DISSERTATION

UNDERSTANDING ENVIRONMENTALLY RESPONSIBLE BEHAVIOR OF NATIONAL PARK VISITORS: A CROSS-CULTURAL PERSPECTIVE

Submitted by

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ABSTRACT

UNDERSTANDING ENVIRONMENTALLY RESPONSIBLE BEHAVIOR OF NATIONAL PARK VISITORS: A CROSS-CULTURAL PERSPECTIVE

Foster environmentally responsible behavior (ERB) among tourists is seen as a practical approach to alleviating human-induced impacts on national parks. In light of the increasingly popularity of national parks and their diverse users around the world, national park practitioners and researchers need to pay closer attention to the cultural influences on tourists' behaviors across cultures. This dissertation introduces a cross-cultural perspective to investigate tourists' environmentally responsible behavior in two national parks in China and US.

This dissertation summarizes three studies that are presented as manuscripts suitable for submission to peer-reviewed journals. It begins with an overview of the visitor impacts in national parks in the US and China—two of the largest nature-based tourism market in the world— and the associated theoretical frameworks and models that assess the antecedents of individuals' environmental behavior. We articulate and clarify the theoretical debates and methodological considerations associated with cross-cultural comparative analysis.

Chapter II provides a comparative discussion of the national park system between China and the US. It begins with a review of the current state of knowledge of China's protected areas development and the motivation to form a new national park system, followed by a comparison of the management structure, funding mechanism, as well as the visitor and tourism management of the national parks in China and US.

Chapter III and IV present two cross-cultural quantitative studies. A review of extant literature shows there are inconsistencies in understanding tourists' environmentally responsible behavior in national parks. In Chapter III, we use multi-group confirmatory factor analysis to examine the measurement invariance of a proposed measures of tourists' environmentally responsible behavior between US and China. The confirmatory factor analysis assessments of equivalent structure, factor loading pattern, and intercepts between samples revealed that the ERB is a multi-dimensional construct and can be examined across cultures. Further, Chapter IV builds upon the previous and investigate how environmental values, attitudes, and norm affect tourists' environmentally responsible behavior intention in national parks between US and China. We discuss the differences and similarities of the patterning of tourists' behavior intention across distinct cultural settings.

Chapter V connects these three studies and subsequently discuss theoretical and practical implications. We illustrate how the results can facilitate national park management in developing sound visitor use planning and communication programs to better promote environmentally responsible behavior among tourists. Overall, this dissertation seeks to comprehend the cultural components in the activation of environmentally responsible behavior. Our findings highlight the need of utilizing quantitative cross-cultural comparative perspectives to understand the culturally conditioned behaviors.

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Lastly, I want to thank caffeine, BTS, and my cat Khaleesi's fluffy belly, which accompanied me through countless sleepless nights as I completed this dissertation.

DEDICATION

I would like to dedicate this dissertation to my family, including my husband, my parents, and my cat.

Daniel, my love and soulmate, words cannot express my deepest gratitude to you. Over these years, we've grown and adventured together; we've been through the ups and downs of life side by side. I felt incredibly fortunate to have met someone with such as humorous and fun spirit as you. I know you are as relieved and happy as I am to have finished this process, and I appreciate all the sacrifices you have made to contribute to my success. Without you, none of this would have been possible.

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Finally, in loving memory of my dad. I miss you and wish you could share this moment with me. Your dream has become my aspiration. This achievement is as much yours as it is mine. This is for you, Dad.

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CHAPTER I: INTRODUCTION

National parks, as delineated by the International Union for Conservation of Nature (IUCN), encompass vast natural areas, established to safeguard ecological processes, species diversity, and the characteristic ecosystems of the area. They also provide spiritual, scientific, educational, recreation and visitor opportunities to visitors (IUCN, 2008). Their significance is underscored by the rapid growth of numbers of parks worldwide; more than 6000 have been designated, a rise of over 30% since 2003 (An et al., 2018; IUCN, 2018).

Drawing inspiration from the United States national park model, China launched its national park system in 2017. Prior to 2022, 11 Chinese pilot national parks were established and managed by China's National Park Administration (CNPA), a newly formed government organization. The mission of United States national parks, referred to as the *dual mandate*, focuses on conservation while simultaneously providing opportunities for public use and enjoyment. This focus has been influential in shaping China's approach (Jones et al., 2017; Kong et al., 2018; Myers et al., 2000; Sheng et al., 2020). Similar to the United States national park system, China's national parks aim to preserve important natural and cultural resources while providing recreational and educational opportunities for the public (Huang et al., 2018; State Council of China, 2017; Zhong & Xiao, 2017). These parks attract tourists who seek to enjoy nature, escape their daily routine and the urban environment, engage in recreational activities, and spend quality time with family and friends.

Although visitation to national parks and protected areas has rapidly increased worldwide in the past decades (IUCN, 2019; UNEP, 2005), the popularity of park tourism simultaneously presents significant environmental challenges, which is among the prevalent threats encountered

by protected areas (Eagles & McCool, 2002; Kaseva & Moirana, 2010; Leverington et al., 2010; Safshekan et al., 2020). Recreational activities contribute to human-induced impacts, such as vegetation trampling, soil erosion, pollution (air, noise, and wastes), and introduction of exotic species, etc. Even moderate levels of park use can overburden the park's carrying capacities and trigger detrimental impacts on the environment, especially if not properly managed (Wearing & Neil, 2009). Furthermore, park visitors also engage in depreciative or destructive behavior, which involve damaging park resources or impacting the experience of other visitors, such as littering, improper human waste disposal, feeding wildlife, wood collecting for campfires, damaging trees and rocks, and venturing off-trail, etc. These ecological degradations, instigated by tourist activities, negatively affect the quality of the tourists' travel experience, creating a cyclical problem that further strains the environmental health of these protected spaces.

Statement of Problem

Fostering environmentally responsible behavior (ERB)—efforts that minimize the negative impact of one's actions on the natural and built world (Kollmuss & Agyeman, 2002, p. 240)—among national park visitors has become a focus for practitioners and researchers (Bowes et al., 2017; Eagles & McCool, 2002; Esfandiar et al., 2019; Lawhon et al., 2013; Winter, 2008). This strategy is considered an effective approach to alleviating the negative human-induced impacts on national parks (Bamberg & Möser, 2007; Esfandiar et al., 2022; Gifford & Nilsson, 2014; Ramkissoon et al., 2012). By making visitors aware of and understanding their impact, they can become active participants in conserving these natural spaces rather than mere consumers (Ardoin et al., 2015; Lee & Jan, 2018).

Previous research has explored ERB and its psychological antecedents in national parks and protected areas. Empirical evidence suggests that environmental value orientations (Kennedy

et al., 2009; Nordlund & Garvill, 2002b; Schultz, Gouveia, Cameron, Tankha, Schmuck, & Franěk, 2005; Vaske & Donnelly, 1999), attitudes (Eagles & Demare, 1999; Hudson & Ritchie, 2001; Kaiser et al., 1999a; Mobley et al., 2010a), and norms (Bamberg et al., 2007; Kinzig et al., 2013; Vaske et al., 2015), can stimulate nature-based tourists' ERB. It is noted that nature-based tourists often develop positive environmental attitudes and behavior, demonstrating a desire to lean about nature and conservation (Ardoin et al., 2015).

A consensus on measuring and predicting ERB among national park tourists from various cultural backgrounds is lacking (Esfandiar et al., 2022; Gammoh et al., 2016; Landon et al., 2018; Tam & Chan, 2017). Some studies treat ERB as a group of behaviors while others focus on specific behaviors (e.g., intention to pick flowers, littering, feeding wildlife, etc.). Most empirical studies of ERB have adopted measurement scales developed in a western context, raising concerns about their suitability in different cultural regions. Additionally, the current literature reveals a scarcity of empirical evidence on the cultural variation of how value orientation, attitudes, and norms jointly influence national park visitors' ERB, particularly in non-Western societies.

Despite the vast number of studies on ERB in national parks, they were primarily conducted in western countries, in places like the United States, Australia, and Canada, which were among the pioneers in establishing national park systems (Alessa et al., 2003; Ardoin et al., 2015; Bamberg & Möser, 2007; Kovács et al., 2014; Kvasova, 2015). An emerging body of literature in recent decades has shifted its attention to investigating ERB in other cultural contexts, especially in the developing countries (Lee et al., 2013; Safshekan et al., 2020). As national parks received increasing popularity globally, understanding the cultural differences among visitors' environmental behavior becomes a crucial research component in park and

outdoor recreation studies (Reisinger & Turner, 2011). The diversity of visitors and employees frequently confronts practitioners and researchers, underlining the necessity to unravel the variations in tourist behavior across cultures (Dimanche, 2011). Environmental behavior is often culturally conditioned—previous research suggests tourists with different ethnic and cultural background behave differently (Dimanche, 1994; Kovács et al., 2014; Tam & Chan, 2017).

Research Themes

The focus of this doctoral dissertation is structured around three central themes. This dissertation follows the manuscript format with each manuscript representing a unique contribution advancing research and knowledge to address the research themes presented below.

Research theme one*: visitor use management in national park systems between China and the United States.*

The first relates to visitor use management in national parks and its implementation, compared between China and the United States. While tourism has always been pivotal in national parks' establishment, especially in China and the U.S., there is a dearth of research assessing the current status of park system development from this viewpoint. Given the integral role tourism plays in national parks, it's critical to enhance visitor understanding of environmental issues and to encourage behavior change to mitigate tourisms' ecological impact, while ensuring a high-quality visitor experience. The first manuscript addresses this gap by comparing the national park systems in both countries, focusing on tourism and conservation efforts.

Research theme two*: measuring park visitors' ERB cross-culturally.*

Several scales exist that quantify ERB in various contexts, however they often fail to capture national park visitors' ERB across cultures. Some scales focus only on a certain type of environmental behavior. Among those studies that measured ERB from a multidimensional perspective, there is a considerable variation in the subsets of such behavior. In chapter 3, a three-factor nine-item ERB measurement scale was developed based on extensive empirical literature in both Chinese and English. We further examined the cross-cultural validity of the proposed scale using a multi-group confirmatory factor analysis. The results demonstrated that the scale exhibits good model fit, scale validity, and scale reliability in both samples. The further measurement invariance test contends the scale presented good configural invariance.

Research theme three*: compare how value orientation, attitude, and norm predict environmental behavior across cultures.*

The third theme pertains to development of a framework to predict national park tourists' environmentally responsible behavior, within a cross-cultural comparative context between China and the United States. The aim is to explore the structural relationships among environmental value orientations, attitudes, norms, and the intentions of ERB, while providing a systematic comparison of these relationships between the two countries. The growing popularity of national parks globally underscores the importance of comparative analysis, a method less explored in leisure and recreation research. This approach motivates us to move beyond a western-centric perspective, striving for a broader representation of knowledge from various societies. This enhances the practical applicability of environmental theories to different cultural contexts. Therefore, the third manuscript builds on the results from manuscript two, proposing an integrative framework of environmental values, attitudes, and norms to predict ERB and testing its cross-cultural applicability. The results observed cross-cultural differences in the proposed

framework where each dimension of the ERB is triggered by different sets of antecedents between the Chinese the United States sample.

Cross-cultural Research Design

Cross-cultural studies generally take a comparative approach to systematically investigating variations in human behavior across different cultural contexts (Dimanche, 1994). This dissertation primarily adopts a quantitative approach to investigating the cross-cultural differences in the formation of environmentally responsible behavior between China and the United States.

Study samples for chapter 3 and 4 were drawn from visitors in national parks in China and the United States via self-administered questionnaire. Establishing conceptual equivalence — when concepts being examined are interpreted in the same way across two or more languages/culture groups — is essential to ensuring the bilingual questionnaires' cross-cultural comparability (Buil et al., 2012; Dimanche, 2011). Hence, this research utilizes back translation, a technique widely used in cross-cultural research, in survey design to improve linguistic and conceptual equivalence. According to Tran (Tran, 2009), back-translation entails a process wherein an instrument is translated to a different language from its original version, then translated back to the original language to assure equivalence in item meanings between the two surveys.

The figure presented below outlines the back-translation procedure utilized in this study. In the first step, the questionnaire used in this study was originally developed in English and translated to Chinese by the first translator (in this case, the author of this dissertation). Then, the Chinese survey was back translated to English by another translator. The second translator was

recruited and received training in background relevant to the research areas. Both translators are bilingual speakers. Finally, differences between the two versions of the English surveys were compared and discussed in order to finalize both the English and Chinese surveys.

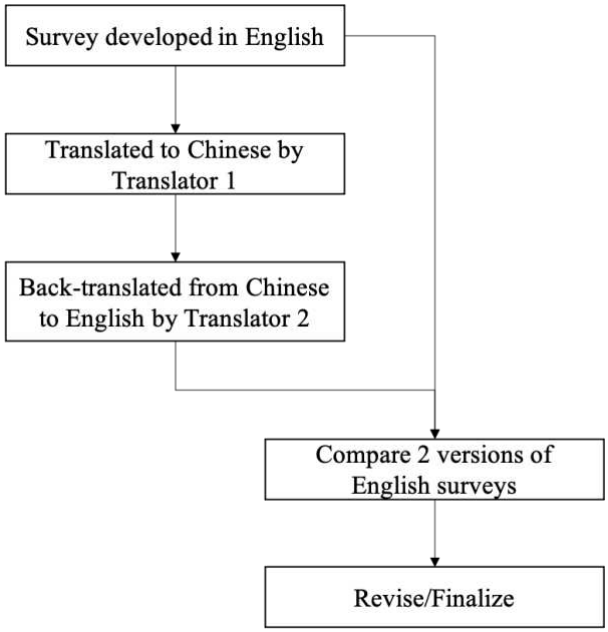

Figure I-1 *Back-translation procedure for developing bilingual surveys.*

Chinese and English surveys share certain variations in terms of demographic questions. For example, in the English survey, we asked the respondents to fill out their zip code to identify their residency while we asked Chinese respondent to fill out which city and which province that they are from. The Chinese sample was collected in July 2019 in Shennongjia (pilot) National Park in central Hubei Province, China, and was completed by a group of student researchers recruited from Central China Normal University, located in Wuhan, China. The United States data were collected in two phases by the author of this dissertation. The first phase took place from September 2019 to December 2019 in gateway communities to Mount Rainier National Park in Washington state. The data collection process was later interfered by COVID-19. The

remaining data was collected via online survey targeted to visitors who identified themselves as having been to any national park in the past six months.

CHAPTER II: COMPARING NATIONAL PARKS IN CHINA AND THE U.S. — MANAGEMENT STRUCTURE, FUNDING, AND VISITOR MANAGEMENT

Introduction

China is a country renowned for its remarkably abundant biodiversity, harboring over 10% of the world's plant and animal species (Tang et al., 2006). To conserve biodiversity, China has established an extensive and comprehensive protected area network. As of 2017, China has designated approximately 12,000 protected areas, with nearly 18% of its territorial land — 420 million acres compared to 276 million acres in the United States — being designated for protection.

Despite the impressive number and coverage of protected areas, concerns have been raised about their effectiveness. There are apprehensions that some protected areas may be merely "paper parks", lacking sustainable conservation outcomes (Jim & Xu, 2004; Xu et al., 2014; Xu et al., 2017). The protected area system in China faced criticism for not adequately maintaining and protecting its ecosystem and biodiversity (Harkness, 1998; Jim & Xu, 2004; Kram et al., 2014; Su, 2004; Sun et al., 2020; Xu et al., 2019). A significant body of literature has discussed the challenges faced by China's protected areas system and management, including administrative overlap, restricted local participation, lack of consistency in conservation practices, and negative environmental impacts from human-induced activities (Buckley et al., 2014; Chen & Tang, 2020; Jim & Xu, 2004; Ma, 2002; Zhou & Grumbine, 2011; Xu et al., 2017). Furthermore, extensive discussion has taken place among researchers and practitioners regarding the classification criteria and the categories of protected areas in China

(Wang et al., 2015; Wang et al., 2004). These discussions have emphasized the need for establishing a national park system, a type of protected area previously absent in China. The dominant protected area model currently in China, natural reserves, prioritizes stringent protection with limited human activities permitted within their boundaries. On the other hand, other protected areas (e.g., scenic areas, national forest parks, national geoparks, etc.) focus on tourism (sometimes in the form of mass tourism) and allow multiple use (e.g., grazing, farming, etc.) within its core and the peripheral areas. There is a consensus that China lacks a type of protected areas that effectively balances conservation and tourism objectives (Huang & Zhang, 2015; Wang & Su, 2015; Xu et al., 2017). The establishment of a new protected area category, national parks, is seen as an opportunity to address the shortcomings of the existing classification system and provide a recognized designation for protected areas that encourage collaboration, knowledge sharing, and capacity-building both domestically and internationally (Huang et al., 2018; Kram et al., 2014; Peng, 2018; Xu et al., 2019; Yang & Duan, 2020).

Acknowledging these challenges, China introduced the Chinese National Park System (CNPS) in 2017, drawing partial inspiration from the United States National Park System (USNPS) (Kong et al., 2018). This system created a new category of protected areas, namely national parks, which aim to preserve significant natural and cultural resources while providing recreational and educational opportunities for the public. To oversee and manage these parks, the CNPS established the Chinese National Park Administration (CNPA) as a unified and streamlined management agency. Presently, a total of 11 pilot national parks have been established across the country. The CNPS is considered a critical component of China's conservation efforts, playing a vital role in biodiversity protection and the safeguarding of natural and cultural resources for future generations.

In recent years, a growing body of literature has introduced and discussed the CNPS and its implications for enhancing conservation efforts (Chen & Tang, 2020; Deng et al., 2019; Huang & Zhang, 2015; Zhang & Sun, 2021). However, upon initial review, I found that the majority of this literature focused on management structure, policy and legislation, and community engagement (Deng et al., 2019; Wang & Su, 2015; Xiang & Zeng, 2017; Zhong & Xiao, 2017). Limited studies have addressed the CNPS and China's national parks from the perspective of tourism and visitor use management.

I contend that the tourism and visitor use management represent crucial facets of the CNPS, because all the 11 national parks were transformed from previously existing protected areas that traditionally centered around high levels of visitation and human-induced modifications (e.g., tourism-related infrastructures). Park tourism does not only provide opportunities for economic development and local livelihood improvement, particularly in rural areas adjacent to the national parks, but also poses significant challenges in terms of ecological conservation and sustainable use of natural resources, as park tourism can exert considerable pressure on fragile ecosystems and cultural resources (Han & Ren, 2001; Jenkins & Wearing, 2003; Krüger, 2005; West et al., 2006; Xiang & Zeng, 2017; Zhou & Grumbine, 2011). Inappropriate visitor use and infrastructure development can lead to habitat degradation disturbance of wildlife, introduction of invasive species, and the erosion of both natural and cultural authenticity (Chan & Xin, 2015; Chiu et al., 2014; Safshekan et al., 2020). Balancing the demands of tourism with the conservation objectives of national park is, therefore, a significant challenge that requires effective management strategies (Higham et al., 2016; Krüger, 2005; Manning & Anderson, 2012).

I asked the key question: To what extent is visitor management in the new Chinese National Parks successful in ensuring sustainability and a quality visiting experience? To answer this question, we compare the national park systems of China and the United States, two countries with large, diverse system of protected areas that have significant implications for global conservation efforts (Choi et al., 2021; Kong et al., 2018; Miller-Rushing et al., 2017). The United States is the earliest country to establish a national park system and has a long tradition of promoting nature conservation and economic development through recreation and tourism management in national parks (Frost & Hall, 2009). The establishment of China's national park system has drawn inspiration from the model and experience of the United States (Kong et al., 2018; J. Z. Wang, 2019). Similar to the United States national park system, China's national parks aim to preserve important natural and cultural resources while providing recreational and educational opportunities for the public (B. Huang et al., 2018; State Council, 2017; Zhong & Xiao, 2017). The mission of national parks as protected areas with a focus on conservation while simultaneously providing opportunities for public use and enjoyment (the *dual mandate*) has been influential in shaping China's approach (Jones et al., 2017; Sheng et al., 2020). Additionally, the CNPS has taken cues from the governance model of the United States National Park Service (USNPS) and created the Chinese National Park Administration (CNPA), a unified and streamlined management approach that mirrors the centralized management approach of USNPS.

Despite differences in political, economic, and social contexts between the United States and China, they both encounter similar challenges in national park and protected area management. Some examples include dealing with the effects of climate change on park environment, navigating bureaucratic complexities and inefficiencies within government

agencies, decreased funding and working personnel, and establishing strong partnership with local communities, etc (Miller-Rushing et al., 2017). In terms of park tourism and visitor management, both countries are increasingly focused on promoting sustainable tourism practices (An et al., 2021). This approach aims to minimize negative impacts on the environment, culture, and local communities while providing visitors with meaningful and enjoyable experiences. Both the United States and China are working to strike a balance between attracting tourists, generating economic benefits, and ensuring the long-term conservation of their national parks (Jones et al., 2017; Lawhon et al., 2013; Wang et al., 2012; Winter, 2008). By identifying similarities and differences in management structure, funding mechanisms, as well as the visitor management strategies between the two systems, we can identify areas for improvement and potential strategies for enhancing the effectiveness of visitor use management in national parks more broadly. Acknowledging these shared concerns, there is an opportunity for park management agencies from different countries to come together and exchange knowledge, experiences, and best practices.

In addition to the comparative analysis, I also investigated the temporal aspect: How has tourism and visitor management in China's protected areas evolved over time? The process of decentralization that has unfolded in China since the 1980s has often positioned local governments as the primary governing bodies responsible for national-level Park Administration (hereinafter referred to as PA) (Xu & Zhang, 2009). This shift has led to the transformation of these areas into lucrative tourism destinations through land commercialization (Deng et al., 2019; Zinda, 2012, 2017). Over the past two decades, protected area tourism has emerged as one of the fastest-growing tourism sectors in China, driven by the burgeoning middle class and their increasing interests in nature-based tourism. Yet, the influx of visitors has brought forth

numerous adverse environmental impacts, presenting a significant challenge for most PAs to address (Deng et al., 2003; Wang et al., 2012). The frequent changes in land ownership, user rights, and the administrative complexities arising from the interplay between central and local governments further compound the persistent difficulties faced in effective management and sustainable tourism development in these areas (Jim & Xu, 2004; Kram et al., 2014; Wang, 2007). Xu and Melick (2007) aptly noted, "…these issues are compounded by a continuing lack of clarity over forest definitions and land tenures…It is into this confused and evolving system, laden with hangovers from recent history, that conservation planning advocates and research must operate in China" (p.319). Therefore, it becomes imperative to retrospectively examine the developments and changes that have occurred over the past 70 years[1] to gain a comprehensive understanding of the trajectory of the PA system, as well as to look ahead and anticipate the future challenges and opportunities that lie ahead.

The research objectives for this study are as follows:

Objective 1. To explore the developmental history of protected areas in China, culminating in the establishment of the Chinese National Park System (CNPS) in 2017.

Objective 2. To conduct a comparative analysis of the CNPS and the United States National Park System (USNPS) focusing on their respective management structure, funding mechanisms, and visitor management strategies.

Methods

[1] China is founded in 1949 and the first protected area is established in 1956.

