevent the creation of transparent and meaningful concept maps, including in ways that might not be apparent to the researcher. A researcher must gauge cultural contexts in order to best determine appropriateness.

The adaptable nature of concept mapping is useful if considering potential applications of the method. Specific focal scales or topics can be decided early in the research activity. Stage Two questions are highly adaptable, and could easily incorporate additional methods such as scenarios planning or futures visioning exercises. The manner of data analysis can vary, for example, data could be inserted into other frameworks or software analysis. Additionally, the actual output of the concept maps is radically adaptable based upon participants. For example, words could be replaced by images, or groups could create their maps using computer software.

Potential applications of concept mapping within tourism destinations extends beyond its use in this study. The growing body of literature linking resilience and tourism reveals a desire to assess the resilience of tourism as an industry and form of economic development. Concept mapping can provide a first step in understanding the SES in which tourism's functions, a

prerequisite to assessing resilience as a system property and for critically approaching the questions “resilience *of what, to what, and for whom?*” Concept mapping can also identify leverage points in a system, an important step if a resilience assessment is conducted with management or development interventions in mind.

With some roots in planning and evaluation, and its accessibility for both researchers and participants, concept mapping could also be applied as a tool for monitoring and evaluating disturbances in a tourism destination. “Disturbances” encompass surprise system perturbations and deliberate interventions, including those which are intended to enhance sustainability. Tourism development is also a disturbance and potential intervention. Concept mapping allows for rapid assessment of feedback loops and could help to explain unanticipated SES dynamics arising from interventions.

Another potential application of concept mapping is a method to collect data for preexisting indicators and frameworks. Concept mapping may offer an achievable way to collect data for respected frameworks, such as Ostrom’s SES framework (2007; 2009), or for many preexisting indicators and frameworks derived from the Millennium Ecosystem Assessment, the Sustainable Development Goals, and other well-recognized international standards.

With a variety of potential applications for concept mapping, there is also a variety of potential users. Tourism researchers can apply the method to a variety of data needs. Tourism development initiatives stemming from the individual through institutional levels can consider the complexity of a system and monitor feedbacks, a critical necessity if sustainability is to be taken seriously. Frequently tourism destinations host a variety of non-governmental organizations (NGOs), arising from the social, cultural, and environmental contexts. NGOs could use the concept mapping more holistically understand their mission in relation to the SES. Tourism operators, whether locally or externally-based, and locally-based tourism collaboratives could use concept mapping for better understanding how tourism functions in their destination.

This case study in Ometepe is an early step in striving for SES understanding of a tourism destination to improve achievability for social, environmental, and economic goals that are sustainable and just for future generations. Notably, the results display only a snapshot in time. Additionally, niche forms of tourism, such as the small-scale, backpacker-style, volcano-based tourism comprising Ometepe's market, account for too little of the tourism sector to clarify the global path to sustainable mass tourism (Chung et al. 2018). Nevertheless, sustainable tourism development at a global scale can be incrementally informed by empirical studies from smaller focal scales. My focal scale for concept mapping was destination-based. Concept mapping could prove equally illuminating in a destination receiving mass tourism. Concept mapping is a worthwhile assessment tool to have available, considering tourism's projected upward trajectory, its propensity for explosive growth, destinations' susceptibility to crises, and the rapidity with which the tourism industry can rebound following a crisis. Additionally, concept mapping offers a method that is more exchange-based than extractive, which was supported by participants' enthusiastic feedback regarding the process itself and the discussions it facilitated among fellow community members.

Concept mapping illuminates the SES through data that can offer value for variety of uses, and highlights areas where more information, particularly quantitative, is needed. While the method of concept mapping itself is not novel, the author has not found the method used in participatory, transdisciplinary data collection for systems or tourism research. At its core, the value of concept mapping lies in the simplicity that it offers to access complexity, while privileging local knowledge.

Conclusion

Current tourism scholarship demonstrates limitations in how tourism is conceptualized, and concurrently lacks practical, empirical methods to analyze the complexity with which the

tourism sector functions within a greater SES. This study successfully demonstrates the use of concept mapping to analyze the tourism sector within the SES of Ometepe. This novel use of concept mapping achieved a more holistic conceptualization of tourism than most tourism studies currently demonstrate via a method that is accessible, adaptable, and achievable. This study provides methodological and empirical contributions to tourism research by supplying a needed method to capture challenging data, including complex relationships and local perspectives, while also being extremely practical for field application.

The simplicity and flexibility of concept mapping result in a method that could be useful for a variety of potential applications and users. As a rapid assessment tool, concept mapping can highlight key interactions in the system. Rapid system assessment is a priority for tourism destinations considering the swift and haphazard growth of the tourism sector around the globe and the accompanying social and ecological consequences. Considering the susceptibility of tourism destinations to hazards, concept mapping could assist in crisis response by understanding how system relationships have altered and what attributes are valued. While this study employs concept mapping to a small focal scale, the method offers potential to consider larger scales, including mass tourism destinations. Overall, concept mapping offers an improved method to conceptualize tourism within a system, and therefore a way to better understand how tourism can be used as a tool of sustainable development.

CHAPTER 3. ANALYZING THE FUNCTION OF TOURISM WITHIN A SOCIAL-ECOLOGICAL SYSTEM

Introduction

Tourism might offer a powerful tool within sustainable development strategies (Z. Liu 2003; Honey 2008; Moscardo 2008; McDonald 2009; Calgaro, Lloyd, and Dominey-Howes 2014; McCool and Bosak 2016). Unfortunately, the tourism sector in Nicaragua and globally is better typified by haphazard, externally-driven development and exacerbation of marginalizing conditions than for intentional, holistic planning (Das and Chatterjee 2015; Fletcher 2009; Honey 1999; Hunt 2010; Hunt and Stronza 2011; Nepal 2002; Stonich 1998). Furthermore, the tourism sector changes rapidly, occurs in a remarkable variety of socioeconomic and geographic contexts, initiates from scales ranging from individual to global, and derives from mixed values including economic, social, and environmental. Even when tourism development is planned, extreme uncertainty and rapid change can lead to surprise consequences and complex feedbacks. In order to use tourism effectively as a sustainable development tool, we need to improve understanding of how the tourism sector functions as part of an SES. An SES perspective through the paradigm of resilience thinking offers ways to address high levels of change and uncertainty.

This research sought to analyze the tourism sector within a specific destination using recognized SES theory via a case study in Ometepe, Nicaragua. The research objective was motivated by two on-the-ground challenges in Ometepe. First, organizations and individuals on Ometepe are looking for ways to enhance ecological and socioeconomic well-being through tourism development sustainable. Secondly, Nicaraguan and international volcanologists are looking for ways to decrease human risk to volcanic hazards on Ometepe through tourism development, specifically via associated education and protected area status. Ometepe,

Nicaragua offers particular insight as a destination for study because tourism is still emergent, versus established, and because the sociopolitical crisis that erupted in 2018 highlighted specific relationships within the SES.

To accomplish the research objective, my study asked: How do local research participants describe the role of tourism within a social-ecological system? My study answered the question through participatory research with Ometepe citizens that was driven by SES theory. Amidst the research, a crisis occurred that prompted two sub-questions: What can be highlighted about how tourism functions in an SES by looking at the cascading effects of a significant disturbance? And, what opportunities might a significant disturbance generate at various scales? Answers to these sub-questions were illuminated through analysis of changed relationships and adaptive responses to the crisis.

This chapter reviews foundational complex systems perspectives, resilience thinking, and tourism-specific contexts in order to derive a set of SES properties that guide this study. The chapter describes the case study location, including the crisis that erupted, before explaining the concept mapping methodology used to analyze tourism within the SES. Results present data from concept mapping as categorized by the SES properties. Results highlight how tourism development can both alter and be altered by system dynamics, and suggest ways in which tourism can support or erode various system attributes. The discussion offers potential intervention points and strategies moving forward with tourism development.

Overview of systems thinking and its applications to this study

If tourism is regarded as a tool of sustainable development, then the tool of tourism development also must be regarded as a system disturbance. The addition or change of tourism to a system alters the structure and dynamics of a system. This case study sought to analyze complexities of a system in which a tourism industry exists, and reciprocal effects between the tourism sector and the encompassing SES. To determine guiding principles for empirically

analyzing a SES in the field, I drew from current understanding of systems. Results of my literature analysis and the conceptual flow to develop the guiding principles for this study can be seen in Table 1.

Levin (1998) and Meadows (2008) provide some of the most fundamental understanding of what Levin classifies as “complex adaptive systems,” and Meadows simply refers to as “systems.” From different disciplines, these authors arrive at parallel explanations of systems, which can be described by three fundamental properties. First, systems comprise different components, or elements. Secondly, the components interact. Third, system behavior is determined by an autonomous process.

These fundamentals of systems are theoretical. To apply this understanding empirically, it is useful to look for more specific system properties that emerge from the dynamics of component interactions and system behavior. Levin (1998) suggests such properties: nonlinearity; diversity; continual adaptation; absence of global controller; emergent hierarchical organization; perpetual novelty; and far-from-equilibrium dynamics. Meadows (2008) likewise offers insight: a system is more than a sum of the parts; surprises happen; and feedback loops are the basic operating unit of system. Consideration of these properties provides the foundation for empirical system analyses.

To develop a systematic approach to empirically analyze a system, I looked towards scholarship with explicit awareness of the inextricable integration of human and natural (i.e., non-human, environmental, ecological) systems, particularly social-ecological systems research. SES theory derives from complex adaptive systems, ecology, and increasingly sociology (Holling 1973, 1986; B. Walker and Salt 2012; Quinlan et al. 2015). SES scholarship acknowledges that “delineation between social and natural systems is artificial and arbitrary” (Berkes and Folke 1998:4).

Levin 1998 “complex adaptive systems”	Meadows 2008 “systems”	Preiser et al. 2018 “Complex Adaptive Systems/Social-ecological systems”	Liu et al. 2007 “Coupled human and natural systems”	This study “social-ecological systems”
Sustained diversity and individuality of components	Elements – different components that create a structure	Constituted relationally – defined more by interactions than individual identity of components	Heterogeneity – variation in human-nature couplings across space, time, and organizational units	Context & heterogeneity – system components with different identities and geographic and temporal specificity
		Contextually determined – as context changes, components may take on a different role or function		
Localized interactions among those components	Interconnections – physical and/or informational flows between elements	Dynamic processes – include nonlinear feedback loops across scales of time and space and are a precursor for unpredictability & uncertainty	Nonlinearity and thresholds – temporal and/or spatial shifts between system states	Nonlinearity and thresholds – relationships change between components; discontinuities and thresholds are present across time and space
An autonomous process selects from among those components, based on the results of local interactions, a subset for replication or enhancement	Function and/or purpose determine(s) system behavior		Reciprocal effects and feedback loops – with recognition that local system dynamics are often shaped by larger-scale processes	Feedbacks – informational or physical responses that amplify or diminish the effects of other system processes
		Novel qualities emerge through complex causality – nonlinear interactions, causality, and cascading effects; emergent properties cannot be attributed to the properties of individual components	Surprises – unexpected effects	Surprises and uncertainty – include risks and disturbances
		Adaptive capacities – in response to feedbacks and interactions; evolution captured in systems’ memory	Resilience – the capability to retain similar structures and functioning after disturbances for continuous development	Resilience – includes traits that both fortify and reduce the ability of a system to retain its structure, function, and identity
		Radically open – system boundaries are not easily determinable, subjective, and permeable	Legacy effects and time lags – impacts of prior human-nature couplings on later conditions	Historical legacies and time lags – physical and informational past is stored in system memory, and affects ensuing functioning of the system
			Interactions among different coupled systems and across scales were not considered, but authors note importance moving forward	Cross-scale interactions – system boundaries are artificial and radically open, with dynamics that interact with other systems and extend across time and space



Figure 3.1. Fundamental Properties of Systems. This study built a systematic method of analyzing SES properties from leading authors and synthesis articles on understanding systems. Systems terminology is listed under study. Levin (1998) and Meadows (2008) distill complex systems to the foundational requirements, arriving at parallel syntheses from different disciplinary backgrounds. Research by Preiser et al. (2018), derived from theory, and Liu et al. (2007), derived from case studies, expands upon key properties that emerge from system dynamics. The emergent properties used in this study are categorized in the far-right column.

SES scholarship includes conceptual and empirical approaches to systems analyses. Preiser et al. (2018) reviewed theoretical systems research to conclude upon six conceptual “organizing principles” for systems, which offer reasonably specific properties to analyze. Preiser et al. offer a link between the rich theory underlying systems understandings and empirical research. J. Liu et al. (2007) analyzed empirical case studies to determine seven SES properties. These seven properties are specific and applicable in the field. Six of the properties provided a focal point for these empirical case studies, while authors explicitly noted a seventh property as absent from the case studies: interactions beyond the system focal scale.

Notably, systems scholarship includes other leading thinkers who have developed rich frameworks to assess SESs, such as Ostrom (2007; 2009). Despite the value of frameworks as robust as Ostrom’s, such frameworks can prove unfeasible to execute within typical field research restraints, especially outside of developed and democratic countries. Additionally, frameworks with detailed and massive indicator sets can be concurrently overwhelming and incomplete in their approach to complexity (Holling 2001), particularly to non-specialists. A more approachable alternative to analyzing systems is to focus on the most influential factors driving system dynamics while maintaining a holistic view (Holling 2001; B. Walker and Salt 2012). One paradigm within SES, resilience thinking, focuses on real-world application, thereby offering particularly useful insight for field research.

Resilience thinking is not the same as *resilience*. Resilience emerges from complex system dynamics, and is one of seven fundamental system properties used for empirical analysis in this study. Resilience describes the amount of disturbance that a system can absorb without changing identity and function (Walker, et al., 2004). The property of resilience is qualitative; it is also valueless, neither valued as ‘good’ or ‘bad’ but instead descriptive of the system (Chaffin and Scown 2018).

Resilience thinking bridges understanding of SESs with practical application. For example, resilience thinking can be used to consider how to manipulate resilience. Practitioners, managers, and scholars note that one way to cope with and respond to complex and uncertain dynamics of our world is through increasing resilience of desired system attributes and decreasing resilience and possibly transforming undesirable attributes (Strickland-Munro, Allison, and Moore 2010; B. Walker and Salt 2012). Resilience thinkers look for system leverage points to manipulate resilience through focusing on the most influential processes in the system without oversimplifying (Holling 2001; B. Walker and Salt 2012). Leverage points are further understood through considering how systems adapt, evolve, and transform in cycles that alternate between growth and collapse, in relationships that span across time, space, and other systems (Holling 2001; Gunderson and Holling 2002).

As knowledge of social-ecological system dynamics has continued to evolve, the understanding of resilience likewise has progressed. Additionally, resilience thinking is gaining insight from multiple disciplines, particularly in the social sciences, including anthropology, development studies, political ecology, social learning, and social innovation (Fabinyi, Evans, and Foale 2014; Mitchell et al. 2014; Duit et al. 2010). Resilience supplements the concept of sustainability (Folke et al. 2002; Espiner, Orchiston, and Higham 2017; Cheer and Lew 2017), bringing resilience thinking to the forefront of conversations on sustainable development.

Resilience thinking enriched my approach to analyzing a SES. Building from foundational systems explanations by Levin (1998) and Meadows (2008), to the more specific systems properties of Preiser et al. (2018) and J. Liu et al. (2007), I derived fundamental system properties that offered potential for systematic empirical research (Figure 3.1). Resilience thinking offered practical insight for holistic systems analysis so that I could design methods that were accessible, adaptable, and achievable in the field. Additionally, current work that

recognizes tourism-specific system properties influenced my approach with this study, as outlined next.

Tourism specificities within systems thinking

From the work of leading systems thinkers and the current state of SES research, it becomes evident that systems understanding has developed through interdisciplinary exchange and that the findings resonate across disciplines. SES understandings are gaining traction within tourism research as conceptualized through resilience thinking (Farrell and Twining-Ward 2004; Lacitignola et al. 2007; Cochrane 2010; Strickland-Munro, Allison, and Moore 2010; Bosak 2016; Butler 2017; Espiner, Orchiston, and Higham 2017; Hall, Prayag, and Amore 2018; Lew and Cheer 2018). An SES perspective can expand understanding of effects across temporal and spatial scales (Lew 2014; Lew and Cheer 2018) and help to account for unpredictability and surprises (Folke 2006; Butler 2017), thereby improving the potential for tourism as a tool of sustainable development.

Though sustainable tourism in research and practice generally proceeds with an assumption that the tourism industry should continue to function in a given destination, tourism is not a *de facto* component of sustainable development (Strickland-Munro, Allison, and Moore 2010; Calgaro, Dominey-Howes, and Lloyd 2014; Strickland-Munro 2017), but rather a potential tool for supporting social-ecological values.

The Brundtland Report defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development (WCED) 1987, 41). The United Nations further stresses that sustainable development harmonizes social equality, environmental protection, economic growth, and the eradication of extreme poverty (United Nations 2019). Holling (2001, 390) contends that the term “sustainable development” is not an oxymoron, but rather “refers to the goal of fostering adaptive capabilities and creating opportunities.” It is with

these definitions in mind that “sustainable development” and “sustainable tourism” are used in this text. To consider tourism as a tool for sustainable development, research should illuminate the SES attributes that people want to retain, with explicit attention granted to the people who live within the system. Because tourism development will change system dynamics, the research should also illustrate fundamental properties of the SES to allow for planning and ongoing adaptation of tourism development.

