

Development of China's nature reserves over the past 60 years: An overview

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ABSTRACT

Establishing nature reserves (NRs) is the most important way to conserve biodiversity in China. In this paper, based on time series, we briefly reviewed its development history. The result showed that the pace and scale of the development of NRs have varied over time, and the development was highly related to China's economic and social development. Thus far, downsizing and downgrading still are the two major factors affecting the effectiveness of NRs. However, there are good signs showing that NRs of China will have a healthier future under the condition that environmental awareness both in the government and the public has been growing over the past decade. Then, suggestions on regulation, the participation of local communities, and environmental education are proposed accordingly.

1. Introduction

China plays a key role in preserving biodiversity globally (Liu et al., 2001, 2003; McBeach and McBeach, 2006). It contains about 35,000 vascular plants, ranking the third in the world (behind only Brazil and Colombia), and over 6500 vertebrates, accounting for 13.7% of the world total (Liu et al., 2003; Wandesforde-Smith et al., 2014; Zheng and Cao, 2015). It is a signatory to most of the major wildlife-related international treaties and conventions, such as the Convention on International Trade in Endangered Species, the Ramsar Convention, and the International Convention on Biological Diversity. However, biodiversity loss in China is serious: about 11% of vascular plants are endangered (Ministry of Ecology and Environmental of the People's Republic of China, MEE, 2013a) and 21.4% of vertebrates are threatened (MEE, 2013b).

Protected areas are the most widely known and well-accepted strategy for conserving biodiversity. To conserve biodiversity, the categories of protected areas have been set in China, such as scene areas, geological parks, historic sites, forest parks, nature reserves (NRs), etc. Among them, only NRs are specifically designated to protect biodiversity (Xu et al., 1999; Xu and David, 2007; Liu et al., 2008; Xu et al., 2014). In China, an NR is defined as an area approved by the government, in which biological varieties and natural remains are specially managed and protected. A quick view of its history would notice that the pace and the scale have varied since the first NR was established in Guangdong Province in 1956. Up to the end of 2015 (the year that the

newest data was provided by MEE), there were 2740 NRs in China, covering 142.43 million hectares of land (14.84% of Chinese land territory) and 4.56 million hectares of sea area (Fig. 1). However, the effectiveness of them has long been suspected.

Besides nature conservation, things have changed a lot in China over the last 60 years. Some may have promoted nature conservation, while some may not. Therefore, to get a comprehensive understanding of China's nature conservation and to guide future development, there is a need to look back what happened over the past 60 years, as well as look forward to what is in store for the future. In this article, based on the time series, we briefly reviewed the development history of China's NRs. Then, we analyzed the reasons for the ineffectiveness of them and suggestions were provided accordingly at the end of the article.

2. Development of NRs in China

The curves for the variations in number and area of NRs over the past 60 years are shown in Fig. 2. It can be seen that the curves are similar to that of the life-circle curves. Therefore, corresponding to the birth, growth, and maturity phases of NRs, we divided the past 60 years into three periods, 1956–1978, 1979–2006, and 2007–2015, respectively. While the first two periods have been widely discussed in the literature (e.g., Jin, 1997; Xu et al., 1999; Li et al., 2003; Liu et al., 2003; Jim and Xu, 2004; McBeach and McBeach, 2006; Xu and David, 2007; Zhang and Wen, 2008), little is known about the third period. Therefore, in this review, we paid special attention to the third period.

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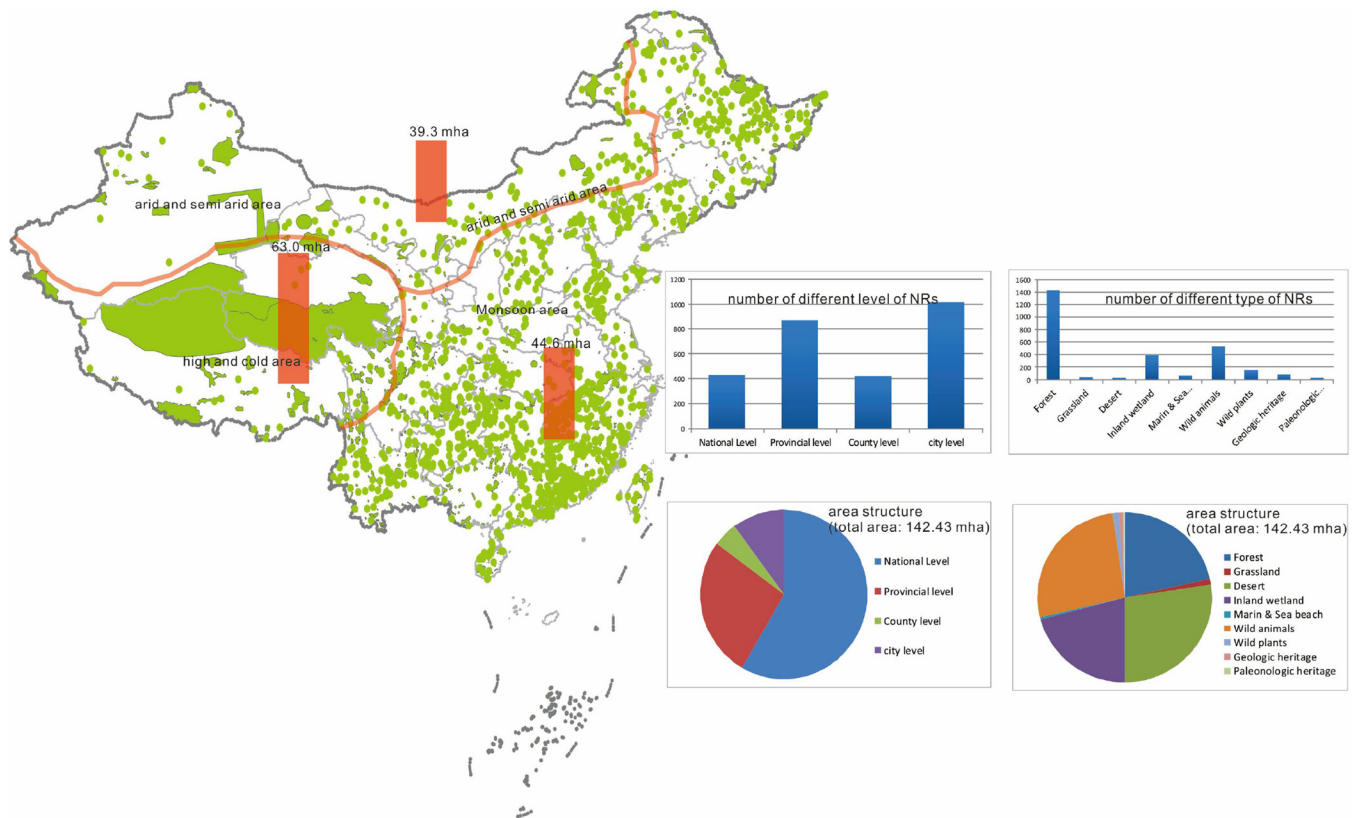


