

Evolution of Tourism in a Flagship Protected Area of China

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| Abstract: | <p>Nature-based tourism in protected areas is increasing worldwide and has strong potential to enhance biodiversity conservation, poverty alleviation, and ultimately sustainable development. Understanding the evolution of protected areas as tourism destinations and the causes and consequences of changing supply and demand elements is essential toward sustainably managing tourism in these critical ecosystems. This research applied the Tourism Area Life Cycle (TALC) model to illustrate and analyze the 30-year evolution of tourism in Wolong Nature Reserve. Being inscribed in UNESCO Biosphere Reserve and World Heritage programmes, Wolong is a flagship protected area in China. We showed that the Reserve experienced exploration, involvement, and development stages of TALC before tourism growth was completely halted by the Wenchuan Earthquake in 2008. We systematically investigated the changes related to the evolution of tourism and identified various internal and external driving forces. We examined the dynamics among politics, economy, and tourism growth that might propel the Reserve through the life cycle and identified significant tourism governance structural changes through the stages. The results have implications for sustainable tourism development in China's protected areas and also contributes to a broader and general understanding of the complex relationships among tourism, protected areas, and community development.</p> |

Evolution of Tourism in a Flagship Protected Area of China

Abstract

Nature-based tourism in protected areas, which is growing worldwide, offers much potential to enhance biodiversity conservation, poverty alleviation, and ultimately sustainable development.

Understanding the evolution of protected areas as tourism destinations and the causes and consequences of changing supply and demand elements is an essential step toward sustainably managing tourism in these critical ecosystems. This research applied the Tourism Area Life Cycle (TALC) model to illustrate and analyze the 30-year evolution of tourism in Wolong Nature Reserve. Being inscribed in UNESCO Biosphere Reserve and World Heritage programmes, Wolong is a flagship protected area in China. We showed that the Reserve experienced exploration, involvement, and development stages of the TALC before tourism growth was completely halted by the Wenchuan Earthquake in 2008. We systematically investigated the changes related to the evolution of tourism and identified various internal and external driving forces. We examined the dynamics of politics, economy and tourism growth that might propel the Reserve through the life cycle and identified significant tourism governance structural changes through the stages. The results have implications for sustainable tourism development in China's protected areas and also contributes to a broader and general understanding of the complex relationships between protected areas, sustainable tourism and community development.

19 **Introduction**

20 Nature-based tourism is a significant and growing segment of tourism (Newsome et al.
21 2002). The conservation sector plays an important role in the development of nature-based
22 tourism, mainly through establishing and maintaining over 210,000 protected areas worldwide
23 (WDPA 2014). The International Union for Conservation of Nature (IUCN), the largest global
24 environmental organization, defines a protected area as “a clearly defined geographical space,
25 recognised, dedicated and managed, through legal or other effective means, to achieve the long
26 term conservation of nature with associated ecosystem services and cultural values” (Dudley
27 2008: 8). Conserving ecosystems and biodiversity through effective protected area management
28 is important for tourism and recreation. IUCN classifies protected area systems based on the
29 management objectives of the many protected areas worldwide. Seven categories of protected
30 areas are defined, recorded and classified under this most widely recognized and used system
31 globally – Ia. strict nature reserve; Ib. wilderness area; II. national park; III. natural monument or
32 feature; IV. habitat/species management area; V. protected landscape/seascape; and VI. protected
33 area with sustainable use of natural resources. Tourism and recreation are primary management
34 objectives for category II, III, and V protected areas and secondary management objectives for
35 category Ib and VI protected areas (Dudley 2008). Other internationally designated protected
36 areas, such as UNESCO World Heritage sites and Biosphere reserves, are also often important
37 travel destinations. Around the world tourist visitation to protected areas continues to increase in
38 most developed and developing countries (Balmford et al. 2009).

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4 39 Protected area tourism has great potential to support biodiversity conservation and reduce
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7 40 poverty by replacing other destructive land uses (e.g., logging), directly financing protected areas,
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10 41 and providing income opportunities to local communities (UNWTO 2010, Buckley 2011, Coria
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12 42 and Calfucura 2012). In practice, however, tourism is often found to cause ecological
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15 43 degradation in protected areas (Klein et al. 1995, Farrell and Marion 2001, Grossberg et al.
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18 44 2003) with little or no benefit to the majority or the poor of the local community (Kruger 2005,
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21 45 He et al. 2008, Liu et al. 2012). The fact that tourism is naturally dynamic and the processes and
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24 46 impacts associated with tourism are highly susceptible to change makes it difficult to harness the
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27 47 power of tourism for the sustainable development of destinations (Butler 1999). Understanding
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30 48 the evolution of a tourism destination and the causes and consequences of changing supply and
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32 49 demand elements is a critical step toward sustainable tourism development.

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35 50 The tourism area life cycle (TALC) (Butler 1980) is one of the best known models of the
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38 51 evolution of tourism destinations. This model represents the relationship between an increasing
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41 52 rate of tourist visitation and the development of a tourist destination over time as a life cycle, and
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44 53 it offers a relevant framework for identifying development milestones for monitoring changes
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47 54 resulting from tourism development. The cycle includes several stages: exploration, involvement,
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50 55 development, consolidation, stagnation and post-stagnation. These stages have been supported by
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53 56 a number of case studies (Lagiewski 2006). In other cases inconsistencies between observed
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56 57 tourism destination development and the TALC model were found. For example, Hovinen (1981,
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59 58 1982) found that tourism development in Lancaster County, Pennsylvania deviated significantly
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4 59 from the TALC model in the later stages, while Bao (1995) found that some karst caves in China
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7 60 had no obvious exploration and involvement stages, and visitation declined sharply after the
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10 61 development stage. But overall, the TALC model is a useful descriptive tool for analyzing the
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13 62 evolution of tourism destinations (Johnston 2001, Lagiewski 2006).

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15 63 Past studies on the application of the TALC model (Johnson and Snepenger 1993, Oreja
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18 64 Rodríguez et al. 2008, Zhong et al. 2008, Garay and Cànoves 2011) usually involved qualitative
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21 65 analyses to relate information on a specific destination to different TALC stages to portray the
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24 66 historical progression of tourism development. These studies tend to be descriptive rather than
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27 67 normative (Lagiewski 2006). Some attempts have been made to examine the TALC model
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30 68 quantitatively (Lundtorp and Wanhill 2006), but their usefulness is limited by the need for long-
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33 69 term data on visitors to tourism areas. Alternatively, Johnson (2001) proposed to specify
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36 70 mechanisms through finding “critical events” and “blurry transitions” that can be used to interpret
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39 71 stage or sub-stage changes. The former refers to a key event that significantly influences the
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42 72 development of tourism. The latter focuses on a series of more subtle events that drive stage
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45 73 changes. Cutoff dates of stage or sub-stage changes identified in this way are then less arbitrary.

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47 74 There are few studies applying the TALC model to protected areas (Johnson and
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50 75 Snepenger 1993, Boyd 2006, Zhong et al. 2008), possibly because protected areas are often
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53 76 subjected to more regulations that may interrupt tourism growth and cause deviation from the
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56 77 theoretical structure of TALC (Weizenegger 2006). For example, Johnson and Snepenger (1993)
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59 78 found that tourism in Yellowstone was more intricate than the TALC model predicted, as
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4 79 different sources of information did not detect whether the park was at development or
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7 80 consolidation stages. In another example, Zhong et al. (2008) showed that the TALC model was
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10 81 applicable to tourism development in the first forest park in China, but environmental
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12 82 degradation took place in early rather than later stages. As the model suggests, different decisions
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15 83 among public and private sectors play important roles in both the demand and supply side of
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18 84 tourism development (Lagiewski 2006) and in shaping the life cycle process (Johnston 2001).
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21 85 Thus, instead of trying to fit protected area tourism growth to TALC and regarding divergence
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24 86 from theory as a challenge to the concept, it might be more useful to treat the model as a
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27 87 descriptive framework and focus on identifying and explaining the major factors (e.g.,
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29 88 government regulation, public and private investments) that cause stage progression during
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32 89 destination development or result in departures from theory. Understanding the roles and
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35 90 consequences of various political and commercial decisions during destination development can
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38 91 help design and plan sustainable nature-based tourism.

92 **Description of case study and research questions**

93 Increases in nature-based tourism are significant in developing countries and emerging
94 economies (Balmford et al. 2009). China is one of the largest international tourism destinations
95 and has the largest domestic tourism market (Lew 2003). Tourism in China's protected areas has
96 grown rapidly during the past three decades (Wang et al. 2012). A survey on 100 nature reserves
97 across 29 provinces in China in the late 1990s showed that 82% had developed nature tourism
98 (Han and Zhuge 2001). In 2002, the first national nature reserve ecotourism master plan was

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4 99 approved by the State Forestry Administration (SFA) to guide tourism development in Wolong
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7 100 National Nature Reserve (Figure 1). This signaled a new round of tourism development into the
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10 101 most restrictively managed and ecologically most important protected areas of China. Since then
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13 102 similar ecotourism master plans have been approved for over 30 national nature reserves (Peng
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15 103 and Zhang 2011).

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18 104 Wolong Nature Reserve was established in 1963 and expanded to the current size of
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21 105 200,000 ha in 1975. It is part of the Southwestern China Mountains global biodiversity hotspot
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24 106 and most famous for hosting the largest wild population of the endangered Giant Pandas
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26 107 (*Ailuropoda melanoleuca*) (Wolong Administration Bureau 2004). The Reserve is managed by
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28
29 108 the Wolong Administration Bureau, reporting to both SFA and Sichuan provincial government.
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32 109 The bureau is hierarchically structured with two townships, Gengda and Wolong, under its
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35 110 governance. There are ~5,700 people living inside the Reserve, including ~5,000 rural residents,
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38 111 about three quarters of whom are Tibetan and Qiang ethnic minorities, and ~700 urban residents,
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41 112 mostly Reserve employees and their family members. In the 20th century they survived primarily
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44 113 on a subsistence-based agricultural economy that was highly dependent on natural resources
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46 114 (Ghimire 1994). Resources extraction activities in the Reserve once caused severe destruction of
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49 115 wildlife populations and habitat (Li et al. 1992, Liu et al. 2001).

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52 116 Conservation challenges in the Reserve started to receive extensive attention both
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55 117 domestically and internationally in the late 1970s. In 1979, the Reserve was promoted to a
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57 118 national nature reserve and became one of China's first three UNESCO Biosphere Reserves (Li
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4 119 and Zhao 1989). Biosphere reserves are internationally recognized protected areas that represent
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7 120 main terrestrial and coastal ecosystems on earth and promote sustainable development based on
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10 121 ecosystem management and local community participation. Biosphere reserves serve in some
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12 122 ways as 'living laboratories' for testing out and demonstrating integrated management of land,
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15 123 water and biodiversity (MAB 2012). Various conservation programs have been proposed and
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18 124 implemented in Wolong to stem ecological degradation and reduce poverty. Special attention
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21 125 was given to tourism as it was perceived as an environmentally clean industry that might provide
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24 126 job opportunities for locals (Yin and Eagles 2005, He et al. 2008).