The research methods employed for this study were primarily based on a review of literature and text analysis. I first conducted a comprehensive review of research of both Chinese and English scholarly publications, such as peer-reviewed articles, conference proceedings, working papers, and white papers concerning protected areas and national parks. English literature search was conducted online via ProQuest, Google Scholar, and Web of Science, covering databases including JSTOR, Elsevier, Sage Journals, PsycNet, EBSCO, and other open access articles. The search of Chinese literature also occurred online, primarily through the Chinese Knowledge Resource Integrated Database (CNKI). Search terms include "China" or "US/U.S./United States", combined with "national park", "protected area", "pilot national park", "park tourism", "visitor management".

Text analysis was conducted on published government reports from various levels of Chinese government (including central, provincial, and local levels), media reports, as well as various websites, with some examples including websites of U.S. National Park Service, China's National Park Administration (same as forestry and Grassland Administration), Shennongjia National Park Administration, Hubei Forestry Department, Chinese travel websites, etc.

Development of China's Protected Areas

Prior to the introduction of CNPS, the history of the development of China's PAs may be broadly divided into two phases — the initial phase (1956-1979) and the swift expansion phase (1980-2016) (Huang et al., 2019; Xu et al., 2017). They vary upon the scale and number of new designated protected areas, as well as the government's priorities in terms of conservation and protected areas management.

In the early years of China, the country's economy heavily relied on timber production, which resulted in significant environmental concerns due to mass deforestation (Xu & Melick, 2007). To address these threats, the National People's Congress of China promulgated the *Natural Forest Natural Reserves Construction Plan* in 1956, which was the first law concerning protected areas (Xu et al., 2014). Subsequently, in the same year, the DinHuShan Natural Reserves in Guangdong Province was established as the country's first national protected area.

However, the political landscape underwent a drastic shift only two years later with the onset of the Great Leap Forward movement in 1958, and further disordered from the Cultural Revolution (1965-1975). These political upheavals disrupted progress in the establishment and management of protected areas in China, often setbacks attributed to "ill-conceived water control, industrial, and agricultural projects" (Xu & Melick, 2007, p. 319). Throughout this phase, little progress was made. Between 1956 and 1979, China created only 34 national-level natural reserves across the country, covering a mere 0.13% of its territorial lands. The primary focus of these reserves was to designate no-logging zones for scientific research, safeguarding specific areas from extensive deforestation.

The second phase began in the early 1980s when the adverse effects of industrialization on natural areas became a significant concern (Huang et al., 2019). During this period, China enacted a series of laws and regulations related to environmental protection. Examples include Forestry Law (1979), Wildlife Protection Law (1988), Environmental Protection Law (1993), Regulations for Natural Reserves (1994, amended in 2014), and Management Rules for Marine Natural Reserves (1995). Additionally, China joined the international conventions such as the Convention on Biodiversity Diversity and the Ramsar Convention in 1992. These legal

instruments provided guidance and financial support for the establishment and management of protected areas.

The focus of protection in this phase was on expanding the number and size of protected areas, alongside a process of decentralization that will be further discussed in the following section (Huang et al., 2019; Jim & Xu, 2004; World Bank, 2001). China rapidly established and designed various types of protected areas. Prior to 2017, China's protected areas network consisted of 12 types, including, for example, scenic areas, natural reserves, forest parks, wetland parks, urban wetland parks, and geoparks. These protected areas were tailored to conserve different types of territorial ecological resources within their territories. For example, National Forest Parks aimed to preserve the remarkable forestry landscape for lumber and grazing; National Urban Wetland Parks were established to conserve wetlands as part of the urban green space system and provide educational, recreational, and aesthetic opportunities for urban residents. The number of protected areas increased rapidly from 481 in 1987 to over 12,000 in 2017, which included 474 national natural reserves, 244 national scenic areas, and 897 national forest parks.

Table II-1 below presents further details on China's Park Administration (PAs) prior to the establishment of the CNPS.

Table II-1 Profile of national-level protected areas in China (prior to 2017).

Managing Agency (Issuing Authority)[1]	**Type of PA (Pilot year)**	**Number**	**Major Resources to Protect**	**Approach to Tourism and Visitor Use**
Multiple Agencies[2]	National Natural Reserves (1956)	474	Remarkable ecosystems, endangered species, and significant natural heritage	Strict environmental protection: restricted public access in core and buffer zones; tourism activities limited and highly regulated in buffer areas

Ministry of Housing and Urban-Rural Development	National Scenic Areas (1982)	244	Remarkable scenery with significantly ornamental, cultural, or scientific value	Commercial tourism/common tourism infrastructure and facilities allowed if aligned with government planning; multi-use lands
	National Urban Wetland Parks (1982)	38	Urban wetlands	A range of recreation opportunities provided through zoning and facility development
National Forestry Administration[3]	National Forest/Forestry Parks (1982)	897	Forests	Ecotourism is usually the management focus, featuring low-density visitor use in core zones; a range of recreation opportunities provided through zoning and facility development
	National Wetland Parks (2005)	429	Wetlands	A range of recreation opportunities provided through zoning and facility development
	National Desert (Rocky Desert) Parks (2013)	55	Deserts	Recreation visitation and commercial tourism permitted
Ministry of Land Resources[4]	National Geoparks (1982; discontinued in 2015)	218	Geological relics of national importance and to promote sustainable development	Recreation visitation and commercial tourism permitted
	National Mining Parks (2005)	72	Mining heritage landscape	Recreation visitation and commercial tourism permitted
Ministry of Water Resources[4]	National Water Scenic Areas (2001)	658	Water resources and hydraulic engineering landscapes	Commercial tourism/common tourism infrastructure and facilities allowed if aligned with government planning; multi-use lands
Ministry of Agriculture	Aquatic Germplasm Resource Reserves (2007)	429	Aquatic germplasm (e.g., fish) resources and habitats	Restricted public access: tourism activities for educational purpose allowed

National Oceanic Administration	National Marine Parks (2011)	42	Oceans	A range of recreation opportunities provided through zoning and facility development
	National Oceanic Reserves (1995)	15	Conserve important oceanic ecosystems	Strict environmental protection through zoning: restricted public access

[1] Institution names before 2018. In 2018, China passed a political system reorganization plan featuring a restructuring of its central government. Some national-level ministries and departments were canceled or merged to create the new ministries.

[2] Co-governed by the National Forestry Administration, Ministry of Ecology and Environment, National Oceanic Administration, Ministry of Land Resources, Ministry of Water Resources, and Ministry of Housing and Urban-Rural Development.

[3] Renamed as the National Forestry and Grassland Administration after 2018, merged into the Ministry of Natural Resources.

[4] Cancelled and integrated into the Ministry of Natural Resources after 2018.

China's national protected area system encompasses many renowned natural areas, but their distribution across the country is uneven. Eastern and southern China have received relatively less protection compared to the southwest region (China National Forestry Administration, 2006; Xu et al., 2014). The management of protected areas involves multiple departments or administrative agencies, as stipulated by the laws and regulations governing natural resources protection. The Chinese National Environmental Protection Administration, which operates under the Ministry of Ecology and Environment, assumes the primary responsibility for the overall integrated management of protected areas. However, specific ministerial departments such as forestry, agriculture, land and resources, and water resources are entrusted with managing particular aspects of natural resources within these protected areas. For instance, the National Forestry Administration is responsible for managing forest habitats, while the Ministry of Water Resources oversees water resources within the protected areas. Hence, it is not uncommon for a protected area to fall under the jurisdiction of multiple government departments (Jim & Xu, 2004). The evolving priorities of the Chinese government, transitioning

from resource acquisition to environmental protection over the past few decades, have presented challenges in establishing a unified strategic focus for the conservation management of protected areas. Additionally, the issue of overlapping environmental protection and management agencies further complicates the development of a cohesive approach to conservation management (Xu et al., 2014; J. Xu & Melick, 2007).

"Central (state)-Local" Relation and Their Implications in Protected Areas Management

In China, land ownership is divided into two forms: state (country)-owned and collective-owned. Collective ownership is typically maintained by one or more rural communities for agricultural or forestry purposes. According to the country's constitution, private ownership of land is not permitted, and all land is considered to belong to the people. As a result, the Chinese central government plays a quintessential role in managing all territories, including the national-level protected areas. These protected areas are designated and regulated by different ministerial departments of the central government, but the majority of their daily operations and practical management occurs at the provincial- or lower-level governments through a complex governance system (Huang et al., 2018; Huang et al., 2019; Jim & Xu, 2004; Xu et al., 2014; Zinda, 2012). Xu and Zhang (2009) argued that China's protected areas development has been closely tied to the country's political transition since the 1950s, which can be examined through a "central (state)-local" relation lens that refers to the dynamic and evolving relationship between central and local government.

In the early phase of China's protected areas development history, all protected areas had centralized administration, meaning that their finances and personnel were directly handled by central government with minimal involvement of local governments and communities (Jim &

Xu, 2004). However, a significant shift in China's political landscape occurred in the early 1980s, as the country transitioned from a centrally controlled political structure to a decentralized governance structure. This shift granted substantial autonomy to local governments concerning land development initiatives (Lu & Wang, 2022).

Simultaneously, the financial and management responsibilities of most of China's protected areas were transferred to the local governments due to the central authorities' inability and unwillingness to consistently support these protected areas (Harkness, 1998). With the transfer of responsibilities, local governments were entrusted with the task of developing protected areas to stimulate local economies and improve community livelihoods (Jim & Xu, 2004). As Xu and Zhang (2009) observed, a dual management mechanism has been utilized by Chinese protected areas for many year. In this scenario, local governments (i.e., county-, city- or provincial-level) are responsible for the planning and operation of the protected areas, while the central government designates the areas and oversees their functioning. However, local governments often lack the incentive to allocate resources for conservation management as they do not generate revenue or provide prospects for career advancement for local politicians (Lu & Wang, 2022; Zinda, 2017).

Moreover, this decentralization of protected area management occurred without proper legislation in place (Leung et al., 2014; Yeh, 2014). At the national level, responsibility and accountability for protected areas remain fragmented (J. Xu et al., 2014). Despite the introduction of numerous regulations for protected areas in China, the actual compliance with these regulations is minimal (Qin, 2019; Xu et al., 2014; J. Xu & Melick, 2007). As highlighted by Kram et al. (2014), it is common in China to observe discrepancies between the *de facto* (actual) and *de jure* (officially prescribed) land use and management practices due to inadequate

and ineffective legislation. In other words, what is permitted by laws and regulations does not necessarily translate into what actually takes place in practice. For example, natural reserves consist of three distinct zoning. The *core* zones feature stringent protection where no human activities are permitted; the *buffer* zones allow for limited human-activities such as surveying and scientific research; the *experimental* zones permit scientific experiments and research, guided environmental education activities and highly regulated tourism activities with limited motorized access, usually by public transport (State Council, 1994). However, a study conducted by the Chinese National Committee for Man and the Biosphere Program in 1997 surveyed 101 national natural reserve managers and found that 82% had carried out ecotourism activities within their reserves, among whom 23% had opened their core zones to visitors (Han & Ren, 2001). Another study reported that 403 buffer zones and 390 core zones out of 446 national natural reserves had seen various degrees of tourism, mining, and grazing activities (Ministry of Ecology and Environment, 2015).

The reliance on local governments to manage national-level protected areas frequently leads to a phenomenon known as multi-designation, where multiple types of protected areas are proclaimed in the same geographic area (He & Cliquet, 2020; Wang, 2007). This is particularly common for natural reserves, which prohibit tourism activities within their core and buffer zones. To generate revenue from tourism and acquire initial funding from the central government, local governments may establish additional types of protected areas. For instance, they might establish National Forest Parks or National Scenic Areas in some cases to allow tourism and infrastructure to be developed and mass tourism to operate. A 2011 study found that approximately 110 out of 474 national natural reserves also bear the names of national scenic area, national forest park, and national geopark. In addition, 226 national scenic areas

geographically overlap with national water scenic areas, national geoparks, and other types of protected areas (Ministry of Ecology and Environment, 2011). Managing these multi-designated regions involves various agencies with different jurisdictions and management objectives, leading to potential conflict in daily operations and administration.

According to Wang (2007), China's protected areas are primarily administered by two distinct sets of management agencies and financial arrangements (see Figure II-1). The first set is associated with a unit from the local or provincial forestry department, focusing on conservation and resource protection. The second set is responsible for local tourism development and is operated by government-owned tourism management companies and developers, or tourism investment corporations (hereafter referred to collectively as government-owned tourism companies) that monopolize the regional tourism resources. In this situation, costs of conservation or management efforts and personnel/staff are primarily supported by appropriations received from the central or provincial forestry department, while tourism revenue is distributed to the local government and reinvested in tourism development.

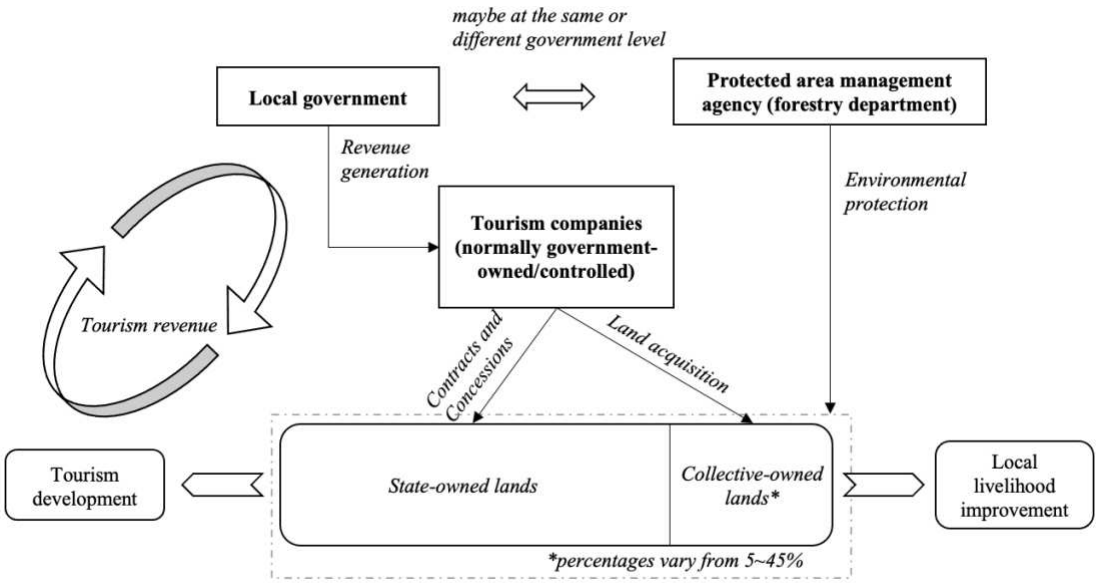

Figure II-1 *Two sets of governance units of protected areas (adapted from Liu & Wu, 2017)*

The deficiencies in the governance of protected areas in China underscore a global phenomenon of "paper parks". These are areas designed as protected areas in official documents, yet they are bereft of the crucial management frameworks necessary for their actual safeguarding and conservation (Liu et al., 2008; Rife et al., 2013). A study conducted in 2004 by the Chinese Ministry of Environmental Protection found 37% of the natural reserves in China can be classified as "paper parks", merely bearing the label of protection without a corresponding management agency to enforce it. Additionally, a significant proportion, about 26%, operate without field operation divisions or a regular patrol routine (Su, 2004). Approximately half of all protected areas offer ecotourism, yet interpretations of what this means vary widely, with some understanding it simply as nature sightseeing without an associated conservation program or sustainability planning (Han & Ren, 2001). Less than 20% of these natural reserves provide educational experiences for visitors, and as many as 50% have reported pollution issues resulting from unregulated tourism development (Su, 2004). Thus, the concept of "paper parks" is an alarming reality in China's protected areas management, posing significant threats to biodiversity and sustainability efforts.

Tourism-Dependent Development

Most of China's protected areas depend heavily upon tourism revenue because they rely significantly on local governments for financial support (Li, 2004; Pei, 2010; Xu et al., 2019; Zhong et al., 2015). Appropriations in protected areas by the Chinese government has been uneven, with some protected areas receiving substantial funding, particularly the most popular ones (Kong et al., 2018; Pei, 2010). Although protected areas normally acquire an initial funding upon proclamation from the central government, the financial resources for salaries and

operating costs are typically sourced from provincial or local government budgets. Studies conducted have consistently indicated that many protected areas in China face inadequate funding (State Council, 1998; Wang, 2019). Another study conducted in 2015 revealed that approximately 36% of protected areas in China had annual operating funds of less than US$70,000 (RMB 500,000), including 11% had operating funds of less than US$7,000 (RMB 50,000) (Zhong et al., 2015). Only above a quarter of the protected areas received annual revenues of over US$700,000 (RMB 5,000,000) (Zhong et al., 2015). This highlights the financial constraints faced by a significant portion of China's protected areas, limiting their ability to carry out essential conservation and management activities.

Accordingly, local governments have been encouraged to find alternative sources of revenue to fund the maintenance of their protected areas. Nature-based tourism—sometimes in the form of mass tourism—has become the default option for many protected areas because China’s burgeoning middle class guarantees a steadily growing demand for tourism and outdoor recreation. From 2000 to 2010, the visitation to and revenue gains of national forest parks in China increased by 20% and 43.6%, respectively (Wang et al., 2012). Local governments in China have actively promoted protected areas as lucrative tourist destinations, and these efforts are supported by the central government because protected area tourism plays a significant role in rural development and poverty alleviation (Zinda, 2017). In remote mountainous regions where opportunities for industrial and agricultural growth are limited, local governments view tourism as a viable means to generate revenue. To finance tourism projects at the provincial level, they utilize state-owned financing platforms and extract income from tourism operations through rents and tourism revenues (Deng et al., 2019). These initiatives align with the government's objective to increase local revenue and stimulate economic growth in these areas.

Throughout this process, tourism has significantly shaped the landscape and management strategies of protected areas in China in many ways. Most of the popular protected areas have centered around high levels of tourism infrastructure and facilities (e.g., hotels, resorts, department stores, golf courses, and gondolas), leading to varying degrees of resource depletion (Buckley et al., 2014; Deng et al., 2003; Huang et al., 2019). For example, 30 square kilometers of forests in Changbai Mountain Natural Reserve, located in Jilin Province in Northeastern China, were cleared for the construction of two golf resorts, resulting in fragmentation of wildlife habitat and migration routes. Two species of mammals were reported extinct, along with 16 species reported endangered within after twenty years of tourism development in the area (Bai, 2017). As another illustration, in Mount Longmen National Geopark in central Sichuan Province, a 600-foot-long stalactite cave of significant geological importance was demolished to make a tourist sightseeing trail (Ji & Zhu, 2007). Other examples include the installation of three gondola lines to the peak of Mount Tai—a National Scenic Area and a UNESCO World Heritage Site—in central Shandong Province; and a glass-made 430-meter-long skywalk bridge and a 1070-foot-tall steel elevator built on the side of a cliff in Zhangjiajie National Forest Park in Hunan Province. These man-made structures created by local tourism infrastructure development have escalated dramatically over the past decade and are now the primary concern preventing PAs from achieving better conservation results (Su, 2004).

Negative environmental impacts resulting from tourists' activities are a major challenge faced by most of protected areas in China (Wang et al., 2012). Numerous studies have reported negative ecological impacts, such as destruction of soil and vegetation, tree vandalism, air and groundwater pollution, loss of biodiversity, and tourists' noncompliance behavior (e.g., littering, feeding wildlife), which also affect the quality of the visitor experience. According to a study

carried out by Ma (2002), 44% of PAs reported solid waste pollution; 11% reported noise pollution; and 3% reported air pollution. Another study conducted in 2000 concluded that 22% of China's natural reserves reported severe damages to biodiversity resulting from tourism development, among which 11% experienced natural resource degradation where litter, water, and air pollution were becoming major obstacles for delivering better park management (Zhang et al., 2004). However, less than 20% of PAs carried out regular environmental monitoring to accurately assess these impacts (Han & Ren, 2001).

Establishment of the Chinese National Park System (CNPS)

Unsuccessful Attempt: Pudacuo (Potatso) and Tangwanghe National Park

In the early 2000s, attempts were made at the local level to establish national parks in China. The concept of national parks was introduced and promoted by NGOs in China (e.g. TNC, the Paulson Institute and the International Union for Conservation of Nature) (Wang, 2019; Zinda, 2012). The motivation behind creating a new type of protected area, i.e., national parks, stemmed from disagreement between conservationists and local government authorities with respect to some of China's dominant protected area models — the Scenic Areas and Natural Reserves (Zinda, 2012). The Scenic Areas prioritized tourism development for economic gain, while the Natural Reserves emphasized stringent environmental protection. The designation of National Park was seen as a compromise that could accommodate both tourism development and conservation outcomes in China (Kram et al., 2014).

Under this framework, Yunnan Provincial government established Pudacuo National Park in 2007 with the assistance from the Nature Conservancy (TNC). Located near Shangri-La city in Diqing Tibetan Autonomous Prefecture in northern Yunnan province, the park aimed to

generate tourism revenue for the benefit of local communities and the environment through market-based conservation interventions. However, it was widely considered an unsuccessful endeavor (Deng et al., 2019; Yeh, 2014; Zinda, 2012). Conflict arose when the site selected by TNC for establishing a national park based on conservation biology principles clashes with the local government's focus on acquiring tourism income. Despite the establishment of Pudacuo National Park Management Bureau (PNPMB) to administer the park, the tourism development and practices were effectively overseen by a government-controlled tourism investment company. This company, established by the Diqing Prefecture government, obtained bank loans and invested in tourism infrastructure projects under the prefecture government's guidance. The majority of the tourism revenue went towards loan repayment, with little benefit reaching local communities. Eventually, TNC withdrew from the efforts to shape park management two years after the establishment of Pudacuo National Park. Zinda (2012, p. 26) observed that this park exemplified a situation where the "economically interventionist local state chose to use the park project to adopt a model of state-driven mass tourism proliferating across the country."

Elsewhere, in 2008, the Ministry of Environmental Protection and National Tourism Administration jointly established Tangwanghe National Park. This park, located near Yichun in the Heilongjiang province, a city in Northeastern China, close to the China-Russia border, was officially designated by the central government, but the actual administration and management are carried out by the Tangwanghe National Park Management Committee (TNPMC), a unit directly led by the Tangwanghe Forestry Department and the Heilongjiang provincial government. The park has received limited funding and legislative support since its establishment. Although the TNPMC formulated some management regulations based on national parks in other countries, these regulations were not approved by higher legislative

bodies and thus were not implemented. The main local source of income relied on lumber, which was prohibited after the park's establishment. Additionally, there was no adequate financial or policy support in place to compensate residents for the loss of income resulting from the curtailment of their livelihood activities. The local government's annual revenue was insufficient to cover the development and operation costs of a large national park, leading to the program's failure after several years.

Both of these attempts to establish national parks were seen as superficial solutions, as they failed to address the major funding concerns and governance challenges faced by China's protected areas (Zhong & Xiao, 2017). The establishment of these parks did not translate into effective governance but rather created an intriguing title to attract tourists. The parks became importance sources of income for the local governments, yet very little revenue was allocated to local communities. Local involvement in planning, decision-making, and benefits allocation associated with the parks' development was minimal. The lack of consistent understanding among multiple stakeholders (such as central and local government, local residents, the management committee, and NGOs, etc.) hindered the development, management, and regulations of the parks (Wang, 2019; Yeh, 2014; Zinda, 2012).