Sustainable development fundamentally requires interfering with a SES, therefore, understanding that SES is imperative. Unfortunately, there is a scarcity of empirical studies that analyze the tourism sector within its greater SES. Peer-reviewed tourism scholarship that engages systems understanding through resilience thinking generally treat the topic theoretically, bound the examined system as a tourism-system rather than tourism-within-a-system, and proceed with the assumption that tourism itself should be resilient (Farrell and Twining-Ward 2004; Lacitignola et al. 2007; Cochrane 2010; Schianetz and Kavanagh 2008; Lew 2014). Though the application of resilience thinking is underpinned by holistic systems understanding, tourism studies are skipping the foundational steps of resilience practice. Managing for resilience is the final stage in applied resilience thinking; it is preceded by describing the focal system, understanding system dynamics, identifying key system interactions, and assessing governance in the system (The Resilience Alliance 2010). Building from these foundational stages of resilience thinking, I aim for a holistic analysis of how the tourism sector functions within an SES.

Though resilience thinking offers a useful SES lens for analyzing tourism, Calgaro, Lloyd, and Dominey-Howes (2014) and Lew (2014) argue that the specific socio-political contexts of tourism do not receive adequate attention from the resilience framework. In particular, a holistic analysis requires attention to tourism-specific vulnerabilities in order to understand potential barriers to sustainability initiatives and to enrich understanding of cross-

scalar spatial, temporal, and social interactions with tourism (Maru et al. 2014; Calgaro, Lloyd, and Dominey-Howes 2014). Calgaro, Lloyd, and Dominey-Howes (2014) highlight tourism-specific system properties including seasonality; social learning involving tourism job skills and sector information; governance of tourism business networks; and destination image, history, and marketing. I explicitly considered their suggested tourism specificities within my methods and analysis.

Tourism-specific vulnerabilities add complexity to destinations where citizens are already experiencing multidimensional forms of vulnerability and poverty. In these locations, sustainable tourism development is frequently championed as a path to improve human wellbeing and protect environmental and cultural world heritage. However, we lack empirical applications of SES approaches in tourism studies, particularly in low-GDP countries. To respond to this need, my research provides a case study in Ometepe, Nicaragua that takes a complex and holistic approach to analyzing the function of tourism within a SES. Ometepe, with entrenched social, economic, political, and natural hazards, is a location ripe for a sustainable development approach. Because tourism has been emerging as a form of economic development, Ometepe presents a destination to consider how (and if) tourism might offer a tool of sustainable development.

Ometepe, Nicaragua: A system with (and without) tourism

I focused my research on understanding the SES of Ometepe Island, located in southwest Nicaragua in Lake Cocibolca. Bounding an SES is inherently an arbitrary and subjective decision because SESs are linked across time and space (Meadows 2008). Nevertheless, the island geography of Ometepe promotes some natural boundaries. First, the land/water border provides a physical boundary. Second, the physical separation by water from the rest of Nicaragua has fostered specificities of history and culture for the island. Therefore, it also is possible to socially

bound the SES to the physical island borders (again, with full recognition that these borders are permeable).

Ometepe contains a rich microcosm of extreme conditions. The potential for natural hazards and social and political upheavals can be used to highlight system dynamics and the function of tourism within the SES. Since the end of the Contra War in 1990, visitation has grown quickly on Ometepe, with tourism replacing many agricultural livelihoods. Then, national-scale social-political crisis erupted in April 2018, during my study, with profound consequences on Ometepe. The tourism industry collapsed. My study of the SES includes the responses triggered by this crisis.

Though the context is specific to Ometepe, analyzing system disturbances and responses offers findings with specific suggestions for Ometepe and broad applicability to other destinations. Ometepe presents a valuable case study because it offers insight to other tourism destinations in addition to data that can be used by local individuals and organizations.

Methods: Concept mapping tourism and a system disturbance

This research examines how the tourism sector functions on Ometepe, Nicaragua, by analyzing mental system models of local citizens. B. Walker and Salt (2012) note in *Resilience Practice* that SESs can effectively be described by those who live within the system, yet there are few tourism studies influenced by resilience thinking that privilege local knowledge. Concept mapping offers a participatory method to visually represent a SES. I used a novel application of concept mapping as a qualitative field method to enhance understanding of how tourism functions in an SES while privileging local knowledge. The details of the method were produced in partnership with a local professional and with feedback from a trial run with local citizens.

I supplemented concept mapping with research activities including literature searches in English and Spanish; informal interviews; solicitation of statistics and available data from local

and regional government offices; field tours with local government officials and the national geologic survey; and written observations and notes over two field seasons, from before and after the start of the crisis. Analysis of the maps was directly supported by conversations with research participants and outputs from introductory and concluding synopsis exercises that were included in each mapping activity.

I conducted mapping activities in four locations, with two maps produced in each, by a total of 39 participants. Participants remained anonymous, with basic demographic information collected to support analysis. The mapping itself was conducted by teams of 3-5 participants, on table-sized sheets of paper, with a variety of media available for participants to represent the SES through drawing system components and the relationships between them. For analysis, I labeled each map arbitrarily with a “1” or “2” and a letter for the location: A-Altigracia, C-Ciudadela, I-Istmo (conducted along the isthmus), M-Moyogalpa.

Each concept mapping activity included two stages. In Stage One, a series of activities, such as building a historical timeline, introduced participants to the research and ways to represent systems understanding. Then, participant groups determined the focal scale of their map and created a basic structure of components and relationships for the system. Details for Stage One methodology are included in Chapter 2, and reflect insight into ways of visualizing knowledge from multiple sources, including education research (Rico 1983; Trochim 1989; Novak and Cañas 2006), workshops in applied SES theory and resilience (Ryan, 2018; USFS-IP and UM 2018), and tourism studies (Lupoli et al. 2015).

Stage Two included questions and procedures based upon the seven fundamental properties of SESs. Stage Two questions also interrogated the system response to the crisis, as the crisis was part of the context and highlighted certain relationships within the SES.

To analyze heterogeneity and context, I listed all individual components from all the maps, then lumped components into a set of categories that were defined on the maps and then

further sorted by me. Because geographic and temporal variations result in different dynamics between social-ecological systems (J. Liu et al. 2007), the collective specifics of place (such as volcanos) and time (such as the socio-political crisis) form a structure that is the backdrop for system dynamics. Guided by this backdrop, I compared and contrasted the maps. Based on data from supplementary methods, I also listed noteworthy omissions from the maps.

Thresholds, defined as the limit between a system's identity and a reconfiguration into a different identity (B. Walker and Salt 2012), demonstrate one type of nonlinearity (J. Liu et al. 2007). Participants marked components or connections on their maps that had been weakened or destroyed through the crisis. I then analyzed what was reconfigured, and whether it exemplified nonlinear dynamics and whether it qualitatively entered a new system state as explained by the data.

Feedbacks were evident in interactions that participants illustrated between components. I requested that participants write explicit explanations of the physical and informational flows they drew between components to assist this analysis.

To identify surprises and uncertainty, participants noted ongoing risks and uncertainty within the system. I also considered how system disturbances identified future unknowns and therefore uncertainty.

To evaluate resilience, I focused on system conditions that affect the structure, identity, and function of the overall SES. Questions to participants specifically focused on system disturbances, adaptive responses, and vulnerabilities, plus how each of these conditions specifically relate to tourism. These three conditions also reflect the pillars of the Destination Sustainability Framework: sensitivity, exposure, and system adaptiveness (Calgaro, Lloyd, and Dominey-Howes 2014). I also designed questions to produce responses to the informational needs of applied resilience thinking: resilience *of what, to what, and for whom*.

To better understand historical legacies, we created timelines during Stage One via group discussion as well as directed involvement of each individual participant. Then in Stage Two, I asked participants to note past events or conditions that were having significant effects on the present. I reviewed the combined data from timelines and maps to better understand how past system dynamics and circumstances define the destination history and affect the current focal scale.

Cross-scale interactions emerged implicitly on the maps as components and relationships from outside the temporal and/or spatial scale. Additionally, I asked participants to explicitly mark cross-scale conditions.

Throughout the mapping activity, participants visually answered questions relating to each SES property on their concept maps. To facilitate analysis of the maps as a complete dataset, I created a spreadsheet for each property, then systematically analyzed the maps for direct and indirect responses relating to each property. On a final spreadsheet, I collected data relating to how SES cyclical phases were represented in the system, eventually categorizing the findings into reorganization, change, and innovation.

Results and implications

Focal scale and properties of the social-ecological system

The SES focal scale for this case study was the island of Ometepe. Participants helped determine this focal scale during preliminary activities of the concept mapping process. Bounding the focal scale helped direct both the creation and analysis of maps, but with full recognition that system boundaries were subjectively chosen and are highly permeable. All maps include relationships that interact with other systems and extend across time and space. Upon analysis, six concept maps reflect the whole island as a focal scale, while two maps, C1 and C2,

reflect a community-based focal scale. All maps successfully offer insight into tourism at the island-scale.

Findings and insights from analyzing the concept maps are divided via the seven properties of SESs used for this study outlined in Table 1. Categorizing these properties is useful for the purpose of analyzing and describing a SES, but ought not be conflated with a misperception that the properties exist distinct from one another. As with the SES itself, boundaries are fuzzy, thus division of data between properties reflect subjective choices.

Each SES property includes a figure of results, text explanation, and commentary regarding implications. Some properties are organized into combined figures because of the overlap between properties and the analytical value of viewing the data together. Further interpretation based upon a holistic synthesis of the SES follows in the discussion section.

Context & heterogeneity

The maps unanimously display heterogeneous components, thereby fulfilling the first requirement of an SES. Compiling the data from all maps show significant overlap between maps, with over 250 individually identified components fitting into a manageable set of categories (Figure 3.8, left side). The set of categories indicates participants' comprehension of the system in which they live, supporting the appropriateness of using local knowledge to describe the SES.

However, the categories alone do not show specific context of this SES. Context is understood through component interactions, societal values, and the wider environment. Additionally, "context is not a passive backdrop" (Preiser et al. 2018), and different social contexts lead to different uses of natural resources (J. Liu et al. 2007). All mapping activities demonstrated that the context for tourism in Ometepe changed radically with the social-political upheaval. As a result, for example, fishing and agriculture became important livelihoods and resulted in different uses of natural resources than when livelihoods catering to tourists figured

more prominently. Context also can be understood through certain factors that persisted through this reorganization, such as societal values. Societal values receive further consideration in the surprise and uncertainty section.

Outliers and omissions from the maps offer interesting insight. Components linked with indigenous culture and identity are present on the Ciudadela maps that are absent from other maps. Ciudadela maps reflect that tourism enterprises in Ciudadela focuses on indigenous history and a vision of rural community tourism. Though Ciudadela participants discussed the whole island as their focal scale, most components of C1 and C2 are specific to Ciudadela. Therefore, the focal scale of the mapped SES for C1 and C2 is actually the community of Ciudadela, rather than the whole island. In contrast, the other maps are rich with components that are consistent with Ometepe Island as their focal scale. That the difference in context is evident on the maps is one verification of the effectiveness of the methodology.

There are two curious omissions regarding governance. First, only four study groups list local government as an individual component, and no maps specifically name the Alcaldía. The Alcaldía is the municipal government, who determines and enforces the majority of regulations on the island, and is directly responsible for land use planning, hazard planning, and community events. It will be very difficult for significant changes to occur on Ometepe that initiate from either the level of the citizens or from federal institutions without the support of the Alcaldía, including tourism development.

Secondly, religion receives little attention in the concept maps. However, the presence of religious institutions is a critical part of social norms and indirect governance (personal observation). The majority of Ometepe citizens attend church, and I met no Nicaraguans on the island for whom religion was not part of their identity. On Ometepe, church services have been held to help people cope with the ongoing sociopolitical conflict. At the national level, religious leaders have attempted to broker deals between the opposition citizenry and the government.

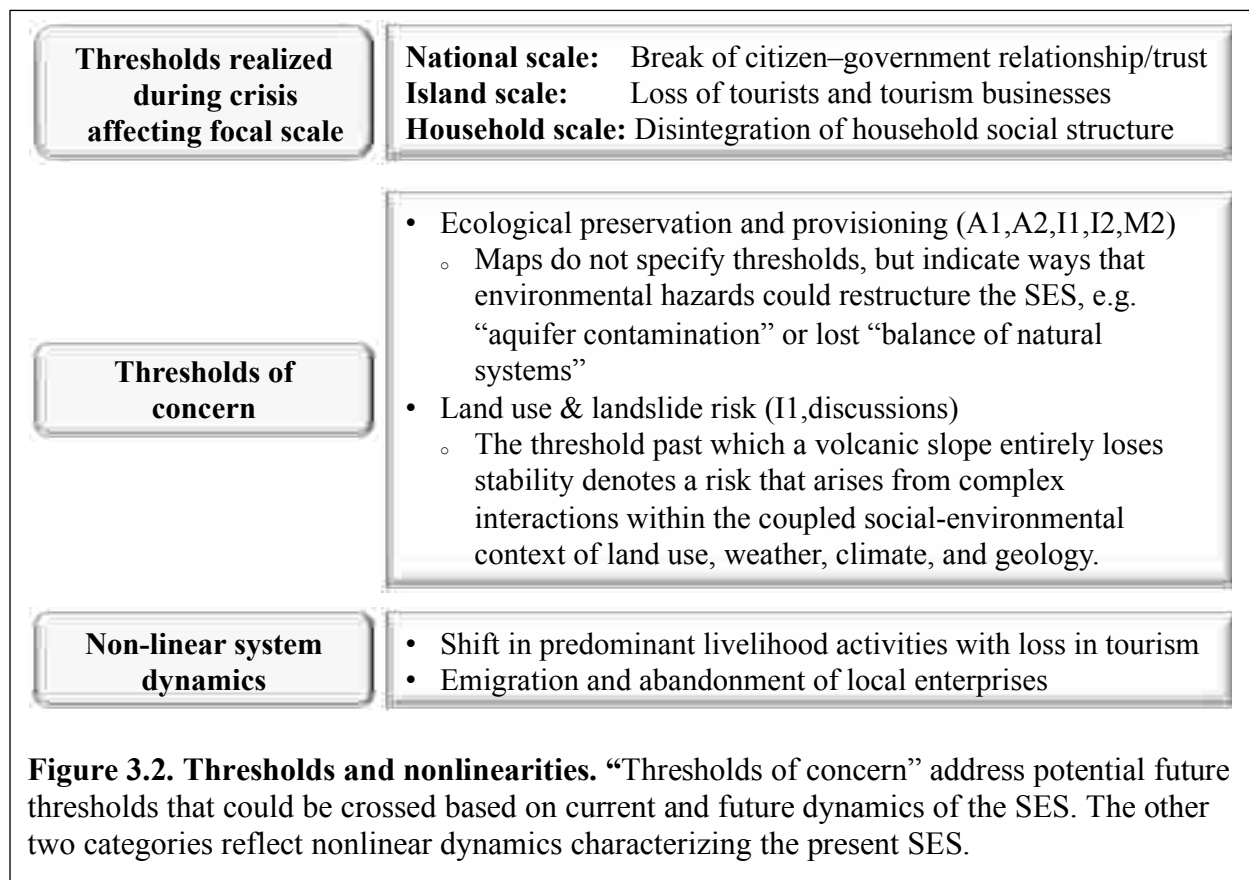
This repeats history of Nicaragua's Revolution, when the church also was active in seeking peace.

The maps' absence of the church might reflect the lack of direct interaction between religious institutions on Ometepe and international tourism. Although the church figures prominently in the life of Ometepe citizens, it has little involvement with international tourists. However, the largest festivals on the island are related to religion. These festivals mainly draw domestic tourists, and account for the biggest annual population boom on the island when well over 20,000 Nicaraguans might arrive in a single month (GPCTO, n.d.).

Nonlinearity and thresholds

The map data indicate three critical thresholds that have been realized during the sociopolitical crisis (Figure 3.2). These thresholds represent system reconfiguration at three scales: national, island, and household. All directly affect the focal scale. Additionally, potential thresholds representing transformational changes to ecological systems repeatedly emerged in the mapping activities, both directly and indirectly. System changes that do not transform the system as thresholds, but still represent reconfigurations, are considered non-linearities. Finally, Ciudadela is a rebuilt community whose very existence and functioning results from dramatically crossing a social-ecological threshold. Because this threshold was passed outside the temporal focal scale, the Ciudadela event is a historical legacy.

At the national scale, maps A1, A2, C2, I1, M1, and M2 indicate a break in the relationship between citizens and government, explicitly noted as a loss in trust in the government, or indirectly characterized as insecurity or loss of tranquility. Loss in trust manifested most strongly as mistrust of the national government, but extended to local government as well, as national and local governments work together closely.



Map A2 indicates how the relationship between communities and the government has shifted. Whereas communities generally supported the government in the past, now they do not. Upon verbal inquiry, a participant indicated that this relationship changed on April 18, 2018 – the date on which protests and violent unrest began. This singular event represents a threshold. The citizens of Nicaragua crossed a threshold of dissatisfaction with government policy; for the government, it reached its limit with citizen dissent. The ongoing unrest in the country has ruptured the tourism industry, accompanied by uncertainty for future tourism.