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26 127 In this study, the TALC framework was applied to help describe tourism development in
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29 128 Wolong Nature Reserve since the 1980s. Using longitudinal data and a comprehensive analysis
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32 129 of tourism development in Wolong, this study provides an in-depth understanding of protected
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35 130 area tourism development in China. By using the experience of China under the context of
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38 131 economic transition and globalization, this research also aims to contribute to knowledge about
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41 132 protected area tourism management in general. The research questions are 1) did the evolution of
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44 133 tourism in Wolong adhere or follow the stages as defined in the TALC framework; 2) what were
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47 134 the economic, ecologic, social, and governance changes associated with the evolution of tourism;
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49 135 and 3) what were the critical drivers of the tourism stage change?
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4 136 **Methods**

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7 137 In this study, we examined whether the TALC model represents the observed tourism
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10 138 development in Wolong Nature Reserve, China. Data used in this study were collected through
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13 139 primary data sources such as in-depth interviews and surveys with various local stakeholders,
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16 140 questionnaire surveys of tourists, field surveys, and secondary data sources, such as government
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19 141 documents, as listed in Table 1. A combination of these methods allows a comprehensive study
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22 142 on all major types of stakeholders, including residents, reserve managers, tourism officials, and
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24 143 tourists.

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27 144 The local rural households survey results reported are part of a longitudinal study on
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30 145 coupled human and natural systems (Liu et al. 2007) in the Reserve (Liu et al. 1999, An et al.
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33 146 2001). Details about the household survey can be found in Liu et al. (2012). During the summer
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36 147 of 2005, semi-structured interviews were conducted with 68 local tourism-related small
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39 148 businesses, including 40 hotel/restaurant owners or managers, nine leisure farm owners, eight
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42 149 souvenir shop owners, five retail shop owners, and six street vendors. This sampled covered over
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45 150 80% of each type of the small businesses, except the leisure farm owners (~45%). The others
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48 151 either were not reachable or refused to be interviewed. The information collected included
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51 152 business conditions, perceptions of tourism development, and knowledge about tourists' activities
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54 153 inside the Reserve.

55 154 In 2005, 15 government and reserve officials were surveyed about the history of tourism
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58 155 development in the Reserve and their perceptions on development. While the individuals were
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4 156 not randomly selected, they cover a range of age (23-52 years old), education levels (primary to
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7 157 college education), and working experience in the Reserve (3 to >20 years). In 2007, a focus
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10 158 group on tourism development issues in the Reserve was organized with the participation of 12
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12 159 managers. These managers were specifically selected from the tourism-related government
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15 160 segments, such as tourism, natural resource management, and socioeconomic development
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18 161 departments. Interviews and in-depth discussions with the director and two vice directors of the
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21 162 Reserve were conducted at various times in 2007-2009 and 2012-2014.

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24 163 A tourist survey was conducted at the most visited attraction in the Reserve, the China
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26 164 Conservation and Research Centre for the Giant Pandas (CCRCGP), where the world's largest in-
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29 165 captive panda population was located. Random intercepts were conducted at the exit of
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32 166 CCRCGP during July and August of 2006 (54 out of 62 days) and June to October of 2007 (62
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35 167 out of 153 days). The first tourist leaving the center every 15 minutes during the day time was
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38 168 intercepted. The structured survey questionnaire covered basic information about the tourist's
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41 169 trip characteristics, trip motivation, and main activities in the Reserve. A total of 1,663 tourists
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44 170 were intercepted, including 502 international tourists (30.2%) and 1,161 domestic tourists
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47 171 (69.8%). The non-response rate for international and domestic tourists are 13.8% and 43.5%
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49 172 respectively, resulting in a final sample size of 1,090.

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51 173 A tourism infrastructure inventory was conducted in 2006 and 2007 to record the
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54 174 locations of the main tourism attractions, hotels/restaurants, and most used trails in the Reserve
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57 175 using a Global Positioning System receiver.
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4 176 Secondary data used in this research included local government's annual statistical reports
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7 177 about visitor arrivals, annual tourism receipts and other tourism-related information, publications
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10 178 (i.e., peer-reviewed journals, books, news articles) about the Reserve, and road and zoning maps.
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12 179 A four-category giant panda habitat suitability map (highly, moderately, marginally, and non-
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15 180 suitable) was reviewed (Viña et al. 2007).
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18 181 Based on annual visitor volumes, tourism receipts (Figure 2), and the change in
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20 182 accommodation capacity (Figure 3), tourism development in the Reserve was segmented into five
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23 183 stages by identifying critical events and the occurrence of major changes in tourism. Key
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26 184 indicators and their ecological, social, and economic impacts were summarized and compared
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29 185 within stages. Major changes in tourism planning and governance through the stages, some as
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32 186 driving forces and others as consequences of tourism development, were investigated.
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36 187 **Results**

38 188 **Tourism development stages and driving forces**

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41 189 A summary of five tourism development stages in the Reserve over the past three decades,
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44 190 including key events that are critical in causing and defining stages, is provided in Table 2.
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47 191 ***Exploration stage (1980-1990)***

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50 192 The late 1970s and the early 1980s mark the initiation of China's recent economic boom,
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53 193 which was also the onset of China's tourism development (Zhang 2003). In 1980 an
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56 194 internationally collaborative giant panda research project was initiated in Wolong Nature Reserve
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4 195 by the Chinese Ministry of Forestry (now State Forestry Administration) and the World Wildlife
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7 196 Fund (WWF). This event attracted global attention as it was the first ever scientific collaboration
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10 197 on conservation between China and the Western world. The collaboration led to fruitful research
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12 198 findings on wild giant panda ecology and also resulted in the establishment of the world's first
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15 199 giant panda breeding facility in the Reserve, which was later named the China Center for the
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18 200 Research and Conservation of the Giant Pandas (CCRCGP) (Schaller 1994).
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21 201 In 1983, a mass flowering and die-off of arrow bamboo (*Bashania fabri Yi*), a major
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24 202 staple food species for wild pandas, swept across the Reserve (Linderman et al. 2005). Field
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27 203 research showed that giant pandas did not change their daily and seasonal behavioral patterns
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30 204 despite the significant decline of their food base (Johnson et al. 1988), however, it was widely,
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33 205 though mistakenly, believed by the public and the government that the bamboo flowering would
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36 206 lead to panda starvation and mortalities (Schaller 1994, Pan et al. 2001). News about the pandas
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39 207 and the Reserve made headlines on both domestic and international media and soon brought to
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42 208 the Reserve donations and aid from around the world. This attracted thousands of visitors every
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45 209 year, mostly “foreign scientists and delegates and domestic and international panda fans”
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48 210 (Wolong Administration Bureau 2004), even though at the time all foreigners were required to
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51 211 get special entry permission from the Minister of Forestry (Sichuan Province Committee on
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54 212 Annal Compilation 1996).

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55 213 Throughout the 1980s, CCRCGP's efforts to breed pandas in captivity were largely
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57
58 214 unsuccessful. The first and only surviving panda bred in 1980s was born in 1986 (Schaller 1994).
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4 215 Britain's Prince Phillip visited the Reserve as the president of WWF and named the panda "Blue
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7 216 Sky" (Wolong Administration Bureau 2004). With the increasing media exposure, the Reserve
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10 217 started to establish its fame as the "Hometown of the Giant Pandas" both internationally and
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12 218 domestically. During this period, annual tourist arrivals in the Sichuan province increased at a
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15 219 rate of almost 25%, but the annual tourist arrivals to the Reserve fluctuated between 10,000 and
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18 220 20,000 (Figure 2). This was partly due to the poor road and the lack of tourism infrastructure in
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21 221 the Reserve. For example, it was recorded that over 3000 tourists from Chengdu city, including
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23 222 200 foreigners, visited the Reserve during the Labor Day holiday (May 1st) in 1983. Only a small
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26 223 proportion of the visitors were able to stay in the Reserve's government guesthouses with a total
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29 224 of 120 beds, and many others had to stay in reserve staff dorms (Wolong Administration Bureau
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32 225 2004).

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35 226 The lack of tourism growth in the 1980s was due to the lack of infrastructure for
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38 227 accessing the Reserve, available basic tourism services, and ultimately the cautiousness of the
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41 228 Reserve administration. The earliest plan to develop tourism was prepared in 1982 (Li et al.
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43 229 1992). The discussions on whether and how to develop tourism in the Reserve continued
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46 230 throughout the decade. The Reserve authorities thought there was not enough knowledge to
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49 231 support a tourism development plan that would result in minimal potential negative impacts on
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52 232 the ecosystem and the endangered pandas. During this period, while visitors were generally
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55 233 welcomed, there was no specific government segment on tourism management and local people
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57 234 had little involvement in tourism.

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4 235 *Involvement stage (1991-1997)*
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7 236 In the 1990s, China's economic reform and "open-door" policy entered a new era and the
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10 237 country started to receive more international visitors (Yu 1992, Zhang 2003). In Sichuan
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12 238 province, giant panda habitat was identified as its top tourism resource and the previous
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15 239 restrictions on tourist visitation (i.e., requirement of entry permission) to Wolong Nature Reserve
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18 240 were lifted (Sichuan Province Committee on Annal Compilation 1996). Further discussions on
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21 241 developing tourism in the Reserve led the managers to believe that carefully planned and
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24 242 managed tourism might bring multiple benefits. The perceived benefits included: a) using tourism
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27 243 income to supplement support from the central government and improve the financial status of
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30 244 the Reserve administration and their employees, b) diversifying the income sources of local
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33 245 residents to help reduce their extraction and consumption of natural resources (e.g., through
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36 246 fuelwood harvest and illegal logging) so that habitats of wildlife, such as the giant pandas, could
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39 247 be better protected; c) providing job opportunities for family members of the Reserve
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42 248 administration officials; and d) enhancing communication and information exchange with outside
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45 249 parties for obtaining more external support (Li et al. 1992).

46 250 The Wolong Tourism Development Inc., a government-owned company, was formed in
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49 251 1991 to organize and regulate the increasing visitation to the Reserve. This marked a major
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52 252 change in the government's role in tourism development from reactive to active tourism
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55 253 management. In 1997 the company was reformed into Tourism Department, an official
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58 254 governmental section under the Wolong Administration Bureau, to take charge of all tourism
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4 255 planning and management issues. Potential attractions were carefully selected by the Reserve
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7 256 administration to balance the economic and conservation needs, and all were distributed along the
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10 257 main road to avoid disturbing wild pandas. These attractions included CCRCGP, a wild animal
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12 258 and plant specimen museum at Wolong township, and short trails into two valleys (Li et al. 1992).

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15 259 During this period, the CCRCGP achieved ground-breaking successes for in-captive
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18 260 panda breeding. In 1991, twin pandas were born in CCRCGP with one cub surviving to adult age.
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21 261 Every year since then, at least one new panda cub was born and survived in CCRCGP. In 1996
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24 262 the first captive born and surviving panda was relocated to San Diego Zoo in the US as one of a
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27 263 pair of pandas in a new cooperative breeding and conservation program between the two
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29 264 countries. This panda, named Bai Yun, became the most productive female panda outside China
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32 265 and has so far given birth to five cubs. These pandas continued to put Wolong Nature Reserve in
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35 266 the global media.

