

Conservation of the Endangered giant panda *Ailuropoda melanoleuca* in China: successes and challenges

JIANGHONG RAN, BEIBEI DU and BISONG YUE

Abstract The giant panda *Ailuropoda melanoleuca*, endemic to China, is perhaps the most powerful and well-known global icon of biodiversity conservation, having been the symbol of WWF since it was formed in 1961. It is categorized as Endangered on the IUCN Red List. Although there have been conservation successes for the giant panda in the last 2 decades, with 59 reserves established for the species, many conservation challenges remain and the species' status on the IUCN Red List has not changed since 1990, when it was first categorized as Endangered. Habitat fragmentation, synchronous bamboo flowering and die-off, and mismanagement of reserves are continuing challenges.

Keywords *Ailuropoda melanoleuca*, bamboo, China, Endangered, endemic, giant panda, reserve.

The giant panda *Ailuropoda melanoleuca* is perhaps the most powerful and well-known global icon of biodiversity conservation, having been the symbol of WWF since it was formed in 1961 (WWF, 2009). The fossil record indicates that the giant panda was once widespread in southern and eastern China as well as in neighbouring countries. However, the species is now restricted to six mountain ranges in south-western China: Minshan, Qinling, Qionglai, Liangshan, Daxiangling and Xiaoxiangling (Fig. 1). The panda's habitat has been isolated and degraded by human population growth and consequent deforestation and agricultural expansion. The species is protected by China's Wildlife Protection Law, is listed on Appendix I of CITES, and is categorized as Endangered on the IUCN Red List (IUCN, 2008).

The giant panda was first described in 1869 and, nearly 1 century later, in 1963, the first reserve for the species was established. There are now 59 reserves specifically set up for the giant panda, covering c. 71% of the species' habitat and including 54% of populations (Fig. 1; He et al., 2007). From 1976 to 2006 three range-wide surveys were carried out (State Forestry Administration, 2006). In 2006 a total of 1,596 pandas were recorded, > 40% higher than in the second survey in the 1980s, although this could be an

underestimate (Zhan et al., 2006). At the same time there has been successful ex situ conservation, with a total of 268 giant pandas presently maintained in captivity at various facilities throughout the world. The survivorship of giant panda cubs in captivity has increased from 20% in the 1970s to 90% (Huang et al., 2001).

Despite these successes giant panda populations are still threatened by habitat fragmentation and degradation, bamboo shortage, and mismanagement of reserves, and the species' status on the IUCN Red List has not changed since 1990, when it was first categorized as Endangered (it was earlier, in 1986, categorized as Rare, under an earlier set of criteria).

Habitat fragmentation remains one of the greatest threats. The six mountain ranges of the panda's habitat are separated by agriculture or cleared forests (Fig. 1), and infrastructure construction and economic development (such as highways, dams, tourism and plantation forestry) have further fragmented the populations (Ran et al., 2003, 2005, 2006). The highways crossing Wolong-Siguniang Mountain, from Baoxing to Xiaojin, separated panda habitat in Qionglai Mountains into three fragments. The densest panda population, in Minshan Mountains, was affected by the highways from Pingwu to Huanglong and from Pingwu to Jiuzhaigou. Further habitat degradation occurred in the Wenchuan earthquake of 12 May 2008, in Qionglai and Minshan Mountains. The earthquake damaged > 1,200 km² of giant panda habitat (i.e. 5.2% of the total known panda habitat). Some reserves were badly affected with, for example, 34 and 47% of panda habitat lost in Longxi-Hongkou and Baishuihe Nature Reserves, respectively (J. Ran, unpubl. data).

The giant panda relies on bamboo, of which there are > 30 edible species. However, collection of bamboo shoots is a major income source for local farmers, and this has led to conflicts between conservation and development in some of the panda reserves (Ran et al., 2004). Furthermore, bamboo flowers and dies off periodically and synchronously. The staple bamboos flowered and died off in large areas in Minshan Mountains and Qionglai Mountains in the 1970s and 1980s, during which time > 200 dead pandas were found in these two mountain ranges (Feng & Li, 2000). Bamboos flowered again in 2004–2007 in the northern parts of Minshan Mountains, and surveys in these areas in