At the scale of Ometepe Island, all eight concept maps noted the collapse of or severe disturbance to the tourism sector following the start of the current sociopolitical crisis. Participants characterized the loss of tourism by a severe reduction of tourist visits, ceased operations of many tourism-related businesses and jobs, and reconfigured economic and subsistence livelihoods.

At the household level on Ometepe, maps C2, I1, and M2 noted the disintegration of families. I1 and M2 pointed to family members emigrating to work abroad. I also witnessed other examples from Ometepe that included living abroad or self-imposed exile due to sociopolitical fears.

Additionally, there are potential thresholds of concern within the system relating to the coupled social-ecological situation. Ecologically, biodiversity, clean water, and other aspects of the biogeophysical environment provide isleños with resources for agriculture and fishing. Thorough ecological research is needed to understand a safe operating space of resource use. Map I2 specifically addressed the advance of the agricultural frontier. The advance of agriculture on the island has generally been characterized by land use that destabilizes soil upon increasingly high elevations on the volcano. However, the more general theme of deforestation, which concerns some NGOs, federal agencies, and individuals for the effects upon land stability, biodiversity, and water, received little attention from the study groups.

The complex interactions between land regulations and enforcement (both conducted by local government), taxation, local subsistence and socio-economic drivers, and protected area management (at the international or more local level) affect tourism development. These complexities would need to be considered moving forward with tourism development through paying attention to their changing dynamics and by creating space to learn and adapt.

Feedbacks

Of all SES properties studied from participants' maps, feedbacks presented the least straightforward analysis. All maps contain arrows, demonstrating physical or informational flow between components (Figure 3.3). Feedback loops were most obvious when the arrows indicated reciprocal effects, either via two-way arrows or a via a set of arrows that formed a loop between components. However, labeling relationships proved challenging for most participant groups, for mixed reasons of how participants prioritized aspects of creating the maps, and for the inherent

difficulty of explaining some of these relationships. Therefore, feedbacks analyzed from the mapping activities generally retain some ambiguity. Nonetheless, they point to important SES relationships to consider in contemplating future development.

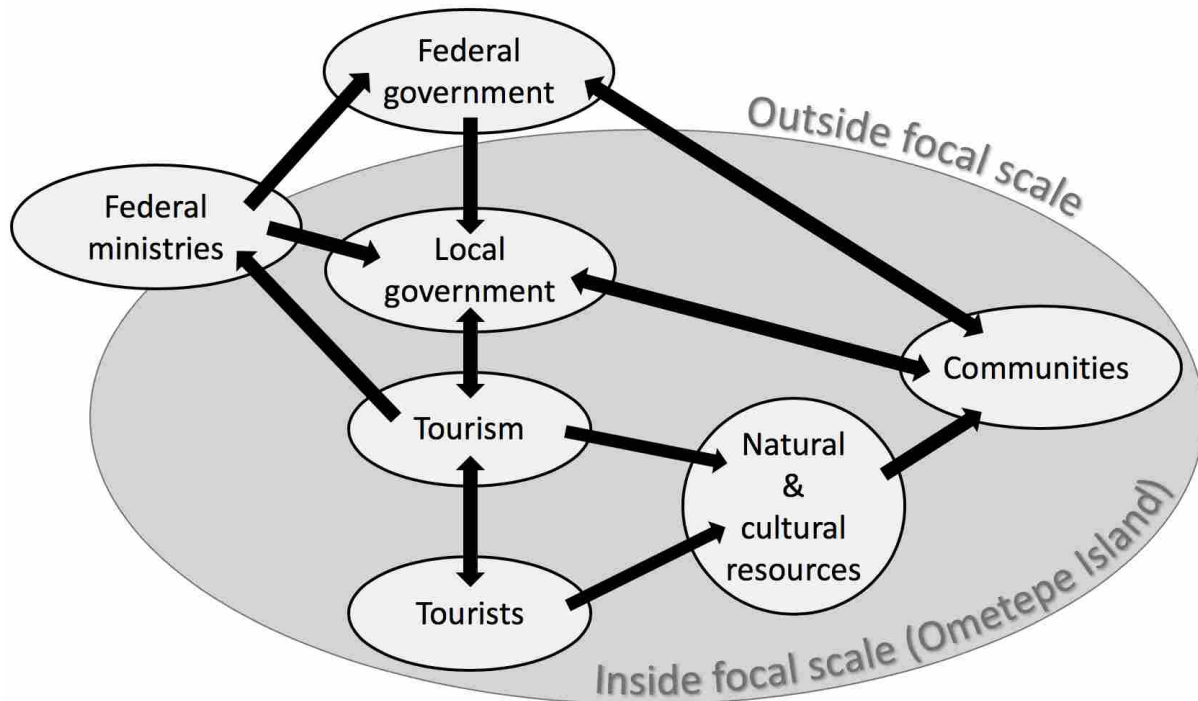


Figure 3.3. Feedbacks. This example is adapted from Map A2, which demonstrated more reciprocal relationships than any other map. Ministries and Resources are categories into which I lumped similar components, in order to focus on relationships. I also added the circle indicating focal scale; federal ministries are on the boundary because they have offices and personnel that operate at the local level. Participants did not label the arrows, increasing the ambiguity in interpreting these relationships. Nonetheless, these arrows likely indicate the fundamental relationships that drive the system. These relationships can offer increased and directed awareness of how effects of tourism development and other disturbances might

Most feedback data on the maps require additional understanding to recognize the feedback loops, which I obtained through supplementary field research methods. Notably, most of the feedbacks extend beyond the boundaries of the focal scale; these cross-scale interactions are explored further at the end of this section.

Combined analysis of the maps indicate that the most significant feedback is the loss of security and trust between citizens and the government, and the related loss of the tourism industry. There is a positive correlation between these components in that they have all

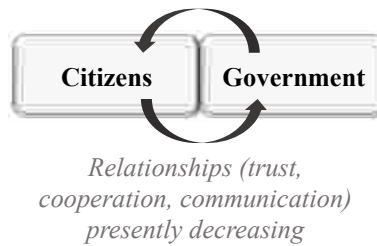
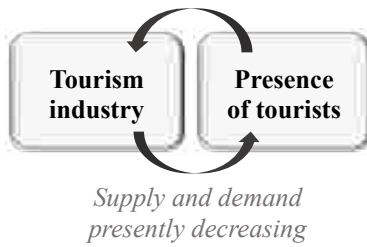
decreased together. On the other hand, it seems possible that a change in direction of these feedbacks, through intentional intervention or otherwise, could result in improving the security situation, building citizen-government trust, and regrowing the tourism industry.

Outside of the sociopolitical crisis, feedback loops associated with landslides highlight the complex, coupled space between Ometepe citizens and their environment. Landslides² are the most common natural hazard to occur on Ometepe. Landslides can directly endanger tourists' physical safety, but the more likely hazard that landslides pose to tourism development is via additional hardships amidst multidimensional forms of poverty on the island. Typical landslide consequences include flooding of a few homes, loss of a parcel of agricultural land, or covering a road. These ongoing events negatively affect development. But, the risk of devastating landslides on Ometepe is significant (they have killed residents and destroyed infrastructure), uncertain (no sufficient hazards map exist, per personal communication with Dr. W. Martinez, INETER director), and affected by human and environmental changes (especially land use and increasing extreme weather events).

In particular, the advance of the agricultural frontier, as noted in Map I2, directly destabilizes high, steep slopes through deforestation and altered land use. Thus, while landslides are a phenomenon outside the temporal focal scale, changing land use and the threat of landslides is ongoing, which affects the focal SES. Complex social-ecological dynamics and governance structures underpin the advancing agricultural frontier. Local Alcaldías are responsible to provide multiple conflicting mandates. The Alcaldías both collect land taxes and control hazard mitigation on the island. The Alcaldías need taxes to function and provide services in a socialist nation, and they also seek to enable local livelihoods. Citizens seek to expand agricultural land to support their livelihoods, with incentives within the focal scale (e.g., subsistence) and from

² I use the term generically to represent lahars, laminar mud flows, and other phenomena denoting loss of slope stability, on par with the multipurpose Spanish term *deslave* used locally.

Positive feedback loops:



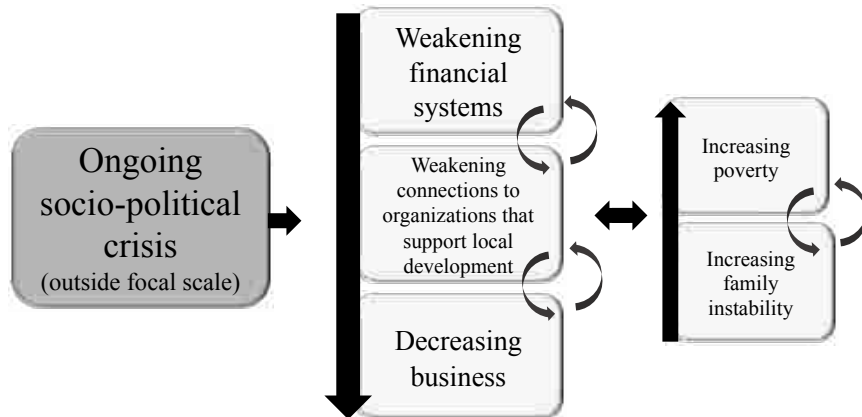
Negative feedback loops:



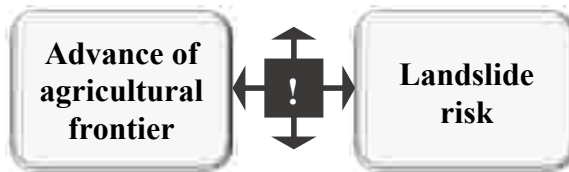
These feedbacks derive from M2, which notes complex dynamics associated with emigration. Though emigration has negative feedbacks, it also demonstrates adaptive capacity to the crisis.

Hierarchal feedback loops:

The disturbance at the national scale has consequences that are cascading through the focal scale SES. However, there is little feedback noted from the focal scale to the national scale. Within the focal scale, feedback dynamics are complex.



Additional feedback loop not related to the crisis:



This complex feedback of the SES involves multiple other factors, such as governance, social and economic vulnerabilities, and international markets.

Figure 3.4. Recognizing feedback effects across scale. All feedbacks that I analyzed in the SES extend beyond the focal scale. All figures have essential dynamics that extend beyond the geographic scale, and the bottommost figure also extends beyond the temporal scale. The upper three feedback loops are directly presented on maps; moving farther down this figure, the feedbacks involve increasingly more interpretation. I recognized these as feedback loops based upon participants' verbal explanations during mapping activities and supplementary research. Italicized text by each image presents my additional interpretation gleaned from supplementary methods.

outside (e.g., whims of the international plantain or beef market, or outside investments affecting real estate prices). To consider tourism development as a tool, this remains an issue that will need explicitly addressed on Ometepe. Diverse livelihood options, available and fertile land for local citizens, and safety for humans and infrastructure is needed for tourism to successfully and sustainably contribute to social and environmental well-being.

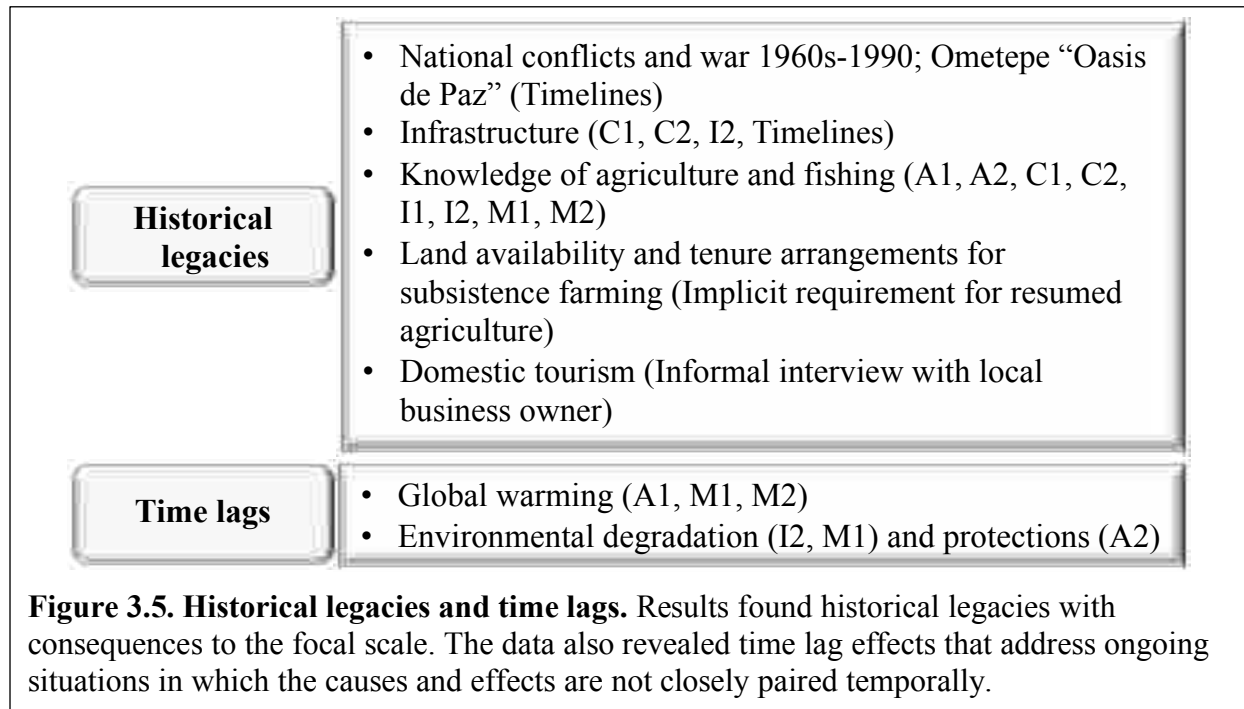
Historical legacies and time lags

With the national eruption of violence and unrest that has extended to Ometepe, Nicaragua's Contra War of the 1980s and its preceding decades of conflict emerged at the forefront of historical legacies (Figure 3.5). Memories of suffering and state-inflicted violence is a historical legacy of war affecting locals' response to the current crisis. Despite widespread discontent, most islanders expressed severe reluctance to politically engage, deeming the risks too great but thereby maintaining the current political system that they believe is harming them. Additionally, locals hold firmly to their island's nickname, the "Oasis of Peace," and indicated a muted sense of disbelief and injustice that the conflict has come to their doorstep. This attitude likely adds to the lack of direct political engagement.

Some participants also suggested in private discussion that the sociopolitical past of Nicaragua directly influences not only islanders' responses to the crisis, but their manner of living in general. Multi-generational conditions of enduring poverty combined with recurrent political upheaval and natural disasters have led to a lack of long-term preparation. Instead, islanders design livelihoods around short-term needs and subsistence. This history has left islanders with little capital or motivation to invest in enterprises with delayed rewards. The legacy creates a notable challenge for future tourism development, and interventions from outside Ometepe will need to maneuver carefully to successfully support local values.

To make up for lost tourism revenue, islanders have largely responded to the crisis through returning to agricultural and fishing livelihoods. Two significant historical legacies are apparent

in this adaptive response. First, the knowledge how to engage in these livelihoods has not yet been lost, despite the prevalence of other livelihoods, particularly tourism, on the island. Secondly, resources, particularly available land and ability to access the land, still exist for people to engage in these livelihoods.



However, agriculture also highlights a time lag in the system. Human land use patterns, such as the conversion of forest to agricultural fields or deforestation to provision cooking wood, can have huge and delayed consequences through destabilization of volcanic slopes. Two villages on Ometepe and multiple private properties have been devastated by landslides. Both officials and local citizens indicated to me that the hazards have been amplified by land use, especially the advance of the agricultural frontier into the steep-sloped, upper zone of the island where agricultural use is supposed to be forbidden.

The town of Los Ramos was dismantled following a 2014 landslide that devastated the community with a child fatality. Ciudadela translates to “fortress,” representing the government-built townsite of connected homes offered to citizens willing to relocate from nearby Los Ramos.

The history of Ciudadela is predicated on surpassing a threshold and reconfiguring the system.

The relocation has been successful because context and citizen values were considered.

In the broader sense, a variety of forms of environmental degradation initiated in the past affect the focal scale. For example, locals informed me that past resource use has resulted in decreased water quality and smaller fish in Lake Colcibolca, and placed biodiversity at risk with lowered populations of species such as the yellow-naped parrot. Only one map specified global warming as a system disturbance, but participants and local professionals said local effects include more extreme and less predictable weather events. A site visit to Ometepe's coast in November 2018 found farm fields flooded by high lake levels, attributed to climate change.

The destination history of Ometepe is wrapped in past system interactions that have occurred in both fast and slow time scales. These legacies affect the current focal scale, and some current conditions will have effects in the future. Sustainable tourism development can benefit from remaining adaptable to system conditions that span temporal scales.

Surprises and uncertainty

Ometepeños unanimously expressed surprise in informal interviews and conversations regarding the onset of the sociopolitical crisis. Looking back, citizen discontent with national governmental policies and practices had been brewing, but islanders had not foreseen the series of events that tipped across a threshold at which large-scale citizen protests began.