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37 267 The successful panda breeding program at CCRCGP further publicized the Reserve. The
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40 268 annual tourist arrivals doubled from the previous period to about 25,000-30,000 (Figure 2). The
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43 269 situation started to change since a multi-year provincial road construction project, funded by the
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46 270 provincial government, was initiated in 1992. The main goal of this project was to strengthen the
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49 271 economic, social, and political linkage between the eastern urban regions of the Sichuan province
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52 272 and the mountainous regions in the west, where ethnic minorities, such as Tibetan and Qiang
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55 273 people, reside. The improved road in the Reserve made large-scale infrastructure construction
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57 274 possible and more efficient. In 1995, Wolong Hotel, the first of its kind in the Reserve with 126
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4 275 beds, was built with partial financial support from the provincial government. In 1996 another
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7 276 hotel, Sitongyuan Hotel, was constructed with investments from the Sichuan Department of
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10 277 Transportation (Wolong Administration Bureau 2004).

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12 278 During this period some small businesses, almost all owned and managed by the relatives
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15 279 of the Reserve officials, emerged to provide food and lodging to tourists. Some rural residents
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18 280 started to sell local products, mainly non-timber forest products (NTFPs) such as mushrooms and
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21 281 herbal medicines, to tourists (He et al. 2008).

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24 282 ***Development stage I (1998-2004)***

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26 283 By the late 1990s, forest and panda habitat loss and degradation in the Reserve peaked,
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29 284 largely because the “fence and fine” type of conservation policies in the past failed to address
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32 285 local people’s livelihood needs (Liu et al. 2001). To change this situation, a new comprehensive
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35 286 conservation plan, the *Wolong National Nature Reserve Master Plan*, was developed by the
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38 287 Reserve and approved by the SFA in 1998. The plan officially aligned tourism as a new strategy
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41 288 within a larger conservation framework. Outcomes of the plan were to draw funds from tourism
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44 289 revenue (e.g., admission to attractions) for forest and panda habitat conservation and provide
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47 290 alternative income for local farmers through tourism-related activities. A zoning management
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50 291 system, including experimental, buffer and core zones, was established as a guideline for
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52 292 regulating human activities and mitigating negative human impacts across the Reserve (Figure 4).

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54 293 Also in 1998 the Sichuan province government announced the first *Sichuan Province*
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57 294 *Tourism Development Master Plan* (Wu 2001), in which giant panda was branded as the
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4 295 province's tourism image marker and Wolong panda tourism was given special development
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7 296 priorities. In 2000 the giant panda was further promoted as one of the top three tourism brands of
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10 297 the province. Two government agencies, the Sichuan Department of Tourism and the Sichuan
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12 298 Department of Forestry, were identified to work with Wolong Administration Bureau to make a
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15 299 panda tourism plan, which later evolved into the *Wolong National Nature Reserve Ecotourism*
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18 300 *Development Master Plan* and was officially approved by SFA in 2002.

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21 301 The completion of the provincial road in 1999 connected the Reserve to an important
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24 302 tourism destination cluster in Sichuan, collectively called the Greater Jiuzhaigou Loop Touring
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27 303 Area (Figure 1), which covers several National Scenic Areas and World Heritage Sites and
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30 304 receives millions of domestic and international tourists every year. As a result annual tourist
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33 305 arrivals in the Reserve almost tripled in the development stage I compared to the involvement
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36 306 stage (Table 3).

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38 307 A new round of tourism infrastructure development was implemented in this period. The
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41 308 first project was the new Panda Hotel constructed by CCRCGP in 1999. In 2001 Wolong
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44 309 Investment Co., Ltd. was established by the Reserve administration with tourism management
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47 310 and promotion as one of its key businesses. But the escalating demand for tourism soon dwarfed
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49
50 311 the Reserve's limited financial (e.g., investment), physical (e.g., infrastructure), and human (e.g.,
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52
53 312 tourism management expertise) capital. In 2002 the Reserve signed a contract with the Luneng
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56 313 Xinyi Ltd. Co., a state-owned enterprise from Eastern China, to set up a new non-listed
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58
59 314 shareholding tourism corporation, with the Reserve receiving 45% of the total shares and Luneng
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4 315 55% (Su et al. 2007). Luneng invested 42 and 30 million Yuan (1 Yuan = 0.1208 US Dollar in
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6
7 316 2002) respectively to build a new four-star level Wolong Hotel with 668 beds (a five-fold
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9
10 317 increase from the 126 beds in the old Wolong Hotel), which was completed in 2004 and operated
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12 318 by Luneng), and the Wolong China Giant Panda Museum, completed in 2003 and operated by the
13
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15 319 Reserve.

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18 320 Another tourism development project in this period took place in the Zhonghe river area
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21 321 of the Reserve, which administratively belongs to the Sanjiang Township of Wenchuan County
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23 322 (Figure 4). Limited by steep mountain ridges, the Reserve's capacity in monitoring human
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26 323 encroachment in this area was low. Since the late 1990s, the Wenchuan county government
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29 324 developed tourism infrastructure in the area (State Forestry Administration 2006). In 1999, the
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32 325 Reserve established a tourism development agreement in this area with the Wenchuan county
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35 326 government under the supervision of Sichuan Department of Forestry. Not only the existing
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38 327 tourism infrastructure in the buffer zone around Zhonghe (Figure 4) was kept, a new three-star
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41 328 hotel in the buffer zone and a series of tourism facilities penetrating three kilometers into the core
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44 329 zone of the Reserve were also constructed.

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46 330 During this stage local participation in tourism increased significantly. Over 30
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49 331 household-owned hostels and restaurants, almost all distributed around the township centers and
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51
52 332 beside the main road, were constructed, together providing over 1000 beds. A significant number
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55 333 of micro-businesses emerged, mainly to sell local products and souvenirs to the tourists. Souvenir
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58 334 demand stimulated the establishment of a family workshop factory in the Wolong Township.
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4 335 ***Development Stage II (2004-2007)***
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6
7 336 In 2004, the Reserve and Luneng decided to terminate their contract and all shares of
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9
10 337 Luneng were transferred to Wolong Investment Co., Ltd.. In 2005, another collaboration was
11
12 338 established between the Wolong Administration Bureau and the Jiuzhaigou National Scenic Area
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15 339 Administration. Jiuzhaigou was the first World Natural Heritage Site and the most popular
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17
18 340 nature-based tourism destinations in Sichuan with over 2,000,000 annual arrivals (Lew 2003). A
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21 341 new Jiuzhaigou-Wolong Giant Panda Ltd. Co. was formed to manage tourism in the Reserve, in
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23
24 342 which Wolong had 20% of the total shares and Jiuzhaigou 80%. Full tourism managerial power
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26
27 343 over all major tourism attractions (e.g., CCRCGP, panda museum) and facilities (e.g., Wolong
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29 344 Hotel) was given to the more experienced Jiuzhaigou side in order to intensify tourism marketing
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31
32 345 using the brand of Wolong pandas, construct new tourism facilities and attractions to enrich
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35 346 visitor experiences, and enhance the underdeveloped services and transportation systems.
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38 347 Between 2005 and 2007, over 80 million Yuan were spent in infrastructure construction in the
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41 348 Reserve (Wolong Administration Bureau 2009).
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43 349 In 2006, a World Natural Heritage site, namely Sichuan Giant Panda Sanctuaries, was
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46 350 officially designated by UNESCO, with Wolong Nature Reserve as its most important part
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49 351 (IUCN 2006). A new ecotourism development plan (2006-2015) was developed by the Wolong
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51
52 352 Administration Bureau and approved by the Sichuan provincial government. Another round of
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55 353 construction was implemented to further widen and upgrade the provincial road.
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4 354 Although the road construction and the related traffic restriction significantly limited and
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6
7 355 reduced the visitation to the Reserve in 2007, the rise of tourist arrivals in the Reserve was
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9
10 356 apparent (Figure 2). Tourists came from around the world. Our sample at CCRCGP between
11
12 357 2006 and 2007 included 434 international tourists from 27 foreign countries and 656 domestic
13
14
15 358 tourists from 29 provinces in China. The top five origins of foreign tourists were Japan (13.3%),
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17
18 359 the United States (7.9%), the United Kingdom (5.0%), France (2.8%), and the Netherlands
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21 360 (2.6%). The top five origins of domestic tourists were Sichuan (28.6%), Chongqing (15.8%),
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24 361 Guangdong (6.4%), Beijing (2.7%), and Shanghai (2.0%). Wild pandas, natural forests and
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26
27 362 wildlife, and unspoiled air and water were the top three reasons that motivated the domestic
28
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30 363 tourists to come to the Reserve; for international tourists, the top three were natural forests and
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32 364 wildlife, wild pandas, and pandas in captivity (Table 4). Late spring to early fall marked the
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35 365 main tourism season, with two peaks in early May (the labor day holiday in China) and early Oct.
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38 366 (the national day holiday in China) (Figure 5).

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40 367 Besides the day-trippers who spent time at the conventional attractions (e.g., panda center,
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43 368 museum) in the Reserve, several new tourist groups emerged in this period. One group was
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46 369 “*Nong Jia Le*” (or leisure farm) tourists, who visited the Reserve mainly for the cool weather and
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49 370 unspoiled air and water in the summer. These tourists were mainly city dwellers from the nearby
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52 371 Chengdu metropolitan area. They usually spent weekends in private hostels or stayed a
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55 372 prolonged period in local people’s houses, and some chose to walk the neighboring trails during
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58 373 daytime. Another group was backpackers, who came mainly for hiking, camping, birding, or
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4 374 enjoying the forest and alpine landscapes. The backpackers frequented the trails across the
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7 375 Reserve. These trails used to be the main routes connecting the reserve to outside and were
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10 376 mostly abandoned after the first road was paved into the Reserve in the 1960s. Backpackers
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12 377 followed these trails into the buffer and core zones of the Reserve, where highly suitable panda
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15 378 habitat is located (Figure 4). According to *Regulations of the People's Republic of China on*
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18 379 *Nature Reserves* (State Council of China 1994), tourists are banned from visiting areas outside
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21 380 the experimental zone in nature reserves. But the lack of monitoring staff and the low frequency
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24 381 (seasonal before 2008 and biannual after 2008) of field monitoring made it impossible to ban
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27 382 backpackers from entering the forests or collect enough disturbance data to inform management.
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29 383 As a result, almost none of the tourists' activities along trails have been regulated or controlled in
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32 384 the Reserve (field observation).

