Construction and management of giant panda protection projects

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Abstract. This paper summarizes the efforts made by the Chinese government in the construction of giant panda conservation projects, and especially presents the construction of China's giant panda national park in terms of the overall planning of the park, brand building, and international cooperation. It also discusses the shortcomings of panda protection at the current stage, and puts forward relevant suggestions to provide references for improving the content of panda protection.

1. Introduction
The giant panda (Ailuropoda melanoleuca) is an endemic species in China. It is known as the "national treasure of China" and is a national first-class protected animal. It mainly inhabits the mountainous areas of Sichuan, Shaanxi and Gansu provinces in China. Since the establishment of the earliest giant panda reserve in 1963, China has established a total of 67 giant panda reserves, covering a total area of 3.36 million hectares, covering 53.8% of the giant panda habitat and protecting 66.8% of the wild giant panda population [1]. At the same time, in addition to the establishment of panda habitat natural reserves, China has also done a lot of work, such as the introduction of relevant laws and regulations, the implementation of ecological immigration, green barren mountains, natural forest protection, wildlife protection and other national key ecological construction projects. At present, the above work has achieved remarkable results [2]. Moreover, China's protection of giant pandas is also reflected in the diversity of "panda diplomacy". In 1950, China began its "panda diplomacy" with political gifts. In 1984, China leased a pair of pandas to the United States to participate in the opening ceremony of the Los Angeles Olympics. Then in 1994, the two pandas at the Chengdu Research Base of Giant Panda Breeding were sent to Japan for the first time with the mission of scientific research exchange. The change in the form of "Panda Diplomacy" also illustrates China's increasing emphasis on the protection of giant pandas. Over the years, China has been working with non-governmental organizations to conduct research on the protection of giant pandas, and has carried out scientific research cooperation including conservation of rare and endangered wildlife, public education, and breeding of giant pandas [3]. The international cooperation project of giant pandas has promoted the exchange of scientific research and culture of giant pandas. While enhancing the friendship among diplomatic relations, it has also gained more external support for the protection of giant pandas.

In 2015, the results of the fourth national survey of giant pandas were announced. As of the end of 2013, the number of wild pandas in the country has reached 1,864, and the number of captive pandas has reached 375. And the habitat area of wild giant pandas is 2.58 million hectares, with potential habitats of 910,000 hectares [4]. The fourth survey basically continued the mature techniques and
methods of the third giant panda survey. The number of wild giant panda populations, captive giant panda populations, protected areas, habitats and potential habitat areas in the country all increased [5]. In 2016, in the newly released the Red List of Threatened Species, the giant pandas were changed from "endangered" to "vulnerable" [6]. The incident aroused widespread concern in China's domestic media and the public. In response, the National Park Administration (formerly State Forestry Administration) responded that the conclusion of the IUCN report is a theoretical judgment based on relevant data and technical indicators. However, as the management department of giant pandas, according to the actual situation and protection situation of giant pandas, the National Park Administration believes that giant pandas are still endangered species.

The main reasons for this are [7]:

- Habitat fragmentation is still the main factor threatening the survival of giant pandas, and some local populations of giant pandas are still facing survival risks.
- The status of population communication needs to be improved.
- The impact of global climate change.
- Protection and management capabilities still need to be strengthened.

The "downgrading" of giant panda species not only represents the IUCN Chinese government and its international partners' recognition of the effectiveness of the panda conservation work, but also indicates that IUCN's protection measures for giant pandas may be adjusted accordingly [8]. However, the Chinese government will still attach great importance to and strengthen related work on panda protection. In January 2017, the Chinese government decided to conduct a pilot project of the Giant Panda National Park system in the main distribution areas of giant pandas in Sichuan, Shaanxi, and Gansu provinces. The construction of the Giant Panda National Park officially kicked off [9], and a new journey of panda protection has begun.