This unexpected crisis exposed or exacerbated a number of uncertainties and risks within the SES. These uncertainties and ongoing risks represent the known unknowns in the system, and are shown in Figure 3.6. Despite all groups prominently placing tourism near the center of their concept maps, only two maps directly highlighted uncertainties stemming from tourism. However, most maps marked uncertainty regarding economic and sociopolitical factors, and many of these factors directly linked to tourism. For example, the country's decreased security situation during the crisis (an ongoing uncertainty) directly affected the loss in tourism.

Analyzing surprises and uncertainty provided an indirect manner to better understand citizens' values and cultural norms, particularly when combined with findings regarding SES context, because how participants prioritized uncertainties also reflects where they value stability. Social values include family, access to education, and health. Religious and indigenous identities also receive some attention. Social values coupled with economic and political circumstances reflect the desire for safety and economic opportunity. Environmental values largely reflect how the environment can provision livelihood opportunities and safety.

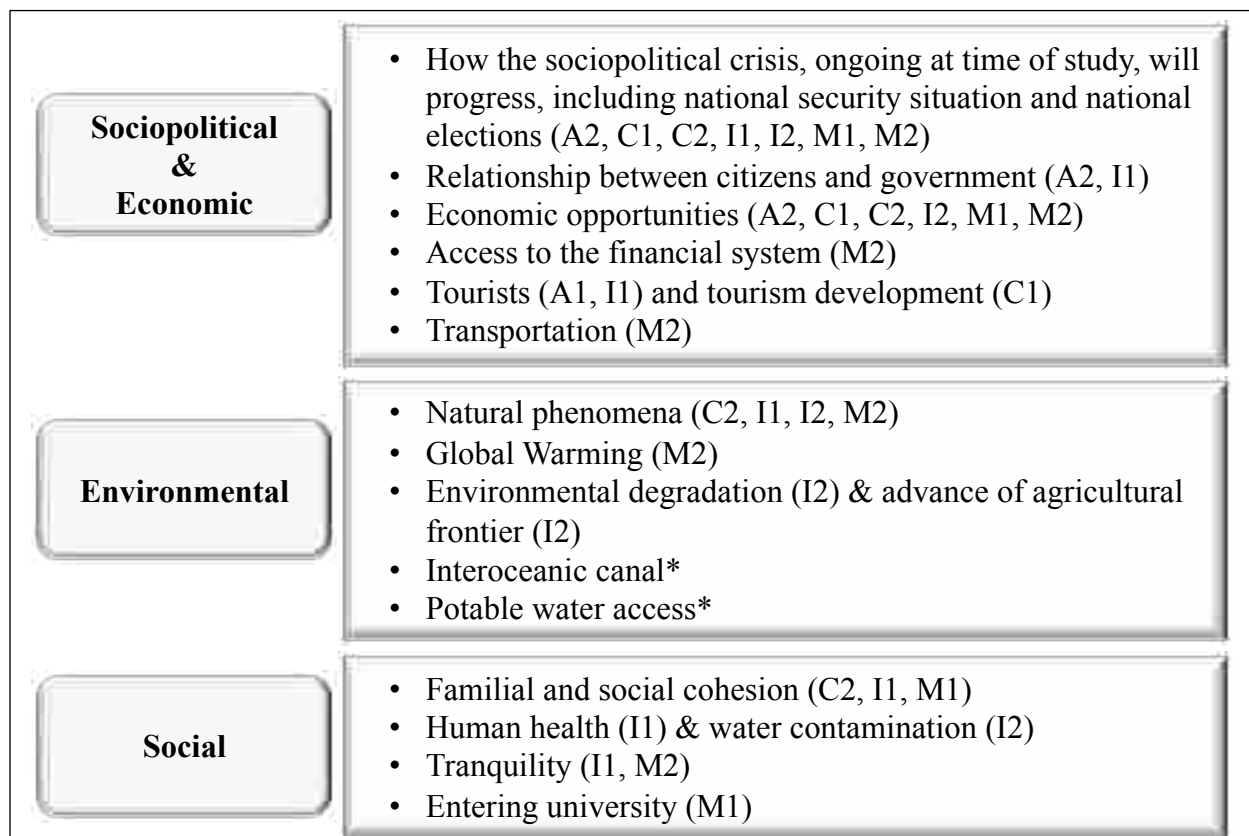


Figure 3.6. Uncertainties and Risks. Participant responses highlighted three main categories of uncertainty. Recognizing the inextricable overlap between these categories is essential to a holistic understanding of the SES. Successful future tourism development would need to allow space to respond to future uncertainties. *These two disturbances were not listed on the maps, but became conspicuous hazards through my supplementary methods.

Cultural norms reflect values and the governance systems which control these values. Within the focal scale, management structures which allow for provisioning of local environmental services is a general expectation. Beyond the focal scale, cultural norms

prominently feature the role of external factors. National government in this socialist nation is directly linked to governance of and response to environmental circumstances, ranging from the local scale phenomena to global climate change. The presence and economic influence of NGOs is also noted, particularly in Ciudadela.

Two significant potential risks did not receive attention on the concept maps: an interoceanic canal that will potentially be built through Lake Nicaragua, and access to potable water. While these risks exist outside the focal scale to the extent that they currently are not affecting the SES, supplementary research indicates that they are legitimate hazards. A canal built through Nicaragua would directly transect Lake Colcibolca, transforming Ometepe (Serra Vázquez 2015; Mejía 2016; McCall and Taylor 2018). Though locals (personal observation 2018) and foreigners are dismissive of the canal's probability of being realized, McCall and Taylor note continuing, on-the-ground progress (2018).

While occasional lapses in water supply are typical on Ometepe, as recently as 2016 there was an extended water crisis that affected water security for a large proportion of islanders³. The inequality associated with the tourism economy in Ometepe would likely exacerbate water security problems. Research in a nearby area of Nicaragua found that “Water is shown to flow towards power,” (LaVanchy 2017, 38). The political, social, and economic capital of tourism developers results in prioritized water access for tourism enterprises, thereby weakening the water security for other segments of the local population (LaVanchy 2017).

Explicitly addressing uncertainty in the system helps to consider future tourism development by (1) decreasing the number of future surprises through recognizing potential future scenarios, and (2) better planning for future surprises through considering ways to support

³ To note just some of the social-ecological couplings evident in this event, potable water is precariously sourced from the Maderas Volcano summit because Lake Colcibolca is increasingly unusable, due to human factors like pollution. The water crisis originated from a landslide that ruptured piping systems. Human land use patterns have directly affected slope stability.

citizen values in the face of uncertainty. For tourism to support sustainable development, it must honor local values and norms and recognize the political structures in place which affect the stability and instability of these values and norms. However, sustainable tourism must also contribute to increasing economic and political opportunities and stability for the most marginalized – a notable challenge amidst the violent nature of Nicaraguan political opposition and repression that has resurfaced on Ometepe during the ongoing crisis.

Resilience

The property of resilience in the Ometepe SES is dominated by the ongoing sociopolitical crisis, which severely disrupts the system. Through soliciting specific information about the crisis, participants revealed a system structured by adaptive capacities, disturbances, and vulnerabilities (Figure 3.7a). Findings highlight diversity and redundancy as conditions that have strengthened resilience of some system attributes amidst the crisis. Livelihood patterns exhibit the best example. Seven of the eight concept maps note that citizens have continued to meet their economic and subsistence needs by engaging in alternative livelihoods. For some islanders this means working in agriculture or fishing instead of tourism. Others have responded to the crisis by working abroad, sending remittances that allow the rest of their family to continue their lifestyles in Ometepe. These findings show that at the household and individual level, tourism-based livelihoods have collapsed, i.e., lost their resilience. However, at the focal scale, attributes including local economy and social cohesion have been weakened but maintained; i.e., adaptive capacities have upheld a level of resilience.

Although Ometepe social systems at the focal scale have maintained the same overall structure, data regarding resilience of social systems are mixed at the household level. Some participants reported that less employment during the crisis presents opportunities for increased family time and the strengthening of social connections. However, another participant responded

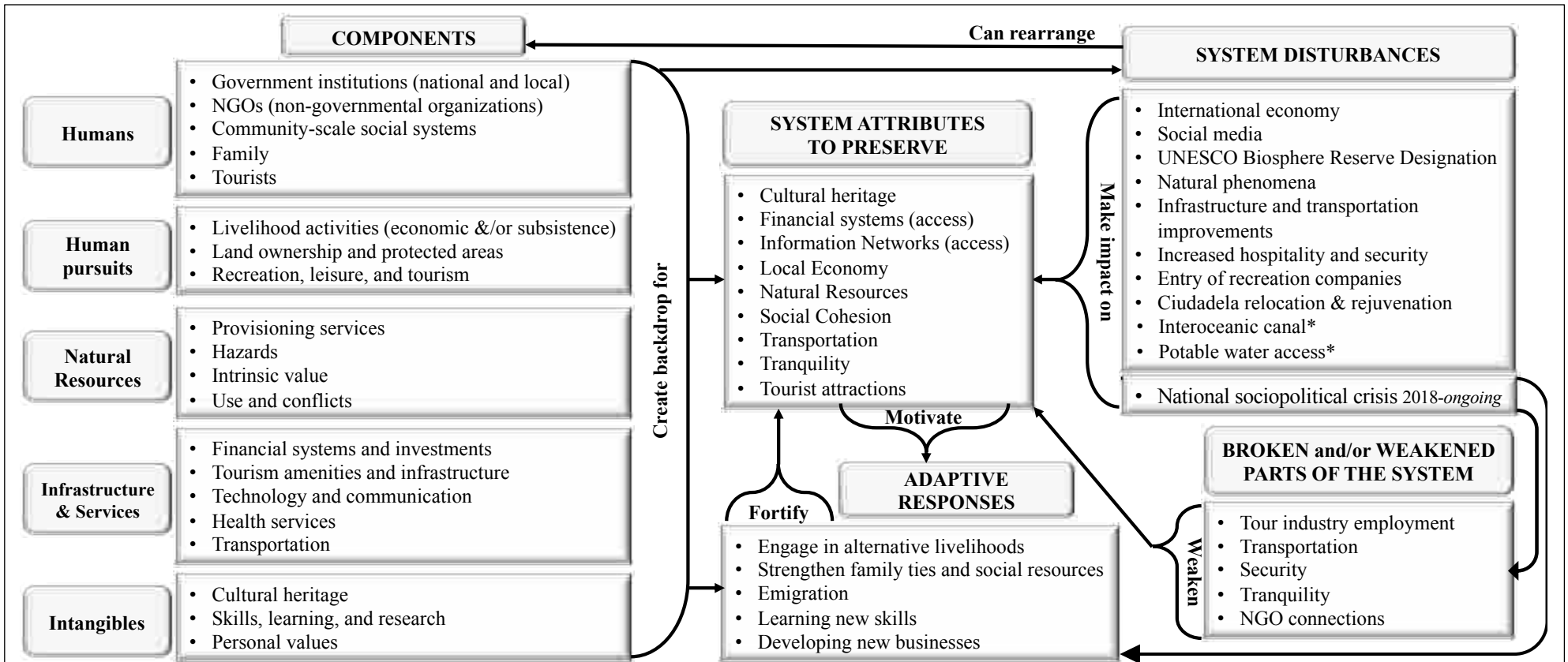


Figure 3.7a. Structural overview of the SES derived from concept mapping activities. Tourism functions within this system, but does not define the system. To consider the application of resilience thinking in this system, resilience *of what* could be answered by “attributes to preserve.” Residents of Ometepe as represented by participants answer resilience *for whom*. Resilience *to what* could be the list of disturbances. Notably, the system disturbances have affected the SES at temporal and spatial scales that extend beyond the focal scale.

“No hay ninguna oportunidad...todos estamos mal” (There is no opportunity...we are all doing badly). My ongoing communications with islanders indicate that emigration continues to increase. Changes at the household level could lead to a threshold, beyond which social systems transform at the island scale.

Findings regarding tourism-specific vulnerabilities highlight lack of relevant knowledge and skills, plus socioeconomic and sociopolitical asymmetries (Figure 3.7b). The role of domestic tourism emerged as a critical factor in resilience of Ometepe’s tourism economy. The seasonality of visitation is asynchronous between peak domestic and foreign tourism, and domestic tourism fluctuates less than foreign tourism over larger time scales (GPCTO, n.d.), reducing vulnerability to seasonality and long-term variability of tourist arrivals.

Tourism-specific sensitivities	Effects
Lack of tourism industry knowledge, skills & capital	Hampers ability to compete and participate in workforce; diminishes potential success of local tourism enterprises
Minimal medical training or emergency protocols with potential for high-consequence accidents	Risk to personal safety of guides and visitors; injuries can disproportionately harm locals for economic inaccessibility of medical care
Seasonality	Irregular earnings throughout year for local workers
Informal tourism economy dominates the sector	Informal industry workers have less power to determine how tourism manifests in their community and lack legitimate personal privileges and rights
Differing demands from domestic vs foreign tourists	Complicates business strategies; difficult or impossible to supply, and therefore earn from, both populations
Declining biodiversity	Wildlife tourism, particularly attracted by the yellow-naped parrot, will decline if species not present
Environmental quality of beaches and water	Water pollution and visible litter negatively affect both domestic and foreign tourism

Figure 3.7b. Vulnerabilities specific to Ometepe tourism. Research methods supplementary to the concept maps largely informed my understanding of these vulnerabilities.

Domestic tourism also demonstrates increased resilience to disturbances versus foreign visitation to Ometepe. Domestic tourism might provide a buffer (i.e., reduce vulnerability) to

social, political, and economic disturbances to Ometepe. Anecdotal evidence indicates that civil and international disturbances affect foreign tourism to Ometepe dramatically. In contrast, domestic tourism is more stable and rebounds faster, as observed from the early era of domestic tourism during the 1980s Contra War and continuing into the present situation (Doña Nora personal communication 2018). Data available from relevant government offices are not sufficient to verify this hypothesis.

Data also indicate that impacts from vulnerabilities and disturbances are unevenly distributed among populations and exacerbated through tourism. One guide's story illustrates asymmetrical effects of tourism sensitivities in Ometepe. The guide lost his front teeth years ago in an accident while rescuing an irresponsible client. The informal nature of local tourism meant there was no official way for him to receive monetary reparations from the client or an insurance plan. The client offered no support; thus, this guide has never received dental treatment because it is cost-prohibitive.

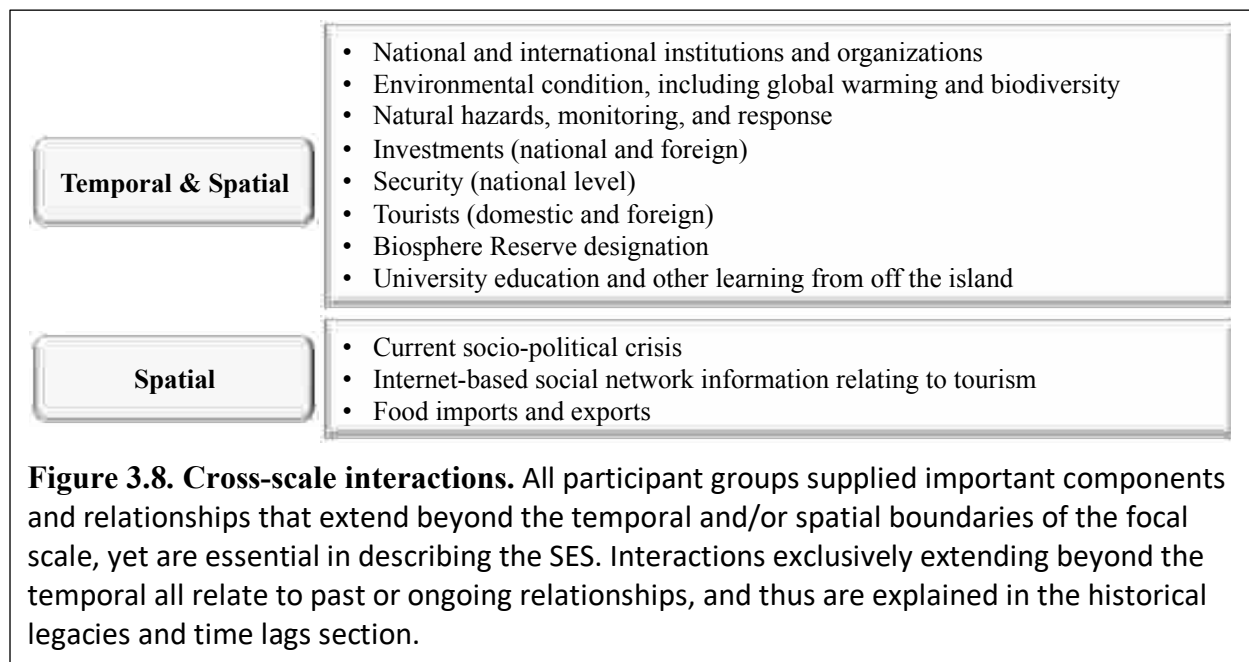
Outlining aspects of resilience draws attention to potential leverage points in the system. For example, lack of knowledge also implies that there are opportunities for learning that might decrease specific vulnerabilities. I asked participants to mark 2-6 attributes of the system that they thought most important to preserve. Their responses elucidate societal values and provide information that would be useful if resilience thinking contributes to future action.