Re-Start: Establishing a New National Park System

The prevailing model of national parks, which has its origins in the United States (e.g., Yellowstone National Park) and Australia (e.g., Royal National Park), has gained global recognition and has been adopted by many countries over the years (Frost & Hall, 2009). While the management models and practices of national parks may vary significantly depending on national contexts, there is a widely recognized classification system provided by the International Union for Conservation of Nature (IUCN) (Frost & Hall, 2009; Wang, 2019). The IUCN

classification system categorizes national park as Category II protected areas and defines its management objective as "large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities. (Borrini-Feyerabend et al., 2013, p. 9)"

Before the introduction of CNPS, the term "national park" has already been used in a variety of contexts pertaining to protected areas in China. However, there was noticeable inconsistency in its interpretation and definition. Many travel website and guidebooks often applied the label "national park" to "national scenic areas" and "national forest parks". Yet, these protected areas did not fully correspond to the IUCN's definition of national parks, because they were originally designated with an emphasis on tourism opportunities and aesthetic appeal, not on the conservation of large-scale ecosystems (they would fall more into the Category V, *protected landscape*, or Category VI, *protected area with sustainable use of natural resources*). Furthermore, certain tourist sites in China include the term "national park" in their naming, but their meaning deviates significantly from the internationally accepted terminology. An example of this is the Sun River National Park in Yunnan Province, which is fundamentally a zoo providing visitors with "natural experience" with animals.

After two failed local attempts of establishing national parks, the idea of creating a national park system from a top-down approach was later revisited by the central Chinese government (Wang, 2019; Xu et al., 2019; Zhong & Xiao, 2017). In 2015, the Chinese government first discussed the need for creating a new protected area, namely national parks, as part of the Communist Party's Integrated Reform Plan for Promoting Ecological Progress, which

outlined the key strategies and goals for addressing environmental challenges and promoting sustainable development in China. In 2017, China's National Development and Reform Commission published the *Pilot Plan for Establishing [a] National Park System*, which was later refined as the *Overall Plan for Establishing [a] National Park System (the Plan)* by the General Office of the Chinese Communist Party.

The *Overall Plan* creates several specific reequipments. One is to establish a unified administrative system with clear demarcation of responsibilities, meaning that the jurisdiction and management of national parks is the responsibility of one department. Therefore, a National Park Administration (NPA) was also created at the national level to administer national parks. This agency acts through the National Forestry and Grassland Administration (NFGA, renamed from National Forestry Administration in 2018), which is a subdivision in the Ministry of Natural Resources. The plan also established a new type of protected area, i.e., national parks, that are compatible with the internationally recognized standard put forth by the IUCN.

According to the plan, the primary goal of Chinese national parks is to protect natural and cultural resources to be shared and enjoyed by all generations. As of February 2019, 11 pilot national parks had been created, geographically spanning 13 provinces. Some basic information each pilot national parks is given in the Table II-2 below. These pilot parks were transformed from previously existing PAs. According to the State Council (2017), China plans to establish a total of 60 official national parks by 2035.

Table II-2 Profile of the pilot national parks in China.

Name (Province)	**Province/City ***	**Est. Date**	**Acreage (mi^2)**	**Land ownership[1]**
Three River Source National Park	Qinghai	March 2016	47529	100%; 0%

Wuyi Mountain National Park	Fujian	March 2016	379	28.7%; 71.3%
Shennongjia National Park	Hubei	May 2016	452	85.8%; 14.2%
Zhejiang Qianjiangyuan National Park	Zhejiang	July 2016	97	-
South Mountain National Park	Hunan	August 2016	246	41.5%; 58.5%
Potatso National Park	Yunnan	October 2016	232	78.1%; 21.9%
Northeastern China Tiger and Leopard National Park	Jilin & Heilongjiang	December 2016	5637	-
Great Wall National Park	Beijing*	January 2017	23	50.6%; 49.4%
Giant Panda National Park	Sichuan, Shaanxi, & Gansu	January 2017	10425	-
Qilian Mountains National Park	Gansu & Qinghai	June 2017	19305	-
Tropical Rain Forest National Park	Hainan	January 2019	16988	-

[1] *state-owned v. collective-owned; source: Huang et al., 2018*

Comparison of National Park Systems in China and the U.S.

Management Structures

The United States National Park System is administered by the National Park Service (USNPS), which is a bureau of the United States Department of the Interior. It was established by the Organic Act of August 25, 1916, to manage 14 national parks and 21 national monuments at that time. The USNPS has since expanded to manage 423 units, covering more than 85 million acres of land, for their natural, cultural, and recreational importance. It currently employs over 19,000 full-time staff and manages nearly 279,000 volunteers (NPS, 2019). The director of USNPS oversees the Equal Employment Opportunity Office, Chief of Staff, and three deputy directors who are responsible for congressional and external relations, management, and administration (See Figure II-2).

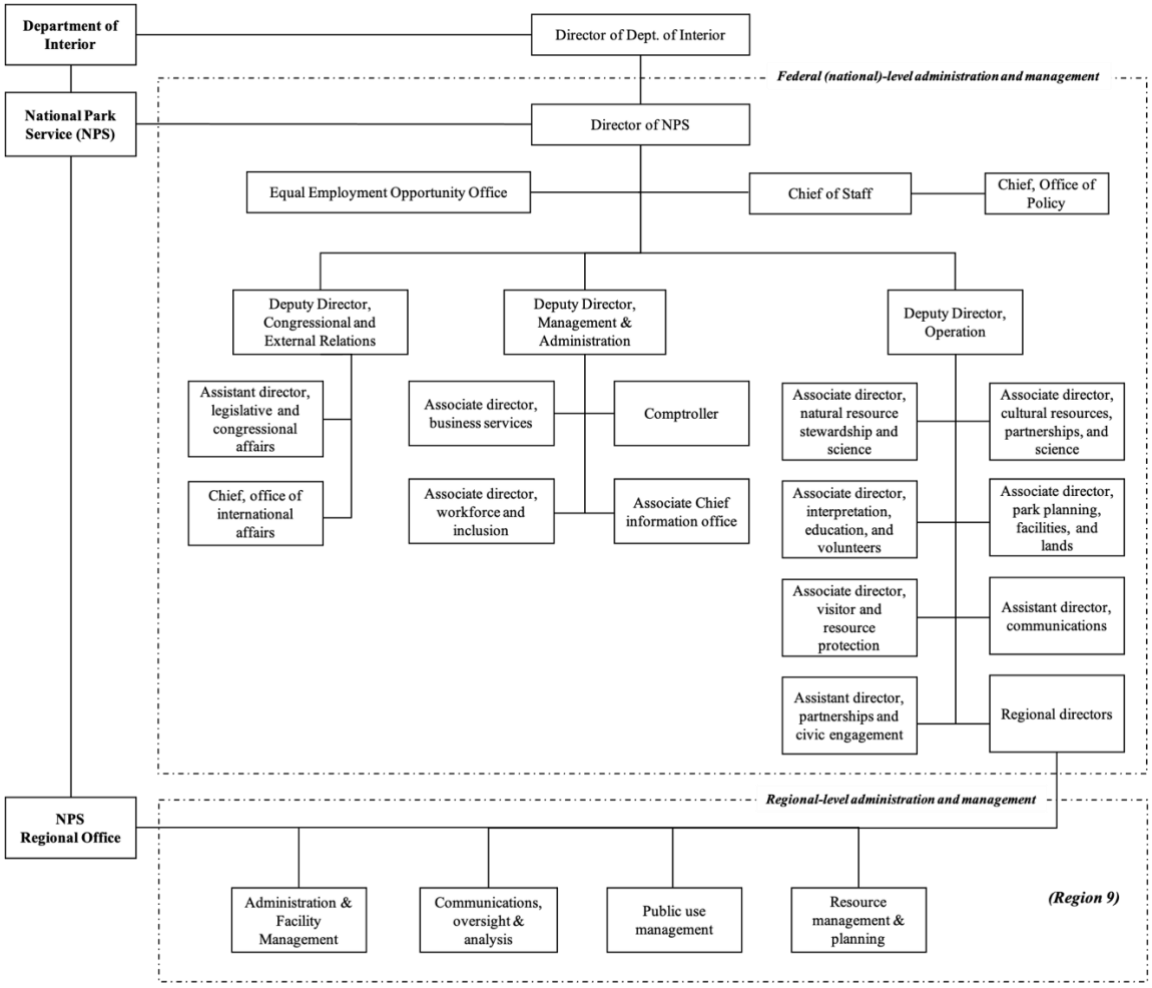

Figure II-2 *Organizational structure of U.S. National Park Service (USNPS; adapted from USNPS website; use Region 9 as an example for regional offices)*

The USNPS divides its management areas into 12 regions (see Table II-2 below). These regional divisions directly manage all the NPS units within their areas of jurisdiction. The division of region 9 (Columbia-Pacific Northwest), for example, sets four additional local offices responsible for administration & facility management, communications and oversight & analysis, public use management, and resource management and planning.

Table II-3 List of US National Park Service regional divisions.

Region	States	Examples for NPS units[1]
1, North Atlantic-Appalachian	Kentucky, West Virginia, Virginia, Pennsylvania, Maryland, Delaware, New Jersey, Connecticut, New York, Massachusetts, New Hampshire, Maine, Vermont, Rhode Island, DC.	Shenandoah NP Washington Monument African American Civil War Memorial NM
2, South Atlantic-Gulf	Tennessee, Alabama, Georgia, South Carolina, North Carolina, Florida	Great Smoky Mountain NP. Everglades NP.
3, Great Lakes	Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio	Cuyahoga Valley NP. Voyageurs NP.
4, Mississippi-Basin	Iowa, Missouri, Arkansas, Louisiana, Mississippi	Hot Springs NP Ozark NSR
5, Missouri-Basin	Montana, North Dakota, South Dakota, Nebraska, Kansas	Glacier NP. Badlands NP.
6, Arkansas-Rio Grande-Texas-Gulf	Texas, Oklahoma	Big Bend NP. Washita Battlefield NHS
7, Upper Colorado-Basin	Utah, Wyoming, Colorado, New Mexico	Rocky Mountain NP. Yellowstone NP Zion NP
8, Lower Colorado-Basin	(Lower) California, Arizona	Saguaro NP Joshua Tree NP Grand Canyon NP.
9, Columbia-Pacific Northwest	Washington, Oregon, Idaho	Mount Rainier NP Olympic NP.
10, California-Great-Basin	(Upper) California, Nevada,	Yosemite NP. Great basin NP.
11, Alaska	Alaska	Denali NP.
12, Pacific Islands	Hawaii, Guam, American Samoa, Puerto Rico, Virgin Islands	Virgin Islands NP. Hawaii Volcanoes NP.

[1] *Abbreviation: NP. – National Park; NM – National Monument; NSR – National Scenic River/Riverway; NHS – National Historic Sites*

In contrast to the USNPS, China's new established National Park System is administered by the Chinese National Park Administration (CNPA), which was established in 2016 and acts through National Forestry and Grassland Administration, a part of China's Ministry of Natural Resources. CNPA is divided into 11 local National Park Administration Agencies that administer each of the individual pilot parks (See Table II-4; e.g., Shennongjia Pilot National Park is administered by the Shennongjia National Park Administration, a subdivision of CNPA).

Based on the relationship between central CNPA and local CNPA offices and park authority, Zhang and Sun (2021) identified three types of management models currently adopted

by the 11 pilot national parks: 1) *direct* management by the central government; 2) *joint management* by the central and provincial governments; 3) and *delegated* management (i.e., provincial governments act on behalf of the central government to manage the national park). Among the pilot parks, only the Northeast Tiger and Leopard National Park is under direct central management; the Giant Panda and Qilian Mountains National Parks are jointly managed by the central and provincial governments; and the rest of the pilot parks are entrusted to provincial governments for management.

Table II-4 Profile of management structure of pilot national parks in China (as of 2021).

Name (Province)	**Management agency**	**Management model** [1]	**Delegated government**
Three River Source National Park (Qinghai)	Three river source national park administration	Delegated	Qinghai provincial government
Wuyi Mountain National Park (Fujian)	Wuyi mountain national park administration	Delegated	Fujian provincial government
Shennongjia National Park (Hubei)	Shennongjia national park administration	Delegated	Hubei provincial government
Zhejiang Qianjiangyuan National Park (Zhejiang)	Qianjiangyuan national park administration	Delegated	Zhejiang provincial government
South Mountain National Park (Hunan)	South mountain national park administration	Delegated	Hunan provincial government
Potatso National Park (Yunnan)	Potatso national park administration	Delegated	Yunnan provincial government
Northeastern China Tiger and Leopard National Park (Jilin and Heilongjiang)	Northwestern Chinese tiger and leopard national park administration	Direct	-
Great Wall National Park (Beijing)	Great wall national park administration	Delegated	Beijing city government
Giant Panda National Park (Sichuan, Shaanxi, and Gansu)	Giant panda national park administration	Joint	-
Qilian Mountains National Park (Gansu and Qinghai)	Qilian mountain national administration	Joint	-

Tropical Rain Forest National Park (Hainan)	Tropical rain forest national park administration	Delegated	Hainan provincial government

[1] *management model: direct — direct management by central government; joint — joint management by both central and local government; delegated — delegated unit (usually provincial government) act on behalf of central government.*

Figure II-3 below demonstrated the organizational structure of Shennongjia (pilot) National Park, which is an example the delegated management model.

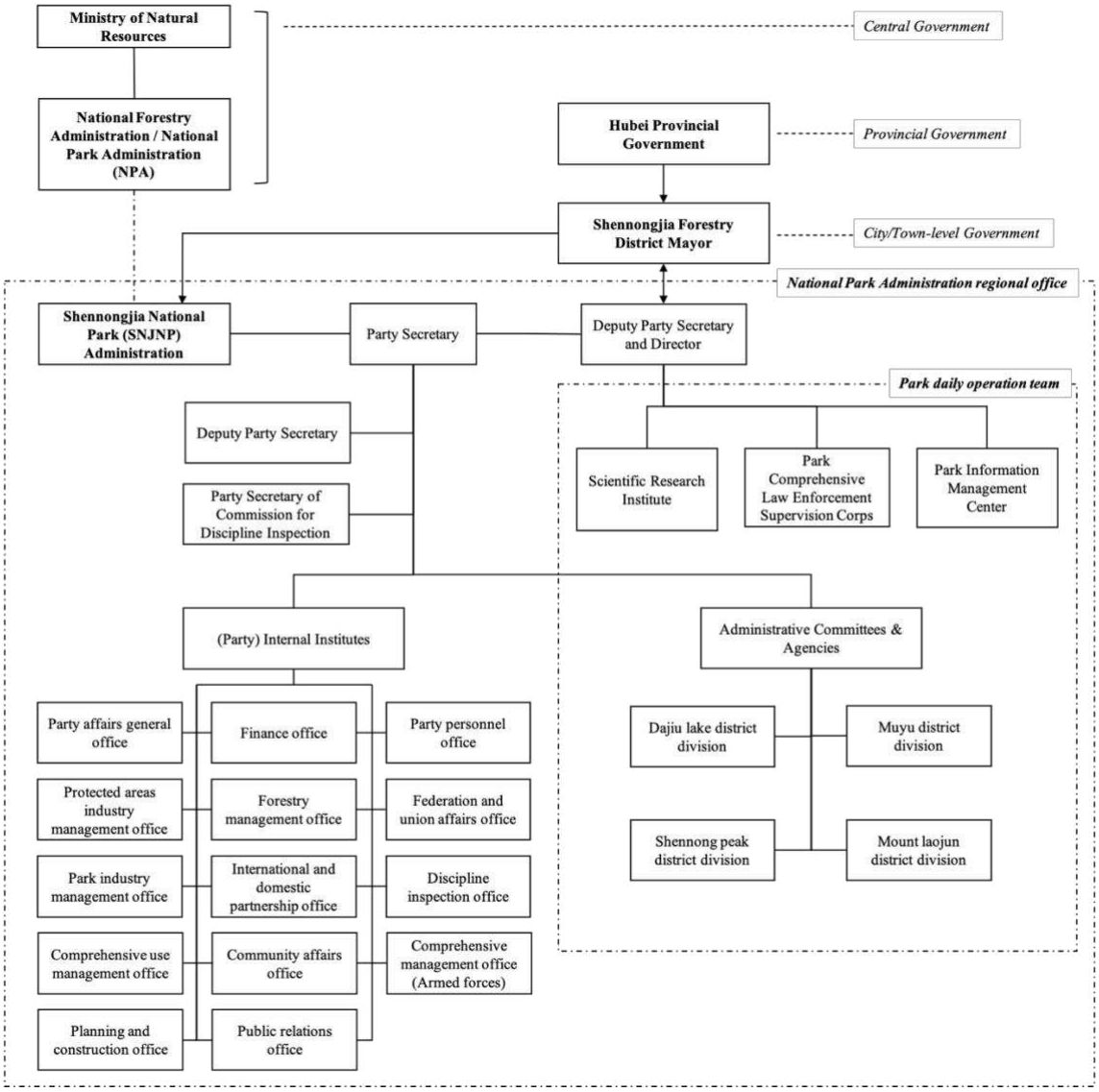

Figure II-3 *Organizational structure of Shennongjia (Pilot) National Park Administration in China*

Funding Mechanisms

The USNPS is primarily funded by the United States Congress through annual discretionary appropriations, which account for approximately 80% of each year's budget (National Park Service, 2019). In addition, it received funding from other sources, including park entrance fees, donations, concession franchise fees, some congressionally chartered philanthropic partners (such as the National Park Foundation), among other sources. The USNPS received congressional appropriation for nearly $3.35 billion USD and $0.77 billion USD from other funding sources in 2019. In general, congressional appropriations toward the USNPS have increased gradually over the past decade, with a downward tendency from 2010 to 2013 but growth since then. The funding reductions reflected the United States park system's relatively stable management of acreage and a 14% decrease in staffing levels. According to National Park Service (2019), it established 32 new units since 2010. A majority of the funds (approximately 75%) were allocated to support the day-to-day operations of the National Park System, such as visitor services, resource stewardship, park protection (i.e., law enforcement programs and public health operations), facility operations and maintenance, park support (National Park Service, 2019).

Comparatively, our review of the literature indicates that China's pilot NPs primarily received funding from the provincial government. In Shennongjia (pilot) NP, 58% of the funding sourced from various provincial appropriation accounts compares to 42% from the national CNPA appropriation. Also, national parks in China are divided into zones based on management objectives and resource characteristics. The zoning varies among parks but generally include a core protection zone, featuring strict protection to the ecosystem and biodiversity with prohibited

public access. Table II-4 below demonstrates a comparison of the management structure and funding mechanism of national park system in China and the United States.

Table II-5 Comparison of management structure and funding mechanism of national park systems in China and United States.

	United States	**China**
Year, first National Park	1872, Yellowstone National Park	2016, Sanjiangyuan (pilot) National Park
Governance body	National Park Service (Department of Interior); 12 regional divisions	National Park Administration / National Forestry and Grassland Administration), Ministry of Natural Resources; 11 regional divisions
Units	429 units, including 63 national parks	11 pilot national parks
Land Tenure/Ownership	NPS (95.3% public; 4.7% non-public lands) [1]	Mix of state-owned and collective-owned lands
Designation	Congress	National Forestry and Grassland Administration
Zoning	Park areas are divided into distinct zones based on management objectives, desired resource, and visitor experience conditions, but zoning differs in each park	Park areas are divided into distinct zones based on management objectives and resources characteristic, but zoning differs in each park
Employee/Staff	19,114 (e.g., Mount Rainier NP: park base FTE 89; total FTE 209)	CNPA data unknown; e.g., Shennongjia NP: 358
Funding sources	Congressional appropriation (80%); other sources	primarily funded by provincial government (~approximately 50-60%); other sources (national appropriations, park entry fees, concessions, etc.)

[1] 2019 data, National Park Service annual acreage report, available at *https://www.nps.gov/subjects/lwcf/acreagereports.htm*

Tourism (and Visitor) Management Approaches

Tourism played a quintessential role in the United States National Park System. Since the establishment of Yellowstone National Park in 1872, railroad companies and lodging operators have been transporting visitors to the park and its gateway communities. According to Frost and

Hall (2014), the Yellowstone model imprinted a strong pattern on the development of the United States National Park System where it emphasizes that "the natural wonders and monumental scenery are preserved for visitors to enjoy…and the national park is established to manage these tourism flows and prevent the inappropriate tourism developments that have occurred elsewhere (p.28)." In the early stages of the USNPS after it was formed in 1916 through the Organic Act, tourism and visitor management was primarily focused on public engagement and outreach to promote parks and provide necessary information for travelers. The USNPS established the *NPS Tourism Program,* and it coordinated with domestic and international travel sectors to promote tourism and facilitated regional USNPS units with park planning, commercial services, and interpretation.

Now, National Parks are key motivators for tourism within and to the United States and have been widely acknowledged by advocates as one of United States' preeminent innovations that can be shared with the global community. Within the United States, the establishment of National Parks serves as a pivotal element of a broader conservation endeavor that aims to safeguard the natural resources and ecosystems. Furthermore, National Parks are considered one of the most significant avenues for educating the public on the importance of preserving the planet's ecological systems. In terms of popularity, National Parks are the foremost tourist destination in the United States, attracting both domestic and international visitors. The USNPS recorded 327 million recreation visits in 2019, representing an increase of 9 million from the preceding year. Due to the impact of COVID-19, the visitation to national parks in the United States dropped to 237 million in 2020, but quickly recovered to 297 million in 2021, which is a similar level to 2014. These visits serve as an opportunity for the public to appreciate natural landscapes and to recognize the criticality of protecting the world's natural resources. In addition

to public outreach, the USNPS tourism offices also collaborate with industry and community partners to guide sustainable and responsible tourism, through effective visitor and use planning. The USNPS, along with five other federal agencies — the Bureau of Land Management, the United States Forest Service, the National Oceanic and Atmospheric Administration, the United States Army Corps of Engineers, and the United States Fish and Wildlife Service — jointly formed the Interagency Visitor Use Management Council (IVUMC) and developed the *Visitor Use Management (VUM)* model to provide science-based visitor use planning on federal lands and waters across the board.

Similarly, tourism is also paramount in China's protected areas and the National Park System (CNPS). The early history of protected area management in China indicates a utilitarian tendency, where parks were often considered wasteland that could be made productive through the creation of tourism opportunities. Most of China's protected areas were originally created not to conserve the entire landscape, but to provide a degree of protection for scenic areas with commercial tourism significance, ultimately to improve local livelihoods and promote economic development. The establishment of CNPS marks the creation of a new type of protected area, designed for dual management objectives of environmental protection and the provision of recreational opportunities. Also, all the current pilot national parks have been converted from pre-existing protected areas, like Shennongjia (pilot) National Park, which was formerly Shennongjia National Scenic Area and Shennongjia National Forest Park. These pilot national parks are famous for nature-based tourism and have a long history of attracting large number of visitors each year.