2. Establishment of Giant Panda National Park

2.1. Overview of the Master Plan of the Giant Panda National Park

In October 2019, the National Park Administration released a master plan of the Giant Panda National Park (draft for comments) [10]. The planning period is 2019 to 2025, of which 2019 to 2020 is a pilot period. The master plan of the Giant Panda National Park was formed on the basis of the pilot scheme of the Giant Panda National Park system. The purpose is to promote the implementation of the pilot task of the Giant Panda National Park system. The master plan clarifies the construction projects of the Giant Panda National Park in the coming years, including major projects for the protection and rehabilitation of giant panda populations, key projects for the restoration of panda habitats, key projects for the protection and restoration of ecosystems, key projects for the construction of scientific research monitoring and early warning assessment systems, key projects for infrastructure protection, key projects in nature education and ecological experience, including the establishment of giant panda ecological corridors, protection and restoration of edible bamboo for giant pandas, wild construction training and release base construction projects, establishment of wildlife rescue systems, "Sky, Land and People Integration " monitoring system construction, etc.

The pilot area of the Giant Panda National Park is divided into core protection areas and general control areas, involving Sichuan, Gansu, and Shaanxi provinces. The geographical coordinates are 102°11'10"E~108°30'52"E and 28°51'03"N~34°10'07"N, with a total area of 27,134 square kilometers, involving 121,800 people in 151 towns and villages [10]. The core protected area covers an area of 20,140 square kilometers, accounting for 74.22% of the total planned area. The region has 14,456 square kilometers of giant panda habitats and 1,519 wild giant pandas, accounting for 80.07% of the giant panda habitat area and 93.13% of the number of wild giant pandas in the national park, respectively. Core protected areas include suitable habitats for giant pandas within the existing nature reserve core areas and some buffer zones, core nature reserves of world natural heritage sites, forest park ecological conservation areas, and protected areas of scenic spots. The general control area is a key area for implementing ecological restoration, improving habitat quality, and constructing ecological corridors,
covering an area of 6,994 square kilometers, accounting for 25.78% of the total area, including the main residential, production and living areas of the existing community residents in the national park region. The core protected area adopts the most stringent control measures, prohibiting human activities, and carrying out activities such as management and patrol, scientific research, resource investigation, and major ecological protection and restoration projects. General control areas control man-made activities according to law, and only allow limited man-made activities that do not cause damage to ecological functions.

2.2. Giant Panda National Park and giant panda conservation programs

As the main distribution area of giant pandas and the main body of the Giant Panda National Park, Sichuan Province insists on promoting the construction of national parks with high quality. Since October 2018, the Sichuan Forestry and Grassland Bureau, together with the Ministry of Natural Resources and the Sichuan bureau of surveying, mapping and geographic information, have carried out four “non-reduction” tasks. They are the total area of the park is not reduced, the area of giant panda habitat is not reduced, the proportion of core protected areas is not reduced, and the number of pandas is not reduced. This work reduced the number of indigenous residents, collective land area, production and operation facilities and townships in the national park, and eased the contradiction between protection and development.

At present, panda protection still faces four major dilemmas [11]:
• Habitat shrinkage and fragmentation are serious.
• Difficulties in coordinating protection and development.
• Scattered and overlapping protected area institutions.
• Insufficient scientific research support and service capabilities.

In response to these four dilemmas, the Chinese government is working hard to implement four conservation plans [11]:
• Ecological integrity protection plan.
• Management standardized protection plan.
• Species scientific protection plan.
• Model collaborative protection plan.

Such protection plans are being implemented in an orderly manner.

2.3. Ecological and cultural branding of Giant Panda National Park

In terms of park operation and management, the overall plan clearly strengthens the cooperation between the National Park Administration and the local government to integrate the ecological industry resources in the park and create an ecological brand for the Giant Panda National Park [10]. And through brand authorization, it can effectively control and guide ecological industry practitioners in the park. The master plan proposes that typical representative ecological industries should be selected as alternative industries to support the development in the general control area. In addition, it is proposed that in the existing ecological experience areas, moderate development of green industries such as ethnic culture with local characteristics, ecological experience, and processing of characteristic agricultural products should be appropriately developed. The development of these ecological industries in domestic tourism areas has matured and has certain market conditions. Ecotourism, as a more popular tourism model in China in recent years, has appeared in many rural tourism and natural scenic areas. However, most of the current eco-tourism is only reflected in the slogan, and the specific real eco-tourism is still in the development stage. The Giant Panda National Park intends to use artificial control, nature education and ecological experience activities, publicity and other means to guide tourists in ecotourism activities.