Cross-scale interactions

As participants noted, the tourism sector is based upon cross-scale interactions, as tourists come from outside the focal scale. Overall, tourism comprises a dynamic role, as it both affects and is affected by cross-scale interactions that span time and space. Much of the investment capital as well as knowledge resources for developing tourism come from outside Ometepe, and reflects a way in which tourism is a system disturbance to Ometepe. At the same time, Ometepe

tourism experiences disturbances from inside and outside the focal scale, including local environmental circumstances, national level security, and global information networks.

Local understanding provides valuable insight of cross-scale interactions to consider if tourism is to be used as a tool on Ometepe (Figure 3.8). For example, outside investments receive mixed opinions by locals; informal interviews indicated that locals generally do not invest in new tourism ventures, and that employees often prefer to work for foreign owners because they believe they are treated better. Islanders reported that this latter point has been highlighted by the crisis because Nicaraguan owners have been much quicker to close their businesses and lay off employees than foreign owners of tourism businesses.



The sociopolitical crisis that erupted at the national level and is at the forefront of understanding the Ometepe SES and its loss in tourism. Participants explained that despite security concerns at the national level, Ometepe has been quite safe and functional for tourists. However, media has depicted a different scene for Nicaragua that falsely envelopes portions of the country with grossly exaggerated danger levels, including Ometepe. Participants chalk the decline in tourism first to the crisis, but secondly to internet media, which has been advancing a

positive feedback cycle between bad publicity, fewer tourist arrivals, and fewer tourist offerings.

At the same time, participants suggest internet networks as an opportunity for disseminating good publicity and accurate information regarding tourism. Some participants find this empowering at the individual level because they can use the internet even with low resources. However, my personal observation is that the ability to do this effectively is held by foreigners or a small minority of local citizens who have received significant education from outside Ometepe. For the tourism sector to effectively support local citizens of Ometepe, local citizens will need to have a knowledge of tourism development that allows them full participation alongside or instead of national and foreign actors.

Discussion: Considerations for tourism

The purpose of my study was to analyze how the tourism sector functions within the SES of Ometepe Island, Nicaragua. By engaging local participants in a holistic and novel use of concept mapping and asking them questions about effects of the sociopolitical crisis, the role of tourism was described in a complex and holistic manner by those who live inside the SES. While recognizing that properties of SESs do not have clear boundaries, analysis of the SES based upon understanding of these fundamental properties revealed complex insight into the system. With the tourism sector's size, ongoing growth, and declared importance for the Sustainable Development Goals (UNWTO and UNDP 2017), this timely and relevant study continues to advance the analysis of tourism beyond traditional linear approaches. At the local scale, my study offers concrete findings for individuals and organizations of Ometepe.

The findings could also construe the requisite first step of an ongoing and iterative process of evaluating tourism as a tool of sustainable development through a resilience thinking framework. My field work indicated that tourism development offers potential on Ometepe. Further tourism development presents a system intervention that could add income and economic

diversity to Ometepe. Local attitudes towards tourism are largely optimistic and supportive. Ometepeños positively referenced the economic input, cultural exchanges, and opportunities to explore their own local heritage. However, for long term success in sustaining social-ecological values, tourism must develop through adapting to the specific and dynamic context of Ometepe's SES.

Nicaragua demonstrates the “symptoms of a failed state” with “no going back,” and that “the country is showing signs of democratic renewal” (Rogers 2018, 1–2). The dynamics of Nicaragua's ongoing situation matches SES understanding of systems' cyclical behavior. Phases of growth and accumulation eventually lead to collapse of the system; then, a period of reorganization follows (Gunderson and Holling 2002). The crisis in Nicaragua characterizes system collapse, and there is conjecture as to how the country will reorganize in the next phase. The nature of the crisis and political opposition parallels aspects of past collapsed regimes in Nicaragua and throughout Latin America, leading to comparisons of how nations have reorganized following collapse in the past (Anderson 2018). Though the crisis initiated outside of the Ometepe focal scale, the linked Ometepe SES cycle and also demonstrates collapse.

My research indicates that the ongoing crisis state of the Ometepe SES is untenable, including dire economic options and continued emigration abroad. Understanding of SES cycles foretells that Ometepe will reorganize into a more stable state. Tourism could be used as one tool, i.e., an intervention, to intentionally reorganize the Ometepe SES. An appropriate strategy of intervention must respond to the present dynamics of the SES, i.e., collapse and reorganization, and recognize that this presents a potent situation for creative experimentation and restructuring (B. Walker and Salt 2012).

Future tourism development on Ometepe can benefit from SES understanding and global tourism initiatives. Progress in understanding systems has been motivated by desires to

implement human interventions to achieve normative goals for complex real-world issues (Levin 1998; Meadows 2008; B. Walker and Salt 2012). Intentional planning for interventions should be adaptable and responsive to local values and a variety of future scenarios (W. E. Walker, Haasnoot, and Kwakkel 2013). Planned interventions have demonstrated encouraging results in fields including resource management (Mitchell et al. 2014; Dunlop et al. 2016; Plummer et al. 2017) and volcanic disaster mitigation (Bowman and Henquinet 2015; Pierson, Wood, and Driedger 2014). Specific successes within tourism can provide guidance. Community-led “Blue Tourism” in Japan has utilized place-based skills and knowledge to support local culture, economics, and environment in the wake of the 2011 earthquake and tsunami (Lin, Kelemen, and Tresidder 2018). However, this example must be considered within the historical legacy of Ometepe that distinguishes it from Japan. While the Japanese example arises within a highly developed context as a response to a singular disaster, on Ometepe the majority of islanders have been entrenched in intergenerational cycles of poverty, political instability, and natural disasters. Comparable historical legacies characterize many low-GDP destinations, defined by uncertainty and instability. The legacy creates a substantial impediment for locally-driven tourism initiatives to have long-term vision. Neighboring Costa Rica has tripled its per capita GDP since 1960 and is considered an upper-middle income country (World Bank 2019a), but its economic growth, substantial tourism industry, and proximity and environmental similarities to Nicaragua make it useful to consider Costa Rica’s results with tourism. Ecotourism in Costa Rica has contributed to pro-environmental conservation perspectives and practices (Stem et al. 2003), and on the Osa Peninsula, interviewed locals have considered ecotourism as promoting conservation and as offering the best livelihood option (Hunt et al. 2015). Local tourism success stories from Ometepe also might offer a glimpse of the way forward. One mapping activity included an unexpected interlude in which an early tourism entrepreneur on Ometepe not only shared her

story with young professionals and students, but also offered deep wisdom and encouragement to them.

Successful management of development initiatives have derived from intentional and responsive planning that adopt adaptive management and governance techniques, empowerment of locals, regard for local values, and promotion of continual learning (Lin, Kelemen, and Tresidder 2018). Successful pathways to adapt or transform an SES require structural alteration of the SES in ways that directly reflect local values and goals and builds space for ongoing adaptation, versus short-sighted fixes with no underlying structural change to the SES (Folke et al. 2002; Meadows 2008; Abel et al. 2016).

For tourism development to function successfully on Ometepe, it must support the attributes of the Ometepe SES that locals want to preserve, while also supporting sustainable tourism goals at a global level. To this end, findings from this study have led me to conclude upon six main areas of consideration for future tourism development on Ometepe: the role of local government, opportunities for learning, the significance of domestic tourism, the sizeable informal tourism sector, the importance of retaining livelihood diversity, and potential disturbances that could transform Ometepe (Figure 3.9).

The two Alcaldías of Ometepe that comprise local government are the most important formal actors in governance of all island matters, including tourism. Increased learning opportunities for islanders might disperse governance of the tourism sector, thereby reducing pressure on the Alcaldías and opening space for innovative way to accomplish other imperatives. For example, I learned from meetings with the Alcaldía of Altagracia that risk mitigation is a high but under-resourced priority. Planning, education, and connecting the tourism sector with broader disaster response networks might achieve multiple goals on Ometepe. The devolution of risk mitigation from top-down to locally-based preparation, monitoring, and response resources

has demonstrated promising results with volcanos (Bowman and Henquinet 2015), floods and atmospheric phenomena (Acosta-Coll 2013), and landslides (Karnawati et al. 2011). Tourism infrastructure and networks of Ometepe present valuable, unrealized resources for devolving hazard response. In a disaster, tour operators frequently realize crucial roles of disseminating information, while hotels and other infrastructure can become essential providers of physical and

<p>Local government (Alcaldía)</p>	<ul style="list-style-type: none"> • Key actor in volcanic risk mitigation and land use & development planning • Potential to support local tourism enterprises through networking and capacity-building
<p>Learning opportunities</p>	<ul style="list-style-type: none"> • Local interpretation skills involving cultural and natural heritage <ul style="list-style-type: none"> ◦ Enhance visitor experience, particularly international, by matching expectations and offerings ◦ Promote retention of traditional, cultural, and environmental forms of knowledge ◦ Reduce risk through improving understanding of natural hazards • Hospitality and tourism <ul style="list-style-type: none"> ◦ Enhance visitor experience, particularly international, by matching expectations and offerings • Business and marketing, including Internet use <ul style="list-style-type: none"> ◦ Foster local enterprise amidst foreign investors and businesspeople ◦ Connect locals with external sources of capital • Safety and emergency response protocols for tourism personnel and visitors • Further research regarding agricultural practices, climate change predictions specific to Ometepe, ecosystem conditions such as biodiversity, hazard mapping, etc.
<p>Domestic tourism</p>	<ul style="list-style-type: none"> • Highly valued by Nicaraguans and islanders • Tourist experience differs from foreign tourists • Buffers fluctuations, including seasonality, in international tourism
<p>Livelihood diversity</p>	<ul style="list-style-type: none"> • Mitigates vulnerabilities related to subsistence and socioeconomic needs of islanders • Buffers sociopolitical and socioeconomic instability • Buffers environmental risks • Reduces dependency on external economies
<p>Informal tourism sector</p>	<ul style="list-style-type: none"> • Comprises majority of tourism employment • Reflects power structures and socioeconomic conditions
<p>Potential SES transformation</p>	<ul style="list-style-type: none"> • Interoceanic canal • Potable water access • Climate change • Unknowns

Figure 3.9. Considerations for tourism on Ometepe Island.

informational resources, but the tourism sector has rarely prepared for these functions (Ritchie 2008). Conversely, disasters imperil the tourism industry and compromise sustainable development efforts (Ritchie 2008), thus tourism personnel of Ometepe have a vested interest in participating in risk mitigation.

In addition to risk mitigation, learning opportunities may benefit local employment and international visitor experiences. Learning opportunities ought to be recognized as multi-directional exchanges of knowledge, especially in the realm of tourism. For example, while locals may improve their economic earning potential from learning hospitality skills that meet international expectations, locals can also craft international expectations to be more appropriate for the destination. Likewise, language barriers could be reduced if locals learn foreign languages, but also by offering high quality Spanish language instruction on the island (of which there is little, despite the potential with the clear accent of Nicaraguan Spanish).

External actors interested in Ometepe tourism generally have focused on international tourism (personal observation). A desire for international visitation seems to drive ideas of increasingly formalizing certain aspects of tourism, such as pursuing international protected area status or federal tourism promotion initiatives. Such formalization might encourage more international visitation. However, domestic tourism is an important consideration in the support of citizen values. Domestic tourism is a pillar of resilience on Ometepe that supports local economies and social values.

Arrival of enough international visitors could decrease domestic visitation. This would shift the cultural dynamics of island tourism, but also have other effects. For example, a large Nicaraguan family will often share a single hotel room, thereby spending less per person on lodging than one or two foreigners who might fill the same hotel room. However, the large

family is also likely to purchase more meals and distribute their expenditures further in the community than the foreign visitor. If hotel rooms are filled less densely, the effects may cascade to transportation services which are sensitive to the number of passengers. New economies could spring up that alter the tourism landscape, such as the recent global rise of alternative lodging options. While these examples are conjecture, SES understanding tells us that flipping the balance between domestic and foreign visitation would have surprise and unintended consequences.

Another pillar of resilience for Ometepe is livelihood diversity, supported by continued land tenure and access to resources. Diversity fortifies resilience (Folke et al. 2002; Holling 2001) and reduces economic vulnerability in an SES with tourism (Ritchie 2008), as islanders confirmed through engagement in agriculture and fishing upon the collapse of the tourism economy. Maintaining a diverse portfolio of livelihoods on Ometepe, which can include tourism, could buffer future disturbances that threaten SES attributes that islanders want to preserve. Nepal (2002) suggests that connecting tourism into more circular local and regional economies can bolster local socioeconomic benefits and reduce dependency on global economies. With Ometepe's diversity of livelihoods and natural resources, tourism could provide a catalyst for increasing the self-sufficiency of regional economies.

The significant size of the informal tourism sector is a critical consideration for any disturbances to Ometepe tourism. As the majority of current tourism workers unofficially earn money from the tourism economy, increasing formalization of tourism endeavors might exacerbate inequalities and marginalization. On the flipside, formalization might make it easier to integrate the tourism sector into risk mitigation planning. Interference with tourism by any external actors will hopefully look for ways to engage informal businesses and employees without compromising their political and economic security.

Finally, risks which pose the greatest threats to the SES and functioning of tourism warrant particular attention. If tourism is used as a tool of sustainable development on Ometepe, disturbances that could transform the SES along with the other five areas of consideration might offer a basis for intentional, holistic planning. Through preparing for uncertainty and a variety of future scenarios, tourism has the potential to support local and global values on Ometepe in a way that supports ecological sustainability, social justice, and poverty alleviation.

Conclusion:

In considering tourism as a tool for sustainable development, researchers and practitioners must first analyze tourism holistically. This case study of Ometepe, Nicaragua confirms that an SES perspective is valuable for improving understanding of how tourism functions. My study privileged local knowledge in analyzing the system, which also recognizes that local understanding and values must be prioritized for successful development. By studying a SES amidst crisis, the research highlighted strengths, weaknesses, and dynamic responses to a system disturbance that devastated the tourism industry.

While the concept of resilience has gained significant traction in tourism research, its successful application is dependent upon understanding how tourism functions in the system. Furthermore, many studies proceed unquestioningly with the assumption that tourism itself ought to be resilient. In contrast, tourism development ought to be considered as one specific process to deliver dynamic social-ecological goals. My research draws systems insight from resilience thinking, but uses that insight to better understand how the tourism sector functions rather than assessing the resilience of the tourism industry.

Moving forward, understanding gleaned from this case study can be applied to sustainable tourism development, with consideration of environment and societal values; or even provide the base for assessing resilience. While findings from my study are specific to Ometepe,

the value and methods of a holistic, human-centered approach to understanding the SES can directly be applied to other destinations. And, select results could offer insight to other tourism contexts. For example, tourism practitioners and developers might consider enhancing interconnectedness and diversity of local economics, focusing upon how development is likely to affect marginalized populations, or what types of learning opportunities might support achievement or maintenance of societal values.

On Ometepe, opportunity exists to reconfigure as the island emerges from the crisis. However, “opportunity” is often rhetoric that gets paired with crises. A side effect of my research was the convening of unlikely groups of local islanders to discuss tourism. Through creating a shared understanding of tourism and representing it through concept mapping, likelihood of collective action might increase. This might be one step in moving “opportunity” from rhetoric towards action. To move beyond rhetoric, Ometepe tourism development must proceed with intentional planning that combines adaptive strategies of management and governance with real consideration of context. Then, tourism might effectively be used as a tool for sustainable development.

CHAPTER 4. CONCLUSION: APPLYING A HOLISTIC SYSTEMS LENS TO TOURISM

My case study in Ometepe, Nicaragua comprised two main branches. First, my study evaluated a novel use of concept mapping as a method designed to be participatory as well as effective and efficient within typical field restraints. The second branch of my study grew from using concept mapping to privilege local knowledge and recognize the ongoing crisis in order to better understand the function of the tourism sector within a system.

For the first branch of the study, I found this novel use of concept mapping to be an accessible, adaptable, and achievable method to analyze the function of the tourism sector within the greater SES. As a rapid assessment tool, concept mapping highlighted key interactions in the system. As a fairly simple tool, it demonstrated that even rudimentary methods can provide a rich understanding of key drivers and values within a system. By successfully producing complex SES insights, concept mapping also reinforced the value of participatory, transdisciplinary tourism research. Considering the growth of the global tourism sector and the susceptibility of tourism destinations to hazards, increased and formalized use of concept mapping offers a valuable method of rapid and holistic analysis.

Secondly, through concept mapping and supplementary methods, I was able to analyze the role of tourism on Ometepe and what the national social-political crisis of 2018 highlighted about the function of the tourism sector. I categorized findings according to fundamental SES properties described by leading systems thinkers. While SES properties overlap, as do SESs themselves across space and time, these categories provided a useful structure for analysis and presentation of results. My findings also led to conclusions regarding key considerations for tourism development on Ometepe.