However, the word 'tourism" and "recreation" rarely appeared in government planning reports in the early proposal phase of establishing the CNPS. As the *Overall Plan* states,

"…national park is a specific land or marine area approved by the state and managed by the state, with clear boundaries, with the main purpose of protecting large areas of natural ecosystems that are representative of the state and achieving scientific conservation and rational use of natural resources… (para. 3)" Pilot national parks were later redefined by Chinese central government to carry tourism and recreation functions but little details on how these activities should be operated within the park, such as how to manage sustainable tourism, allocation of tourism revenue, criteria for building tourism-related facilities, regulations, and policies for concession, etc. Essential tourism and visitor use planning still remain unclear for CNPS (Ma & Li, 2017; Wang & Su, 2015).

We further conducted a review of the planning reports of each individual pilot national parks. Our review indicated eight of the eleven national parks had updated management plans that consist of environmental impact assessment plan, interpretation and environmental education programs, as well as visitor experience management plan. Environmental education programs offered by China's pilot national parks encompasses a wide range of scope and goals, including promotion of environmentally responsible behavior (ERB) among tourists and environmental knowledge education through visitor center, museums, and ecological experience sites. These environmental education programs emphasize the region's unique characteristics including its history, culture, indigenous communities, scenery, and biodiversity. In addition to targeting tourists, various programs are designed to provide trainings for park professionals and residents/villagers. Through this approach, CNPS seeks to raise awareness of environmental consciousness among tourists, build capacities, and enhance sustainable development by building a mutually beneficial relationship with residents/villagers.

Discussion

Our comparative discussion demonstrated that tourism plays a crucial role in the establishment and development of national parks in United States and China. The United States National Park Service (USNPS) has developed the most comprehensive visitor management policy that is well coordinated into its overall management plan. Furthermore, the USNPS demonstrates a successful cross-agency collaboration with the formation of an Interagency Visitor Use Management Council, which comprises six major federal natural resources agencies to provide a consistent, science-based visitor management framework applicable to all of them and supported by communication and training strategies. However, in China, the planning for tourism and visitor management is not well articulated in the visions and management objectives for national parks. As a result, new forms of outdoor recreation opportunities and effective visitor management may not be clearly understood or accommodated by park managers. This highlights the lack of a comprehensive strategic visitor management planning across the Chinese pilot national parks.

I highlight the importance of promoting environmentally responsible behavior among park visitors for long-term sustainability of national parks. In both United States and China, national park management authorities have recognized the importance of educating visitors on how to minimize their impact on the environment. In the United States, the USNPS has developed a comprehensive environmental education program that includes interpretive talks, guided tours, and interactive exhibits aimed at educating visitors on the importance of responsible behavior. Similarly, China's pilot national parks have developed a range of environmental education programs that aim to promote environmentally responsible behavior among tourists. Yet, simply providing environmental education programs may not be enough to change visitor behavior. Additional policies and measures that encourage and incentivize

environmentally responsible behavior should be considered. For example, the USNPS has introduced a "Leave No Trace" program that provides visitors with practical tips on how to minimize their impact on the environment. In addition, some United States national parks have introduced permit systems that limit the number of visitors allowed in certain areas in order to minimize the impact on sensitive ecosystems.

Overall, promoting environmentally responsible behavior among park visitors requires a multifaceted approach that includes environmental education, policy implementation, and community engagement. By working together to implement these strategies, national park management authorities can help ensure the long-term sustainability of these important natural areas.

CHAPTER III: MEASURING ENVIRONMENTALLY RESPONSIBLE BEHAVIOR IN NATIONAL PARKS IN THE UNITED STATES AND CHINA

Introduction

Visitations to national parks can post negative environmental impacts, such as ecological degradation, loss of wildlife habitat, trampling of vegetation, and reduced biodiversity (Dudley, 2008; Eagles & McCool, 2002; Marion & Reid, 2007; Ranaweerage et al., 2015). Fostering environmentally responsible behavior (ERB) among park visitors is considered as an effective approach to mitigate these human-induced impacts to national park ecology (Ajuhari et al., 2016; Bamberg & Möser, 2007; Dolnicar & Leisch, 2008; T. Huang et al., 2018; Hungerford & Volk, 1990; Kaiser et al., 1999b; Moser, 2015). ERB is described as an action which does not damage the environment and may contribute to environmental sustainability (Bamberg & Möser, 2007; Lee et al., 2013). Encouraging visitors to participate in various ERBs, such as litter removal, cleaning up after picnics, and staying on designated trails, are essential ways to enhance the sustainability of a national park (Ajuhari et al., 2016; Brown et al., 2010; Goh, 2020; Markle, 2013). These practices can subsequently lead to improved environmental outcomes and foster nature stewardship among the park visitors, ultimately contributing to a more sustainable society (Eagles & McCool, 2002; Halpenny, 2010; Ramkissoon et al., 2012). Over the years, understanding ERB in national parks context has attracted considerable research attention. Many studies have empirically examined various aspects of ERB and the potential influencing factors that may lead to the formation of ERB among park visitors (Goh et al., 2017; Halpenny, 2010; M.-S. Kim et al., 2018; Lawhon et al., 2013; Mallick & Driessen, 2003).

However, limited research exists that examines ERB in protected areas across cultures, despite the continually growing popularity of national parks worldwide (Budruk, 2010; Esfandiar et al., 2022; Milfont et al., 2016; Milfont et al., 2010). My literature review shows there are discrepancies among studies in understanding ERB. For example, some researchers frequently treated ERB as a single dimensional construct, such as picking wildflower, feeding wild animals. Off-leash/on-leash dog walking, and movement of firewood for camping, etc. A growing body of studies in recent years support have empirically examined and confirmed the multidimensionality of ERB. Nonetheless, there is still an absence of a commonly adopted metric to capture ERB's diverse facets among the national park visitors. Furthermore, the majority of existing scales were developed in Western contexts, specifically countries like the United States, Australia, and Canada, which pioneered national parks systems (Punzo et al., 2019; Tam & Chan, 2017). This raises questions about the extent to which findings from Western-centric research are applicable to other cultural settings. A major concern is whether the conceptual structure of ERB remains consistent across multiple cultural contexts. Given the differences in how national parks operate around the world (Eagles & McCool, 2002; Frost & Hall, 2009), interpretations of what constitutes ERB may vary significantly among park visitors in different countries.

Additionally, researcher frequently caution that questionnaires developed within Western contexts for English-speaking respondents may fail to keep their original meaning when translated into other languages (Chen, 2008). This may result from systematic biases in non-English speakers' response to conceptual and linguistic differences (Dimanche, 2011; Vijver & Leung, 1997). Failure in establishing equivalence, i.e., cross-cultural comparability, can lead to cultural bias and cultural attribution fallacy (Beins, 2019; Dimanche, 2011; Morren & Grinstein,

2016; Tran, 2009). Hence, it is important to develop a reliable and psychometrically validated behavioral scale that can yield meaningful and comparable findings from different cultural contexts (Lange & Dewitte, 2019).

To the best of my knowledge, despite the importance of recognizing cross-cultural differences in scale interpretation, no empirical research has examined the multiple dimensions of ERB in a cross-cultural comparative perspective, which presents a significant knowledge gap. Addressing this gap, this study developed and validated a multidimensional ERB scale aimed at enabling sound comparisons between national parks in the United States and China. First, a brief review of the conceptualization of ERB, including the measurement of ERB in the context of nature-based tourism and the existing evidence of cross-cultural ERB research is presented. Then a more detailed overview of the concept of measurement invariance is provided. Finally, the analysis and results of the current study is described, concluding with a discussion of the results and their implications for future ERB research.

Literature Review

Conceptualizing Environmentally Responsible Behavior for National Park Visitors

The concept of environmentally responsible behavior (ERB) has gained extensive attention in the past few decades by social science researchers. It has been described as "behavior that harms the environment as little as possible, or even benefits the environment" (Steg & Vlek, 2009a, p. 309); and "efforts that minimize the negative impact of one's actions on the natural and built world" (Kollmuss & Agyeman, 2002, p. 240). It is seen to occur when an individual or group aims "to do what is right to help protect the environment in general daily practice" (Cottrell, 2003, p. 356). Other terms in the literature are seen to be interchangeable with ERB,

such as “pro-environmental behavior” (Bamberg & Möser, 2007a; Han, 2015; Kollmuss & Agyeman, 2002; Larson et al., 2015; Steg & Vlek, 2009; Stern et al., 1995); “environmental supportive behaviors” (Kennedy et al., 2009), “sustainable behavior” (Meijers & Stapel, 2011), “sustainable tourist behavior” (Juvan & Dolnicar, 2016), “environmentally concerned behavior” (Axelrod & Lehman, 1993), “ecological behaviors” (Kaiser, 1998; Kaiser & Shimoda, 1999), “environmental significant behavior” (Nordlund & Garvill, 2002b), “green consumer behavior” (H. Han, 2015), and “conservation behavior” (Schultz, Gouveia, Cameron, Tankha, Schmuck, & Franek, 2005).

ERB in national parks is theoretically and empirically tested to differ from the general ERB that individuals perform in their daily life, such as recycling or reduced energy use behavior when at home or at work (Barr et al., 2010; Esfandiar et al., 2022; Halpenny, 2010; Zhang et al., 2014). Context and situational factors are crucial in motivating individuals’ environmental behavior (Harland et al., 2007; Steg et al., 2014; J. Vaske et al., 2015). People might be comfortable engaging in environmentally responsible behavior when at home, but less so when they are on vacation (Barr et al., 2010; Xu et al., 2020). Empirical studies also revealed ERB in national parks and/or protected areas are affected by some factors such as place attachment, connectedness to nature and environmental identity, etc., that are absent in a work or home setting (Lawhon et al., 2013; Ramkissoon et al., 2012; Wan et al., 2014). In this study, we define environmentally responsible behavior as the *efforts that minimize the negative impacts of visitors’ actions during their visits to national parks.*

Measuring ERB Across Cultures

Our review of the existing literature found no standardized measurement scales capturing ERB of visitors in national parks and protected areas. Some studies focused on examining a

specific aspect of ERB, i.e., treating ERB a single-dimensional construct, such as wildlife preservation voting intention (Vaske & Donnelly, 1999), picking flowers in forested areas (Chang, 2010), collecting flora and fauna specimens (Alessa et al., 2003), walking off-trail in national parks (Goh et al., 2017), and getting close to wildlife (Verbos et al., 2018), among others.

Recently, a growing body literature has theoretically and empirically tested ERB as a multi-dimensional construct that consists of various subsets (Chiu et al., 2014; Halpenny, 2010; Huang et al., 2018; Landon et al., 2018; Larson et al., 2015; Lee et al., 2013; Lee & Jan, 2018; Ramkissoon et al., 2012). According to Larson et al., (2015), ERB can be influenced by different motives depending on the type of behaviors and the difficulty level of carrying out these behavior. Lee et al. (2013) identified three subsets of ERB based on nature-based visitors in a rural community in Taiwan, namely, the sustainable behavior (i.e., proactive ecological preservation behavior while travelling), pro-environmental behavior (i.e., voluntary behavior, such as choosing eco-friendly products or voluntarily visit a site less), and environmentally friendly behavior (i.e., compliance with sustainable behavior while travelling). In a study using a panel of travelers from the United States, Landon et al., (2018) extended ERB to include visitor impacts on local economies and communities. They categorized ERB as eco-behavior (individual actions that mitigate direct environmental impacts, e.g., recycling and reducing water use), localism (locally beneficial behaviors, e.g., staying at locally owned accommodations and eating locally sourced food), and willingness to sacrifice (willingness to incur greater costs or longer travel time to choose sustainable goods and services).

Some studies have examined ERB in a high-/low-cost sphere, which is associated with individual's time, money or comfort spent on doing the behavior. Related to this, Ramkissoon et

al. (2013) categorized the low-effort and high-effort ERB based on the degree of commitment and involvement of visitors in a national park setting. Low-effort ERB reflects compliance and more relaxed behavior of visitors to safeguard and improve a destinations' resources, such as "do not feed animals" or "picking up litter left by other visitors". High-effort ERB represents a stronger commitment to and more active participation in actions that protect and enhance a destination's environment. It indicates a willingness to fully engage in activities that contribute to biodiversity and sustainability of a destination by contributing time and efforts. Some of the items include "volunteer to work in projects that help this park" and "write letters in support of this national park". However, Esfandiar et al., (2022) pointed out that concepts of time, effort, and money are defined differently among societies. Therefore, before further classifying high-/low-cost to study ERB, there is a need for a more precise definition of what is meant by "cost".

Another recent focus of ERB research is the studies on antecedents of non-compliant or destructive behavior. Understanding why individuals engage in environmentally harmful behavior is crucial for developing effective interventions to promote ERB. Studies have attempted to empirically test off-leash dog walking (Bowes et al., 2017), flower-picking (Chang, 2010), proximity for wildlife viewing (Verbos et al., 2018), off-trail walking (Goh et al., 2017), littering (Brown et al., 2010), and wildlife feeding (Mallick & Driessen, 2003; Marion et al., 2008). Goh (2020) suggested that future research on non-compliant behaviors should be considered with the inclusion of other destructive behavior and settings, such as illegal camping, wood movement for illegal campfires, etc.

During my literature review on Chinese peer-reviewed articles, I noted cultural variations in defining the potential domains of ERB. For example, due to the differences in political environment, Chinese literature on ERB did not include items such as "voting for candidates

who support environmental initiatives", or "donate to conservation campaigns". Volunteer programs and outreach services are not commonly seen in national parks and protected areas in China, so items such as "participating in volunteer activities to help the park" are less frequently included in the measures. Additionally, I also noticed that Chinese articles often include items such as "persuade others not to litter", "pick up litters left by others", and "report destructive behaviors to park managers" (Cheng & Wu, 2015; Huang et al., 2018; Xu et al., 2019; Zhang et al., 2014). For example, in a study focused on visitors to Jiuzhaigou National Forest Park, Wan et al., (2014) categorized ERB as compliance-oriented and pro-active behavior. The former emphasized adherence to park rules and guidelines (e.g., properly dispose garbage while travelling, etc.), while the latter focused on high-effort behaviors such as persuading others not to litter, and picking up trash left by others.

A majority of the existing literature utilized self-reported surveys to measure behavioral intention, a method widely adopted by researcher owing to its cost-effectiveness and ease of use (Pisano & Lubell, 2017; Tam & Chan, 2017). Behavioral intention has been shown to be a good predictor of future actions (Ajzen & Fishbein, 1980; Kraus, 1995) and have strong correlation with the actual behavior (Kormos & Gifford, 2014). Given the objectives of encouraging future environmentally responsible behavior, this study focused on using self-reported surveys to assess behavioral intention rather than actual behaviors.

Moreover, in the existing literature, very few attempts have been made to develop a valid ERB measurement scale from cross-cultural perspective. Psychological constructs are highly dependent on the cultural context as culture may affect people's attitudes, behaviors, as well as how they respond to surveys and research (Chen, 2008; Dimanche, 2011; Ember & Ember, 2009). In a cross-cultural setting, it may be inappropriate to adopt an instrument developed

elsewhere because it is much more likely that the instrument will not elicit equivalent responses due to the differences in factors resulting from context, culture, and language. The comparability of cross-cultural data is subject to translation accuracy, success of items being measured to capture the same concept across culture, different culturally-driven response styles, and the different performance in social desirability level across cultural groups (Chen, 2008). Lack of equivalence (comparability) of the psychological assessment in the cross-cultural studies can lead to cultural bias (Vijver & Leung, 1997). Hence, ensuring equivalence — where the data collected from the studies are comparable and the findings can be interpreted in the same way for two individuals from different cultures — is fundamental for cross-cultural research (Budruk, 2010; Vandenberg & Lance, 2000).

Cross-Cultural Comparability and Measurement Invariance

For a questionnaire to be considered equivalent among cultural groups, scholars should establish linguistic and measurement invariance of the scales first before proceeding to statitsical comparison (Brown et al., 2017; Milfont & Fischer, 2010; Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000; Vijver & Leung, 1997). Back-translation is commonly and widely utilized in many cross-cultural research to increase the validity of a translation (Tran, 2009). It involves a procedure of bilingual translator(s)/researcher(s) translate the survey from original language to another, then have other translator(s) "back-translate" the survey to the original language.

Furthermore, researchers frequently use multi-group confirmatory factor analysis (MGCFA) to test measurement equivalence across cultures (Budruk, 2010; Meredith, 1993; Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). MGCFA tests a sequence of invariance — configural invariance (assuming the same factor structure of the proposed

construct across groups), metric invariance (assuming the same factor loadings across groups), scalar invariance (assuming the same item intercepts across groups), and error variance invariance (assuming the same error variance across groups, also known as the strict invariance model) (Milfont & Fischer, 2010). MGCFA investigates whether the factor loadings, intercepts and error variances of a given model are equal across groups. This method involves testing observed structure in two or more samples by assessing nested models that are organized in a hierarchical order with parameter constraints added one at a time. By constraining parameters of nested models, researchers can test the incremental fit indices between the unconstrained model with the models having constrained parameters. Because each new model is nested in the previous model with an added restriction on one of the parameters (factor loadings, intercepts, etc.), researchers can test the incremental fit indices between the unconstrained model and the nested model to examine whether the proposed factor structure reached a higher level of invariance across groups.

Configural invariance is typically the first step to establish measurement invariance and can be tested by running individual CFAs in each group and check the model fit indices for the baseline model in the MGCFA analysis results. The baseline model in MGCFA is tested by constraining the factorial structure to be the same across groups. Once configural invariance is achieved, a second model constraining all factor loadings to be the same across groups is tested. At this point, the researcher should check the incremental model fit indices between the baseline model and the second constrained model to determine whether metric invariance is satisfied, where observed scores of the items can be compared across groups and the item differences will indicate group differences in the underlying latent construct at this level. It is suggested that at least partial metric invariance should be established before continuing the sequence of tests.

Method

Initial Scale Development Process

This study has followed DeVellis' (2012) scale development guidelines to develop the measurement scale for ERB:

A literature review was first conducted to extract ERB for national park visitors. Keywords like "environmentally responsible behavior", "eco-friendly behavior", "pro-environmental behavior", "environmentally significant behavior", "conservation behavior" were entered in both English and Chinese databases to search articles published between 1980 and 2018. A total of 34 preliminary behavioral items pool were extracted during this phase.

Simultaneously, six semi-structured interviews, using the convenience sampling, were performed from March to June 2018, including two park staff, three outdoor enthusiasts recruited from an outdoor recreation forum, and one ecological interpreter. The interviews centered around discussions on the relatively important aspects of environmentally responsible behaviors when travelling in national parks. Results from these interviews were analyzed to identify emerging themes on the relatively important aspects of environmentally responsible behaviors when travelling in national parks, until content saturation. From the interview, 12 behavioral items were identified and added to the initial item pool.

Based on the above work, a further review of the extracted items was performed by examining the scientific evidence. Items that were redundant or lacking sufficient scientific evidence were eliminated. About 27 items were retained based on the interview results and were adapted from Lee et al. (2013), Goh et al. (2017), Landon et al. (2018), Larson et al. (2015), and Ramkisson et al.(2013), forming the preliminary item pool. Also, during this phase, I identified

three overarching themes in this phase to represent distinct behavioral domains of national park visitors' ERB: First dimension is *personal compliance behavior,* which aligns with the low-effort, compliance-oriented ERBs described by Ramkissoon et al. (2013). This behavioral domain entails following park rules and guidelines that require little effort or sacrifice from visitors, like staying on marked trails, proper disposal of trash, and avoiding wildlife disturbance. Measuring visitors' compliance provides insight into adherence to basic rules vital for park sustainability. Second, *persuasive behavior* captures park visitors' willingness to encourage ERB in other visitors through leading by example or voicing concerns. As Vesely and Klockner (2018) discussed in their multilevel study, social norms can be diffused horizontally through peer interactions and sustainably minded individuals persuading others in their group. This factor measures visitors' sense of personal responsibility to actively promote ERB, which also align with the high-effort ERB proposed by Ramkisson et al. (2013) and Wan et al. (2014). Finally, *destructive behavior* represents the environmentally harmful actions that should be strongly discouraged, such as littering, wildlife feeding, or taking natural artifacts from the park or protected area. These behaviors directly undermine conservation efforts, so understanding their predictors can inform deterrence strategies. As Goh et al. (2017) did in their park study, incorporating negative ERBs provides a more complete picture of sustainable visitor motivations and actions.

Following this, a small group of experts, including a faculty member and two graduate researchers with the focus in the relevant field, were selected to review the preliminary item pools. Expert reviewers were asked to evaluate each of items in regard to its relevancy, clarity, and conciseness to the construct. In all 27 items, 10 items were retained.

Measures

The measurement items was initially developed in English. Then, a back-translation was conducted to develop the Chinese survey to ensure cross-cultural comparability and linguistic equivalence. Back translation entails a process wherein an instrument is translated to a different language from its original version, then translated back to the original language to assure equivalence in item meanings between the two surveys. The English survey was first translated to Chinese by the first translator. The Chinese survey was then translated back to English by the second translator, followed by comparison between both English surveys on the clarify and differences of the wordings. Both translators are bilingual speakers that has adequate understanding of the research aims and key research concepts to perform a valid translation. Following Tran (2009)'s suggestion, verbatim translation was avoided but the process emphasize the comparability of the concepts and ideas between the source and target languages. As the last procedure of the questionnaire development, a pilot test was conducted on a convenience sample of 10 respondents (4 American and 6 Chinese). Correction of wording, typo errors, and layout as well as removal of one item were also made from this process.

A three-factor nine-item scale, as shown in the appendix, were developed to capture ERB. All items were measured on a seven-point Likert scale based on respondents' self-reported likelihood of acting environmentally responsible while travelling (i.e., 1 = "not at all likely" to 7 = "very likely").

Study Sites and Data Collection

Data for this study were primarily obtained from self-administered intercept surveys distributed to visitors in national parks in China and the United States during the summer and fall of 2019 (late July to October). The Chinese sample was collected on-site in Shennongjia National Park, located in central Hubei province. Shennongjia National Park was historically

known as Shennongjia National Forest Park for its sole primeval forests in central China, as well as containing the habitats for a variety of endangered species. It was proclaimed in 2016 as one of the first 10 pilot national parks in China and has received over 15 million visits in 2018. To collect the survey data on-site, we recruited seven Chinese graduate students from Central China Normal University in Wuhan, Hubei Province. Although the Chinese university did not require IRB approval for the field survey study, all the Chinese research assistants completed a week-long research ethics and compliance training workshop offered through the university prior to the field visit. Park visitors were randomly selected at various sites at various times of the day to obtain a representative sample of nature-based visitors. For groups of visitors, one adult per group was asked to complete the survey. It took 15 to 20 minutes on average to complete a survey.