35 385 ***Earthquake and post-quake reconstruction (2008 – present)***

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38 386 The Olympic Games were held in Beijing, China in 2008. With the road upgrade
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41 387 completed in early spring, a peak tourism year for the Reserve was anticipated, but two
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44 388 unexpected events struck this region and resulted in a complete stop of tourism. The Tibetan
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47 389 unrest (Yeh 2009) in spring 2008 led the government to enforce travel restrictions to western
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50 390 Sichuan. The Labor Day holiday of 2008 witnessed a much lowered visitation to the Reserve. On
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52 391 May 12th of 2008, a 7.9 Mw earthquake struck the Reserve at its eastern boundary. The
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55 392 earthquake and its associated landslides led to 48 casualties (6 reserve employees, 35 rural
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58 393 residents, and 7 visitors), over 100 visitors missing and extensive damage to the infrastructure,
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4 394 including the road network and the tourism facilities in the Reserve (Viña et al. 2011). Many
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7 395 houses and other buildings collapsed or were damaged. All in-captive pandas raised in CCRCGP
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10 396 were relocated to its branch base in Ya'an, Sichuan. A series of plans were drawn to rebuild the
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12 397 infrastructure and restore the ecosystem. Tourism was identified as the main tool of economic
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15 398 development after the completion of infrastructure reconstruction. Recently, a newer version of
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18 399 the ecotourism master plan has been proposed, with 1.382 billion Yuan (1 Yuan = 0.1464 \$US in
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21 400 2009) to be spent by 2015 (Wolong Administration Bureau 2009). Plans call for the repair or
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23
24 401 replacement of damaged infrastructures, including roads and tourism facilities. To accommodate
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26
27 402 the new demand for lands to build tourism infrastructure the zoning scheme was modified, with
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29
30 403 an extra 102 ha of highly suitable habitat allocated into the experimental zone (Hull et al. 2011),
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32 404 and many local households relocated and their cropland converted into built areas.

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35 405 Post-earthquake tourism development in the Sanjiang township territory within the
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38 406 Reserve was first revitalized. The Sanjiang area was promoted to a National Scenic Area in 2009,
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41 407 the first of its kind in the Wenchuan Earthquake affected region (Xinhua News Agency 2012). A
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44 408 new round of infrastructure development and tourism growth in this area may further encroach
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47 409 wildlife habitat from southeast of the Reserve. Inside the Reserve, Wolong Administration
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50 410 Bureau originally expected volumes of tourists would return soon and tourism would replace
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53 411 agriculture and become the dominant economic segment after reconstruction (Wolong
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56 412 Administration Bureau 2009). However, frequent landslides and debris flow every summer since
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59 413 2008 recurrently damaged the newly reconstructed road and delayed the completion of new
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4 414 CCRCGP facilities in the Huangcaoping area of Gengda township to 2014 (Figure 4). A third
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7 415 round of road reconstruction was started in 2012 and will take at least four years. Because of the
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10 416 disaster risks, Wolong Administration Bureau declared the Reserve too dangerous to visit and
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12 417 thus closed for tourism until 2016. While some individual tourists and small groups still pass
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15 418 through the Reserve occasionally, no official tourist-related data have been collected since May
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18 419 2008.

20 420 **Changes related to tourism development**

22 421 *Economic changes*

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26 422 When tourism started in the Reserve in early 1980s, the local economy was a subsistence-
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28
29 423 based agricultural economy (An et al. 2006). Over the last 20 years per capita annual net income
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32 424 of local residents increased steadily from 1,297 Yuan in 1990 to 3,010 Yuan in 2006 (Table 3).
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35 425 Several factors contributed to the income increase: a) shifting crop type from corn and potato to
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38 426 cash crops (e.g., cabbage and radish); b) temporary labor jobs inside the Reserve on road or other
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41 427 infrastructure construction projects; and c) participating in commercial activities, mainly tourism-
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44 428 related. Based on a random sample of 220 local households, the percentage of tourism-
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47 429 participating households increased from 4% in 1998 to 27% in 2006. A multivariate analysis
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50 430 showed that households with greater financial (e.g., income), physical (e.g., access to key tourism
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53 431 sites), human (e.g., education), and social (e.g., kinship with local government officials) capital
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56 432 and less natural capital (e.g., cropland) were more likely to participate in tourism activities (Liu et
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59 433 al. 2012).
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4 434 By 2006 the service industry (mainly tourism) was still a small part of the rural economy
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7 435 in the Reserve, although its importance had been increasing since the 1980s (Table 3). Economic
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10 436 leakage, flowing of tourist expenditures to outside investors or managers that does not directly
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12 437 benefit local economy and community, was significant and the level of leakage continued to
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15 438 increase. While the annual service industry total income in the rural community more than tripled
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18 439 from Development I stage to Development II stage, the total share of tourism receipt by the rural
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21 440 community was almost halved from 8.5% to 4.7% (Table 3). These statistics have been
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23
24 441 confirmed by findings reported by He et al. (2008) and from the interviews with the tourist
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26 442 business participants. In 2006, about 60% of the employees in the three government-owned
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28
29 443 hotels were from outside the Reserve. About half of the employees in the private hotels and
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32 444 restaurants were nonlocals, and they held higher-paying and more prestigious managerial jobs.
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35 445 Almost all raw food products were purchased from nonlocal sources. The locally-owned souvenir
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37 446 factory stopped its production in 2005, after which all souvenirs sold in the Reserve were
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40 447 purchased from outside. Furthermore, opportunities to participate in tourism within the local
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43 448 community were also unevenly distributed (Liu et al. 2012).

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46 449 After the 2008 earthquake, tourism has not been an income source for local households
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49 450 for five years and the local service industry has shrunk to the level of early 2000s. The annual
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52 451 rural per capita net income plummeted in 2008, but increased significantly afterwards, mainly
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55 452 from the highly-paid local laborer jobs in the reconstruction projects, which came to an end by
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57 453 early 2013 (Table 3).
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4 454 ***Ecological changes***

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7 455 Forests and panda habitat in the Reserve experienced severe destruction and degradation
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10 456 in the 20th century (Liu et al. 2001, Viña et al. 2007). This declining trend has recently been
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12 457 stopped, largely attributed to the implementation of two national forest conservation and
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15 458 restoration programs (Viña et al. 2011). Under these programs, logging in natural forests for any
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18 459 purpose was banned and over three quarters of cropland on steep slopes in the Reserve was
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21 460 reclaimed into tree plantation. Subsidies were provided to local households through these two
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24 461 programs. A large amount of labor was released from fuelwood harvesting and cropping, and
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27 462 tourism became one option for some of this labor. Households with less cropland tended to have
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30 463 a higher likelihood of participating in tourism, and households operating a private hostel,
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32 464 restaurants, or *Nong Jia Le*, tended to reduce fuelwood consumption more than those who did not
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34
35 465 (Liu et al. 2011). Tourism infrastructure construction in the Reserve, especially in the
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38 466 Development II stage, was mostly conducted with low direct impact on vegetation. Timber
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41 467 needed for construction was imported from outside and tree felling only occurred when the road
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44 468 was widened. Thus, tourism appears to have positively supported the forest recovery in the
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47 469 Reserve.

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49 470 Visitation to key panda habitats of the Reserve was increasing before the earthquake. The
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51
52 471 current zoning scheme included less than half of the highly suitable panda habitat inside the core
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55 472 zone and 15.4% and 39.6% of the highly suitable panda habitats are inside the experimental and
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58 473 buffer zones, respectively (Figure 4). The core zone is not immune to tourists' disturbance.
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4 474 Many trails extend well into the core zone through large patches of highly suitable panda habitat
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7 475 (Figure 4). More than 95% of the locations where panda presence was confirmed in the Reserve
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10 476 between 2005 and 2007 were at least 500 meters away from heavily used trails (Liu 2012).
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12 477 Increasing road traffic of tourists may also discourage wildlife from visiting road side areas and
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15 478 thus further segregate wildlife populations on the two sides of the road.
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18 479 *Social changes*
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21 480 The social impact of tourism in the Reserve was mixed. Tourism helped raise more
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24 481 awareness about conservation in the Reserve and made the Reserve more visible both
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26 482 domestically and internationally. Tourism induced more interactions and information exchanges
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29 483 between local people and outside visitors, although the information flows primarily from locals to
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32 484 tourists (Liu et al. 2012). People from households participating in tourism tended to perceive
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35 485 more non-financial benefits in addition to more negative environmental impacts of tourism,
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37 486 compared with households not participating in tourism. Interviews in 2005 and 2007 showed that
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40 487 most local residents considered tourism a good thing for the Reserve, and some complained about
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43 488 the unequal distribution of tourism job opportunities in the Reserve (Liu et al. 2012). Conflicts
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46 489 between local jobless young people and nonlocal tourism industry employees were on the rise.
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49 490 Overall, while many local residents, especially those who operated small businesses, embraced
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52 491 tourism, some others might react in different ways by tolerating tourists traveling through their
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55 492 villages or adjusting to the times when tourists were near their daily lives by being in their homes
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57 493 (Ap and Crompton 1993).
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4 494 ***Governance change***
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7 495 The tourism governance structure in the Reserve changed substantially through the stages.
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10 496 In the Exploration stage, the Reserve administration was the main tourism management body and
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12 497 various international non-profit organizations (e.g., WWF) and national governance agencies
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15 498 (e.g., Ministry of Forestry) were also involved. In the Involvement stage, financial support from
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18 499 the provincial government played a critical role in tourism infrastructure development, such as
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21 500 road and hotels, and a local government-owned company, the Wolong Tourism Inc., emerged.
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24 501 Late in the Development I stages, an outside corporation, Luneng, become part of the
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26 502 management body. By the Development II stage, all attractions were operated and managed by a
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29 503 complex parastatal corporation, largely controlled by an outside public organization, Jiuzhaigou.
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32 504 Tourism development in the Sanjiang part of the Reserve was operated by the private sector with
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35 505 strong support from the Wenchuan County and Aba Prefecture governments. The alterations in
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38 506 tourism management body and emergence of new tourism governance structures in the Reserve
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41 507 are important indicators of stage changes. On the one hand, the local community and government
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44 508 lacked the necessary financial capacity and human resources to meet the increasing demands for
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47 509 tourism in the Reserve. On the other hand, regional and national authorities held increasing
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49 510 interests in regulating tourism development in the Reserve.
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Discussion

In this study we found that the observed tourism development in Wolong Nature Reserve generally conforms to the exploration, involvement, and development stages described in the TALC model. Although the Reserve has not completed a full cycle or even reached the consolidation stage, the TALC model is useful in characterizing a general pattern of tourism growth in the Reserve. Annual tourist numbers, tourism receipt, and tourism facilities all increased significantly from stage to stage as one would expect from a TALC model. Key events that significantly affected relevant policies to tourism development in the Reserve were crucial in modifying the speed and shape of tourism growth. The Reserve experienced prolonged exploration and involvement stages, and then fast development in the late 1990s and the early 2000s, when the Reserve's management master plan and tourism master plan were approved. The World Heritage site designation in 2006 is another critical event boosting tourism growth; however the earthquake in 2008 changed its course. This study also creates a platform for studying how tourism in the Reserve recovers from the disaster and starts another life cycle.