Giant pandas are China's unique "living fossils". They are not only loved by people all over the world, but also shoulder the mission of peaceful diplomacy. As of April 2019, China has established panda research cooperation with 15 zoos in 13 countries, such as the United States, the United Kingdom, Austria, Australia, Japan, Thailand, Singapore, Malaysia, Finland, South Korea, the Netherlands, Indonesia, and Belgium. It has built a bridge for friendly exchanges between China and other countries.
in the world. Panda culture is based on the biological image of pandas, which is derived from the sum of its scientific, aesthetic, ecological, social and cultural values [12]. The core of giant panda culture is natural selection, harmony and common prosperity, and friendly tolerance [13]. The Giant Panda National Park is strengthening the construction of a giant panda cultural brand, establishing a big country image of peaceful coexistence, friendliness, tolerance, and harmonious coexistence between man and nature, and promoting panda culture as a "national business card". At the same time, the first China Giant Panda International Culture Week was held in Beijing. The event is global-oriented and showcases the results of the research and cultural construction of giant pandas at this stage, pushing the giant panda culture to the world. In addition, China is actively organizing the giant panda culture festival, panda summer camp, panda protection messenger and other activities, in-depth implementation of the "giant panda +" strategy to strengthen the organic integration of panda brand and industrial development. In December 2018, the Giant Panda Cultural Alliance (China) was established in Ya'an, and issued a declaration. It proposed four initiatives: protection priority, sustainable development; resource integration, harmonious symbiosis; overall coordination, cooperation and win-win cooperation; opening up cooperation and participation. The main contents of the alliance are to stabilize the breeding of giant pandas, maintain the integrity and authenticity of the ecosystem, explore the construction model of ecological civilization, build a giant panda brand, and make breakthroughs in the dissemination of giant panda culture and tourism integration and development, helping to promote giant pandas into "National Brand". The construction of the ecological and cultural brand of the Giant Panda National Park not only promotes tourism development, international exchanges, and strengthens cultural influence, it also helps the protection and preservation of giant pandas and their habitats.

2.4. International exchange and cooperation of Giant Panda National Park

The master plan of the Giant Panda National Park clearly proposes to deepen international exchanges and cooperation. Its plan is to establish long-term friendly and cooperative relations with well-known foreign national parks through sister national parks and other forms. And it plans to establish long-term cooperation mechanisms with well-known foreign scientific research institutes and international protection organizations to establish a responsible national image for the protection of endangered and rare wild animals [10]. As early as October 2018, the China National Park Administration and the Parks Canada Agency signed a cooperation agreement on the pairing of the Chinese Giant Panda National Park with the Canadian Jasper National Park and Elk Island National Park. The agreement stipulates international cooperation in the areas of park planning and management, biodiversity protection, recreation and ecotourism management, and science education [14]. In October 2019, the Sichuan Province-Utah State Natural Resources and National Park Management Advanced Seminar was held in Chengdu, and the Sichuan-Utah Giant Panda National Park Science and Technology Innovation Alliance was officially established [15]. The Sichuan-Utah Giant Panda National Park Science and Technology Innovation Alliance consists of universities, governments, enterprises, and research institutes, and shares academic resources and industry information. After the establishment of the alliance, it will refine the cooperation areas, work priorities and work plans of the two sides in 2020, jointly integrate related resources in China and Utah, and build a national park innovation exchange platform, scientific research resource sharing platform, and talent training base. The international exchange and cooperation project of the Giant Panda National Park is being actively carried out, laying a solid foundation for further opening the business card of the Giant Panda National Park, advancing the scientific protection of the panda and entering a new stage of cultural economy, and adding more international for the panda protection power.

3. Conclusions and suggestions

The Chinese government has devoted many years of efforts to the protection of giant pandas and their habitats, and significant progress and remarkable results have been achieved in the protection and research of giant pandas. At present, the construction of a giant panda national park with a total area of more than 27,000 square kilometers is being actively promoted, which is the focus of the protection of
giant pandas and their habitats. China is actively carrying out international cooperation in the construction of giant panda national parks, building a global platform for cooperation and exchange in the protection of giant pandas, and exploring the best countermeasures for national park construction.