For the United States sample, surveys were delivered both onsite and online. The first survey was distributed on-site in the gateway communities near Mount Rainier National Park from September to December 2019. Located southeast of Seattle, Mount Rainier NP consists of various geographical landscapes, covering nearly 369 square miles of land. Mount Rainier NP is famous for its magnificent mountain scenery, offering a variety of outdoor recreation opportunities to its visitors, including hiking, rock climbing, snowshoeing, cross-country skiing, etc. A total of 227 surveys were collected during this phase. Due to the impact of the COVID-19 outbreak in the United States, data collection was suspended and moved online. In the second phase, a total of 34 surveys were distributed via Qualtrics to American participants who identified themselves having visited any American national parks within the previous six months. This online survey took place during May and June 2020. In all, 664 surveys were

collected for this study, including 403 Chinese surveys and 261 American surveys. There were no missing data in either of the samples.

Data Analysis

Data analysis began with descriptive statistics to explore the sample profile, plus several calculations designed to assess the reliability and construct validity of the ERB scale. Cronbach's alpha was calculated to determine the internal consistency of the three proposed ERB factors. Then, based upon the measurement invariance literature, this study followed procedures using multi-group confirmatory factor analysis to examine measurement equivalence, which are outlined below:

1. First, two confirmatory factor analyses (CFAs) were performed to determine if the proposed model fit the empirical data collected from each cultural group. Goodness-of-fit indices recommended by Milfont and Fischer (2010), and Hu and Bentler (1999) were examined to determine the degree to which the theoretical model was consistent with the empirical data. The indices and their thresholds that indicate a good model are: (1) a normed chi-square to degrees of freedom ratio (χ^2/df < 3:1) of 3:1 or less; (2) a goodness-of-fit index (GFI) close to or higher than .095; (3) a comparative fit index (CFI) close to or higher than .95; (4) a root mean squared error of approximation (RMSEA) close to or less than .06); and (5) a standardized root mean squared residual (SRMR) close to or less than .08. No error covariance was specified for the model.
2. To evaluate the measurement invariance of the proposed ERB scale across the two cultural groups, a multi-group confirmatory factor analysis (MGCFA) was conducted. This aims at examining if respondents use similar cognitive framework when

answering the items of if the items have different meanings across groups. In this analysis, a test of configural invariance across the American and Chinese samples was examined by checking the modification fit indices of the two separate CFA analyses and the configural model from the multi-group CFA analysis. Configural invariance is viewed as a starting point for more stringent invariance analyses. Following configural invariance analysis, metric invariance (same factor loadings across groups), scalar invariance (same item intercepts across groups), and error variance invariance (same error variance across groups, also known as the strict invariance) were also examined.

3. The last step is to examine the degree of invariance by comparing the modification indices of each nested model with the previous model. In this study, $\Delta\chi^2$ was used with a cut-off value of $\Delta CFA < .01$ to calculate measurement invariance between the two nested models (Cheung & Rensvold, 2002; T. Milfont & Fischer, 2010). There were no missing data in either of the samples.

Results

Descriptive, Reliability Results and Factor Loadings

As shown in Table III-1 below, the average Chinese national park visitor was 33.68 years old (SD = 14.27). About 53% (n=215) of the Chinese respondents were female. Comparatively, the American sample consisted of park visitors with an average age of 42.28 years old (SD = 16.67). About 54% (n=158) of the American respondents were female. In both samples, more than 8 of 10 respondents travelled with their families or friends (86.25% in American sample and 83.50% in Chinese sample).

Table III-1 Sample profile.

	United States (n=261)		China (n=403)	
	Mean (SD)	***Frequency (%)***	***Mean (SD)***	***Frequency (%)***
Gender	-	-	-	-
Female	-	158 (54.30)	-	215 (52.96)
Male	-	133 (45.70)	-	191 (47.04)
Age	42.28 (16.67)	-	33.68 (14.27)	-
Travel Type	-	-	-	-
Solo	-	29 (9.97)	-	21 (5.17)
With families or friends	-	251 (86.25)	-	339 (83.50)
With others	-	11 (3.78)	-	46 (11.33)

Table III-2 below demonstrate the mean, standard deviation, factor loading and the standard error of each of the indicator variables. Results of independent sample t-tests comparing the means of each variable and the factors were also reported in this table, which will be discussed in the results of measurement invariance section. Reliability coefficients (i.e., Cronbach's *alpha*) for the proposed factors ranged between .69 to .73 for the U.S. sample, and .61 to .80 for the Chinese sample, which are all within the acceptable range for adequate reliability (Cortina, 1993). Confirmatory factor analysis (CFA) was used to examine the convergent validity of the measurement model. The standardized factor loadings (i.e., λ) of the indicator variables on their hypothesized factors were all salient (i.e. >=.30; Brown, 2015). CFA on the entire sample (for better demonstration, this result is shown in Table III-3) reported acceptable model fit: $\chi^2 = 68.28$; $df = 22$; $\chi^2/df = 3.10$; RMSEA = .055, 90% CI [.040, .070]; SRMR = .038; CFI = .964; TLI: .941.

Table III-2 Reliability and confirmatory factor analysis results.

Factor/Items	United States			China			t-test
	Mean (SD)	λ (factor loading)	***SE***	***Mean (SD)***	***λ***	***SE***	
Personal compliance behavior	***α = .71***			***α = .61***			***.136***
Carefully read park instructions	5.53 (1.58)	0.57	0.15	5.88 (1.25)	0.63	0.04	3.253***
Not disturb wildlife or vegetation	6.00 (1.38)	0.78	0.10	5.86 (1.57)	0.65	0.04	-1.236
Leave the place in good condition after a picnic	6.51 (1.07)	0.73	0.06	6.33 (1.09)	0.79	0.04	-2.103*
Persuasive behavior	***α = .69***			***α = .80***			***-6.368******
Pick up litter left by others	5.49 (1.48)	0.63	0.15	4.75 (1.58)	0.73	0.02	-6.228
Tell others not to feed wildlife	4.44 (1.67)	0.61	0.19	4.51 (1.61)	0.87	0.03	.510
Report inappropriate behaviors to park rangers	5.16 (1.63)	0.72	0.18	3.90 (1.73)	0.77	0.03	-9.669
Destructive behavior	***α = .73***			***α = .67***			***-.374***
Hike off-trail and explore interesting areas	3.58 (1.84)	0.51	0.22	3.18 (1.83)	0.79	0.05	-2.838**
Feed the wildlife if they appear hungry	2.38 (1.74)	0.87	0.19	3.17 (1.72)	0.72	0.04	5.928
Pick a flower if it looks pretty	2.92 (1.79)	0.71	0.19	2.66 (1.61)	0.57	0.04	-2.057*

*p<.05; **p<0.01; ***p<0.001

Measurement Invariance

Following Milfont and Fischer's (2010) recommendation, three single-group CFAs on the combined model as well as each sample independently were conducted to examine whether the proposed three-factor structure fit both data sets well. The results of the separate CFAs, presented in Table III-3, reported generally acceptable to good model fit for the American sample ($\chi^2 = 26.85$; $df = 22$; $\chi^2/df = 1.22$; RMSEA = .028, 90% CI [.000, .059]; SRMR = .035; CFI = .993), for the Chinese sample ($\chi^2 = 57.26$; $df = 22$. $\chi^2/df = 2.630$; RMSEA = .063, 90% CI [0.043, 0.083]; SRMR = .046; CFI = .956), as well as the combined model (($\chi^2 = 68.283$; $df =$

22; χ^2/df = 3.103; RMSEA = .059, 90% CI [0.040, 0.070]; SRMR = .038; CFI = .964). This indicated that the three-factor model of visitor environmentally responsible behavior is supported in both samples.

Table III-3 Overall model fit indices.

Model	χ^2 (*df*)	χ^2/df	GFI	CFI	TLI	RMSEA	SRMR
Combined model							
U.S. and China	68.28 (22)	3.10	.998	.964	.941	.059	.038
Individual model							
United States	26.85 (22)	1.22	.998	.993	.989	.028	.035
China	57.27 (22)	2.60	.998	.956	.928	.063	.046

The next step was to move from single-group CFAs to cross-validate the ERB scale across the two samples. The model fit indices of each invariance model were examined using a multi-group CFA (MGCFA), demonstrated in Table III-4. This section of the table shows the results of the MGCFA analysis comparing the U.S. and Chinese samples. Model 1 represents the configural model, meaning that CFA was performed for two samples with no constraints on any parameters between the groups; that is, all factor loadings, item intercepts, and item errors were allowed to vary freely between both samples. Indices obtained suggested configural invariance was achieved with acceptable fit across both samples: χ^2 = 119.28, *df* = 50, χ^2 (*df*) = 2.39 GFI = .997; CFI = .954; TLI = .934; RMSEA = .068; SRMR = .069. As the configural invariance was supported, the metric invariance model (model 3) was then examined by constraining all factor loadings to be equal between samples while allowing the item intercepts and error variances to vary freely. Model 2 reported acceptable model fit indices: χ^2 = 102.35, *df* = 47, χ^2 (*df*) = 2.18; GFI = .998; CFI = .963; TLI = .944; RMSEA = .058; SRMR = .052.

Tests for model 3 (equal constraint on item intercepts added) and model 4 (equal constraint on error variance added) was then performed. The results of model 1 and model 2 indicate the number of factors and pattern of the items loaded in each factor were identical between the samples. Fit indices worsened for both Model 3 ($\chi^2 = 307.83$; $df = 56$; GFI=.993; CFI = .833; TLI = .785; RMSEA = .114; SRMR = .078) and Model 4 ($\chi^2 = 405.24$; $df = 67$; GFI=.991; CFI = .775; TLI = .759; RMSEA = .120; SRMR = .089), indicating an unsatisfactory model fit.

Table III-4 Multi-group analysis and comparative model fit indices.

Model	**χ^2 (*df*)**	**χ^2/*df***	**CFI**	**TLI**	**RMSEA**	**ΔCFI**	**Δχ2**	**Δdf**
Model 1: Configural invariance model	119.28 1(50)	2.39	.954	.934	.068	-	-	-
Model 2: Metric invariance model	102.35 0* (47)	2.18	.963	.944	.058	.009	16.931*	3
Model 3: Scalar invariance model	307.83 0* (56)	5.50	.833	.785	.114	.013	205.480 *	9
Model 4: Strict (error variance) invariance model	405.23 6* (67)	6.05	.775	.759	.120	.058	97.406*	11

*Note: *p <.001*

As the last step, results of model comparison by conducting chi-square test of the fit indices were presented in Table III-4. The chi-square test between model 2 and model 1 was significant ($\chi^2 = 16.931$; $df = 3$; $p < .001$), showing that imposing constraints on factor loadings resulted in statistically significant decreases in the fit indices of model 2 compared to model 1. However, taking additional comparative fit indices (ΔCFI < .01) into consideration, the result demonstrated partial metric invariance is established. For the remaining chi-square tests, results showed the comparative fit indices failed in reaching threshold limit, further indicating the model failed in establishing scalar and error variance invariance across the U.S. and Chinese samples.

Discussion and Limitations

This study empirically tested the cross-cultural validity of a nine-item, three factor ERB scale among national parks visitors from United States and China. ERB was defined in this study as the actions taken by visitors to mitigate the ecological and environmental impacts resulting from nature-based tourism activities. Noted the lack of a cross-culturally valid scale for measuring ERB, I utilized back-translation technique to ensure linguistic equivalence and multi-group confirmatory factor analysis to examine the measurement invariance of the proposed scale.

The findings provided support for the proposed scale as an acceptable representation of the construct in both the United States and China samples as the conceptual and configural invariance were established in this study, further confirming the multi-dimensional nature of the ERB. This result indicated ERB can be categorized into three subsets, namely the personal compliance behavior, persuasive behavior, and destructive behavior. Yet, this study only found partial metric invariance, which refers to the factor loadings of each item to be the same across groups. The inability to establish full scalar and error variance invariance indicates that the measurement scale may not adequately capture the differences of behavioral intentions across cultures. This discrepancy may be resulted from a variety of reasons. One possible explanation is at least one item loading is not equivalent across groups. Another potential explanation is the linguistic differences, despite the use of back-translation as a standard cross-cultural comparability method in the existing literature.

Nonetheless, it should be noted that scalar invariance is rarely attained in practice (Marsh et al., 2018). Many researchers argue partial measurement invariance (i.e., at least two invariances are established) is sufficient for performing meaningful comparisons (Cieciuch et al., 2018; Jung & Yoon, 2016; Putnick & Bornstein, 2016; Steenkamp & Baumgartner, 1998).

Hence, I encourage the utilization of the proposed three-factor ERB construct within the context of nature-based tourism to aid in understanding of park visitors behavior, which may inform the visitor management process and be useful for use impact monitoring and comparisons among diverse population groups. Manager and policy makers of national parks must be aware of visitors' intention of acting environmentally responsible and promoting destination sustainability. To this end, the three-factor ERB scale can be utilized as a tool for designing effective environmental education programs for interpretive service, as well as planning, assessing, and monitoring the implementation of of environmentally responsible tourism. By incorporating the proposed ERB construct into the management and policymaking process, destination professionals can take a proactive approach in ensuring the sustainability of nature-based tourism, thus contributing the protection and preservation of the natural environment.

Furthermore, despite the contributions made by this study, it is important to acknowledge its limitations. One of the limitations is that the behavioral scale used in this research relies on self-report measures of visitors' intention to behave environmentally responsible, which may not necessarily reflect their actual behavior. It is worth noting that self-report measures of environmental behavior are subject to social desirability biases, which could lead to over-reporting of behavior and intentions (Paulhus, 1991). While some scholars have argued that the social desirability bias does not significantly impact self-reported environmental behavior (Kormos and Gifford, 2014), caution should still be exercised when interpreting the findings of self-report measures. In addition, due to the impact of COVID-19 pandemic, a small percentage of U.S. respondents (13%, n = 34) completed their survey online in the spring of 2020, which may have introduced some level of bias to the results.

Respondents were asked to recall their most recent national park trip experience within the previous 6 months — a typical *recall survey* that is commonly utilized in social psychology, health, and marketing research (Sudman et al., 1996). The length of the reference period (e.g., referring to "yesterday" versus "last year") utilized in the recall survey could affect the accuracy of behavioral intention estimation (Winkielman et al., 1998). Generally, as the recall period increases, the reliability of measurement drops (Andrews et al., 2018). However, to minimize the impact of recall error, the recall period in this study was set to six months, which allowed for the capture of respondents' past travel experiences prior to the pandemic.

Despite these limitations, this study provides valuable insights into the multi-dimensionality of ERB across different cultural context, which could have significant implications for nature-based tourism researcher and practitioners. Future research could address the limitations of this study by utilizing alternative methods to measure ERB, such as field observation or laboratory assessment approaches.

Conclusion

In the present study, we conducted empirical validation of a nine-item, three-factor scale for measuring environmentally responsible behavior (ERB) among visitors in two distinct cultural contexts, namely, the United States and China. Our results from measurement invariance analysis revealed that the proposed ERB scale displayed acceptable invariance, thus demonstrating its applicability for evaluating respondents from different cultures. This study contributes to the literature by examining the multi-dimensionality of ERB across cultures, an area that has received limited attention in prior research. Consequently, this research provides significant implications for nature-based tourism researchers and practitioners. By enriching the

environmental behavior literature, our study enables destination professionals to develop more effective strategies for monitoring and promoting environmentally responsible behavior.

CHAPTER IV: MODELING VALUES, ATTITUDES, AND NORMS TOWARD ENVIRONMENTALLY RESPONSIBLE BEHAVIOR IN NATIONAL PARKS — A CROSS-CULTURAL COMPARATIVE ANALYSIS

Introduction

Minimizing human-induced impacts resulting from nature-based tourism is an ongoing objective for National Park management worldwide (Lawhon et al., 2013). These impacts arise from diverse recreational activities and visitors' inappropriate behaviors, such as off-trail hiking, wildlife harassment, resource theft, littering, etc., which will eventually lead to resource degradation and loss of biodiversity within the Parks (Hammitt & Cole, 2015; Mobley et al., 2010b; Pickering & Hill, 2007). Fostering visitors' environmentally responsible behavior (ERB)—visitors' action which does not damage the environment and may contribute to environmental sustainability (Bamberg & Möser, 2007; Van Riper et al., 2019)—is seen as an effective approach to alleviating these human-induced impacts to the park ecology. Effective visitor management that encourages visitors to participate in pro-environmental behavior (e.g., cleaning up picnic areas, picking up litter, etc.) or to reduce non-compliant behavior (e.g., off-leash dog walking, walking off-trail, etc.) contributes to advancing sustainability in National Parks.

Extensive empirical studies on ERB over the past several decades yield useful insights regarding its psychological processes within the context of protected areas. Many investigations into the antecedents of ERB have relied on theoretical frameworks grounded in a combination of value orientations, attitudes, and norms (Ajzen & Fishbein, 1980; Homer & Kahle, 1988b,

1988a; Kaiser et al., 1999; Kim & Seock, 2019; Landon et al., 2018; Steg & Vlek, 2009; Vaske & Donnelly, 1999; Vesely & Klöckner, 2018). Each perspective has proven helpful in understanding the relationship between individual-level psychological variables and environmental behaviors.

Understanding the cultural variations in environmentally responsible behavior and its antecedents, however, remains an underexplored avenue of research. While there has been a surge in research focusing on the differences in environmental values, attitudes, and norms across cultures (Cordano et al., 2011; Kang & Moscardo, 2006; Kovács et al., 2014; Milfont et al., 2010; Tam & Chan, 2017; Vesely & Klöckner, 2018), a gap remains in understanding how these factors jointly and/or severally, influence environmentally responsible behavior among visitors from different cultures, particularly non-western cultures.

This study aims to bridge this gap through a cross-cultural analysis set in the context of national parks in China and the United States. China's protected areas, which have traditionally centered around high levels of visitation rates and a high degree of human-induced ecological impacts (Buckley et al., 2016), present a unique context for this investigation. Past studies indicate that protected areas in China often grapple with water and air pollution and waste management issues, mostly attributed to visitors littering. These challenges become notably severe during festival and holiday periods in China (i.e., the Golden Weeks) (Wang et al., 2012). Chinese protected areas are often flooded with visitors, which leads to numerous human impacts, such as trampling, facility damage, and pollution (Buckley et al., 2017; Deng et al., 2003; Su, 2004). To alleviate these problems and conserve the valuable environment in national parks, the development of a comprehensive management plan that understands visitor environmental behavior is critical.

Recent research has noted some broad cultural differences in human-nature interaction among China and Western countries. Studies have found Chinese are less interested in being actively involved in adventure tourism and outdoor recreation (Buckley et al., 2014), and more interested in buying souvenirs containing threatened species. Some of the environmental behavior studies carried out in China found that Chinese demonstrated lower levels of environmental awareness, knowledge, and environmentally responsible behavior intentions (Buckley et al., 2014; Chan & Lau, 2002; Miller-Rushing et al., 2017). However, multiple empirical studies found that compared to the general public, the broad cultural differences in attitudes towards nature and wildlife between Chinese and Western park and protected areas visitors are less marked (Buckley et al., 2017; Leung et al., 2014). Buckley et al. (2017) suggested this may be because Chinese park visitors are a self-selected segment of the Chinese population, with above-average interests and empathy for nature-based tourism experiences. They are also relatively more well-off and educated than the general Chinese public.

This study builds on this body of literature, aiming to investigate potential variation in environmental values, attitudes, norms, and behavior between Chinese and United States national park visitors. Another research gap addressed in this study relates to the multi-dimensional structure of visitors' environmentally responsible behavior. In a previous empirical study (in Chapter 3 of this dissertation), I identified *personal compliance behaviors, persuasive behavior, and destructive behaviors* as the three dimensions of environmentally responsible behavior (ERB) and have cross-culturally validated this three-factor ERB scale between the visitors to national parks in the United States and China. We hypothesize that cultural contexts may mediate the influence of value orientation, attitudes, and norms on these dimensions of behavior.

This study focuses on elucidating the relationships among environmental value orientations, attitudes, and norms and parks visitors' environmental behaviors in United States and Chinese national parks. The research objectives of this study follow.

Research Objective 1. To assess how environmental value orientations, attitudes, and norms of park visitors influence their intention to engage in personal compliance behavior in national parks.

Research Objective 2. To assess how environmental value orientations, attitudes, and norms of park visitors influence their intention to engage in persuasive behavior in national parks.

Research Objective 3. To assess how environmental value orientations, attitudes, and norms of park visitors influence their intention to engage in destructive behavior in national parks.

Research Objective 4. To investigate how the influence of environmental value orientations, attitudes, and norms on environmentally responsible behavior differs between United States and Chinese national park visitors.

Literature Review and Hypotheses

The literature will discuss the development and use of Environmentally Responsible Behavior scales followed by a review of literature on value orientations, attitudes, and norms. This review of values, attitudes, and norms (both personal and social norms) includes the study hypotheses regarding each of these factors' impacts on ERB in national parks by park visitors.

Environmentally Responsible Behavior (ERB) in National Parks

Various terms have been adopted to describe behaviors that protect the natural environment, such as pro-environmental behavior (Aoyagi-Usui et al., 2003; Bamberg & Möser, 2007; Stern et al., 1995), conservation behavior (Göckeritz et al., 2009), environmentally significant behaviors (de Groot & Steg, 2008; Stern, 2000), and environmentally responsible behavior (Chiu et al., 2014; Lee et al., 2013). Our focus in this study is environmentally responsible behavior (ERB), defined as the proactive actions taken by visitors to protect the environment and address related issues during their visits (Lee et al., 2013; Stern, 2000).

In the existing literature, visitors' ERB in national parks is often distinguished from their general environmental behavior, such as recycling behavior at home, purchasing eco-friendly products, or voting for candidates with conservation platforms (Dolnicar & Leisch, 2008; Hsu & Huang, 2010; Vaske & Donnelly, 1999; Xu et al., 2019). This emphasis on contextualizing behavior is critical, as the factors driving specific behaviors and their resulting consequences may vary across different contexts (Steg & Vlek, 2009; Vaske et al., 2015). For example, some individuals may be comfortable engaging in conservation behavior at home or work, but less so when they are on vacation (Barr et al., 2010; Holmes, Dodds, & Frochots, 2019; Mehmetoglu, 2010).

ERB research within protected areas often emphasizes specific behavior, such as littering (T. J. Brown et al., 2010), venturing off-trail (Goh, 2020; Goh et al., 2017), feeding wildlife (Mallick & Driessen, 2003; Marion & Reid, 2007), picking flowers (Chang, 2010), off-leash dog walking, car use intentions (H. Zhang et al., 2018), willingness to pay for conservation, etc. However, ERB is widely viewed as a multi-dimensional concept encompassing various behavioral categories (Landon et al., 2018; Larson et al., 2015; Lee et al., 2013; Ramkissoon et al., 2013; Smith-Sebasto & D'Costa, 1995; Stern, 2000). For example, Lee et al. (2013)

identified and validated three types of ERB of visitors: *sustainable behavior* (respect local culture and conserve the natural environment), *pro-environmental behavior* (voluntarily visit a destination less often or never to reduce impacts), and *environmentally friendly behavior* (take action to reduce existing damage). Landon et al. (2018) categorized ERB as *willingness to sacrifice* (e.g. pay more to stay at environmentally friendly accommodations), *localism* (e.g. stay and eat at local businesses), and *eco-behavior* (e.g. recycle and use reusable shopping bags).