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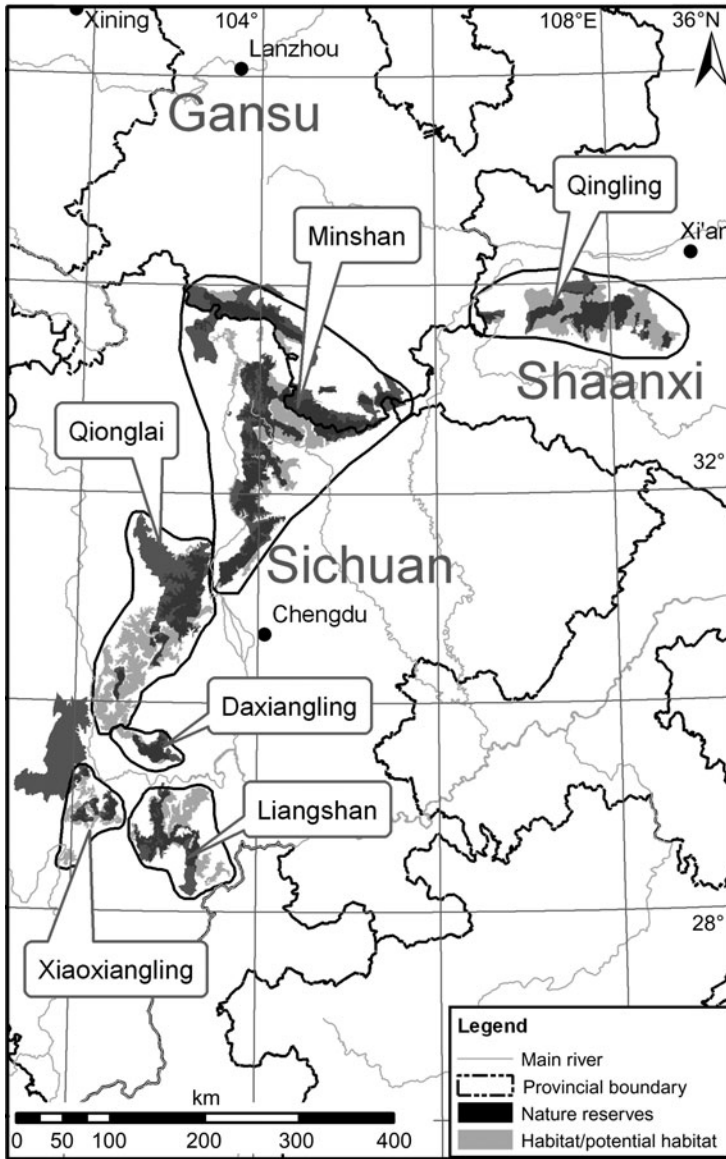


FIG. 1 The six mountain ranges in south-western China to which the giant panda is now restricted, showing the reserves established for the species (a total of 59) and unprotected known or potential panda habitat.

2006–2007 indicated that 62–87% of the bamboo flowered in Jiuzhaigou, Diebu and Ruoergai Counties (J. Ran, unpubl. data). The effects of such widespread, synchronous flowering and die-off of bamboo are compounded by fragmentation of the panda’s habitat. The flowering mechanism of bamboo is not yet understood and, other than ensuring that areas of suitable habitat are sufficiently large so that areas with bamboo are always available, no other conservation response to flowering and die-off of bamboo is available. Although no dead pandas have yet been reported in the areas where bamboo has recently flowered (J. Ran, unpubl. data) there have been no recent surveys of panda activities there.

Numerous reserves for giant pandas have now been established, with > 40 decreed after 1990 and 26 within the last 10 years (He et al., 2007; Yan, 2007). Many of these reserves do not, however, fulfil their conservation mandate,

being short of funds, infrastructure, staff and professional conservationists, and they do not have capacity for monitoring and protection. Furthermore, only 71% of panda habitat and 23.7% of potential habitat are covered by panda reserves (State Forestry Administration 2006). There are areas of both current and potential panda habitat that are not protected and that are exposed to various human activities. Potential but unprotected panda habitat has been found to be important in some circumstances, such as when pandas were found to have moved into such habitat following the bamboo flowering in northern Minshan Mountains in 2004–2007. The management of the established reserves needs to be strengthened and improved and, at the same time, some of the currently unprotected potential panda habitat needs to come under protection.

The giant panda is a shy and solitary animal and is therefore difficult to study in the wild. Although there has

been research on the panda within the last few decades a number of questions are as yet unanswered. For example, to what extent is movement occurring between population fragments and how is this affecting genetic diversity? How do pandas find a partner for courtship in the breeding season? What would be the best way to establish corridors between isolated populations? More research is required to improve our understanding of panda ecology in the wild.

Although the panda population in captivity has increased, the genetic diversity of the captive population is low compared to that in the wild; the genetics of the captive population need to be carefully managed (Shen et al., 2009). The final destination for pandas bred in captivity is reintroduction to the wild. Preliminary studies on reintroduction have been carried out (Wei & Zhang, 2008). The captive panda Xiangxiang was trained for 2 years before it was reintroduced to Wolong National Nature Reserve in April 2006. Unfortunately, its dead body was found in February 2007 and the cause of death is unknown (Di, 2007). A wild panda known as Shenglin No. 1 strayed into an urban area in 2005, from where it was captured and then released to the Longxi-Hongkou National Nature Reserve with a global positioning system collar attached (Chen, 2006). Information from these two cases will help guide future panda reintroductions.

Although there has been disputation regarding the actual population size of the giant panda in the wild (Zhan et al., 2006; Guo, 2007; David et al., 2008; Garshelis et al., 2008), it seems unlikely there are > 2,500 individuals, and thus the IUCN Red List categorization of Endangered remains appropriate. However, more than the actual number, it is important that many other animals, plants and their habitats are protected along with the giant panda, and that the species thus continues to fulfil its role as the best-known global flagship for the conservation of nature.

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Biographical sketches

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