Strong fluctuation in visitor volume within stages is obvious, which was caused by various endogenous and exogenous uncertainties. For example, the spike in tourist arrival in 1983 was triggered by the media report on "panda starvation" due to bamboo flowering and die-off; the reasons for the tourist number drops in 1989, 2003, and 2008 can be attributed to the Tiananmen square protest (Lüsted 2010), the burst of SARS (Liu 2003), and the 2008 earthquake (Figure 2). These rises and falls suggest that tourism is an open and complex system exposed to risk and

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4 531 uncertainty from many sources. For example, the Reserve and the surrounding areas in western
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7 532 Sichuan mountains are within a global hotspot for landslide and earthquake disasters.
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10 533 Historically human population density in these regions was low as a result of low land fertility
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12 534 and high natural hazards. In a commentary on the Sichuan province's tourism development
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15 535 master plan, Wu (2001) pointed out that a major flaw of the plan was the high level of investment
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18 536 in developing mass nature-based tourism in the disaster-prone region of western Sichuan. Before
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21 537 the 2008 earthquake, landslides and debris flow were common in Wolong Nature Reserve, and in
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24 538 less than one hour, a flood in summer 2007 damaged millions of Yuan of infrastructure
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27 539 construction in the Zhenghe valley of the Reserve. The 2008 earthquake is a vivid example
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30 540 showing how fragile a tourism system can be when facing natural disasters. Landslide and debris
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33 541 flows induced by heavy rainfall events occurring every summer since 2008 have further damaged
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36 542 the newly re-constructed infrastructure and significantly impacted the local community's normal
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39 543 social and economic exchange with the outside. Based on current information, the Reserve will
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42 544 be classified as an officially inactive tourism destination for at least eight years following the
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45 545 earthquake. This is the first reported case of a natural disaster having such a profound impact on
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48 546 tourism growth as a factor within the TALC model.

49 547 The case of Wolong offers an interesting laboratory for assessing the dynamics of
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52 548 governance in regulating tourism growth. Tourism is naturally multi-faceted and dynamic.
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55 549 Policy-making and management for tourism and protected areas can be distinct and fragmented
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58 550 (Eagles 2009). Different organizations (government, private, non-profit, and community) deal
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4 551 with different aspects of protected area tourism according to their respective interests and
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7 552 responsibilities and form various kinds of partnerships. Eagles (2009) used ten criteria for
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10 553 governance to evaluate eight common management models of tourism partnership development
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12 554 in parks and protected areas, and concluded that generally models with high degrees of for-profit
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15 555 operations ranked lower and high nonprofit sector involvement ranked higher in terms of the
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18 556 ideals of good governance. This is supported by a recent review of public-private partnerships on
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21 557 tourism in South Africa's national parks (Varghese 2008).

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24 558 Applying Eagles' management models to the case of Wolong, we found a series of
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27 559 changes in tourism governance structure through stages (Table 3). In the exploration stage, the
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30 560 Reserve adopted a national park model. With the establishment of Wolong Tourism Inc., a
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33 561 parastatal model was taken in the involvement stage. In the early development stage, a public
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36 562 and for-profit combination model was used, which was considered an "theoretically viable"
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39 563 innovation in China's protected area tourism governance (Su et al. 2007), but lasted for only two
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42 564 years. Later a new partnership between two protected area agencies (Wolong and Jiuzhaigou)
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45 565 emerged to form another tourism enterprise. In this unique partnership one protected area agency
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48 566 transferred full tourism managerial rights to another protected area that was more experienced in
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51 567 developing tourism. Each change in governance structure was a critical event that can be used to
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54 568 interpret sub-stages or stage changes in the TALC model.

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57 569 Analyzing the governance structural changes also helped us understand how the major
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60 570 driving forces of tourism development changed over time and across organizational scales. In the

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4 571 early stages, internal financial needs of both rural residents and the Reserve's management body
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7 572 drove tourism growth. The national and international level partner agencies and provincial
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10 573 government (Table 4) mostly provided policy and intellectual support. In the later stages,
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12 574 tourism boomed in the surrounding region. By the early 2000s the Reserve had been surrounded
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15 575 by a cluster of nature and culture tourism destinations (Figure 1). Both the Aba prefecture and
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18 576 Sichuan provincial governments considered this "Hometown of the Giant Pandas" their greatest
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21 577 tourism asset and a critical piece to complete the regional tourism development arrangement.
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24 578 Therefore, a combination of internal needs and external pressure fueled the fast tourism growth in
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26
27 579 this period. By 2007, the Aba prefecture government had gained almost full control of tourism
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30 580 development in the Reserve through Jiuzhaigou National Scenic Area and Wenchuan County,
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32 581 which had caused serious concern for some senior officials of the Reserve.
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35 582 As a flagship reserve in China, Wolong's conservation and tourism management serves as
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38 583 a role model for many other reserves. In China nature reserves are disproportionately distributed
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41 584 in the economically underdeveloped western provinces, where tourism has been identified as a
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44 585 major economic development and poverty reduction strategy for over a decade (Yeung and Shen
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47 586 2004). As demand for tourism resources increases in western China, these nature reserves
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50 587 inexorably become the targets. The approval of Wolong's ecotourism master plan by SFA in
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53 588 2002 was a strong top-down signal to other reserves and their regional authorities about the
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56 589 national government's positive attitude toward developing tourism in these most strictly managed
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59 590 protected areas and has triggered a new wave of ecotourism development in national nature
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4 591 reserves (Luo and Wang 2010). Considering the important role of tourism and recreation in
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7 592 national parks around the world, it can be expected that Wolong Nature Reserve will continue
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10 593 being a laboratory in testing sustainable tourism development models in China's protected areas.

11 12 13 594 **Conclusions**

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15 595 Past tourism growth in Wolong shows a high level of dynamism in protected area tourism
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18 596 in the context of China during a period of great societal transition. As an important process of
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21 597 telecoupling (socioeconomic and environmental interactions over distances, (Liu et al. 2013)),
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24 598 tourism has connected Wolong with many distant parts of the world. Applying the TALC model
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27 599 to longitudinal data from one of China's prominent protected areas, we systematically tracked
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30 600 major changes in the system and explored the forces that drove those changes. This approach
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33 601 enabled us to "better understand the 'why' as well as the 'what' of destination development and
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36 602 cycles" (Butler 2011: please insert the page number for this quote here). While the tourism
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39 603 growth trend in Wolong before 2008 generally follows what would be predicted by the TALC
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42 604 model, this trajectory was significantly altered by a single event and its aftermath. This
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45 605 longitudinal analysis also sets ground for future research to systematically monitor recent and
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48 606 near-future tourism-related activities and understand how a complex and fragile tourism system
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51 607 (Farrell and Twining-Ward 2004) reorganizes in response to new destination characteristic and
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54 608 enters into the next stage of the destination life cycle.
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609 **References**

- 610
- 611 An, L., He, G., Liang, Z., & Liu, J. (2006). Impacts of demographic and socioeconomic factors
612 on spatio-temporal dynamics of panda habitat. *Biodiversity and Conservation*, 15(8), 2343–
613 2363.
- 614 An, L., Liu, J., Ouyang, Z., Linderman, M., Zhou, S., & Zhang, H. (2001). Simulating
615 demographic and socioeconomic processes on household level and implications for giant
616 panda habitats. *Ecological Modelling*, 140(1-2), 31–49.
- 617 Ap, J., & Crompton, J. L. (1993). Residents' strategies for responding to tourism impacts.
618 *Journal of Travel Research*, 32(1), 47–50.
- 619 Balmford, A., Beresford, J., Green, J., Naidoo, R., Walpole, M., & Manica, A. (2009). A global
620 perspective on trends in nature-based tourism. *PLoS Biology*, 7(6), e1000144.
- 621 Bao, J. (1995). A study on tourist development of karst caves. *Acta Geographica Sinica*, 50(4),
622 353–359.
- 623 Boyd, S. W. (2006). The TALC model and its application to national parks: A Canadian example.
624 In R. W. Butler (Ed.), *The Tourism Area Life Cycle: Vol. 1. Application and modifications*.
625 Clevedon, UK: Channel View Publications.
- 626 Buckley, R. C. (2011). Tourism and environment. *Annual Review of Environment and Resources*,
627 36(1), 397–416.

- 1
2
3
4 628 Butler, R. (2011). Tourism Area Life Cycle, Contemporary Tourism Reviews. *Series Editor:*
5
6
7 629 *Chris Cooper. Goodfellow Publishers Limited, Woodeaton, Oxford. Retrieved December,*
8
9
10 630 *12, 2012.*
- 11
12 631 Butler, R. W. (1980). The concept of a tourist area cycle of evolution: implications for
13
14
15 632 management of resources. *The Canadian Geographer/Le Géographe Canadien*, 24(1), 5–12.
- 16
17
18 633 Butler, R. W. (1999). Tourism - an evolutionary perspective. In J. G. Nelson, R. W. Butler, & G.
19
20
21 634 Wall (Eds.), *Tourism and sustainable development: monitoring, planning, managing,*
22
23 635 *decision making* (2nd ed., Vol. 52). Waterloo, Canada: University of Waterloo Department
24
25
26 636 of Geography publication series.
- 27
28
29 637 Coria, J., & Calfucura, E. (2012). Ecotourism and the development of indigenous communities:
30
31
32 638 The good, the bad, and the ugly. *Ecological Economics*, 73(1), 47–55.
- 33
34
35 639 Dudley, N. (Ed.). (2008). *Guidelines for Applying Protected Area Management Categories.*
36
37
38 640 Gland, Switzerland: IUCN. Retrieved from <http://data.iucn.org/dbtw-wpd/edocs/PAPS->
39
40 641 [016.pdf](http://data.iucn.org/dbtw-wpd/edocs/PAPS-016.pdf)
- 41
42
43 642 Eagles, P. F. J. (2009). Governance of recreation and tourism partnerships in parks and protected
44
45
46 643 areas. *Journal of Sustainable Tourism*, 17(2), 231–248.
- 47
48
49 644 Farrell, B. H., & Twining-Ward, L. (2004). Reconceptualizing tourism. *Annals of Tourism*
50
51 645 *Research*, 31(2), 274–295.
- 52
53
54 646 Farrell, T. A., & Marion, J. L. (2001). Identifying and assessing ecotourism visitor impacts at
55
56
57 647 eight protected areas in Costa Rica and Belize. *Environmental Conservation*, 28, 215–225.
- 58
59
60

- 1
2
3
4 648 Garay, L., & Cànoves, G. (2011). Life cycles, stages and tourism history: The Catalonia (Spain)
5
6
7 649 experience. *Annals of Tourism Research*, 38(2), 651–671.
8
9
10 650 Ghimire, K. B. (1994). *Conservation and social development: a study based on an assessment of*
11
12 651 *Wolong and other panda reserves in China*. (p. 54). United Nations Research Institute for
13
14
15 652 Social Development.
16
17
18 653 Grossberg, R., Treves, A., & Naughton-Treves, L. (2003). The incidental ecotourist: measuring
19
20
21 654 visitor impacts on endangered howler monkeys at a Belizean archaeological site.
22
23
24 655 *Environmental Conservation*, 30, 40–51.
25
26
27 656 Han, N., & Zhuge, R. (2001). Ecotourism in China's Nature Reserves: Opportunities and
28
29 657 Challenges. *Journal of Sustainable Tourism*, 9(3), 228.
30
31
32 658 He, G., Chen, X., Liu, W., Bearer, S., Zhou, S., Cheng, L. Y. Q., ... Liu, J. (2008). Distribution
33
34
35 659 of economic benefits from ecotourism: A case study of Wolong Nature Reserve for Giant
36
37
38 660 Pandas in China. *Environmental Management*, 42(6), 1017–1025.
39
40
41 661 Hovinen, G. R. (1981). A tourist cycle in Lancaster County, Pennsylvania. *The Canadian*
42
43 662 *Geographer*, 25(3), 283–286.
44
45
46 663 Hovinen, G. R. (1982). Visitor cycles: Outlook for tourism in Lancaster County. *Annals of*
47
48
49 664 *Tourism Research*, 9, 565–583.
50
51
52 665 Hull, V., Xu, W., Liu, W., Zhou, S., Vina, A., Zhang, J., ... Liu, J. (2011). Evaluating the
53
54
55 666 efficacy of zoning designations for protected area management. *Biological Conservation*,
56
57 667 *144*(12), 3028–3037.
58
59
60