There isn't a universally accepted scale for measuring ERB in a national park setting. Based on this scale, park visitors' ERB can be driven by various factors, such as a normative concerns (i.e., what other people think I should do), a moral concern (i.e, what I feel obligated to do), a habitual factor (e.g., I recycle at home), or self-interest (i.e., how it will benefit me) (Larson et al., 2015; Lindenberg & Steg, 2007; Steg et al., 2014). In a previous study, I validated a three-factor nine-item environmentally responsible behavior scale across the United States and Chinese sample; the three factors being personal-compliance behavior, persuasive behavior, and destructive behavior.

Values, Attitudes, and Behavior

According to Homer & Kahle (1988b), values refer to the social cognitions that facilitate adaptation to one's environment and reflect a belief on the desirability of a certain end-state (Rokeach, 1973). Value is generally seen to comprise a value orientation, which refers to the patterns of a set of strongly value-laden basic beliefs (Fulton et al., 1996). In natural resources management and recreation settings, an environmental value orientation is often reflected in an "anthropocentric – biocentric" continuum (Shindler et al., 1993; Steel et al., 1994; Vaske & Donnelly, 1999), and sometimes seen in other literature as the "protection – use" continuum (Bright et al., 2000; Dougherty et al., 2003; Vaske & Needham, 2007).

These two distinctive perspectives of environmental value orientation — anthropocentric (also termed “altruistic”, “homocentric”, or “protectionist”) and biocentric (also called “biospheric”, “ecocentric”, or “utilitarian”) have been extensively studied to capture individuals’ value orientation towards forests (Steel et al., 1994; Vaske & Donnelly, 1999), wildlife (Fulton et al., 1996; Manfredo et al., 2003; Siemer et al., 2021), recreation and outdoor activities (Needham, 2010), and other general environmental issues. An anthropocentric (or the use orientation) perspective posits humans to be the most important life form. In this orientation, other forms of life are considered important, primarily to the extent that they can be exploited for the benefit of humans. Simply put, anthropocentrism treats the natural environment as a means to support human beings’ physiological, material, and recreational needs (Bourdeau, 2004; Curry, 2007; Gagnon Thompson & Barton, 1994). Conversely, the biocentric (or the protection orientation) perspective focuses on conserving nature because it recognizes that nature has spiritual and intrinsic values. Biocentrism posits that all lives are equally important because of their intrinsic value, regardless of their usefulness to humans. Although these two value orientations are sometimes referred to as existing on a continuum, they are not mutually exclusive—individuals normally present a combination of the two (Needham, 2010; Vaske & Donnelly, 1999; Steel et al., 1994).

Attitudes symbolize the general favorability a behavior holds for an individual, encompassing all activated behavioral beliefs about a behavior in a given situation (Klöckner, 2013). Research has found a significant direct relationship between environmental attitude and environmental behavior. Behavior that benefits the environment arises from people’s notion that the environment is under threat and that they are able to engage in behaviors that can protect it (Ajzen, 1991; Ajzen & Fishbein, 1980; Kaiser et al., 1999b; Kovács et al., 2014; Kraus, 1995).

Both value orientation and attitude are widely recognized as critical predictors of environmental behavior and intention (de Groot & Steg, 2008; Li & Ernst, 2015; Rickenbach et al., 2017; Stern et al., 1995; Thompson & Barton, 1994). In the cognitive hierarchy model proposed by Homer and Kahle (1988b), the authors suggested that the influence of values on specific behavior is mediated by an individual's attitude towards the behaviors. This model is often used interchangeably with the VAB (Value-Attitude-Behavior) model. Extensive studies have utilized VAB model to explain the antecedents of environmental behavior.

For instance, Vaske and Donnelly (1999) examined the residents' intention to vote for wildland preservation using the VAB model. Their findings demonstrated the attitude toward the preservation of wildland fully mediated the relationship between the biocentric/anthropocentric value orientation and behavioral intention. Likewise, in another study conducted by Shin et al., (2017), the author found that altruistic values have significant impact on biosphere values, which influence respondents' intention to act pro-environmentally through their attitudinal construct. Moreover, Milfont et al. (2010) empirically examined the casual sequence of the extended value/threat-attitude-ecological behavior model across samples from Brazil, New Zealand, and South Africa. They confirmed the cross-cultural validity of the model. Building on this research stream, this study proposed that value orientations influence attitude towards the environmentally responsible behavior; and this attitude affects intentions to engage in such behavior.

Hypothesis 1: The anthropocentric value orientation has a significant negative relationship with attitude towards environmentally responsible behavior.

Hypothesis 2: The biocentric value orientation has a significant positive relationship with attitude towards environmentally responsible behavior.

Hypothesis 3: The attitude towards environmentally responsible behavior has a significant positive relationship with intention to engage in personal compliance behavior.

Hypothesis 4: The attitude towards environmentally responsible behavior has a significant positive relationship with intention to engage in persuasive behavior.

Hypothesis 5: The attitude towards environmentally responsible behavior has a significant negative relationship with intention to engage in destructive behavior.

Personal Norms

Personal norms are the moral expectations an individual holds for themselves (Esfandiar et al., 2019; Harland et al., 2007; Park & Smith, 2007; Pearce et al., 2022). They represent "an individual's internalized values, standards, or beliefs about the appropriate courses of action in particular social situations" (Schwartz, 1977, p. 108). People are encouraged to engage in environmentally responsible acts triggered by a moral concern within their own minds, which results in judgements of what is right or wrong according to themselves (Lindenberg & Steg, 2007). Personal norms regarding reducing human-induced impact on the environment as a pro-social behavior is important in explaining individual's environmentally responsible behavior, together with other cognitive factors (attitude and social norm) (Harland et al., 2007; Jansson & Dorrepaal, 2015; Xu et al., 2019). Specifically, some empirical studies have shown that personal norms areamong the most salient variables in explaining visitors' willingness to engage in environmentally responsible behavior (Brown et al., 2010; Doran & Larsen, 2016). Mehmetoglu (2010)found that personal norms are a stronger predictor than other psychological variables (e.g. personal values and environmental concern) in explaining individuals' pro-environmental behavior. They also found that the existence of a personal norm to protect the environment was

positively associated with both pro-environmental behavioral intention on vacation and at home. Following are the hypothesized relationships between personal norms and value orientations and environmentally responsible behaviors.

Hypothesis 6: The anthropocentric value orientation has a significant negative influence with personal norms.

Hypothesis 7: The biocentric value orientation has a significant positive influence with personal norms.

Hypothesis 8: Personal norms have a significant positive influence with intention to engage in personal compliance behavior.

Hypothesis 9: Personal norms have a significant positive influence with intention to engage in persuasive behavior.

Hypothesis 10: Personal norms have a significant negative influence with intention to engage in persuasive behavior.

Social Norms

Another essential normative concern in explaining environmental behavior are social norms , defined as "rules and standards that are understood by members of a group, and that guide and/or constrain social behavior without the force of laws" (Cialdini & Trost, 1998, p. 152). According to Harre (2018), social norms evolve as a result of a combination of imitation as a basic type of social learning, our desire to belong to a social group that approves of our behavior, and an individual's generally predictable response to group approval or disapproval.

Perry et al. (2021) added that social norms are closely tied to geographic locations and the people who inhabit them. In other words, a visitor's perception that a certain action would harm the environment is likely linked to their belief that other visitors share the same belief. For example, national park visitors may avoid destructive behaviors (e.g., littering or walking off-trail) when they perceive that other visitors or companions whom they travel with do not accept such behavior (Esfandiar et al., 2021; Goh, 2020). Hence, social norms can be key precursors in cultivating national park visitors' ERB intentions (Farrow et al., 2017; Nolan et al., 2008; Pearce et al., 2022; Perry et al., 2021). In this study, we emphasized the subjective social norm (i.e., the perceived social pressure to participate or not in a behavior). Previous studies indicate social norms directly influence individuals' environmental behavior (Farrow et al., 2017; S. H. Kim & Seock, 2019; Park & Smith, 2007). The following hypotheses express the relationships between social norms and intention to engage in personal compliance, persuasive, and destructive behaviors.

Hypothesis 11: Social norms have a significant positive relationship with intention to engage in personal compliance behavior.

Hypothesis 12: Social norms have a significant positive relationship with intention to engage in persuasive behavior.

Hypothesis 13: Social norms have a significant negative relationship with intention to engage in destructive behavior.

Proposed Model

A theoretical model was developed based on the above discussion of the literature and the hypothesis (see Figure IV-1).

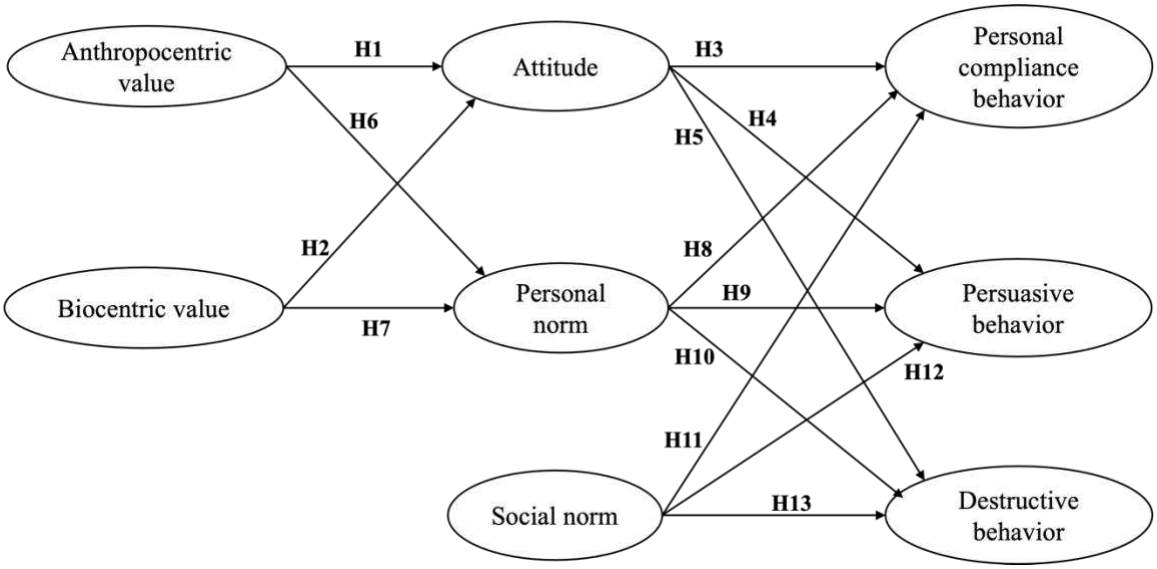

Figure IV-1 *Proposed model.*

Method

Study Sites

Two national parks, the Shennongjia National (pilot) Park in Hubei Province (China) and Mount Rainier National Park in Washington State (United States), were chosen as the study sites for this research. Both study sites are within four-hour drive to metropolitan areas (i.e., Yichang-Xiangyang-Wuhan, and Seattle-Tacoma) and received high volume of visitation over the years.

Shennongjia (pilot) National Park is located in the central Hubei Province and covers an area of 288,640 acres. It was first established in 1985 as a national natural reserve and proclaimed in 2016 as a UNESCO world heritage site. In May 2016, it was approved to be one of the first ten pilot national parks in China. The park is currently open 24 hours per day and is administered by the Shennongjia National Park Administration, a division of China's National Park Administration. The park is famous for its intact ecosystem and rich biodiversity including many rare endangered species (e.g., Golden Monkey, South China Tiger, Asian Black Bear,

Asian Golden Cat, Dwarf Musk Deer, Golden Eagle, Reeves's Pheasant, Mainland Serow, Wushan Salamander, Chinese Moccasin, etc.). The park is available to visitors for four seasons, offering various recreation opportunities to the public, such as trekking, skiing, camping, alpine lake tours, birdwatching, wildlife watching, and others. Shennongjia reported more than 13 million visitations every year since 2017. Due to the high level of visitation and modification due to this high use, the park is at a risk from harmful effects on the park ecology from tourism development (Wang & Li, 2020). Shennongjia National Park Administration addressed the importance of reducing human-induced impacts (i.e. littering, wildlife harassment, reducing wastes) through capacity management and an enhanced interpretation system in their 2017 and 2018 annual report.

The study site in United States featured Mount Rainier National Park in Washington state. Located 90 miles south of Seattle, this park encompasses Mount Rainier, an active volcano and the highest peak in the Cascade Range, covering approximately an area of 236,381 acres. It was established in 1899 as the fifth oldest national park in the U.S. and is noted for dense stands of coniferous trees on its lower slopes, scenic subalpine and alpine meadows with wildflowers during the warmer seasons, waterfalls and lakes, and an abundance of wildlife. The park opens all year with the peak season in July and August, offering abundant outdoor and wilderness opportunities to its visitors, such as wilderness hiking, camping, climbing, snowshoeing, bird and wildlife watching, fishing, boating, bicycling, and other activities. This park has reported over 2 million visits per year since 2017. After a 30% decline in visitation in 2020—dropping to 1.6 million visits—this park documented 2.47 million visits in 2021. The current focus of the park management is to improve visitor safety and to better manage peak-period visitation so that the number of visits does not adversely affect park resources and visitor experience (NPS, 2022).

Measures and Survey Development

Several factors and concepts were examined in this study to assess study hypotheses and achieve research objectives. These included *demographic variables*, *environmental value orientation*, *attitude toward environmentally responsible behavior*, *personal norms*, *social norms*, and *environmentally responsible behavior.*

Demographic variables. Respondents were asked to report their age, gender, travel frequency (how many times they visited any national-level protected areas in the past six months), and travel mode (travel solo, with family or friends, or others); residency status (U.S. sample only; country-urban consortium); household income, education level and residential area (China sample only).

Environmental value orientation. The environmental value orientation scale consisted of eight items measuring respondents' biocentric and anthropocentric value orientation adapted from Vaske and Donnelly (1999). The biocentric value orientation scale is measured using an index of three items: (1) nature has much right to exist as people; (2) wildlife, plants, and people have equal rights to live and develop; and (3) nature should be preserved so that future generations can enjoy it. The anthropocentric value orientation scale is measured using an index of five items: (1) the value of nature exists only in the human mind, without people nature has no value; (2) the primary value of nature today is to provide places to play and recreate; (3) nature are valuable only if it produces jobs and incomes for people; (4) nature's primary value is to provide products useful to people; and (5) the purpose of nature is for people to be able to make a living from it. The survey items in each of the value orientations were measured using a 7-point Likert-type scale ranging from 1 = "strongly disagree" to 7 = "strongly agree".

Attitude towards environmentally responsible behavior. Measurement to this construct is adapted from Ajzen (2006) where respondents were asked to rate their attitude towards reducing their environmental impact while travelling on a 7-point semantic differential scale between three polar adjectives, i.e., 1 = "inconvenient" to 7= "convenient", 1 = "waste of time" to 7 = "not a waste of time", and 1 = "not important" to 7 = "important" . The selection of a semantic differential scale measuring behavior-based attitude is based on the consideration of trying to focus respondent to a very specific subject (Gable & Wolf, 1993).

Personal norms. Personal norms were operationalized using three items adapted from Landon, Woosnam, and Boley (2018). These items were (1) I would feel guilty if I were responsible for damaging nature; (2) I feel I should not harm nature when traveling; and (3) I feel that I should educate others about the importance of protecting nature. These survey items were measured using a 7-point Likert-type scale ranging from 1 = "strongly disagree" to 7 = "strongly agree".

Social norms. Social norms were captured using three items reflecting the injunctive norm. All measurement items were adopted from Park and Smith (2007) and Vesely and Klockner (2018) and modified for this research. The questions read, "how likely is…would expect you to minimize your impact on the environment while travelling?" (1) my family; (2) my friends; and (3) tourists around me. These items were measured on a 7-point Likert scale ranging from 1 = "not at all likely" to 7 = "very likely".

Environmentally Responsible Behavior (ERB). This scale consisted of nine items measuring respondents' *personal compliance behavior, persuasive behavior, and destructive behavior* that are adapted from Lee et al. (2013), Goh et al. (2017), Landon et al. (2018), Larson et al. (2015), and Ramkisson et al. (2013). In my previous research (see chapter III), this nine-

item three-factor behavioral intention scale was psychometrically validated and demonstrated good reliability and validity across cultures. Respondents were asked to indicate their level of likelihood of with the following items regarding personal compliance behavioral intention scale during their trips in national parks: (1) read park instructions; (2) not disturb wildlife or vegetation; (3) leave the place in good condition after a picnic. Persuasive behavior is measured by asking respondents how likely they are to (1) pick up litter left by others, (2) tell others not to feed wildlife, and (3) report inappropriate behaviors to park rangers, during their visits to national park. Similarly, self-reported destructive behavior include: (1) hike off-trail and explore interesting areas; (2) feed the wildlife if they appear hungry; (3) pick a flower if it looks pretty.

The survey was initially developed in English. I used the back-translation technique to ensure linguistic equivalence (Brislin, 1970). Back translation entails a process wherein an instrument is translated to a different language from the original version, then translated back to the original language to assure equivalence in item meanings between the two surveys. In this study, the initial English survey was translated to Chinese by the first translator (i.e., me). Then the Chinese survey was translated back to English by the second translator, who was recruited for this research and received training of background relevant to the research topics. Differences between the two versions of the English surveys were compared on the clarity and differences of the wording. As the last procedure of the survey development, a pilot test was then conducted on a convenience sample of ten respondents (four American and six Chinese) to finalize both surveys. A few question statements were reworded to improve the understanding of the surveys, one item from the ERB scale were removed, and a brief introductory note was added to the beginning of the surveys.

Data Collection Process and Sample Profiles

On-site intercept surveys were used to collect data from national park visitors. To minimize social desirability bias in responses, participants were informed that their participation was voluntary and that their responses would remain anonymous.

The Chinese sample was collected on-site in Shenongjia National (pilot) Park during August 2019, administered by seven Chinese research assistants recruited from Central China Normal University (CCNU). Although the Chinese university did not require IRB approval for the field study, all the Chinese research assistants completed a week-long research ethics and compliance training workshop offered by CCNU prior to their field visits. Park visitors were randomly selected at various sites to obtain a representative sample of the visitors. For groups of visitors, one adult per group was asked to complete the survey. A total of 404 completed surveys were obtained from Chinese visitors.

The United States sample consisted of two sub-samples from surveys delivered onsite and online. Surveys were first distributed on-site in the gateway communities (Nisqually, WA) near Mount Rainier National Park from September 2019 to December 2019. Initially, respondents were approached with the screening question asking whether they had previously been to Mount Rainier National Park and only those who had been to the park previously were asked to complete the survey. Two hundred twenty-seven respondents were successfully recruited to complete survey during this phase. Later, due to the impact of the COVID-19 outbreak in the U.S., on-site data collection was suspended and moved online. Thirty-four surveys were distributed online to American participants who indicated that they had visited any American national parks within the previous six months. In total, 291 completed surveys were collected from United States national park visitors (227 onsite and 64 online).

Among the Chinese sample, 48% were male and 52% were female, whereas in the U.S. sample, 46% were male and 54% were female. No difference of gender distribution was observed between two samples (χ^2 (1, N = 695) = .12, p = .73). Age distribution was found to be significantly different between the two samples (t(695) = .-7.31, p < .01) where the Chinese respondents are averagely younger (M = 33.67, SD = .70) than the U.S. respondents (M = 42.28, SD = .98). All the respondents in the U.S. sample have visited other national-level protected areas (e.g., national parks, national forests, etc.) at least once in the past six months. In contrast, 28% of the Chinese respondents (N = 114) reported that this is their first time visiting any national-level protected areas in the past six months. Additionally, 95% of the Chinese respondents and 90% of the U.S. respondents reported that they visited the study sites (i.e., Shengnongjia and Mount Rainier National Park) with their families and/or friends, indicating that the U.S. visitors are more likely to visit national parks by themselves (χ^2 (1, N = 695) = 5.76, p < .05).

Data Analysis

Data analysis was conducted using SPSS 26 and AMOS 26. First, frequencies and descriptive statistics and analysis of study measures were conducted utilizing means and standard deviations. Factor and reliability analyses of each of the construct variables were conducted to determine reliability. Then, confirmatory factor analysis examined the underlying structure of the proposed framework and determined if there was a tenable measurement model for the constructs in the Chinese and U.S. samples. Following recommendations made by Milfont and Fischer (2010) and Hu and Bentler (199), goodness-of-fit indices (x^2/df), comparative fit index (CFI) and root mean square error of approximation (RMSEA) were used to determine the degree to which the theoretical model was consistent with the empirical data.

Multiple-group structural equation modeling (MGSEM) proposed by Myers et al. (2000) was then adopted to cross-validate the hypothesized model across two groups, in other words, to answer the question whether the same models hold across different populations, in this case, the United States and China Samples. MGSEM has been suggested to be the most appropriate procedure for model comparison in quantitative cross-cultural analysis. In MGSEM, the hypothesized model is compared with the observed structure in two or more samples. In this process, a sequence of nested models is tested in terms of their model fit by constraining parameters (such as factor loadings, item intercepts, error variance, etc.) in a hierarchical order. The following indices to determine whether the two compared models shown statistical differences were adopted: the differences in chi-square between two nested models (i.e., χ^2 between different models) and the comparative fit index (CFI), as suggested by Milfont and Fischer (2010).

Results

Measurement Model and Confirmatory Factor Analysis

The validity of the measures was assessed first for both samples. The measurement structure of the proposed model was analyzed using confirmatory factor analysis (CFA), which hypothesizes latent variables as "causes" of observed responses and allows measurement and assessment of the validity of these latent variables (Byrne, 2009). The initial CFA presents a poor but still acceptable fit. In response to this initial model, the social norms item "*people who live nearby would expect me to minimize my impact on the environment while travelling"* was eliminated to obtain a more acceptable model. In addition, the three items related to destructive behavior were reverse-coded. This resulted in a much-improved CFA model. The model fit was acceptable for both the Chinese sample (χ^2=558.003; *df* = 285; χ^2/df = 1.95; CFI = .919; TLI

= .904; RMSEA = .051; SRMR = .061) and U.S. sample (χ^2=529.289; *df* = 274; χ^2/df = 1.93; CFI = .935; TLI = .923; RMSEA = .057; SRMR = .063). To view the complete list of items, item means and standard deviation, factor loadings, and reliabilities see Table IV-1.