A SES perspective offers a more holistic lens to view tourism than more traditional conceptualizations used within tourism research. In particular, the practical nature and links to sustainability offered through the resilience paradigm offer great promise for tourism research and development. While recent tourism scholarship is frequently concerned with maintaining or increasing the resilience of the tourism industry, such concerns overlook that we must first understand tourism from a systems perspective and then question resilience *to what? of what? and for whom?* before directly applying resilience thinking to the tourism industry. My study analyzed the complexity of tourism and questioned some fundamental assumptions, including the question “is tourism development an appropriate intervention in this context?”

SES approaches, particularly through resilience thinking, can ultimately lead to intervening in a system to accomplish normative goals. Successful intervention strategies will build from complex systems understanding that considers fundamental SES properties and cycles. These strategies will include space for adaptive responses to expected and unexpected system dynamics.

Insights from SES thinking intuitively apply to understanding how the tourism sector functions within a system. The coupling of social and ecological dynamics is not only a conspicuous characteristic of the tourism sector, but also a holistic way of thinking that characterizes humans’ oldest ways of knowing. SES thinking helps us understand tourism development and sustainability goals amidst wicked problems. As Donella Meadows (2008, 6–7) emphasizes,

At a time when the world is more messy, more crowded, more interconnected, more interdependent, and more rapidly changing than ever before, the more ways of seeing, the better. The systems-thinking lens allows us to reclaim our intuition about whole systems and

- hone our abilities to understand parts
- see interconnections,
- ask “what-if” questions about possible future behaviors, and
- be creative and courageous about system redesign.

Then we can use our insights to make a difference in ourselves and our world.

Using systems-thinking that includes local perspectives can help us understand not only how tourism functions in a system, but also how we might better use tourism as a tool of sustainable development.

REFERENCES

- Abel, Nick, Russell M. Wise, Matthew J. Colloff, Brian H. Walker, James R.A. Butler, Paul Ryan, Chris Norman, et al. 2016. "Building Resilient Pathways to Transformation When 'No One Is in Charge': Insights from Australia's Murray-Darling Basin." *Ecology and Society* 21 (2): 10. <https://doi.org/10.5751/ES-08422-210223>.
- Acosta-Coll, Melisa. 2013. "Sistemas de Alerta Temprana (S.A.T) Para La Reducción Del Riesgo de Inundaciones Súbitas y Fenómenos Atmosféricos En El Área Metropolitana de Barranquilla." *Scientia et Technica* 18 (2): 303–8. <https://doi.org/10.22517/23447214.8661>.
- Aligica, Paul Dragos. 2006. "Institutional and Stakeholder Mapping: Frameworks for Policy Analysis and Institutional Change." *Public Organization Review* 6 (1): 79–90. <https://doi.org/10.1007/s11115-006-6833-0>.
- Alonso Lugo, Luis. 2018. "OAS Human Rights Body Counts 317 Dead in Nicaragua Unrest." *AP NEWS*, 2018.
- Anderson, Jon Lee. 2018. "Nicaragua on the Brink, Once Again." *The New Yorker*, 2018.
- Babbie, Earl. 2008. *The Basics of Social Research, Fourth Edition*. Belmont, CA: Wadsworth/Thomson Learning.
- Belsky, Jill. 1999. "Misrepresenting Communities: The Politics of Community-Based Rural Ecotourism in Gales Point Manatee, Belize." *Rural Sociology* 64 (4): 641–66.
- Berkes, Fikret. 2007. "Community-Based Conservation in a Globalized World." *Proceedings of the National Academy of Sciences* 104 (39): 15188–93. <https://doi.org/10.1073/pnas.0702098104>.
- Berkes, Fikret, and Carl Folke. 1998. "Linking Social and Ecological Systems for Resilience and Sustainability." In *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*, edited by Fikret Berkes and Carl Folke, 1–26. New York: Cambridge University Press.
- Binder, Claudia R, Jochen Hinkel, Pieter W. G. Bots, and Claudia Pahl-wostl. 2015. "Comparison of Frameworks for Analyzing Social-Ecological Systems." *Ecology and Society* 18 (4): 26.
- Bosak, Keith. 2016. "Tourism Development, and Sustainability." In *Reframing Sustainable Tourism*, edited by Stephen F. McCool and Keith Bosak, 33–44.
- Bossel, Hartmut. 2001. "Assessing Viability and Sustainability: A Systems-Based Approach for Deriving." *Ecology and Society* 5 (2): 1–13. <https://doi.org/10.1109/ICEBE.2010.11>.
- Bousquet, F, M Anderies, M Antona, T Bassett, T Benjaminsen, O Bonato, M Castro, et al. 2015. "Socio-Ecological Theories and Empirical Research. Comparing Social-Ecological Schools of Thoughts in Action." *Research Report*. CIRAD-GREEN. <https://doi.org/hal-01130178>.
- Bowman, Luke J, and Kari B Henquinet. 2015. "Disaster Risk Reduction and Resettlement Efforts at San Vicente (Chichontepec) Volcano, El Salvador: Toward Understanding Social and Geophysical Vulnerability." *Journal of Applied Volcanology* 4 (14): 18. <https://doi.org/10.1186/s13617-015-0031-0>.
- Brian, Bourke. 2014. "Positionality: Reflecting on the Research Process." *The Qualitative Report*

19 (33): 1–9.

- Bridges, Todd S., Daniel Kovacs, Matthew D. Wood, Kelsie Baker, Gordon Butte, Sarah Thorne, and Igor Linkov. 2013. "Climate Change Risk Management: A Mental Modeling Application." *Environment Systems and Decisions* 33 (3): 376–90. <https://doi.org/10.1007/s10669-013-9461-6>.
- Butler, Richard W., ed. 2017. *Tourism and Resilience*. Wallingford, Oxfordshire, UK; Boston, MA: CAB International.
- Calgaro, Emma, Dale Dominey-Howes, and Kate Lloyd. 2014. "Application of the Destination Sustainability Framework to Explore the Drivers of Vulnerability and Resilience in Thailand Following the 2004 Indian Ocean Tsunami." *Journal of Sustainable Tourism* 22 (3): 361–83. <https://doi.org/10.1080/09669582.2013.826231>.
- Calgaro, Emma, Kate Lloyd, and Dale Dominey-Howes. 2014. "From Vulnerability to Transformation: A Framework for Assessing the Vulnerability and Resilience of Tourism Destinations." *Journal of Sustainable Tourism* 22 (3): 341–60. <https://doi.org/10.1080/09669582.2013.826229>.
- Central Intelligence Agency (CIA). 2019. "Central America:: Nicaragua." The World Factbook 2019. Washington, D.C. 2019. <https://www.cia.gov/library/publications/the-world-factbook/geos/nu.html>.
- Chaffin, Brian, and Murray Scown. 2018. "Social-Ecological Resilience and Geomorphic Systems." *Geomorphology* 305: 221–30. <https://doi.org/10.1016/j.geomorph.2017.09.038>.
- Cheer, Joseph M, and Alan A Lew. 2017. "Sustainable Tourism Development: Towards Resilience in Tourism." *Interaction* 45 (1): 10–15.
- Chung, Min Gon, Tao Pan, Xintong Zou, and Jianguo Liu. 2018. "Complex Interrelationships between Ecosystem Services Supply and Tourism Demand: General Framework and Evidence from the Origin of Three Asian Rivers." *Sustainability (Switzerland)* 10 (4576): 21. <https://doi.org/10.3390/su10124576>.
- Cochrane, Janet. 2010. "The Sphere of Tourism Resilience." *Tourism Recreation Research* 35 (2): 173–85. <https://doi.org/10.1080/02508281.2010.11081632>.
- Das, Madhumita, and Bani Chatterjee. 2015. "Ecotourism: A Panacea or a Predicament?" *Tourism Management Perspectives* 14: 3–16. <https://doi.org/10.1016/j.tmp.2015.01.002>.
- Doña Nora. 2018. "Personal Communication, October 24, 2018."
- Duit, Andreas, Victor Galaz, Katarina Eckerberg, and Jonas Ebbesson. 2010. "Governance, Complexity, and Resilience." *Global Environmental Change* 20 (3): 363–68. <https://doi.org/10.1016/j.gloenvcha.2010.04.006>.
- Dunlop, Michael, Russell Gorddard, Paul Ryan, Jason Mackenzie, Helen Waudby, Alison Skinner, and Tim Bond. 2016. *Exploring Adaptation Pathways in the Murray Basin*. CSIRO, Australia.
- Duryea, Suzanne, and Marcos Robles. 2016. "Social Pulse in Latin America and the Caribbean 2016: Realities & Perspectives," 176. <https://doi.org/10.18235/0000384>.
- Espinero, Stephen, Caroline Orchiston, and James Higham. 2017. "Resilience and Sustainability: A Complementary Relationship? Towards a Practical Conceptual Model for the Sustainability–Resilience Nexus in Tourism." *Journal of Sustainable Tourism* 25 (10):

- 1385–1400. <https://doi.org/10.1080/09669582.2017.1281929>.
- Fabinyi, Michael, Louisa Evans, and Simon J. Foale. 2014. “Social-Ecological Systems, Social Diversity, and Power: Insights from Anthropology and Political Ecology.” *Ecology and Society* 19 (4): 28. <https://doi.org/http://dx.doi.org/10.5751/ES-07029-190428>.
- Farrell, Bryan H., and Louise Twining-Ward. 2004. “Reconceptualizing Tourism.” *Annals of Tourism Research* 31 (2): 274–95. <https://doi.org/10.1016/j.annals.2003.12.002>.
- Fletcher, Robert. 2009. “Ecotourism Discourse: Challenging the Stakeholders Theory.” *Journal of Ecotourism* 8 (3): 269–85. <https://doi.org/10.1080/14724040902767245>.
- Folke, Carl. 2006. “Resilience: The Emergence of a Perspective for Social–Ecological Systems Analyses.” *Global Environmental Change* 16 (3): 253–67. <https://doi.org/10.1016/j.gloenvcha.2006.04.002>.
- . 2016. “Resilience (Republished).” *Ecology and Society* 21 (4). <https://doi.org/10.5751/ES-09088-210444>.
- Folke, Carl, Steve Carpenter, Thomas Elmqvist, Lance Gunderson, C.S. Holling, and Brian Walker. 2002. “Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations.” *AMBIO* 31 (5): 437–40. <https://doi.org/10.1579/0044-7447-31.5.437>.
- Gabinete del Poder Ciudadano de Turismo de Ometepe (GPCTO). n.d. “Resumen Estadístico: Ingresos de Visitantes Extranjeros y Nacionales a Isla de Ometepe Del 2006 Al 2011.”
- Gleeson, Bridget, and Alex Egerton. 2016. *Lonely Planet: Nicaragua*. 4th ed. Lonely Planet Global Ltd.
- Gray, Steven, Michael Paolisso, Rebecca Jordan, and Stefan Gray, eds. 2017. *Environmental Modeling with Stakeholders: Theory, Methods, and Applications*.
- Gunderson, Lance H., and C. S. Holling, eds. 2002. *Panarchy: Understanding Transformations in Human and Natural Systems*. Washington, D.C.: Island Press.
- Hall, C. Michael. 2019. “Constructing Sustainable Tourism Development : The 2030 Agenda and the Managerial Ecology of Sustainable Tourism.” *Journal of Sustainable Tourism*, 1–17. <https://doi.org/10.1080/09669582.2018.1560456>.
- Hall, C. Michael, Girish Prayag, and Alberto Amore. 2018. *Tourism and Resilience: Individual, Organisational and Destination Perspectives*. Blue Ridge Summit, PA, USA: Channel View Publications.
- Hewitt, Kenneth. 1992. “Mountain Hazards.” *GeoJournal* 27 (1): 47–60. <https://doi.org/10.1017/CBO9780511807527.004>.
- . 2017. “Disaster Risk Reduction in the Era of ‘Homeland Security’: The Struggle for Precautionary, Preventive, and Non-Violent Approaches.” In *Identifying Emerging Issues in Disaster Risk Reduction, Migration, Climate Change, and Sustainable Development: Shaping Debates and Policies*, edited by Karen Sudmeier-Rieux, Manuela Fernández, Ivanna M. Penna, Michel Jaboyedoff, and J. C. Gaillard. Cham, Switzerland: Springer.
- Holling, C.S. 1973. “Resilience and Stability of Ecological Systems.” *Annual Review of Ecology and Systematics* 4 (1): 1–23. <https://doi.org/10.1146/annurev.es.04.110173.000245>.
- . 1986. “The Resilience of Terrestrial Ecosystems: Local Surprise and Global Change.” In *Sustainable Development of the Biosphere*, edited by W.C. Clark and R.E. Munn, 292–

317. Cambridge, U.K.: Cambridge University Press.
- . 2001. “Understanding the Complexity of Economic, Ecological, and Social Systems.” *Ecosystems* 4 (August): 390–405. <https://doi.org/10.1007/s10021-001-0101-5>.
- Holman, John. 2018. “Nicaragua: Tourism Industry Crumbles after Months of Protests.” Al Jazeera English.
- Honey, Martha S. 1999. “Treading Lightly? Ecotourism’s Impact on the Environment.” *Environment: Science and Policy for Sustainable Development* 41 (5): 4–9. <https://doi.org/10.1080/00139159909604631>.
- . 2008. *Ecotourism and Sustainable Development: Who Owns Paradise?* 2nd ed. Washington, D.C.: Island Press.
- Hummel, John, and Rene van der Duim. 2012. “Tourism and Development at Work: 15 Years of Tourism and Poverty Reduction within the SNV Netherlands Development Organisation.” *Journal of Sustainable Tourism* 20 (3): 319–38. <https://doi.org/10.1080/09669582.2012.663381>.
- Hunt, Carter A. 2010. “‘We Are Even Poorer, but There Is More Work’ an Ethnographic Analysis of Ecotourism in Nicaragua.” *Dissertation Abstracts International Section A: Humanities and Social Sciences* 70 (11-A): 4340.
- Hunt, Carter A., William H. Durham, Laura Driscoll, and Martha Honey. 2015. “Can Ecotourism Deliver Real Economic, Social, and Environmental Benefits? A Study of the Osa Peninsula, Costa Rica.” *Journal of Sustainable Tourism* 23 (3): 339–57. <https://doi.org/10.1080/09669582.2014.965176>.
- Hunt, Carter A., and Amanda L. Stronza. 2011. “Missing the Forest for the Trees?: Incongruous Local Perspectives on Ecotourism in Nicaragua Converge on Ethical Issues.” *Human Organization* 70 (4): 376–86.
- Joaquín Chamorro, Pedro. 2017. “¿Por Qué Ometepe Es El Oasis de Paz?” *La Prensa*, July 19, 2017.
- Karnawati, Dwikorita, Teuku F. Fathani, Sudarno Ignatius, Budi Andayani, Djoko Legono, and Paul W. Burton. 2011. “Landslide Hazard and Community-Based Risk Reduction Effort in Karanganyar and the Surrounding Area, Central Java, Indonesia.” *Journal of Mountain Science* 8 (2): 149–53. <https://doi.org/10.1007/s11629-011-2107-6>.
- Kayat, Kalsom. 2002. “Exploring Factors Influencing Individual Participation in Community-based Tourism: The Case of Kampung Relau Homestay Program, Malaysia.” *Asia Pacific Journal of Tourism Research* 7 (2): 19–27. <https://doi.org/10.1080/10941660208722116>.
- Kolkman, M. J., M. Kok, and A. van der Veen. 2005. “Mental Model Mapping as a New Tool to Analyse the Use of Information in Decision-Making in Integrated Water Management.” *Physics and Chemistry of the Earth* 30 (4-5 SPEC. ISS.): 317–32. <https://doi.org/10.1016/j.pce.2005.01.002>.
- Koutra, Christina. 2010. “Rapid Situation Analysis: A Hybrid, Multi-Methods, Qualitative, Participatory Approach to Researching Tourism Development Phenomena.” *Journal of Sustainable Tourism* 18 (8): 1015–33. <https://doi.org/10.1080/09669582.2010.497221>.
- Kristjánsdóttir, Kristín Rut, Rannveig Ólafsdóttir, and Kristín Vala Ragnarsdóttir. 2018. “Reviewing Integrated Sustainability Indicators for Tourism.” *Journal of Sustainable Tourism* 26 (4): 583–99. <https://doi.org/10.1080/09669582.2017.1364741>.