- 1
2
3
4 668 IUCN. (2006). *Sichuan Giant Panda Sanctuary – Wolong, Mt. Siguniang and Jiujin Mountains*.
5
6
7 669 World Heritage Nomination - IUCN Technical Evaluation. Retrieved from
8
9
10 670 http://whc.unesco.org/archive/advisory_body_evaluation/1213.pdf
11
12 671 Johnson, J. D., & Snepenger, D. J. (1993). Application of the tourism life cycle concept in the
13
14
15 672 Greater Yellowstone Region. *Society and Natural Resources*, 6(2), 127–148.
16
17
18 673 Johnson, K. G., Schaller, G. B., & Hu, J. (1988). Responses of giant pandas to a bamboo die-off.
19
20
21 674 *National Geographic Research*, 4(2), 161–177.
22
23
24 675 Johnston, C. S. (2012). Shoring the foundations of the destination life cycle model, Part 1:
25
26 676 Ontological and epistemological considerations. *Tourism Geographies*, 3(1), 2–28.
27
28
29 677 Klein, M. L., Humphrey, S. R., & Percival, H. F. (1995). Effects of ecotourism on distribution of
30
31
32 678 waterbirds in a wildlife refuge. *Conservation Biology*, 9(6), 1454–1465.
33
34
35 679 Kruger, O. (2005). The role of ecotourism in conservation: Panacea or Pandora’s box?
36
37
38 680 *Biodiversity and Conservation*, 14(3), 579–600. <http://doi.org/10.1007/s10531-004-3917-4>
39
40
41 681 Lagiewski, R. M. (2006). The application of the TALC model: A literature survey. In R. W.
42
43 682 Butler (Ed.), *The Tourism Area Life Cycle: Vol. 1. Application and modifications*. Clevedon,
44
45
46 683 UK: Channel View Publications.
47
48
49 684 Lew, A. A. (2003). *Tourism in China*. New York: Haworth Hospitality Press.
50
51
52 685 Li, C., Zhou, S., Xian, D., Chen, Z., & Tian, Z. (1992). A study of the management of Wolong
53
54
55 686 Nature Reserve (in Chinese). In Wolong Nature Reserve & Sichuan Normal College (Eds.),
56
57
58
59
60

- 1
2
3
4 687 *The Animal and Plant Resources and Protection of Wolong Nature Reserve* (pp. 309–372).
5
6
7 688 Chengdu, China: Sichuan Publishing House of Science & Technology.
8
9
10 689 Linderman, M., Bearer, S., An, L., Tan, Y. C., Ouyang, Z. Y., & Liu, H. G. (2005). The effects of
11
12 690 understory bamboo on broad-scale estimates of giant panda habitat. *Biological*
13
14 691 *Conservation*, 121(3), 383–390.
15
16
17
18 692 Liu, J. (2003). SARS, wildlife, and human health. *Science*, 302(5642), 53–53.
19
20
21 693 Liu, J., Dietz, T., Carpenter, S. R., Folke, C., Alberti, M., Redman, C. L., ... Provencher, W.
22
23 694 (2007). Coupled human and natural systems. *Ambio*, 36(8), 639–649.
24
25
26 695 Liu, J., Hull, V., Batistella, M., DeFries, R., Dietz, T., Fu, F., ... Zhu, C. (2013). Framing
27
28 696 Sustainability in a Telecoupled World. *Ecology and Society*, 18(2).
29
30
31
32 697 Liu, J., Linderman, M., Ouyang, Z., An, L., Yang, J., & Zhang, H. (2001). Ecological degradation
33
34 698 in protected areas: The case of Wolong Nature Reserve for giant pandas. *Science*,
35
36 699 292(5514), 98.
37
38
39
40 700 Liu, J., Ouyang, Z., Taylor, W. W., Groop, R., Tan, Y., & Zhang, H. (1999). A framework for
41
42 701 evaluating the effects of human factors on wildlife habitats: The case of giant pandas.
43
44 702 *Conservation Biology*, 13(6), 1360–1370.
45
46
47
48
49 703 Liu, W. (2012). *Patterns and Impacts of Tourism Development in A Coupled Human and Natural*
50
51 704 *System*. Michigan State University, East Lansing, MI, USA.
52
53
54 705 Liu, W., Vogt, C. A., Luo, J., He, G., Frank, K. A., & Liu, J. (2012). Drivers and Socioeconomic
55
56 706 Impacts of Tourism Participation in Protected Areas. *PloS One*, 7(4), 35420.
57
58
59
60

- 1
2
3
4 707 Liu, W., Yang, W., Luo, J., He, G., & Liu, J. (2011). Effects of payment for ecosystem service
5
6
7 708 programs on rural energy transition. Presented at the US Society for Ecological Economics
8
9
10 709 Annual Meeting.
- 11
12 710 Li, W., & Zhao, X. (1989). *China's Nature Reserves*. Beijing: Foreign Language Press.
- 13
14
15 711 Lundtorp, S., & Wanhill, S. (2006). Time path analysis and TALC stage demarcation. In R. W.
16
17
18 712 Butler (Ed.), *The Tourism Area Life Cycle: Vol. 2. Conceptual And Theoretical Issues*.
19
20
21 713 Clevedon, UK: Channel View Publications. Retrieved from
22
23
24 714 <http://books.google.at/books?id=AicuoXTVrU0C>
- 25
26 715 Luo, J., & Wang, L. (2010). Problems on ecotourism in nature reserves in China. *Journal of*
27
28
29 716 *Beijing Forestry University*, 32(3).
- 30
31
32 717 Lüsted, M. A. (2010). *Tiananmen Square Protests*. ABDO Publishing Company. Retrieved from
33
34
35 718 <http://books.google.com/books?id=bAoR-tiyR0oC>
- 36
37
38 719 MAB. (2012). FAQ - Biosphere Reserves? Retrieved from
39
40
41 720 <http://www.unesco.org/mab/doc/faq/brs.pdf>
- 42
43 721 Newsome, D., Moore, S. A., & Dowling, R. K. (2002). *Natural area tourism: ecology, impacts,*
44
45
46 722 *and management*. Buffalo, N.Y.: Channel View Publications.
- 47
48
49 723 Oreja Rodríguez, J. R., Parra-Lopez, E., & Yanes-Estevéz, V. (2008). The sustainability of island
50
51
52 724 destinations: Tourism area life cycle and teleological perspectives. The case of Tenerife.
53
54
55 725 *Tourism Management*, 29(1), 53–65.
- 56
57
58
59
60

- 1
2
3
4 726 Pan, W., Lv, Z., Zhu, X., Wang, D., Wang, H., Long, Y., ... Zhou, X. (2001). *A chance for*
5
6
7 727 *lasting survival*. Beijing, China: Beijing University Press.
8
9
10 728 Peng, L., & Zhang, Q. (2011). How many nature reserves have been eroded. *Southern Weekend*.
11
12 729 Retrieved from www.infzm.com/content/57363
13
14
15 730 Schaller, G. B. (1994). *The last panda*. Chicago: University of Chicago Press.
16
17
18 731 Sichuan Province Committee on Annal Compilation (Ed.). (1996). *Annals of Tourism in Sichuan*
19
20 732 *Province*. Chengdu: Sichuan People's Press.
21
22
23 733 State Council of China. Regulations of the People's Republic of China on Nature Reserves
24
25 734 (1994).
26
27
28
29 735 State Forestry Administration. (2006). *The third national panda survey report*. Beijing: Chinese
30
31 736 Forestry Press.
32
33
34 737 Su, D., Wall, G., & Eagles, P. F. J. (2007). Emerging governance approaches for tourism in the
35
36 738 protected areas of China. *Environmental Management*, 39(6), 749–759.
37
38
39
40 739 UNWTO. (2010). *Tourism and the millennium development goals*. Madrid: United Nations
41
42 740 World Tourism Organization. Retrieved from <http://www.unwto.org/tourism&mdgseazine/>
43
44
45
46 741 Varghese, G. (2008). Public-private partnerships in South African national parks: The rationale,
47
48 742 benefits and lessons learned. In A. Spenceley (Ed.), *Responsible tourism: Critical issues for*
49
50 743 *conservation and development* (pp. 69–84). London: Earthscan. Retrieved from
51
52 744 <http://www.artyforum.info/documents/MicrosoftWord-VARGHESE.pdf>
53
54
55
56
57
58
59
60

- 1
2
3
4 745 Viña, A., Bearer, S., Chen, X., He, G., Linderman, M., An, L., ... Liu, J. (2007). Temporal
5
6
7 746 changes in connectivity of Giant Panda habitat across the borders of Wolong Nature
8
9
10 747 Reserve, China. *Ecological Applications*, 17(4), 1019–1030.
- 11
12 748 Viña, A., Chen, X., McConnell, W. J., Liu, W., Xu, W., Ouyang, Z., ... Liu, J. (2011). Effects of
13
14
15 749 natural disasters on conservation policies: The case of the 2008 Wenchuan Earthquake,
16
17
18 750 China. *Ambio*, 40(3), 274–284.
- 19
20
21 751 Wang, G., Innes, J. L., Wu, S. W., Krzyzanowski, J., Yin, Y., Dai, S., ... Liu, S. (2012). National
22
23
24 752 park development in China: conservation or commercialization? *Ambio*, 41(3), 247–61.
- 25
26 753 WDPA. (2014). World Database on Protected Areas. Retrieved from www.ProtectedPlanet.net
27
28
- 29 754 Weizenegger, S. (2006). The TALC model and protected natural areas: African examples. In R.
30
31
32 755 W. Butler (Ed.), *The Tourism Area Life Cycle: Vol. 2. Conceptual And Theoretical Issues*.
33
34
35 756 Clevedon, UK: Channel View Publications. Retrieved from
36
37
38 757 <http://books.google.at/books?id=AicuoXTVrU0C>
- 39
40 758 Wolong Administration Bureau. (2004). *The History of Wolong Nature Reserve (in Chinese)*.
41
42
43 759 Chengdu, China: Sichuan Science and Technology Press.
- 44
45
46 760 Wolong Administration Bureau. (2009). *Wolong National Nature Reserve Ecotourism*
47
48
49 761 *Development Plan*.
- 50
51 762 Wu, B. (2001). A commentary on the Sichuan Province Tourism Development Master Plan (in
52
53
54 763 Chinese). *City Planning Review*, 25(4), 21–25.
55
56
57
58
59
60