Table IV-1. *Descriptive, reliability, and confirmatory factor analysis of the measurement model.*

	United States Sample		**Chinese Sample**		
Latent Construct & Items	***M (SD)***	**λ**	***M (SD)***	**λ**	***t-test***
Biocentric value orientation	***α = .86***		***α = .77***		3.231***
BV1 Nature has right to exists as people	6.038 (1.552)	.825	6.318 (.804)	.884	
BV2 Wildlife, plants, and people have equal rights to live and develop	5.849 (1.512)	.791	6.293 (.835)	.867	
BV3 Nature should be preserved so that future generations can enjoy it	6.433 (1.197)	.826	6.426 (.815)	.471	
Anthropocentric value orientation	***α = .90***		***α = .84***		8.154
AV1 The value of nature exists only in the human mind, without people nature has no value	2.749 (1.961)	.725	4.283 (1.920)	.476	
AV2 The primary value of nature today is to provide places to play and recreate	3.354 (1.885)	.652	3.736 (1.807)	.684	
AV3 Nature are valuable only if it produces jobs and income for people	2.330 (1.700)	.863	3.133 (1.740)	.854	
AV4 Nature's primary value is to provide products useful to people	2.649 (1.799)	.872	3.239 (1.685)	.895	
AV5 The purpose of nature is for people to be able to make a living from it	2.526 (1.758)	.895	3.788 (1.779)	.682	
Attitude towards environmentally responsible behavior	***α = .84***		***α = .88***		5.857
AT1 reducing my impacts…is not waste of time	6.007 (1.339)	.905	6.222 (1.118)	.894	
AT2 reducing my impacts…is not inconvenient	5.120 (1.537)	.645	6.047 (1.205)	.845	
AT3 reducing my impacts…is important	6.003 (1.361)	.860	6.342 (0.973)	.804	
Personal norms	***α = .81***		***α = .59***		1.288
PN1 I would feel guilty if I were responsible for damaging nature	5.983 (1.461)	.867	5.778 (1.140)	.582	
PN2 I feel I should not harm nature when traveling	6.124 (1.291)	.910	6.286 (0.856)	.679	
PN3 I feel that I should educate others about the importance of protecting nature	5.254 (1.454)	.568	5.591 (1.267)	.482	
Social norms	***α = .80***		***α = .70***		13.838
SN1 my family…expect me to minimize my impact on the environment	4.189 (2.019)	.659	5.768 (1.043)	.575	
SN2 my friends…expect me to minimize my impact on the environment	4.261 (1.971)	.935	5.690 (1.005)	.732	

SN3 visitors around me…expect me to minimize my impact on the environment	4.007 (1.509)	.625	5.150 (1.215)	.589	
Personal compliance behavior intention	***α = .71***		***α = .61***		.136
SERB1 read park instructions	5.533 (1.581)	.593	5.882 (1.250)	.537	
SERB2 not disturb wildlife or vegetation	5.997 (1.381)	.703	5.855 (1.570)	.521	
SERB3 leave the place in good condition after a picnic	6.505 (1.074)	.777	6.330 (1.091)	.683	
Persuasive behavior intention	***α = .69***		***α = .80***		6.368***
SERB4 pick up litter left by others	5.488 (1.479)	.641	4.751 (1.582)	.679	
SERB5 tell others not to feed wildlife	4.443 (1.669)	.594	4.507 (1.613)	.842	
SERB6 report inappropriate behaviors to park rangers	5.158 (1.630)	.705	3.904 (1.729)	.760	
Destructive behavior intention[1]	***α = .73***		***α = .67***		-.374
SERB7 hike off-trail and explore interesting areas	3.577 (1.839)	.498	3.177 (1.732)	.720	
SERB8 feed the wildlife if they appear hungry	2.381 (1.741)	.882	3.167 (1.716)	.660	
SERB9 pick a flower if it looks pretty	2.924 (1.793)	.710	2.658 (1.610)	.538	

Note 1. *Destructive behavior intention construct was reverse-coded.*
Note 2. *Model fit indices: U.S. Sample: $\chi 2 = 529.289$, $df = 285$, $\chi 2/df = 1.93$, $p < .001$, CFI = .919, TLI = .904, RMSEA = .051, SRMR = .061; Chinese Sample: $\chi 2 = 558.003$, $df = 274$, $\chi 2/df = 1.95$, CFI = .935, TLI = .923, RMSEA = .057, SRMR = .063.*
Note 3. *M = mean; SD = standard deviation; λ = standardized factor loading; α = Cronbach's alpha.*
Note 4. ** $p < .05$, ** $p < .01$, *** $p < .001$*

All the construct reliability (i.e., Cronbach's alpha) exceed .06, suggesting an acceptable level of internal consistency for the latent variables. Furthermore, values of the factor loadings fell within the range between .476 to .910, surpassed the recommended level of .40, indicating the measurement model reached convergent validity at the item level.

Structural Equation Modelling and Hypothesis Testing

A structural equation modelling (SEM) was then performed to empirically test the hypothesized relationships among the constructs in our proposed model, as demonstrated in Figure IV-1. The results of model fit indices suggested acceptable fit of the proposed model in both samples (United States: $\chi^2 = 679.452$, $df = 285$, $\chi^2/df = 2.384$, CFI = .900, GFI = .840,

RMSEA = .690; China: χ^2 = 666.817, *df* = 285, χ^2/df = 2.340, CFI = .891, GFI = .889, RMSEA = .058). Result of the SEM analysis (standardized coefficient and correspondent t-values) is presented in Table IV-2 below.

Table IV-2. *Structural analysis and hypothesis testing*

Hypothesized Relationship	**United States Sample**		**Chinese Sample**	
	Standardized Coefficient	***t*-value**	**Standardized Coefficients**	***t*-value**
H1: Anthropocentric value → attitudes	-.303	-6.441***	-.176	-2.828*
H2: Biocentric value → attitudes	.533	9.611***	.250	3.232**
H3: Attitudes → personal compliance behavior	.374	6.515***	.015	.373
H4: Attitudes → persuasive behavior	.336	4.807***	-.063	-1.080
H5: Attitudes → destructive behavior	.297	4.498***	.389	4.619***
H6: Anthropocentric value → personal norm	-.206	-4.063***	-.047	-1.033
H7: Biocentric value → personal norm	.571	9.006***	.267	4.192***
H8: Personal norm → personal compliance behavior	.368	6.601***	.419	4.317***
H9: Personal norm → persuasive behavior	.170	2.691**	.518	4.199***
H10: Personal norm → destructive behavior	.127	2.302*	.238	1.598
H11: Social norm → personal compliance behavior	.008	.237	.111	1.433
H12: Social norm → persuasive behavior	.046	.953	.536	4.193***
H13: Social norm → destructive behavior	-.075	-1.772	-.343	-2.150*

Note 1. *Destructive behavior construct was reversed-coded.*
Note 2. ** p < .05, ** p < .01, *** p < .001.*

Hypothesis 1 stated that *the anthropocentric value orientation has a significant negative relationship with attitude towards environmentally responsible behavior*. The anthropocentric value orientation showed a negative relationship with attitude toward environmentally responsible behavior. This was true for both the United States sample (β [standardized coefficient] = -.303, $p < .001$) and the Chinese sample (β = -.176, $p < .001$). Therefore, hypothesis 1 was supported for both the United States and the Chinese samples.

Hypothesis 2 suggested that *the biocentric value orientation has a significant positive relationship with attitude towards environmentally responsible behavior*. The biocentric value orientation showed a positive relationship with attitude toward environmentally responsible behavior. Again, this was the case for both the United States sample (β = .533, $p < .001$) and the Chinese sample (β = .250, $p < .01$), validating hypothesis 2 for both samples.

Hypothesis 3 posited that *the attitude towards environmentally responsible behavior has a significant positive relationship with intention to engage in personal compliance behavior.* Attitude toward environmentally responsible behavior for the United States sample was found to have a significant positive relationship with personal compliance behavior (β = .374, $p < .001$). On the other hand, attitude toward environmentally responsible behavior did not have a significant relationship with personal compliance behavior for the Chinese sample (β = .015, p = .710). Therefore, hypothesis 3 was supported for the United States sample, but not for the Chinese sample.

Hypothesis 4 anticipated that *the attitude towards environmentally responsible behavior has a significant positive relationship with intention to engage in persuasive behavior.* Similar to personal compliance behavior, attitude toward environmentally responsible behavior was found

to have a significant positive relationship with persuasive behavior for the Unites States sample (β = .336, p < .001), but not for the Chinese sample (β = -.063, p = .280). Hence, hypothesis 4 was therefore supported for the United States sample, but not for the Chinese sample.

Hypothesis 5 stated that *the attitude towards environmentally responsible behavior has a significant negative relationship with intention to engage in destructive behavior.* Recoding of destructive behavior changed the measurement scale of this construct to *high intention to engage in destructive behavior* on the low end of the scale and to *low intention to engage in destructive behavior* on the high end of the scale (i.e., reverse coding). For both the United States sample (β = .297, p < .001) and the Chinese sample (β = .389, p < .001), the more positive the attitude toward engaging in ERB, the lower the respondent's intention to engage in destructive behavior. Therefore, since this suggests a negative relationship between attitude toward environmental behavior and intention to engage in destructive behavior, hypothesis 5 was confirmed for both the United States and the China samples.

Hypothesis 6 stated that the *anthropocentric value orientation has a significant negative influence on personal norm*. In this study, anthropocentric value orientation was found to have a significant negative relationship with personal norm for the United States sample (β = -.206, p < .001), but not for Chinese sample (β = -.047, p = .301). Hence, hypothesis 6 is partially supported only for the United States sample.

Hypothesis 7 stated that *the biocentric value orientation has a significant positive influence on personal norm*. As expected, the results demonstrated the biocentric value orientation have a significantly stronger positive influence on the personal norm for the United

States sample ($\beta = .571$, $p < .001$). Similar but weaker association was also found for the Chinese sample ($\beta = .267$, $p < .001$), confirming hypothesis 7 for both samples.

Hypothesis 8 stated the *personal norm has a significant positive influence on personal compliance behavior*. Result of the analysis shown that personal norm has a significant positive influence on the personal compliance behavior in both samples (United States: $\beta = .368$, $p < .001$; Chinese sample: $\beta = .419$, $p < .001$). Therefore, hypothesis 8 is supported for both samples.

Hypothesis 9 stated that the *personal norm has a significant positive influence on persuasive behavior*. Like hypothesis 8, personal norm had a positive relationship with persuasive behavior for United States sample ($\beta = .170$, $p < .001$) and Chinese sample ($\beta = .518$, $p < .001$). The results supported hypothesis 9 for both samples.

Hypothesis 10 stated the *personal norm has a significant negative influence on destructive behavior*. The result found a weak positive relationship between personal norm and destructive behavior for the United States Sample ($\beta = .127$, $p < .05$), but not for Chinese sample ($\beta = .238$, $p = .110$). Since the measurement scale of destructive behavior is reverse-coded for analysis, this result means the more visitors felt obligated to reduce their impact to the environment, the lower the intention to engage in destructive behavior, suggesting a negative relation between the personal norm and destructive behavior. Hence, hypothesis 10 is partially supported for the United States sample.

Hypothesis 11 stated *the social norm has a significant positive influence on personal compliance behavior*. This hypothesis is not supported for both samples as the results found no

significant relationship between social norm and personal compliance behavior (United States sample: $\beta = .008$, $p = .813$; Chinese sample: $\beta = .111$, $p = .152$).

Hypothesis 12 stated the *social norm has a significant positive influence on persuasive behavior*. The analysis indicated a strong positive relationship between social norm and persuasive behavior for Chinese sample ($\beta = .536$, $p < .001$), but not for the United States sample ($\beta = .046$, $p = .007$). Therefore, hypothesis 12 is only partially supported for Chinese sample.

Hypothesis 13 stated the *social norm has a significant negative influence on destructive behavior*. No significant relationship between social norm and destructive behavior was found for the United States sample ($\beta = -.075$, $p = .076$). The analysis also found weak negative effect of social norm on destructive behavior for the Chinese sample ($\beta = -.343$, $p < .05$). However, since the measurement scale of destructive behavior is reverse-coded for the structural analysis, the result for the Chinese sample indicated a positive relationship between social norm and destructive behavior, meaning that the more park visitors perceived social pressure to reduce their impact to the environment, the more likely they will engage in destructive behavior. Hence, hypothesis 13 is not supported for both samples.

A summary of the results of hypothesis testing between both samples is presented in Table IV-3 below.

Table IV-3. *Summary of results of the hypotheses tested.*

Hypothesis	**United States Sample**	**Chinese Sample**
H1: the anthropocentric value orientation has a significant negative influence on attitude towards environmentally responsible behavior.	Supported	Supported
H2: the biocentric value has a significant positive influence on attitude towards environmentally responsible behavior.	Supported	Supported

H3: the attitude towards environmentally responsible behavior has a significant positive influence on personal compliance behavior.	Supported	X
H4: the attitude towards environmentally responsible behavior has a significant positive influence on persuasive behavior.	Supported	X
H5: the attitude towards environmentally responsible behavior has a significant negative influence on destructive behavior.	Supported	Supported
H6: the anthropocentric value has a significant negative influence on personal norm	Supported	X
H7: the biocentric value has a significant positive influence on personal norm	Supported	Supported
H8: the personal norm has a significant positive influence on personal compliance behavior.	Supported	Supported
H9: the personal norm has a significant positive influence on persuasive behavior.	Supported	Supported
H10: the personal norm has a significant negative influence on destructive behavior.	Supported	X
H11: the social norm has a significant positive influence on personal compliance behavior.	X	X
H12: the social norm has a significant positive influence on persuasive behavior.	X	Supported
H13: the social norm has a significant negative influence on destructive behavior.	X	X

Model Comparison

As the final step, a multigroup structural equation modeling (MGSEM) analysis was performed to examined whether there are statistical differences of the proposed model between the two groups. A baseline model was first generated by adding the proposed paths on the full-metric invariance model. Then, the structural invariance between the United States and Chinese samples was examined by comparing a nested series of models with added parameter constraints to the baseline model. Although the model fit for the baseline model showed an acceptable model fit (($\chi 2 = 1346.384$, $df = 570$, CFI = .896, TLI = .881, RMSEA = .044), results of a chi-square difference test indicated a significant difference in the proposed model between the U.S. and Chinese samples ($\Delta\chi^2 = 188.792$, $p < .001$).

Discussion

This study adds to a growing literature focused on understanding factors promoting individuals' behavioral intention to engage in environmentally responsible behavior (ERB), specifically while visiting natural areas. We empirically tested a comprehensive theoretical framework by extending the value-attitude-behavior model with normative constructs in two national park visitor samples; one located in the United States and the other in China. In line with the expanded model, the results revealed that value-attitude relationship, personal norms, and social norms are essential in activating park visitors' ERB intention but cultural differences in the structural relationship between United States and China are noted.

The first finding supports the significant relationship between value orientation and attitudes, where biocentric value orientation is found to positively associated with attitudes, and anthropocentric value orientation is found to negative associated with attitudes in both samples. Further, the result indicates biocentric value orientation has a stronger relationship to attitudes and self-reported environmentally responsible behavioral intention than anthropocentric value orientation. This finding is consistent with previous empirical studies (Milfont et al., 2010; Schultz, 2001; Schultz, Gouveia, Cameron, Tankha, Schmuck, & Franěk, 2005b; Thompson & Barton, 1994). Evidence from the United States sample also indicates attitude is a significant predictor of environmental behavior. Taken together, anthropocentric and biocentric value orientations significantly influenced attitudes towards ERB, and ultimately drive individuals' intention to behave in an environmentally responsible manner. These findings are consistent with previous empirical studies, such as Nordlund and Garvill (2002) and Stern (2000), confirming the predictive power of value-attitude-behavior model in explaining ERB intention in the national park context in both countries.

Second, the result indicates value orientation has a significantly relationship with personal norm. This activation of personal norms is derived from an environmental value orientation, which concerns itself with appropriate (or inappropriate) behavior in terms of understanding the consequences of individual actions on the environment. In other words, national park visitors are more likely to undertake ERB when they felt that they were personally obligated to protect the environment that provides them with valued social and recreational experiences. This finding was in line with previous studies where studies shown personal norm is triggered when an individual acknowledges their responsibility for their actions and possess an awareness of the threat to the environment (Esfandiar et al., 2019; Landon et al., 2018).

Third, personal norm is found to have a positive relationship with all three categories of ERB intentions in the United States sample, further confirming the power of personal norm in driving human behaviors, which has been well-established in the literature (Doran & Larsen, 2016; Kim & Seock, 2019; Nolan et al., 2008). However, there was not such a relationship between social norms and the ERB in the United States sample. This result echoes previous studies where researchers found that the predictive power of social (subjective) norms decrease when other norms (i.e., personal norms) were added to the analysis (Bamberg & Moser, 2007; Niemiec, Champine, Vaske, & Merten, 2020). Another study, conducted by de Groot et al. (2021), found similar conclusion where individuals with strong personal norms were more likely to reduce their environmental impact regardless of their perception of the social norms towards environmentally responsible behavior.

The result of the group comparison analysis further illustrates cultural differences in how value orientation, attitudes, and norms influence different types of ERB intentions. Traditionally, ERB intention was frequently treated as a unidimensional behavior in parks and protected area

context. However, emerging studies in recent years advocate a multi-dimensional understanding of park visitors' ERB and recognize that different types of ERB may be activated by distinct set of antecedents, as confirmed by the Chinese sample results.

Specifically, personal compliance behavior intention is solely activated by biocentric value orientation through personal norm in Chinese sample. A Chinese park visitor with a higher level of moral obligation toward reducing environmental impact (i.e., personal norm) is more likely to engage in compliance behavior while travelling, such as read park instructions or leave the place in good condition after a picnic. For persuasive behavior, attitude is found to be the strongest predictor in the United States sample, while personal and social norms demonstrate a stronger influence in the Chinese sample. Little difference found in the relative importance of personal and social norm in affecting persuasive behavior intention, echoing the empirical findings by Wu et al. (2021). Additionally, only biocentric value orientation predict compliance and persuasive behavioral intention, meaning that anthropocentric value orientation is not activated when a visitor decides to engage in both types of behaviors.

At last, this study reveals that destructive behavior is linked to social norms and anthropocentric value orientation, which is mediated by attitudes toward ERB. Consequently, individuals who possess high anthropocentric value orientation will result in lower level of attitude towards reducing environmental behavior. Biocentric value orientation — although Chinese visitors score higher averagely on this construct than the United States visitors — does not predict destructive behavior among Chinese visitors. This finding suggests that although values are fundamental to human behavior, they only influence behavior when individuals perceive their relevance and importance in specific actions. Hence, visitors who hold a strong

biocentric value orientation may not consider feeding wildlife, picking wildflowers, or walking off-trail as violation of their value principles and may see no harm in doing so.

Interestingly, I found a positive relationship between social norm and destructive behavior intention in the Chinese sample, meaning that the higher the perceived social pressure of park visitors to reduce their environmental impact, the more likely they will engage in destructive behavior. A possible explanation for this finding is lack of environmental knowledge, and in the same vein as the previously mentioned conclusion that biocentric value orientation does not activated when engaging destructive behavior, that Chinese park visitors may not have realized that feeding wildlife or picking flowers as a violation of park rules. Another possible explanation to this finding is a poor survey wording. Another possible explanation is the combination of poor survey wording and rationalization of destructive behavior under situational conditions, as discussed in previous studies (Goh, 2020; Goh et al., 2017). In other words, those visitors demonstrate a higher level of perceived social pressure are more likely to confidently engage in destructive behavior when they observe other visitros doing the same thing, because they perceive limited barriers that would restrict their behavior.

Results from this research generates meaningful implications theoretically and practically. First, limited existing literature have explored the multi-dimensionality of ERB and their antecedents. In this study, I attempt to categorize ERB into three subsets: personal compliance behavior, persuasive behavior, and destructive behavior. The findings presented are an important step in re-conceptualizing ERB in the national park context. Also, most of the existing studies examining the psychological antecedents of ERB have been studied in western societies. This study expands the current knowledge of ERB to other populations through cross-cultural comparative analysis. Specifically, this research uses multi-group structural equation

modelling (MGSEM) to investigate cross-cultural variations in ERB. While MGSEM has been frequently applied in other psychology publications, to the best of this researcher's knowledge, this is the first instance of MGSEM being applied to measure and explore antecedents of ERB in national parks, using a robust multiple-item scale to operationalize the constructs. Further, the use of MGSEM facilitated a comprehensive investigation of the complex relationship between variables and allowed for an examination of how these relationships may differ across cultures. This research has confirmed the benefits of a cross-cultural perspective in understanding visitor use management. The results identify the similarities and variance that exist between groups of visitors across geographic and cultural boundaries. This has the potential to encourage cooperation between management organizations across the world as well as the application of visitor management research undertaken in one country to another.

Furthermore, this study provides managers of national parks with some key management considerations from a practical implication. Since both attitude towards ERB and personal norms have been found to positively affect ERB, park managers can use a mixture of tactics to encourage visitors to act environmentally responsible that target attitudes and norms. Signs advising of the need to repair negative visitor impacts (such as trampling or tree damage) or calling for individuals to help with park conservation efforts could include emotive sentiments relating to enhancing/embracing nature. It is also important to develop environmental education and recreational programs (interpretive signage, guided tours, etc.) which can enhance individuals' personal norms for protecting environment can help bolster their sense of advocacy for the environment (Moyle & Weiler, 2017).

CHAPTER V: CONCLUSION

Beyond the natural science information concerning species and ecosystems, practitioners and researchers of protected areas around the world should acquire social science insights regarding visitors, as they often confront complex challenges associated with human use on public land. This is exceedingly important for national park management, which operates under a dual mandate: to safeguard the natural and cultural resources while simultaneously providing recreational opportunities to the public. Fostering environmentally responsible behavior (ERB) among park visitors is not only critical to the sustainability of national parks but also the broader stewardship of natural resources.

Currently, China is restructuring its protected area management while piloting a national park system, partly modeled after the United States. In China, where the social and natural systems are deeply intertwined, protected areas seek to mitigate the tension between human use — especially for social and economic development — and land resources. A salient objective for Chinese protected areas is to promote sustainability of natural resources, facilitated through environmental education and effective visitor management strategies, thereby nurturing ERB among visitors. Previous research has confirmed that visitors' ERB is influenced by a range of psychological antecedents—such as environmental attitudes and values, etc. However, these psychological variables vary greatly between different countries and cultures, and these differences affect the effectiveness of environmental impact and management.

In light of the above background, the findings of this doctoral dissertation contribute to the domain of public land environmental behavior and its cross-cultural differences. It enriches

our understanding of the multiple dimensions of national park visitors' ERB and highlights the opportunities for practitioners to refine these behavioral intentions.

Research and Managerial Implications

Visitor Management in National Parks Between the United States and China

Chapter 2 of this dissertation undertakes a comparative analysis of the national park systems in China and the United States from a visitor and tourism management perspective. While national parks were pioneered in the United States and Australia, and the International Union for Conservation of Nature (IUCN) provides a global standard for protected area categorization, national parks around the world have evolved their own unique models in different countries, with variation noted in conservation objectives, land ownership, indigenous/local community participation, visitor management, and governance, etc. These discrepancies reflect the impact of local natural, societal, and political environments. Thus, the first half of chapter 2 sorts through the 70-year history of protected area development in China and examines the context and opportunities underlying the Chinese government's decision to institute a national park system. This historical review indicates that before the introduction of the Chinese national park system, China's protected areas faced ongoing challenges, such as the central-local government dynamics over land use rights, decentralized management and accountability, deficit in continuous fiscal and conservation aid, conflicts between revenue generation with conservation aims, local resistance to institutional reform on conservation, as well as the lack of a designation compatible with dual objectives, all of which ultimately resulted in a high-capacity, tourism-centric development scene across the protected areas in China. Since 2016, China has been committed to creating a national park system, leveraging the lessons and best practices from the United States to advance the objectives of China's national park network.