The large-scale changes in ecosystems or biological communities caused by climate change are inevitably affecting the long-term survival and reproduction of giant pandas [16]. The construction of a giant panda national park is an active model of giant panda protection, but it cannot solve all the threats to the survival of giant pandas. While the construction of the Giant Panda National Park improves the level of giant panda protection and management, it is also necessary to consider the impact on the ecological environment of the construction project at the current stage and the use of the subsequent stages of the project completion.

Combining the difficulties of the giant panda protection raised by the National Park Administration, and the difficulties currently encountered in the construction of the Giant Panda National Park at this stage and some of the situations in the future, we raise the issues that need to be paid attention to the status of giant panda protection:

- It is important to protect giant pandas to grasp in advance the impact of changes in the natural environment, which are mainly characterized by climate change, on the survival and reproduction of giant panda populations, and to make timely responses.
- The negative impact of the new panda national park project on the current and future ecological environment.
- Human disturbance caused by the development of ecotourism poses new threats to giant pandas and their protected species.

In response to the above problems, we propose the following three suggestions:

- Strengthen the establishment of a digital scientific management platform.
- Attach importance to the environmental sustainability assessment of new projects.
- Promote the construction of eco-tourism education and management systems.

3.1. Strengthen the establishment of digital scientific management platform
Sanjiangyuan National Park is China’s first national park system pilot area. Based on the established ecological monitoring and early warning system, the Ecological Data Center of Sanjiangyuan National Park has been constructed and has been put into use. The platform provides quantitative and high-precision spatial information support for national park management and ecological security decision-making, and provides services such as ecological data collection, sharing, analysis, and display for the needs of related industries. The Giant Panda National Park is advancing the construction of the "Sky, Land and People Integration" monitoring system. The project can use the established national park ecological monitoring system (the Ecological Data Center of Sanjiangyuan National Park) as a model, reasonably adjust and add cutting-edge scientific management technology to protect the integrity of the regional ecosystem. For example, the ClimateAP platform developed by the University of British Columbia, Canada is used to generate high-resolution and high-precision historical and future climate data to simulate and predict future climate characteristics. It is also used to study the impact of regional climate change on the survival of giant pandas and timely adjust protection strategies [17].

3.2. Emphasis on environmental sustainability assessment of new projects
The population of giant pandas is low, their actions are very covert, and their vigilance against humans is very high. It is difficult to observe their entities in the wild, and giant pandas who settle outside the protected area are also avoiding roads and agricultural areas with high interference [18], [19]. A study showed that the tourism activities of Tangjiahe National Nature Reserve in recent years have impacted giant pandas [20]. Tourism activities carried out in the national park recreation area require the support of some infrastructure. However, the construction of tourism infrastructure and the development of tourism activities are a new threat to the protection of national parks. In 2014, the National Park Administration issued a technical specification on biodiversity impact assessment for construction projects in nature reserves, setting standards for the impact assessment of new projects in nature reserves.
on biodiversity. However, the evaluation indicators and standards for new national park projects have not been implemented uniformly. Attaching importance to the environmental sustainability assessment of new panda national park projects can eliminate new threats and improve the level of national park panda protection and management.

3.3. **Promote the construction of eco-tourism education and management system**

As a country with a large population, China has a large number of tourists. At present, China lacks a corresponding management and regulation system for ecotourism. Therefore, it is particularly important to promote the construction of an eco-tourism education and management system in the construction of national parks. Eco-tourism education in national parks is an important part of the social environment education system. Promoting and popularizing socialized and popularized ecotourism knowledge from different perspectives in various forms can cultivate the sustainable development concept of tourists and tourism stakeholders, strengthen their basic knowledge and awareness of ecotourism, and improve their ecological environmental protection capabilities and skills [21]. The eco-tourism management system is a functional system whose construction goal is to achieve sustainable development of regional tourism [22]. Strengthening eco-tourism education, exploring and promoting the popular education model of eco-tourism can cultivate real eco-tourists. It also guarantees that the integrity of national park ecosystems will not be artificially damaged by the tour. This is something that needs to be focused on in the construction of national parks.

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