- 1
2
3
4 764 Xinhua News Agency. (2012). Sanjiang township at Wenchuan, China: From a disaster area to a
5
6
7 765 4A level scenic spot. Retrieved from [http://news.xinhuanet.com/2012-](http://news.xinhuanet.com/2012-09/23/c_113174917.htm)
8
9
10 766 [09/23/c_113174917.htm](http://news.xinhuanet.com/2012-09/23/c_113174917.htm)
11
12 767 Yeh, E. T. (2009). Tibet and the Problem of Radical Reductionism. *Antipode*, 41(5), 983–1010.
13
14
15 768 <http://doi.org/10.1111/j.1467-8330.2009.00704.x>
16
17
18 769 Yeung, Y. M., & Shen, J. (2004). *Developing China's West: A Critical Path To Balanced*
19
20 770 *National Development*. Chinese University Press. Retrieved from
21
22 771 <http://books.google.com/books?id=qS6vcLH5nQAC>
23
24
25
26 772 Yin, W. C., & Eagles, P. F. J. (2005). Development and Ranking of Tourism Management Goals
27
28 773 for Wolong and Wangland Giant Panda Reserves, China. *International Journal of*
29
30 774 *Biodiversity Science and Management*, 1(3), 137–149.
31
32
33
34 775 Yu, L. (1992). Emerging Markets for China's Tourism Industry. *Journal of Travel Research*,
35
36 776 31(1), 10–13. <http://doi.org/10.1177/004728759203100103>
37
38
39
40 777 Zhang, G. (2003). China's Tourism since 1978: Policies, Experiences and Lessons Learned. In A.
41
42 778 A. Lew, L. Yp, J. Ap, & G. Zhang (Eds.), *Tourism in China* (pp. 13–34). Binghamton, NY:
43
44 779 The Haworth Hospitality Press.
45
46
47
48 780 Zhong, L., Deng, J., & Xiang, B. (2008). Tourism development and the tourism area life-cycle
49
50 781 model: A case study of Zhangjiajie National Forest Park, China. *Tourism Management*,
51
52 782 29(5), 841–856. <http://doi.org/10.1016/j.tourman.2007.10.002>
53
54
55
56 783
57
58
59
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4
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For Peer Review

786 **Tables**

787 Table 1. A summary of the data used in this study.

788

| Data | Years | Sources | |
|----------------------------------|------------------|----------------------|----------------|
| Reserve official interviews | 2005–2014 | Conducted by authors | Primary data |
| Reserve official focus group | 2007 | Conducted by authors | |
| Tourism infrastructure inventory | 2005–2007 | Conducted by authors | |
| Tourist survey | 2006–2007 | Conducted by authors | |
| Local business survey | 2005 | Conducted by authors | |
| Local business survey | 2003 | He et al. 2008 | |
| Local household survey | 2005, 2007 | Liu et al. 2012 | Secondary data |
| Panda habitat assessments | 2001, 2007, 2008 | Viña et al. 2011 | |
| Annual rural economic statistics | 1980s–2012 | Government data | |
| Annual tourist arrivals | 1980–2007 | Government data | |
| Annual tourism receipt | 1997–2007 | Government data | |
| Reserve management master plan | 1998, 2014 | Government document | |
| Reserve tourism master plan | 2001, 2007, 2009 | Government document | |

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790 Table 2. Key events in tourism area life cycle of Wolong Nature Reserve.

| TALC Stage | Year | Key events |
|---------------------------|------|--|
| Exploration | 1979 | The Reserve was designated as a UNESCO Biosphere Reserve. |
| | 1980 | An internationally collaborative giant panda research project was initiated in the Reserve by the Chinese Ministry of Forestry and WWF. |
| | 1983 | Mass flowering and die-off of bamboo in Wolong Nature Reserve attracted global media attention; the Chinese Conservation and Research Center of Giant Pandas (CCRCGP) was established. |
| Involvement | 1991 | The government-owned Wolong Tourism Development Inc. was formed to organize and regulate the increasing visitation to the Reserve. |
| | 1996 | Two pandas from CCRCGP were sent to San Diego Zoo in the United States as part of a new cooperative breeding and conservation program between China and the US. |
| | 1997 | The Tourism Department under the Wolong Administration Bureau was established. |
| Development I | 1998 | The Wolong Nature Reserve Master Plan was approved. |
| | 1999 | A provincial highway connecting the Reserve to outside was completed. |
| | 2000 | The Wolong Nature Reserve ecotourism master plan (2001-2005) was approved by the Sichuan provincial government. |
| | 2002 | The Wolong Nature Reserve ecotourism master plan (2001-2005) was approved by the State Forestry Administration. |
| Development II | 2004 | The construction of Wolong Hotel, the only four-star hotel in the reserve, was completed. |
| | 2006 | The Sichuan Giant Panda Sanctuaries World heritage site was designated by UNESCO; a new round of road upgrade was started. |
| | 2007 | Tourism master plan II (2007-2015) was approved by State Forestry Administration. |
| Post-quake reconstruction | 2008 | The 7.9 Mw Wenchuan Earthquake struck the reserve on May 12 th . |
| | 2009 | Tourism master plan III (2009-2015) was compiled. |
| | 2012 | The third round of road reconstruction was started. |
| | 2013 | The Reserve was identified as one of the two nature reserves in Sichuan Department of Forestry's pilot effort in national park development. |
| | 2014 | The Reserve, supported by Hong Kong Special Administrative Region, organized the first all-stakeholder workshop to discuss future tourism development. |

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792 Table 3. Major changes across the tourism area life cycle stages in Wolong Nature Reserve.

| Stage | Exploration | Involvement | Development | | Post-quake Reconstruction |
|--|------------------------------|-------------------------------|--|--|---------------------------|
| Years | 1980-1990 | 1991-1997 | I | II | 2008-present |
| | 1998-2003 | 2004-2007 | | | |
| Mean annual tourists (thousand) | 14.1 | 27.9 | 77.5 | 180.0 | N/A |
| Mean annual tourism receipt (million Yuan) | N/A | 1.40 | 5.51 | 32.40 | N/A |
| % International tourist | 1.93% | 2.15% | 12.43% | 6.72% | N/A |
| Total number of panda cubs born and survived at CCRCGP | 1 | 14 | 38 | 51 | 63 |
| Per capita annual net income of rural residents *(Yuan) | 1247 | 1795 | 2415 | 3010 | 1860 ('08) 6628 ('12) |
| Rural community annual service industry income (million Yuan) | 0.02 | 0.10 | 0.42 | 1.42 | 0.91 |
| % Service industry income in rural economy | 0.7% | 1.9% | 3.3% | 7.1% | 2.7% |
| % tourism receipt to rural residents | No Data | No Data | 8.5% | 4.7% | N/A |
| Tourism management body | Wolong Administration Bureau | Wolong Tourism Inc. | Wolong Tourism Department, Wolong Investment Co., Ltd. | | |
| Major external partners | Ministry of Forestry, WWF | Sichuan Provincial Government | Luneng Xinyi Ltd. Co. | Jiuzhaigou National Scenic Area, Aba Prefecture Government | |
| Tourism management model | National park model | Parastatal model | Public and for-profit combination model | | Mixed model |

* Data from the years 1990, 1997, 2003, 2006, 2008, and 2012 (inflation adjusted to year 2012) were used to represent approximately the end of each stage. Year 2007 and 2013 data were not available.

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794 Table 4. Importance of different tourism resources in the Reserve as perceived by the tourists
 795 (n=1,090) (measured using a five-point Likert scale: 1. Not important; 2. Somewhat important; 3.
 796 Important; 4. Very important; 5. Extremely important) based on surveys at CCRCGP in 2006 and
 797 2007. Student's t-tests were conducted for comparison between domestic and international
 798 tourists.

| Tourism Resources | Domestic | | International | | p-value |
|------------------------------------|----------|------|---------------|------|---------|
| | Mean | SD | Mean | SD | |
| Giant pandas in the wild | 4.39 | 0.89 | 4.14 | 1.06 | <0.0001 |
| Giant pandas in captivity | 3.74 | 1.08 | 4.07 | 1.02 | <0.0001 |
| Unspoiled air and water | 4.19 | 0.94 | 3.91 | 1.11 | <0.0001 |
| Natural forest and wildlife | 4.27 | 0.91 | 4.21 | 0.95 | 0.13 |
| Tibetan & Qiang culture | 3.24 | 1.23 | 3.32 | 1.27 | 0.86 |