It is worth mentioning that in the analysis of the historical development, a local central analytical lens was adopted. This is a common research perspective to understand Chinese history and politics. The metamorphosis of China's protected areas is closely tied to the changes in the country's political and societal processes. For instance, the significant increase in the numbers of protected areas after the 1980s mirrors China's shift from a centralized political system to a more decentralized governance approach. During this period, the management and funding were entrusted to local government where they were encouraged to develop protected areas—often through mass tourism—to drive regional economic growth. In this political system, the new national park system not only signifies a change of focus and objectives in public land management, it also symbolizes an adjustment of the Chinese government's move toward centralization, i.e., emphasizing the trend towards adjusting the previous decentralized management that was dominated by local interests. This is evident in the *Overall Plan* [*National Park Overall Plan*] as written by the central government where it emphasizes a top-down approach led by the central government and reaffirms national parks as a manifestation of national identity.

Chapter 2 also provides a comparison of the management models, funding mechanisms, and visitor management approaches of the national park systems in China and the United States. There are notable differences between the two, potentially impacting the effectiveness of visitor management and conservation efforts. Like the National Park Service in United States (USNPS), China establishes the National Park Administration (NPA) within the central government body. However, NPA differs in that it comprises 11 subordinate management bureaus, each overseeing one of the 11 pilot national parks, with major operations still carried out by local governments.

Furthermore, while the United States national parks rely primarily on congress appropriations, China's national parks are more dependent on provincial government funding.

National parks in both countries face unique challenges resulting from high visitation and recognize the importance of effectively managing visitor behavior. U.S. national parks have seen a 30% increase in visitors over the past decade. The USNPS has implemented a series of strategies to manage the surge in visitation while ensuring high-quality visitor experiences. These strategies include leveraging social science for visitor experience planning, managing access to remote areas through permits, employing multiple transportation modes to reduce vehicle congestion, and offering interpretive services and environmental education to foster environmental stewardship. It also developed a comprehensive visitor use management that features consistent and cross-agency collaboration for all types of public lands. In contrast, China's 11 pilot parks were all transformed from previously existing protected areas that were popular among domestic travelers. Yet, further analysis reveals that China's pilot parks lack a streamlined and unified approach to visitor management. Although the Overall Plan states the China's national parks should serve the dual purpose of conservation and recreation, visions and details on how recreational activities should be implemented and managed (e.g., sustainable tourism management, concession policies, carrying capacities, etc.) are not well-defined.

China is still in the early stages of planning effective visitor management in national parks development. In both countries, national park practitioners recognize the importance of educating visitors on how to minimize human-induced environmental impacts. Some of China's pilot national parks have also developed various environmental education programs designed to encourage environmentally responsible behaviors among visitors. Yet, simply providing environmental education programs may not be enough to adequately influence visitor behavior.

Considering the Chinese government's ambitious goal—creating at least 60 parks by 2035—and its large domestic nature-based tourist population, developing proper visitor use strategies should be the priority in the future. China needs to learn from the best practices and should work towards adopting strategies that have proven to be successful around the world, e.g., the United States.

Multidimensionality of ERB and Its Cross-Cultural Validity

Chapter 3 features quantitative cross-cultural research that empirically validates a measuring scale of ERB among national parks visitors in the United States and China. This research contributes to the limited empirical studies of multi-dimensionality of ERB within the context of national parks. Most existing ERB research is primarily based in Western societies. To address the lack of a cross-culturally valid ERB scale, a three-dimensional behavior scale was developed. Back translation techniques were employed to ensure linguistic equivalence, and multiple confirmatory factor analyses were conducted to test the measurement invariance of the proposed scale.

Data were collected from visitors at Shennongjia National Park in China and Mount Rainier National Park in the United States. The results confirmed that the proposed scale effectively represents ERB's concepts and structural invariance in both Chinese and American samples, further confirming ERB's multidimensionality. The findings indicated that ERB comprises three subsets: personal compliance, persuasive, and destructive behavior.

From a theoretical perspective, some levels of environmental impacts are an inevitable result from visitor use. Previous ERB research predominantly focuses on positive actions that contribute to conservation. This study broadened such scope to include destructive and

problematic behaviors, which are equally critical to understand and manage. In this study, we examined three common problematic behaviors in national parks: off-trail hiking, picking wildflowers, and feeding wildlife. The results indicate a notable cross-cultural variation in the perception and manifestation of these behaviors. For example, off-trail hiking is less associated with the underlying construct of destructive behavior in the American sample compared to the Chinese sample. On the contrary, the item of wildlife feeding holds a lower factor loading in the Chinese sample, suggesting a different cultural perception of this behavior as compared to the American sample.

These variations highlight the importance of cultural nuance when developing visitor use management strategies and environmental education in national parks. Understanding cultural dimensions and its implication in shaping individuals' environmental behavior are important in designing effective strategies that would resonate with visitors from different cultural backgrounds. From a practical perspective, The three-factor ERB construct tested in this study should be adopted in nature-based tourism settings and would be useful in understanding park visitors' behavior and to inform visitor management processes. It can further assist in impact monitoring and comparison across diverse populations. Park managers and policymakers should recognize visitors' intentions towards environmental responsibility and the promotion of sustainable development. The three-factor ERB scale can be instructional in designing effective environmental education programs, as well as planning, evaluating, and monitoring environmentally responsible tourism in national parks.

Promoting ERB Across Cultures

In chapter 4, an extended model of value-attitude-behavior with normative construct is adopted to analyze the ERB among national park visitors from the United States and China.

Findings of this quantitative study not only reveals the intricate ways that value orientations, attitudes, and norms interact to shape environmental behavioral intention, but also discover noticeable variation of behavioral processes across different cultural contexts.

The pivotal role of both biocentric and anthropocentric value orientations in shaping attitudes towards ERB was evident in both cultural groups but the strength of these relationships differs, suggesting a cultural variation in the association between value orientation and attitude. This study also highlights the mediating effect of personal norms related to value orientation and ERB in both contexts.

This study further confirms culture-specific pathways to different subsets of ERB among national park visitors. For example, a biocentric value orientation primarily influences personal compliance behavior through personal norms in the Chinese sample. On the contrast, in the American sample, personal compliance behavior is triggered by both anthropocentric and biocentric value orientations that are mediated through attitude and personal norm. The observed cultural differences in this study highlight the necessity for considering the cultural influence of environmental behavior when designing visitor engagement and environmental education programs to the park visitors. Additionally, this study underscores personal norms as a significant driver of ERB across cultures, suggesting that strategies promoting moral obligation (i.e., personal norm) towards the environment could be effective in both the United States and China. While the impact of social norms on ERB varies across the samples, understanding their role in different cultural contexts can be helpful in designing interventions to leverage peer pressure (e.g., from visitors nearby) for encouraging ERB.

Research Limitations

This study acknowledges certain limitations regarding its measurement approach, sampling, and research timeline. The behavioral scale used in this research relies on self-report measures of tourists' intention to behave in an environmentally responsible manner, which may not necessarily reflect their actual behavior. It is worth noting that self-report measures of environmental behavior are subject to social desirability biases, which could lead to over-reporting of certain behaviors and behavior intentions (Paulhus, 1991). While some scholars have argued that the social desirability bias does not significantly impact self-reported environmental behavior (Kormos & Gifford, 2014), caution should still be exercised when interpreting the findings from self-report measures.

The sampling approach used in this study targeted national park visitors, especially respondents who were easy to reach. In Chinese national parks, visitors were approached on designated trails by researchers. Comparatively, surveys could not be utilized inside the national parks in United States, hence, American visitors were approached in gas stations and grocery stores in the gateway communities as they exited the parks. This sampling method potentially excluded those involved in a variety of outdoor activities (e.g., backcountry hiking, camping, etc.) as national parks prohibit conducting research inside the park.

Another factor that may have impacted the interpretation of the results of this study is that data collection primarily took place during the summer and fall of 2019, the year preceding the outbreak of COVID-19. A small percentage of U.S. respondents (13%, n = 34) completed their survey online in the spring of 2020 after the outbreak, which may have introduced some level of bias to the results. Respondents were asked to recall their most recent national park trip experience within the previous 6 months — a typical *recall survey* that is commonly utilized in social psychology, health, and marketing research (Sudman et al., 1996). The length of the

reference period (e.g., referring to “yesterday” versus “last year”) utilized in the recall survey could affect the accuracy of behavioral intention estimation (Winkielman et al., 1998). Generally, as the recall period increases, the reliability of measurement drops (Andrews et al., 2018). However, to minimize the impact of recall error, the recall period in this study was set to six months, which allowed for the capture of respondents’ past travel experiences prior to the pandemic.

Personal Reflection

Conservation has its root in both a social and cultural context, which requires an understanding of how diverse communities perceive, value, and interact with the natural environment. These perceptions and interactions are strongly conditioned by cultural beliefs and norms, and therefore can vary across cultures. Cultural systems exert a significant influence in shaping how individuals perceive and respond to changes in their environment. Comprehending the intricate systems interlinking human and their environment is important in exploring psychological antecedents of environmentally responsible behavior, which yield invaluable insights into programs and policies tailored to address environmental issues across human societies.

My interests in exploring human-nature interaction and its cultural variation have deep root in my transformative journey over a decade in the United States, where I experienced a change in my self-identity from a foreign international student to a first-generation immigrant. Living amidst two cultures—my Chinese heritage and the American culture I immersed in post-relocation—inspired my interest in the role of cultural factor in shaping individuals’ perception and behavior. The unique cultural confluence has given me a unique perspective to evaluate the complex interactions between culture and human-nature interaction. In my second year in the

United States, I obtained a driver's license, bought a car, and engaged in road trips to national parks across the country during my school breaks. Over my decade-long stay in this country, I visited 36 national parks. I had numerous conversations with national parks visitors and park staff, trying to understand their stories and to share their joy for the beautiful landscapes and sceneries found in nature. In this journey, I began to appreciate and value an "outsider" perspective. The capacity for international mobility, along with the ability to embody intercultural perspective is in fact a privilege—they both constructed a domain of comprehension, derived from one's own exclusive and unique experiences. These experiences reminded me of the critical importance of stepping outside a western-centric perspective when studying human subjects. Cross-cultural research challenges our preconceived notions and biases, showcasing the range of human relationships with nature, which is beyond the singular viewpoint often provided by a western-centric lens. The diversity of perspectives helped us to develop more holistic and adaptive approaches to conservation, better accommodating the complexity of natural and social systems.

During the journey of writing this dissertation, I have observed some barriers to effective cross-cultural dialogue at a broader scale. These barriers often arise not only from linguistic differences, but also from disparate sociocultural norms that shape expectations and actions, as well as shifts in the geopolitical landscapes. But more importantly, environmental conservation transcends political and technical challenges. Creating inclusive and culturally sensitive approaches are essential for overcoming the escalating global environmental challenges. Our collective responsibility to the planet transcends cultural boundaries, encourages us to learn from each other and collaborate for a sustainable future.

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APPENDIX 1: ENGLISH SURVEY

Thank you for agreeing to take this important survey to help us understand your opinions towards nature-based tourism destinations and tourists' behavior. Your participation is voluntary. ***This survey should take you 5-10 minutes to complete***.

1. Including this visit, about how many times have you visited any national parks in the past 6 months?
   _____ times _____ I don't remember

2. During this visit today, were you:
   ☐ Alone
   ☐ With Family or Friends _____ Number of people in the group (including yourself)
   ☐ Other _____ Number of people in the group (including yourself)

3. To what extent do you agree or disagree with each of the following statements regarding nature:
   (***Circle one response for each statement)***

	Strongly disagree	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Agree**	**Strongly agree**
Nature has as much right to exist as people.	1	2	3	4	5	6	7
Wildlife, plants, and people have equal rights to live and develop.	1	2	3	4	5	6	7
Nature should be preserved so that future generations can enjoy it.	1	2	3	4	5	6	7
The value of nature exists only in the human mind, without people nature has no value.	1	2	3	4	5	6	7
The primary value of nature today is to provide places to play and recreate.	1	2	3	4	5	6	7
Nature are valuable only if it produces jobs and income for people.	1	2	3	4	5	6	7
Nature's primary value is to provide products useful to people.	1	2	3	4	5	6	7
The purpose of nature is for people to be able to make a living from it.	1	2	3	4	5	6	7

4. When you travel to a natural area (e.g., forests, state and national parks), how likely are you to do the following?
(***Circle one response for each statement)***

While travelling, how likely are you to …	**Not at all likely**	**Unlikely**	**Somewhat unlikely**	**Neutral**	**Somewhat likely**	**Likely**	**Very likely**
…read park instructions	1	2	3	4	5	6	7
…participate in ranger-led activities	1	2	3	4	5	6	7
…not disturb wildlife or vegetation	1	2	3	4	5	6	7
…leave the place in good condition after a picnic	1	2	3	4	5	6	7
…pick up litter left by others	1	2	3	4	5	6	7
…tell others not to feed wildlife	1	2	3	4	5	6	7
…report inappropriate behaviors to park rangers	1	2	3	4	5	6	7
…hike off-trail and explore interesting areas	1	2	3	4	5	6	7
…feed the wildlife if they appear hungry	1	2	3	4	5	6	7
…pick a flower if it looks pretty	1	2	3	4	5	6	7
…carve messages on trees	1	2	3	4	5	6	7
…carve messages on stones	1	2	3	4	5	6	7

5. To what extent do you agree or disagree with each of the following statement: (***Circle one response for each question)***

While travelling…	**Strongly disagree**	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Agree**	**Strongly agree**
…I am aware of the negative impacts that people can have on the natural environment	1	2	3	4	5	6	7
…My personal actions can negatively impact nature	1	2	3	4	5	6	7
…If I touch or feed wildlife, it could hurt the animal's ability to survive	1	2	3	4	5	6	7
…It is my responsibility to minimize my negative impacts on nature	1	2	3	4	5	6	7
…All people should feel responsible for reducing negative impact to nature	1	2	3	4	5	6	7
…It is my responsibility to protect nature	1	2	3	4	5	6	7

6. For me, reducing my impact on nature while travelling is: (***Circle one response for each statement***)

Waste of time	1	2	3	4	5	6	7	**Not waste of time**
Inconvenient	1	2	3	4	5	6	7	**Convenient**
Not important	1	2	3	4	5	6	7	**Important**

7. How likely is it that the groups of people listed below would expect you to minimize your impact on the environment
while travelling? (***Circle one response for each question)***

	Strongly disagree	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Agree**	**Strongly agree**
My family	1	2	3	4	5	6	7
My friends	1	2	3	4	5	6	7
People who live nearby	1	2	3	4	5	6	7
Tourists around me	1	2	3	4	5	6	7
Rangers and other park staff	1	2	3	4	5	6	7

8. To what extent do you agree or disagree with each of the following statements: (***Circle one response for each question)***

While travelling…	**Strongly disagree**	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Agree**	**Strongly agree**
…most people who are important to me minimize their impact on the environment	1	2	3	4	5	6	7
…most tourists minimize their impact on the environment	1	2	3	4	5	6	7
…government regulations require me to reduce my impact on the environment	1	2	3	4	5	6	7

9. To what extent do you agree or disagree with each of the following statements: (***Circle one response for each question)***

	Strongly disagree	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Agree**	**Strongly agree**
I would feel guilty if I were responsible for damaging nature	1	2	3	4	5	6	7
I feel I should not harm nature when traveling	1	2	3	4	5	6	7
I feel that I should educate others about the importance of protecting nature	1	2	3	4	5	6	7

10. In general, how often do you to do each of the following: ***(Circle one response for each statement)***

In general, I …	**Never**	**Rarely**	**Occasionally**	**Sometimes**	**Frequently**	**Usually**	**Always**
…donate to conservation efforts	1	2	3	4	5	6	7
…vote for politicians that support conservation	1	2	3	4	5	6	7
…talk to others about environmental issues	1	2	3	4	5	6	7
…recycle glass bottles or jars or aluminum cans	1	2	3	4	5	6	7
…write to government officials to express support for protecting the environment	1	2	3	4	5	6	7

Finally, a few questions about you. Remember all answers are confidential.

11. Are you: ☐ Male ☐ Female

12. How old are you? _____

13. How would you describe **your residence** or community when you were **growing up**? **(*Check one response*)**

- ☐ Large city with 250,000 or more people
- ☐ City with 100,000 to 249,999 people
- ☐ City with 50,000 to 99,999 people
- ☐ Small city with 25,000 to 49,999 people
- ☐ Town with 10,000 to 24,999 people
- ☐ Town with 5,000 to 9,999 people
- ☐ Small town / village with less than 5,000 people
- ☐ A farm or rural area

14. How would you describe **your current** residence or community? **(*Check one response*)**

- ☐ Large city with 250,000 or more people
- ☐ City with 100,000 to 249,999 people
- ☐ City with 50,000 to 99,999 people
- ☐ Small city with 25,000 to 49,999 people
- ☐ Town with 10,000 to 24,999 people
- ☐ Town with 5,000 to 9,999 people
- ☐ Small town / village with less than 5,000 people
- ☐ A farm or rural area

APPENDIX 2: CHINESE SURVEY

神农架旅游调查问卷

尊敬的游客：

您好！我是美国科罗拉多州立大学人文自然系的博士生，因毕业论文需要正在开展神农架游客调查工作。请根据您此次神农架旅游的切身感受填写此问卷。所有问题不涉个人隐私，答案无所谓对错，仅用于学习研究，敬请如实填答。您的如实填写对我们的学习非常重要，我们将依法对您的信息严格保密。衷心感谢您的帮助和配合！

一、在过去的六个月里您去自然景点（如，森林公园、国家公园、风景名胜区等）旅游了多少次（包含这一次）？

_____ 次　　☐ 我不记得了

二、在这一次旅行中，您是：

☐ 独自一人出行

☐ 与家人或朋友同行　　人数（包括自己）_____

☐ 和其他人出行　　人数（包括自己）_____

三、请就下列关于自然的陈述作出您的评价（单选）：

	强烈不同意	不同意	部分不同意	中立	部分同意	同意	强烈同意
1. 大自然拥有与人类同样存在的权利	1	2	3	4	5	6	7
2. 野生动物、植物和人一样拥有平等生存和发展权利	1	2	3	4	5	6	7
3. 我们应当保护自然，这样我们的后代可以享受它们	1	2	3	4	5	6	7
4. 自然的价值只存在于人的观念中，没有人的自然是没有价值的	1	2	3	4	5	6	7
5. 当今自然的主要价值是给人类提供游憩和休息场所	1	2	3	4	5	6	7
6. 只有为人们创造就业机会和收入，自然才有价值	1	2	3	4	5	6	7
7. 大自然的主要价值在于提供对人们有用的产品	1	2	3	4	5	6	7
8. 自然存在的目的是让人们能够以此为生	1	2	3	4	5	6	7

四、当您去一个自然景点旅游时（如，森林公园、国家公园、风景名胜区等），您会做下列的事情

吗？（单选）

在旅行时，您有多大可能会…（做下列事情）	根本不可能	不可能	有些不可能	中立	有些可能	可能	非常可能
1. 阅读公园（景点）的游览说明和注意事项	1	2	3	4	5	6	7
2. 不打扰/采摘野生动物或植物	1	2	3	4	5	6	7
3. 在野餐后收拾好这个地方	1	2	3	4	5	6	7
4. 捡拾他人扔下的垃圾	1	2	3	4	5	6	7
5. 劝解他人不要去喂野生动物	1	2	3	4	5	6	7
6. 向景区管理处汇报其他游人的不恰当行为	1	2	3	4	5	6	7
7. 离开游步道，探索自己感到有趣的地方	1	2	3	4	5	6	7
8. 喂那些看起来很饿的野生动物	1	2	3	4	5	6	7
9. 采摘一朵看起来很美的野花	1	2	3	4	5	6	7
10. 在树上刻画	1	2	3	4	5	6	7
11. 在石块上刻画	1	2	3	4	5	6	7

五、您在多大程度上同意下列的陈述（单选）？

在旅行时…	强烈不同意	不同意	部分不同意	中立	部分同意	同意	强烈同意
1. 我意识到游客可能会对自然环境带来负面影响	1	2	3	4	5	6	7
2. 我的个人行为可能会对自然产生负面影响	1	2	3	4	5	6	7
3. 如果我触碰或喂一个野生动物，可能会伤害它们的生存能力	1	2	3	4	5	6	7
4. 我有责任要减少我对自然环境的负面影响	1	2	3	4	5	6	7
5. 所有人都有责任去减少自己对自然环境的负面影响	1	2	3	4	5	6	7
6. 我有义务保护自然环境	1	2	3	4	5	6	7

六、对于我来说，在旅行中减少我个人对自然环境的负面影响是（请根据您的感受从中做出选择，并在相应的数字上打√）：

浪费时间	1	2	3	4	5	6	7	不浪费时间的
不方便的	1	2	3	4	5	6	7	方便的
不重要的	1	2	3	4	5	6	7	重要的

七、下面列出的人们有多大程度会期待您在旅行过程中减少自己对自然环境的负面影响？（单选）

	强烈不同意	不同意	部分不同意	中立	部分同意	同意	强烈同意
我的家人	1	2	3	4	5	6	7
我的朋友	1	2	3	4	5	6	7
我的邻居	1	2	3	4	5	6	7

景区里的其他游客	1	2	3	4	5	6	7
景区的管理者和工作者	1	2	3	4	5	6	7

八、您在多大程度上同意下列的陈述（单选）？

在旅行时…	强烈不同意	不同意	部分不同意	中立	部分同意	同意	强烈同意
1. 我的家人、亲朋好友会减少他们对环境的负面影响	1	2	3	4	5	6	7
2. 景区里的其他游客会减少他们对环境的负面影响	1	2	3	4	5	6	7
3. 政府的法律法规要求我减少对环境的负面影响	1	2	3	4	5	6	7

九、您在多大程度上同意下列的陈述（单选）？

	强烈不同意	不同意	部分不同意	中立	部分同意	同意	强烈同意
1. 不保护自然环境我会感到内疚	1	2	3	4	5	6	7
2. 我觉得在旅行过程中不应当破坏环境	1	2	3	4	5	6	7
3. 我觉得我应当教育他人关于保护环境的重要性	1	2	3	4	5	6	7

十、总体上，您如何评价下列的陈述？（单选）？

总而言之，我…	从不	很少	偶尔	有时	时常	经常	总是
1. 会给环保组织捐钱	1	2	3	4	5	6	7
2. 和他人探讨和环境保护有关的议题	1	2	3	4	5	6	7
3. 回收玻璃瓶、铝罐等垃圾	1	2	3	4	5	6	7
4. 向政府或景区管理处写信支持环境保护举措	1	2	3	4	5	6	7

十一、最后，关于您的个人信息。

您的性别： ☐ 男性 ☐ 女性 **您的年龄：** _____岁

1、您的教育程度：

☐ 未受教育	☐ 小学	☐ 初中
☐ 高中	☐ 副学位/文凭/证书/大专	☐ 本科
☐ 研究生(硕士)	☐ 研究生(博士及以上)	

2、您的家庭税前可支配收入（元）：

☐ 1500 元以下	☐ 1500-5000 元	☐ 5001-10000 元
☐ 10001-20000 元	☐ 20001 元以上	

3、您目前的常住地（近一年长期停留的地方）： _____省 _____市