- Lacitignola, D., I. Petrosillo, M. Cataldi, and G. Zurlini. 2007. "Modelling Socio-Ecological Tourism-Based Systems for Sustainability." *Ecological Modelling* 206 (1–2): 191–204. <https://doi.org/10.1016/j.ecolmodel.2007.03.034>.
- LaVanchy, G. Thomas. 2017. "When Wells Run Dry: Water and Tourism in Nicaragua." *Annals of Tourism Research* 64 (May): 37–50. <https://doi.org/10.1016/J.ANNALS.2017.02.006>.
- Levin, Simon A. 1998. "Ecosystems and the Biosphere as Complex Adaptive Systems." *Ecosystems* 1: 431–36.
- Lew, Alan A. 2014. "Scale, Change and Resilience in Community Tourism Planning." *Tourism Geographies* 16 (1): 14–22. <https://doi.org/10.1080/14616688.2013.864325>.
- Lew, Alan A., and Joseph M Cheer, eds. 2018. *Tourism Resilience and Adaptation to Environmental Change: Definitions and Frameworks*. London; New York, NY: Routledge.
- Lin, Yiwen, Mihaela Kelemen, and Richard Tresidder. 2018. "Post-Disaster Tourism: Building Resilience through Community-Led Approaches in the Aftermath of the 2011 Disasters in Japan." *Journal of Sustainable Tourism* 26 (10): 1766–83.
- Liu, Jianguo, Thomas Dietz, Stephen R Carpenter, Marina Alberti, Carl Folke, Emilio Moran, Alice N Pell, et al. 2007. "Review: Complexity of Coupled Human and Natural Systems." *Science* 317 (5844): 1513–16. <https://doi.org/10.1126/science.1144004>.
- Liu, Zhenhua. 2003. "Sustainable Tourism Development : A Critique." *Journal of Sustainable Tourism* 11 (6): 459–75. <https://doi.org/10.1080/09669580308667216>.
- Ludwig, Donald. 2001. "The Era of Management Is Over." *Ecosystems* 4 (8): 758–64. <https://doi.org/10.1007/s10021-001-0044-x>.
- Lupoli, Christopher A., Wayde C. Morse, Conner Bailey, and John Schelhas. 2015. "Indicator Development Methodology for Volunteer Tourism in Host Communities: Creating a Low-Cost, Locally Applicable, Rapid Assessment Tool." *Journal of Sustainable Tourism* 23 (5): 726–47. <https://doi.org/10.1080/09669582.2015.1008498>.
- Malterud, Kristi. 2001. "Qualitative Research: Standards, Challenges, and Guidelines." *Qualitative Research Series* 358: 483–88.
- Maru, Yiheyis Taddele, Mark Stafford Smith, Ashley Sparrow, Patricia F. Pinho, and Opha Pauline Dube. 2014. "A Linked Vulnerability and Resilience Framework for Adaptation Pathways in Remote Disadvantaged Communities." *Global Environmental Change* 28: 337–50. <https://doi.org/10.1016/j.gloenvcha.2013.12.007>.
- Maslow, A.H. 1943. "A Theory of Human Motivation." *Psychological Review* 50 (4): 370–96. <https://doi.org/DOI:10.1037/h0054346>.
- Matos Castaño, Julieta, Frederick van Amstel, Timo Hartmann, and Geert Dewulf. 2017. "Making Dilemmas Explicit through the Use of a Cognitive Mapping Collaboration Tool." *Futures* 87: 37–49. <https://doi.org/10.1016/j.futures.2017.01.006>.
- McCall, Sarah, and Matthew J. Taylor. 2018. "Nicaragua's 'Grand' Canal : Cuento Chino ? Rhetoric and Field-Based Evidence on the Chinese Presence in Nicaragua." *Journal of Latin American Geography*, 17 (2): 191–208.
- McCool, Stephen F. 2019. "Information Needs for Building a Foundation for Enhancing Sustainable Tourism as a Development Goal: An Introduction." In *A Research Agenda for Sustainable Tourism*, edited by Stephen F. McCool and Keith Bosak, 255. Cheltenham, UK;

- Northampton, MA: Edward Elgar Publishing Limited.
- McCool, Stephen F., and Keith Bosak, eds. 2016. *Reframing Sustainable Tourism*. New York: Springer.
- McDonald, Janine Robyn. 2009. "Complexity Science: An Alternative World View for Understanding Sustainable Tourism Development." *Journal of Sustainable Tourism* 17 (4): 455–71. <https://doi.org/10.1080/09669580802495709>.
- McGehee, Nancy Gard, B. Bynum Boley, Jeffrey C. Hallo, John A. McGee, William Norman, Chi Ok Oh, and Cari Goetcheus. 2013. "Doing Sustainability: An Application of an Inter-Disciplinary and Mixed-Method Approach to a Regional Sustainable Tourism Project." *Journal of Sustainable Tourism* 21 (3): 355–75. <https://doi.org/10.1080/09669582.2012.709862>.
- Meadows, Donella H. 2008. *Thinking in Systems: A Primer*. Edited by Diana Wright. White River Junction, Vermont: Chelsea Green Publishing.
- Mejía, Tania. 2016. "Segmentación Por Beneficios Buscados de Los Turistas Que Visitan La Isla de Ometepe, Nicaragua." *Tesis Para Optar Al Grado de Magíster En Marketing*. Universidad de Chile.
- Meletis, Zoë Angela. 2007. "Wasted Visits? Ecotourism in Theory vs. Practice, at Torguero, Costa Rica." Duke University.
- Mitchell, Michael, Greg Walkerden, Brian Walker, and Valerie A Brown. 2014. "Applying Resilience Thinking to Natural Resource Management through a "Planning-By-Doing" Framework," no. February 2013: 299–314. <https://doi.org/10.1080/08941920.2013.861556>.
- Moscardo, Gianna. 2008. "Sustainable Tourism Innovation: Challenging Basic Assumptions." *Tourism and Hospitality Research* 8 (1): 4–13. <https://doi.org/10.1057/thr.2008.7>.
- Nault, Sebastien, and Paul Stapleton. 2011. "The Community Participation Process in Ecotourism Development: A Case Study of the Community of Sogoog, Bayan-Ulgii, Mongolia." *Journal of Sustainable Tourism* 19 (6): 695–712. <https://doi.org/10.1080/09669582.2010.536240>.
- Nepal, Sanjay K. 2002. "Mountain Ecotourism and Sustainable Development" 22 (2): 104–9.
- Nepal, Sanjay K, Stephanie Verkoeyen, and Tom Karrow. 2015. "The End of Sustainable Tourism? Re-Orienting the Debate." In *The Practice of Sustainable Tourism: Resolving the Paradox*, edited by Michael Hughes, David B Weaver, and Christof Pforr, 303. London; New York, NY: Routledge.
- Novak, Joseph D., and Alberto J. Cañas. 2006. "The Origins of the Concept Mapping Tool and the Continuing Evolution of the Tool." *Information Visualization* 5 (3): 175–84. <https://doi.org/10.1057/palgrave.ivs.9500126>.
- Organización Mundial del Turismo (OMT) y La Organización de los Estados Americanos (OEA). 2018. *El Turismo y Los Objetivos de Desarrollo Sostenible – Buenas Prácticas En Las Américas*. Madrid, Spain: OMT. <https://doi.org/10.18111/9789284419937>.
- Ostrom, Elinor. 2007. "A Diagnostic Approach for Going beyond Panaceas." *Proceedings of the National Academy of Sciences* 104 (39): 15181–87. <https://doi.org/10.1073/pnas.0702288104>.
- . 2009. "A General Framework for Analyzing Sustainability of Social-Ecological

- Systems.” *Science* 325 (5939): 419–22. <https://doi.org/10.1126/science.1172133>.
- Otis, John. 2018. “‘Pack Up and Get Out’: Nicaraguan Unrest Shakes U.S. Expat Community.” *The Wall Street Journal*, 2018.
- Perkins, Elizabeth. 2015. *Moon Nicaragua*. 6th ed. Chicago: Avalon Travel Publishing.
- Pierson, Thomas C, Nathan J Wood, and Carolyn L Driedger. 2014. “Reducing Risk from Lahar Hazards: Concepts, Case Studies, and Roles for Scientists.” *Journal of Applied Volcanology* 3 (16): 25. <https://doi.org/10.1186/s13617-014-0016-4>.
- Pizzitutti, Francesco, Stephen J. Walsh, Ronald R. Rindfuss, Reck Gunter, Diego Quiroga, Rebecca Tippet, and Carlos F. Mena. 2017. “Scenario Planning for Tourism Management: A Participatory and System Dynamics Model Applied to the Galapagos Islands of Ecuador.” *Journal of Sustainable Tourism* 25 (8): 1117–37. <https://doi.org/10.1080/09669582.2016.1257011>.
- Plummer, Ryan, Julia Baird, Angela Dzyundzyak, Derek Armitage, Örjan Bodin, and Lisen Schultz. 2017. “Is Adaptive Co-Management Delivering? Examining Relationships Between Collaboration, Learning and Outcomes in UNESCO Biosphere Reserves.” *Ecological Economics* 140: 79–88. <https://doi.org/10.1016/j.ecolecon.2017.04.028>.
- Preiser, Rika, Reinette Biggs, Alta De Vos, and Carl Folke. 2018. “Social-Ecological Systems as Complex Adaptive Systems: Organizing Principles for Advancing Research Methods and Approaches.” *Ecology and Society* 23 (4). <https://doi.org/10.5751/ES-10558-230446>.
- Quinlan, Allyson E, Marta Berbes-Blazquez, L Jamila Haider, and Garry D Peterson. 2015. “Measuring and Assessing Resilience : Broadening Understanding through Multiple Disciplinary Perspectives.” *Journal of Applied Ecology*. <https://doi.org/10.1111/1365-2664.12550>.
- Redman, Charles L. 2014. “Should Sustainability and Resilience Be Combined or Remain Distinct Pursuits?” *Ecology and Society* 19 (2): art37. <https://doi.org/10.5751/ES-06390-190237>.
- Rico, G.L. 1983. *Writing the Natural Way: Using Right-Brain Techniques to Release Your Expressive Power*. Los Angeles, CA: J.P.Tarcher.
- Ripley, Charles G. 2018. “Three Months of Violent Conflict in Nicaragua with No End in Sight: An On-The-Ground Report.” *A Report of Council of Hemispheric Affairs*, July 30, 2018.
- Rissman, Adena R., and Sean Gillon. 2017. “Where Are Ecology and Biodiversity in Social–Ecological Systems Research? A Review of Research Methods and Applied Recommendations.” *Conservation Letters* 10 (1): 86–93. <https://doi.org/10.1111/conl.12250>.
- Ritchie, Brent. 2008. “Tourism Disaster Planning and Management : From Response and Recovery to Reduction and Readiness.” *Current Issues in Tourism* 11 (4): 315–48. <https://doi.org/10.2167/cit-0389.0>.
- Robinson, John, and James Tansey. 2006. “Co-Production, Emergent Properties and Strong Interactive Social Research: The Georgia Basin Futures Project.” *Science and Public Policy* 33 (2): 151–60.
- Rogers, Tim. 2018. “The Unraveling of Nicaragua.” *The Atlantic*, June 6, 2018.
- Ryan, Paul. 2018. “Resilience in Practice.” In *Resilience Workshop, University of Idaho*,

Moscow, ID. March 22-24, 2018.

- Schianetz, Karin, and Lydia Kavanagh. 2008. "Sustainability Indicators for Tourism Destinations : A Complex Adaptive Systems Approach Using Systemic Indicator Systems Sustainability Indicators for Tourism Destinations : A Complex Adaptive Systems Approach Using Systemic" 9582. <https://doi.org/10.2167/jost766.0>.
- Serra Vázquez, Luis H. 2015. *El Desarrollo Histórico de La Isla de Ometepe*. 1a ed. Managua: UCA Pulicaciones.
- Sharifi, Ayyoob. 2016. "A Critical Review of Selected Tools for Assessing Community Resilience." *Ecological Indicators* 69 (October): 629–47. <https://doi.org/10.1016/J.ECOLIND.2016.05.023>.
- Sharpley, Richard. 2000. "Tourism and Sustainable Development : Exploring the Theoretical Divide." *Journal of Sustainable Tourism* 8 (1): 1–19. <https://doi.org/10.1080/09669580008667346>.
- Silva Monge, M. Hamilton. 1995. *Ometepe: Su Historia, Mitos y Leyendas*. Altagracia: Autor.
- Smith, Courtland L. 2002. "Institutional Mapping of Oregon Coastal Watershed Management Options." *Ocean and Coastal Management* 45: 357–75. [https://doi.org/10.1016/S0964-5691\(02\)00075-3](https://doi.org/10.1016/S0964-5691(02)00075-3).
- Stem, Caroline J., James P. Lassoie, David R. Lee, and David J. Deshler. 2003. "How 'Eco' Is Ecotourism? A Comparative Case Study of Ecotourism in Costa Rica." *Journal of Sustainable Tourism* 11 (4): 322–47. <https://doi.org/10.1080/09669580308667210>.
- Steven A. Gray, Stefan Gray, Jean Luc De Kok, Ariella E. R. Helfgott, Barry O'Dwyer, Rebecca Jordan, and Angela Nyaki. 2015. "Using Fuzzy Cognitive Mapping as a Participatory Approach to Analyze Change, Preferred States, and Perceived Resilience of Social-Ecological Systems." *Ecology and Society* 20 (2). <https://doi.org/10.5751/ES-07396-200211>.
- Stockholm Resilience Center. 2015. "What Is Resilience? An Introduction to a Popular yet Often Misunderstood Concept." 2015. <http://www.stockholmresilience.org/research/research-news/2015-02-19-what-is-resilience.html>.
- Stonich, Susan C. 1998. "Political Ecology of Tourism." *Annals of Tourism Research* 25 (1): 25–54.
- Strickland-Munro, Jennifer K. 2017. "Resilience and Protected Area Tourism in Purnululu National Park." In *Tourism and Resilience*, edited by Richard Butler, 137–49. Wallingford, Oxfordshire, UK; Boston, MA: CAB International.
- Strickland-Munro, Jennifer K, Helen E Allison, and Susan A Moore. 2010. "Using Resilience Concepts to Investigate the Impacts of Protected Area Tourism on Communities." *Annals of Tourism Research* 37 (2): 499–519. <https://doi.org/10.1016/j.annals.2009.11.001>.
- Teijlingen, Edwin R. van, and Vanora Hundley. 2001. "The Importance of Pilot Studies." *Social Research UPDATE* Winter (35).
- The Resilience Alliance. 2010. "Assessing Resilience in Social-Ecological Systems: Workbook for Practitioners." *Resilience Alliance*, 54. <https://doi.org/10.1007/s11284-006-0074-0>.
- Trochim, William M.K. 1989. "An Introduction to Concept Mapping for Planning and Evaluation." *Evaluation and Program Planning* 12: 1–16. [94](https://doi.org/10.1016/0149-</p></div><div data-bbox=)

7189(89)90016-5.

- UN World Tourism Organization (UNWTO). 2019. “World Tourist Barometer: January 2019 (Excerpt).” Vol. 17.
- UN World Tourism Organization (UNWTO), and United Nations Development Programme (UNDP). 2017. “Tourism and the Sustainable Development Goals – Journey to 2030.” <https://doi.org/10.18111/9789284419401>.
- United Nations. 2019. “The Sustainable Development Goals Report 2019.” New York.
- United Nations Development Programme. 2018. “Human Development Indices and Indicators 2018 Statistical Update.” New York, NY. <https://doi.org/10.18356/656a3808-en>.
- United States Forest Service International Programs and University of Montana. 2018. “‘Manejo de Cuencas Hidrográficas y Cambio Climático.’ Workshop.” San Salvador, El Salvador. May 7-11, 2018.
- Walker, Brian, C.S. Holling, Stephen R. Carpenter, and Ann Kinzig. 2004. “Resilience, Adaptability and Transformability in Social – Ecological Systems.” *Ecology and Society* 9 (2): 5. <https://doi.org/10.1103/PhysRevLett.95.258101>.
- Walker, Brian, and David Salt. 2012. “Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function.” *Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function*. <https://doi.org/10.5822/978-1-61091-231-0>.
- Walker, Warren E., Marjolijn Haasnoot, and Jan H. Kwakkel. 2013. “Adapt or Perish: A Review of Planning Approaches for Adaptation under Deep Uncertainty.” *Sustainability (Switzerland)* 5 (3): 955–79. <https://doi.org/10.3390/su5030955>.
- White, Gilbert. 1945. “Human Adjustment to Floods: A Geographical Approach to the Flood Problem in the United States.” University of Chicago.
- White, Gilbert, Robert W Kates, and Ian Burton. 2001. “Knowing Better and Losing Even More: The Use of Knowledge in Hazards Management.” *Environmental Hazards* 3: 81–92.
- World Bank. 2017. “Nicaragua: Paving the Way to Faster Growth and Inclusion. Systematic Country Diagnostic.” Washington, D.C.: The World Bank Group.
- . 2019a. “Costa Rica Overview.” The World Bank Group. 2019. <https://www.worldbank.org/en/country/costarica/overview>.
- . 2019b. “Personal Remittances, Received (% of GDP) - Nicaragua.” The World Bank Group. 2019. <https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS?locations=NI>.
- World Commission on Environment and Development (WCED). 1987. “Our Common Future.” Oxford.
- World Travel & Tourism Council. 2017. “Tourism Economic Impact 2017: World.” London.
- Wujec, Tom. 2013. “Draw Toast - A Primer in Systems Thinking.” [http://www.drawtoast.com/downloads/DrawToast Systems Thinking Guide.pdf](http://www.drawtoast.com/downloads/DrawToast%20Systems%20Thinking%20Guide.pdf).

APPENDIX A. REPORT: KEY FINDINGS FOR OMETEPE (ENGLISH)

RESEARCH OVERVIEW

Tourism on the island of Ometepe may offer a livelihood option that helps to support human well-being and environmental conservation. Development must progress with intention and adapt to changes and uncertainty in order to achieve desired outcomes such as improved socioeconomics, resilient livelihood options, and environmental conservation. Intentional and adaptable development must build from an understanding of the complex interconnections and interdependencies that characterize life on Ometepe. The capacities, pressures, and complex dynamics of Ometepe and its people extend beyond its geographic boundaries, as well as into the past and future. Through local participatory methods, this study examined social and environmental dynamics on Ometepe.