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3 801 **Figures legends**
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5 802
6 803 Figure 1. The location of Wolong Nature Reserve in the Greater Jiuzhaigou Touring Area in
7 804 Sichuan, China.
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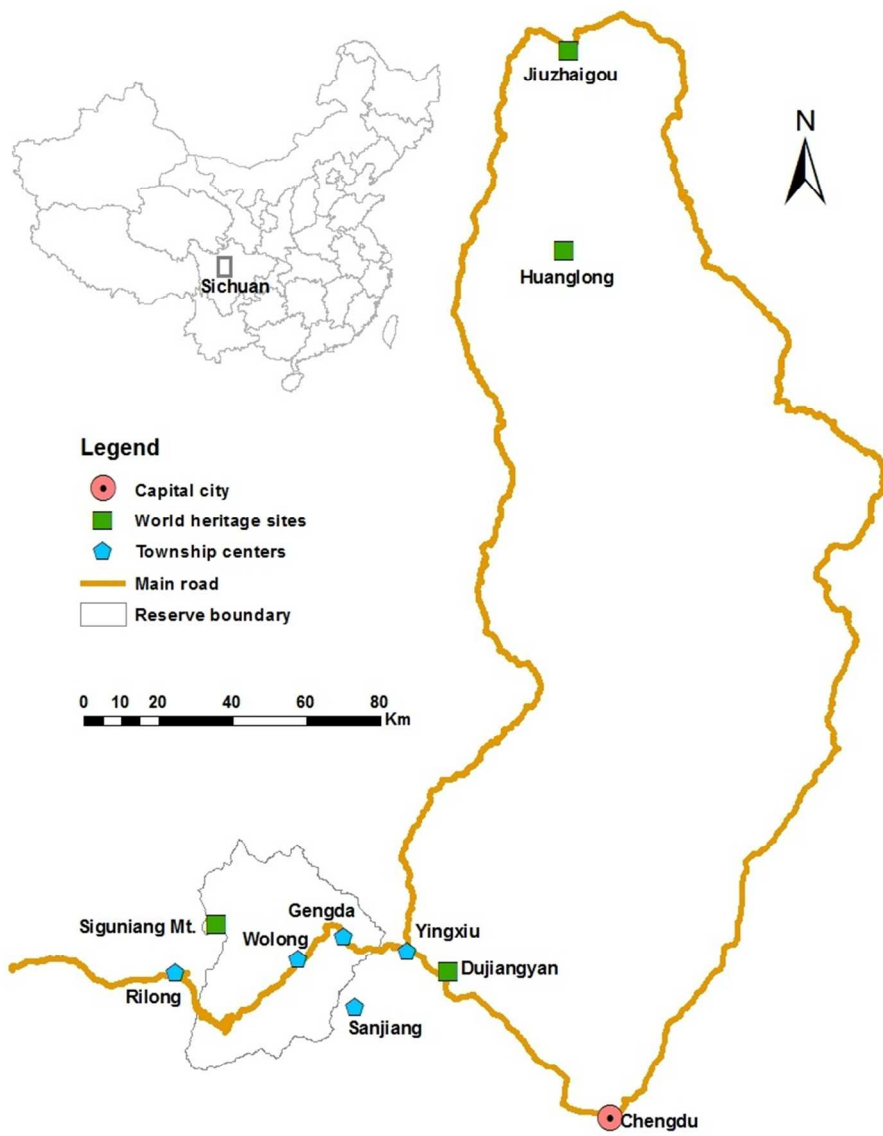
9 805
10 806 Figure 2. Trends of annual tourist arrivals (solid line) and tourism receipt (dashed line) in
11 807 Wolong Nature Reserve from 1980 to 2013 (Data on tourism receipt were only available since
12 808 1997, when the reserve's Department of Tourism was established).
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14 809
15 810 Figure 3. Numbers of hotels and beds available in Wolong Nature Reserve from 1993 to 2007.
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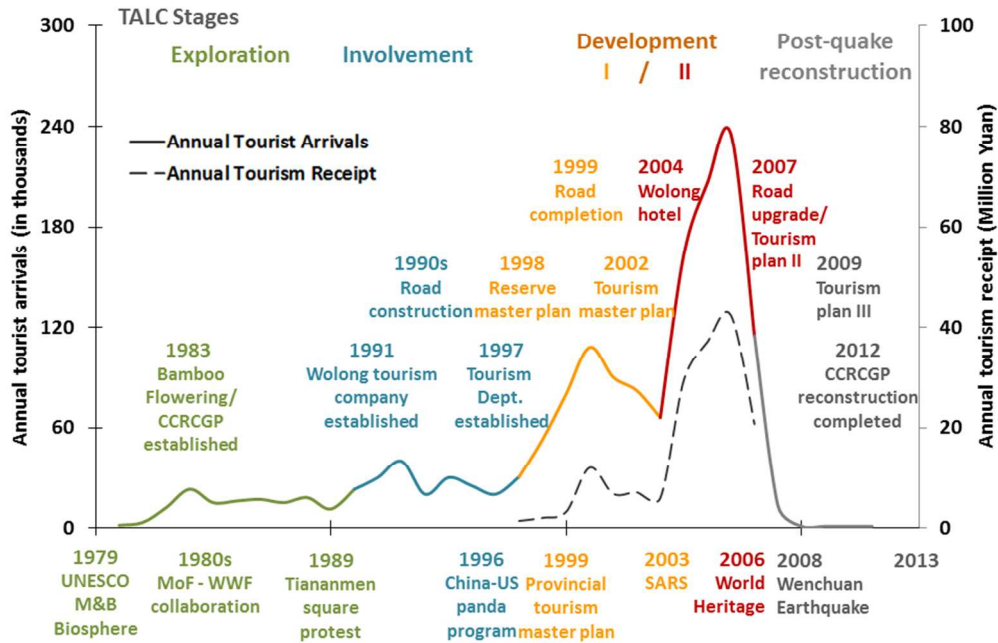
17 811
18 812 Figure 4. Distribution of trails and natural attractions with tourist activities across Wolong Nature
19 813 Reserve in Development II stage. Township names are shown with underscores.
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21 814
22 815 Figure 5. Seasonality of tourist visitation to the China Center for Research and Conservation of
23 816 the Giant Pandas (CCRCGP) at Wolong Nature Reserve in Development II stage (2004-2006
24 817 data used).
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The location of Wolong Nature Reserve in the Greater Jiuzhaigou Touring Area in Sichuan, China.
215x279mm (96 x 96 DPI)

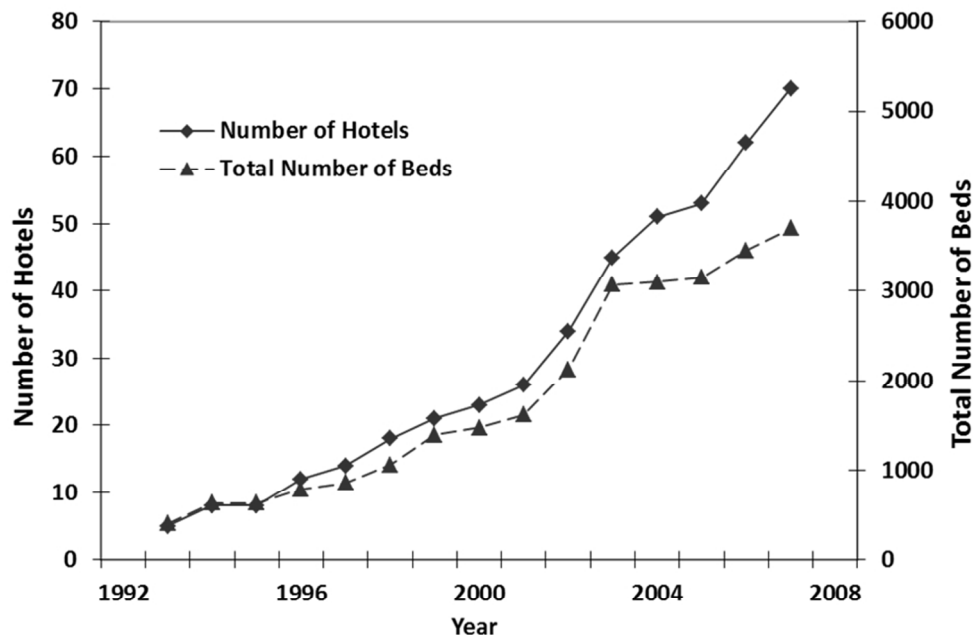


Trends of annual tourist arrivals (solid line) and tourism receipt (dashed line) in Wolong Nature Reserve from 1980 to 2013 (Data on tourism receipt were only available since 1997, when the reserve's Department of Tourism was established).
254x190mm (96 x 96 DPI)

Review

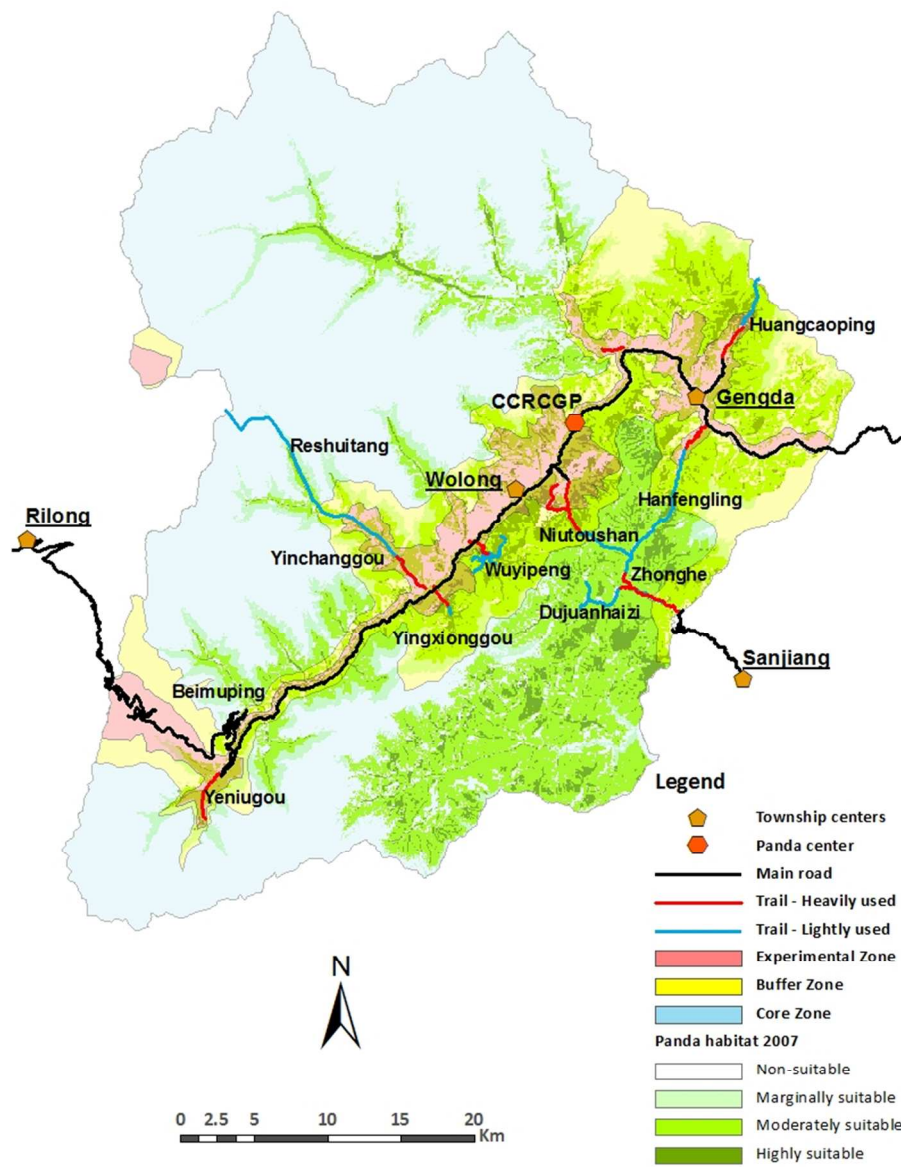
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Numbers of hotels and beds available in Wolong Nature Reserve from 1993 to 2007.
254x190mm (96 x 96 DPI)

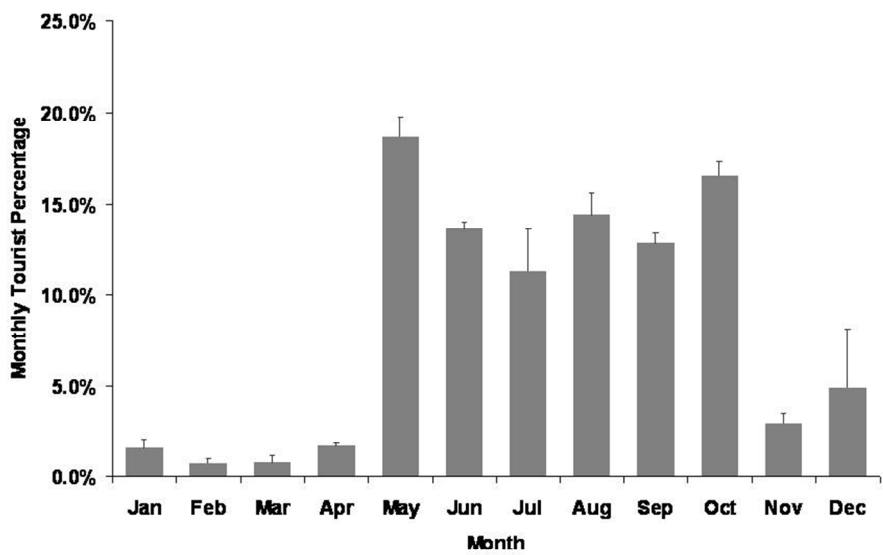
Review



Distribution of trails and natural attractions with tourist activities across Wolong Nature Reserve in Development II stage. Township names are shown with underscores.
215x279mm (96 x 96 DPI)

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Seasonality of tourist visitation to the China Center for Research and Conservation of the Giant Pandas (CCRCGP) at Wolong Nature Reserve in Development II stage (2004-2006 data used).
254x190mm (96 x 96 DPI)

Review