Fig. 1. Distribution, types, and structure of China’s NRs. In the figure, only very large NRs are presented with a polygon to show their boundaries. Small NRs are presented in dots. Map data are collected from the website of IUCN’s World Commission on Protected Areas. There are nine types of NRs in China (pie chart at down-right) with four administrative levels (pie chart at down-left). According to physical differences, China’s land can be demarcated into three natural regions. One is Northwestern Arid and Semiarid Region, which is featured with arid and semiarid climate. Most deserts are located in this region, except the Qaidam Desert. One is Southeast Monsoon Region, where the climate is humid because of the East Asian Monsoon and Indian Monsoon. The other is Tibetan High and Cold Region, where the climate is cold because of high elevation.

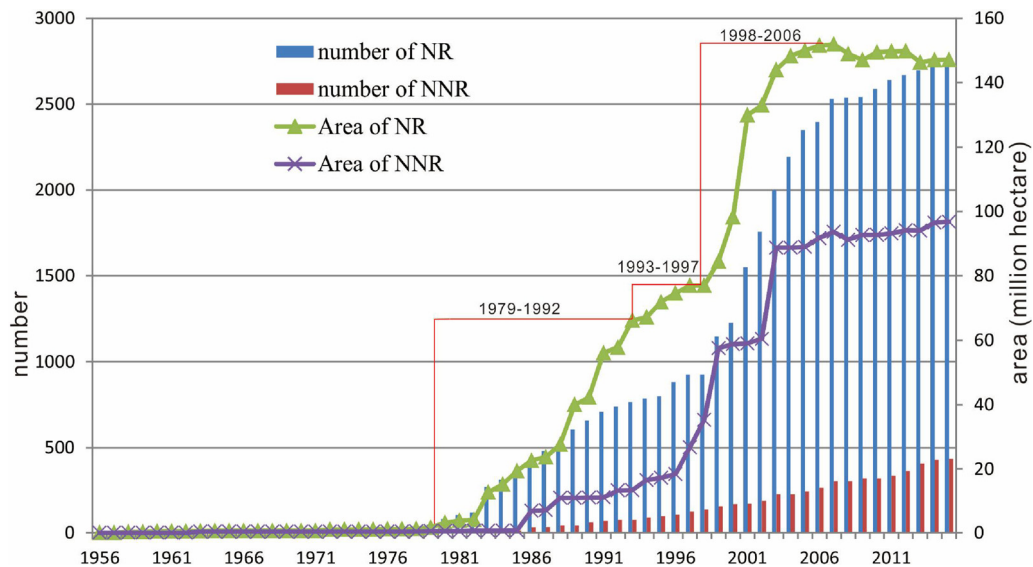


Fig. 2. The number and the area of NRs and National level NRs (NNRs) in China from 1956-2015.

2.1. The birth of China’s NRs: 1956-1978

Introduction of modern nature conservation to China is relatively new (Xu and David, 2007). In 1956, a proposal about the establishment of NRs and forest sanctuaries was put forward in the first National People’s Congress of China. Then, the Plan of Natural Forest NR

Construction, the first law on NRs, was enacted in the same year. And the Dinghushan NR, the first NR in China, was established. Therefore, the year 1956 is widely recognized as the beginning of modern nature conservation in China (Zhu, 1989; Jin, 1997; Xu and David, 2007). Unfortunately, little progress was made over the next 20 years for political reasons. By 1978, there were still only 34 NRs, and the area of

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