Potential benefits of tourism:

- Sustaining local values
- Enhancing conservation
- Improving local socioeconomics
- Lessening vulnerabilities to environmental and economic risks

Concerns on Ometepe:

- Poverty and lack of employment opportunities
- Health and lack of healthcare access
- Natural hazards accompany natural splendor
- Ongoing sociopolitical crisis has eroded trust, services, and economy (including tourism)
- Local-scale environmental degradation arises from complex dynamics across a global scale

This study was conducted from 2017-2019, incorporating the national sociopolitical crisis that began in April of 2018. Research during the crisis offered an opportunity for Ometepeños to focus upon strengths, weaknesses, and the most significant drivers of change on the island. Nationally, the crisis destabilized the relationship between citizens and the government. More saliently for many island residents, the crisis worsened an

ongoing lack of opportunities to earn sufficient income. Post-crisis, agriculture and fishing generate most income and subsistence. However, resource availability is tenuous. Climate change is increasing hazardous weather events, land use patterns exacerbate soil instability, and fishing pressure and water quality have reduced the fishery. Volcanic hazards are omnipresent. Complex pressures stemming from global socioeconomics compel locals to engage in environmentally damaging, short-term solutions to survival, such as collecting yellow-naped parrot eggs or wanton deforestation.

Findings from this study reflect both significant concerns on the island, as well as potential benefits of tourism and other forms of development. Importantly, some findings will be implicitly obvious for Ometepeños. However, such observations require explicit attention by those considering tourism and other development. This research returned four key findings regarding social and environmental dynamics to consider moving forward:

KEY FINDING #1: Tourism development should consider domestic visitation.

Ometepe Island captures a special place in Nicaraguan national identity. Domestic visitation to the island initiated long before international tourism, and seems to remain of greater magnitude and more stable amidst crises than international visitation. While higher-end resorts, international designations such as from UNESCO, and single-day adventure tourism cater to foreign visitors, **domestic visitors support broader social and economic benefits to Ometepeños**, ranging from family visits to economic spending habits that support a diversity of recipients.

KEY FINDING #2: Diversity and redundancies among livelihoods cultivate sustainable social and environmental outcomes.

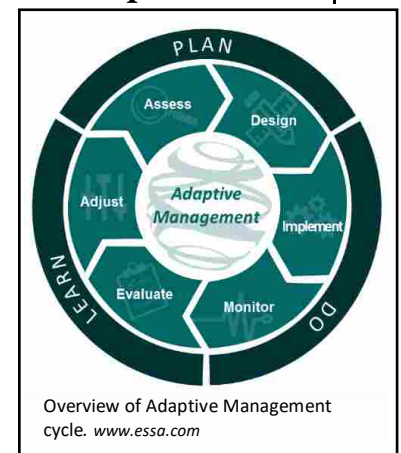
The ability to engage in alternative livelihoods reflects valuable knowledge, memory, and land availability that still exist on Ometepe. Many families have continually participated in a suite of livelihoods, such as mixed tourism, agriculture, and small business, despite tourism growth over the past decades. When the sociopolitical crisis in 2018 devastated the tourism industry, many Ometepeños immediately responded by planting food crops and fishing, for subsistence and income. **By engaging in varied livelihoods, island residents demonstrate how they can buffer socioeconomic and environmental shocks.** Over-reliance upon specific livelihoods, such as tourism or plantain monocropping, increases vulnerabilities to social and environmental hazards, thus alternative sources of income and subsistence should persist.

KEY FINDING #3: Seek common values between local value systems, national risk-reduction, and international conservation through creating forums to communicate and act. Align development initiatives accordingly.

Ometepe is iconic for its beauty and tranquility. Local values stem from these properties, natural resource use and personal connections fostered within the landscape. Regional and global values relate to these same properties. Tourism development, or any interference to the current structure and function of the island, should first identify where values align among local Ometepe residents and larger scale interests, recognizing that local support is essential for initiatives to succeed. **Deliberately creating forums to increase communication among actors and sharing of different types of knowledge might hasten the recognition of shared values.** Suggested island issues that seem ripe for collaborative forums include: clean water (for human use and wildlife); healthy ecosystems (including humans and endangered and sensitive species), and volcanic features (as hazards and benefits).

KEY FINDING #4: Development is a cyclical process, not an end goal, and should allow for ongoing learning, experimentation, and adaptation.

Continual consideration of Ometepeños’ personal values and island dynamics is necessary for development to intentionally progress towards specific goals. The concept mapping research method used for this study effectively assessed diverse perspectives, is highly accessible, and a number of locals are familiar with it. **Concept mapping could inform development initiatives through situation assessment, and could also potentially be used for monitoring and/or evaluation.** Concept mapping could form a foundation for systematic adaptive management and governance strategies.



In conclusion, tourism and other types of development alter life on Ometepe. If development proceeds haphazardly, it is more likely that negative outcomes will be increased, including vulnerabilities, marginalization and inequity, weakening of sociocultural networks, and environmental degradation. However, with thoughtful intent, tourism might offer a tool that helps to achieve desired outcomes. Ensuring that a diverse and representative segment of the population have a say in determining what outcomes are desirable will require effort. Furthermore, it must be recognized that there will be unexpected dynamics and consequences. Nonetheless, tourism development is well underway on Ometepe and will undoubtedly rebound as sociopolitical stability increases. The present time offers an opportunity to reflect upon tourism development that has happened thus far and to move forward with intention.

APPENDIX B. PARTICIPANT INVITATION LETTER (SPANISH)



Invitación a actividad de investigación universitaria:

Sr (a) _____

Mapeo de conceptos de turismo basado en volcanes y el sistema social-ecológica de Ometepe

Me llamo Chelsea Leven y soy una estudiante universitaria de un programa de conservación y desarrollo internacional y resolución de conflictos de recursos naturales. Estoy haciendo un estudio sobre turismo basado en los volcanes de Ometepe en alianza con _____ de Fauna & Flora Internacional. Me gustaría invitarle a participar en una actividad de grupos pequeños con otros pobladores de Ometepe. **A través de esta actividad espero aprender cómo los residentes de Ometepe conceptualizan el turismo en sus vidas, y si eso ha cambiado con la reciente pérdida en el turismo.**

La actividad de grupo puede ser completamente diferente a cualquier tipo de taller, clase o conversación comunitaria que haya tenido. No actuaré como un "maestro" o "líder", sino que facilitaré algunas actividades que podrían ayudarme a comprender mejor cómo el turismo influye en sus vidas.

Su participación es totalmente voluntaria. Además, permanecerá completamente anónimo en mi salida de datos y resultados (i.e., su información personal como su nombre será confidencial). El propósito de esta actividad es la investigación universitaria, y no juzgaré la opinión de nadie como "correcta" o "incorrecta". No trabajo directamente para ninguna de las organizaciones con las que me he afiliado. Sin embargo, a estas organizaciones, y otras, se les ofrecerán los resultados de este estudio.

Esta actividad está programada para que ocurra el de noviembre en _____. La actividad tendrá una duración aproximada de **8:00am – 2:30pm**. Se proporcionará café y pan en la mañana, y terminamos después un almuerzo y postre rico. Además, podría hacer un seguimiento con usted individualmente si tengo preguntas sobre un tema específico. Estaremos disponible para responder cualquier pregunta que tenga sobre el proyecto y sus resultados, incluso por teléfono o correo electrónico después de mi partida de Nicaragua. No hay compensación por la participación, sin embargo, le reembolsaré cualquier gasto requerido, como pasaje de su autobús. No tiene obligación de participar y es libre de interrumpir su participación en cualquier momento que lo desee.

Aquí hay algunas preguntas a considerar (no es necesario que registre ninguna respuesta) antes de llegar a la actividad:

- ¿Qué rol tiene el turismo basado en los volcanes en su vida?
- ¿Quién está involucrado con el turismo basado en los volcanes?
- ¿Qué valora del turismo basado en los volcanes?
- ¿Cómo están respondiendo los isleños a la actual desaceleración del turismo como resultado de la situación política?
- Aparte de la situación política actual, ¿qué otros problemas han surgido en la historia del turismo en Ometepe?

Requisitos: Por favor, lleve a las 8:00 en _____

Por favor no traiga niños ni a nadie más con usted.

Todos los demás materiales serán proporcionados en el taller. Esperamos verlos allí!

Con cualquier pregunta o problema, contácteme: **Chelsi** - 5830 4302 (Claro)
- +1 440 xxxxxxxx (WhatsApp)

APPENDIX C. OUTLINE FOR CONCEPT MAPPING ACTIVITY (MIXED ENGLISH AND SPANISH)

Esquema de la actividad de mapeo de conceptos del grupo objetivo

- Covered location with restroom, lunch and refreshments capacity, tables and chairs
- Printed activity outline for facilitator(s)
- Sign-in sheet with full name, town of birth, current hometown, phone number
- Blank nametags
- Printed worksheets for small team activities/sending home w/ folks
- Example concept maps (computer or printed examples)
- Post-it notes of different colors
- Markers and/or crayons, at least 3 apiece of 5 colors
- pens/pencils (on tables)
- white paper for “how to make gallo pinto”
- large white sheets of paper for maps, reglas basicas, y timeline
- Masking tape
- My personal business cards/contact info
- Camera to take pictures of maps
- Whiteboard + markers if available
- Participant certificates

8:00-9:00	Café y bocaditos listos Hoja de registro "Como hacer gallo pinto" como participantes entrar
9:00 - 9:30	Nuestras introducciones – <i>gracias</i> por asistir Por que? turismo – internacional/intercambio importance of people both within and outside of tourism distribute nametags; [smallgroup introduction activity Reglas basicas Present outline (schedule) for today's activity Q: “Cual es una oportunidad que estas aprovechando actualmente como resultado de la situación?”
9:30-9:40	Reflect on gallo pinto drawings
9:40-9:55	thinking in systems; "area de estudio"
9:55-10:10	Timeline
10:10-10:30	<i>Descanso (10 min)</i>
10:30-10:45	Intro "turismo basado en los volcanes" Las ofertas, las demandas, y los conexiones - circle/explain <i>components and connections</i>
10:45-11:45	Actividad de mapeo en equipos pequeños
11:45-12:20	Añadir la situacion actual
12:20-12:30	Look at others’ maps
12:30-12:40	Reflect, Conclude
12:40-12:45	certificates
12:45-1:30	<i>Almuerzo y postre</i>

Estructura:

08:00 BEINVENIDOS - café y snacks

hoja de registro

“Como hacer gallo pinto”

09:00 - 09:30 INTRODUCCIÓN

1) Facilitator intro

Names and where we're from

Gracias por asistir; gracias a {hosting location}

Baño, agua; atmosfera informal

El por que de este estudio: turismo un fenómeno internacional – y organizaciones grandes, por ejemplo, los Naciones Unidos, tratan a promover turismo por desarrollo sostenible. Sin embargo, con frecuencia no ayuda a la mayoría de personas locales o al medio ambiente.

Obvio, no soy de aqui. Pero uds tiene una isla hermosa, con la oportunidad de considerar el rol del turismo y el futuro. Por esto oportunidad, y el hecho de que turismo es un fenomeno internacional, estoy aqui por hacer mis investigaciones.

2)conocer a alguien nuevo, descubrir una cosa de la naturaleza que él asocia con él mismo, hacer su etiqueta con el nombre, luego presentarle al grupo
(*Sample introduction*) (set up gallo pinto pics in another area during this time)

5) Reglas básicas: solicitar a los participantes - escribir en la pizarra / papel

Reglas Básicas

- respetar del tiempo de participantes
- respetar todos ideas

3) Pida a los participantes: “Cual es una oportunidad que estas aprovechando actualmente como resultado de la situación?”

4) La esquema por la mañana: Explicación del propósito: tourism is promoted around the world for its potential for sustainable development, but there is little proof that it is successful. Ometepe offers a great learning opportunity

la primera vez que facilité, para que podamos desarrollarnos juntos, recuerden que soy un estudiante, no un maestro ni un líder de esto, y que esto es muy diferente de un clase o taller típico: comentarios y preguntas son bienvenidos

09:30 – 10:15 PENSAMIENTO DE SISTEMAS

9:30-9:40: Reflect on “Cómo hacer gallo pinto”

move to section where these are set up and everyone look

Idea = algo con lo que muy familiar, pero también complejo; ¿Cómo descomponer en componentes simples?

Explain “components” and “connections”

Comparar, deconstruct, y reflexionar - fomentar “pensamiento sistémico”

9:40-9:55 Area de Estudio (“focal scale”) (área de enfoque por gallo pinto)
Of interest to me – does this work for participants?:

Spatial = Ometepe; temporal = current

(sugiera una forma de taller = ¿a qué escala pueden afectar un cambio?)

9:55-10:10 Línea de tiempo de perturbaciones con el turismo basado en volcanes:

Quick review of timeline

Any major events missing?

Utilice ejemplos para presentar una idea de "perturbación", no necesariamente buena o mala

Add personal post-it –to think about the manner in which *you* are part of system

-->"Historical legacies" --- _____

-->Livelihoods

-->Volcanic

10:10-10:30 Descanso (15 min)

10:30-10:45 Intro Turismo

Why do tourists visit Ometepe? What do they need when they are here?

Who provides those needs? How do they provide those needs?

¿Por qué los turistas visitan Ometepe? ¿Qué necesitan cuando están aquí?

¿Quién provee esas necesidades? ¿Cómo proporcionan esas necesidades?

Las ofertas, las demandas, y las conexiones

circle/explain components and connections

explicación de "turismo basado en los volcanes"

10:45-11:45 Actividad de mapeo (PEQUEÑOS EQUIPOS)

3 equipos de 4 personas (1 de turismo, 1 de fuera de turismo, 1 mezclado;writer)

Mapeo conceptual: Introducir

Mostrar ejemplos

Explica flexibilidad, no hay método correcto / incorrecto

Poner título: *Mapeo conceptual del sistema de turismo basado en volcanes*

Trate de simplificar el sistema en los componentes y controladores más importantes, pero no simplificar demasiado

Hojas de trabajo disponibles para ayudar, sin embargo , no es necesario que todo esté incluido en el mapa, y algunas cosas pueden surgir en sus mapas que no están en las hojas de trabajo

Para comenzar, sugiera equipos elegir unos componentes mas necesario para definir "turismo basado en volcanes"

Añadir *actores* principales, *recursos naturales* y *medios de vida* como componentes, y luego comience a dibujar las conexiones entre ellos utilizando las otras secciones de las hojas de trabajo.

Cada participante debería ser suyo propio conexion a turismo en el mapa

**On the back of each map,
participants record (on post-its)**

(1) sexo (2) edad (3) principal medio de vida (4) ciudad actual donde vive ud. (5) ciudad de trabajo primaria

11:45 - 12:30 AÑADIR LA SITUACION ACTUAL

What connections have been weakened or destroyed? components?

Mark any connections that have been created or strengthened. Repeat for components.

¿Qué conexiones se han debilitado o destruido? ¿Se ha debilitado o destruido algún componente?

Marca cualquier conexión que haya sido creada o fortalecida. Repita para los componentes.

Teniendo en cuenta la línea de tiempo, cuáles de los eventos del pasado tienen efectos significativos en la actualidad?

¿Cuáles son los riesgos en curso en el sistema? ¿Cuáles son perturbaciones buenas en curso?

¿Quién maneja alguno de estos perturbaciones, y cómo?

Seleccione 2-6 de los problemas más significativos en este sistema. Considere cómo se conectan las personas y el entorno a medida que selecciona estos.

Seleccione 2-4 de los problemas más importantes en este sistema específicamente relacionado con el turismo. Estos pueden ser iguales o diferentes a la pregunta anterior.

¿Dónde se ha incrementado la vulnerabilidad, o debilidad, en el sistema como resultado de la situación actual? Otra vez, considere las personas, el medioambiente, y los conexiones.

¿Dónde han mostrado las personas la capacidad para adaptarse o responder a la situación?

¿Dónde esta la mayor incertidumbre para el futuro? (tal vez: ¿Qué conexión es más probable que cambie o se rompa en el futuro? ¿O en la que todos tienen menos confianza?)

Seleccione de 2 a 4 componentes o conexiones que cree que es más probable que cambien, y describa en qué escala de tiempo esperaría este cambio (por ejemplo, meses, años, décadas).

FINALMENTE: Marque 2-6 atributos de este mapa de su sistema que su equipo cree que son los más importantes de preservar.

Step back and review overall map. 3 minutes for any final changes or additions.

On the back of each map, participants record on post-its

(1) sexo (2) edad (3) principal medio de vida (4) ciudad actual donde vive ud. (5) ciudad de trabajo primaria

12:20-12:30 Comparar mapas: Publicar mapas de todos y permitirles ver los de otros

Discusión, como grupo completo:

observaciones, reflexiones, ¿algún cambio que harían en las suyas?

Conclusión: Resumen de las actividades de la mañana.

solicite reflexiones en este mapa frente a (vs) los mapas de equipos pequeños

Día de repaso y lo que el grupo ha producido.

Pregunte al grupo: ¿Es este grupo representativo de los residentes de Ometepe?

¿Quién no está presente?

Ofrecer tiempo para preguntas y reflexión.

Postre y dispersión