AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Construction of National Nature Reserve System in China

ZHENG Hai-yang*, WANG Guo-xiang

Key Laboratory of Environmental Change and Ecological Construction of Jiangsu Province, School of Geographical Science, Nanjing Nomal University, Nanjing 210046, China

Abstract This paper introduces the construction status of National Nature reserves in China, and then it points out some primary problems in the construction of national nature reserves. Finally, we put forward some related countermeasures and suggestions.

Key words National nature Reserves of China;Construction status;Biodiversity conservation;Management;Development countermeasures

Nature reserve is the most concentrated area for wildlife resources. It is the most effective measures to protect natural resources and environment. At the end of 2007, China has set up a total of 2 531 nature reserves occupying 15 188.00 $\times 10^4$ hm^2 (not including Hongkong, Macao and Taiwan areas, the same as follows). Nature reserves accounts for 15.19% of the land area of China. National nature reserve is the essence of China's nature reserves. It protects the vast majority of ecosystems and the rare and endangered species in China. Its development and construction directly relates to the safety of biological diversity in China. We analyze the construction status of national nature reserves in China, discuss its disadvantages in the process of construction development, and put forward related countermeasures for sustainable development, in order to provide references for the harmonious development and scientific management of national nature reserves.

1 Construction status of national nature reserves in China

1.1 Analysis of the quantity and area Since the establishment of the first national nature reserve (Guangdong Dinghushan Nature Reserve) in the year 1956, the construction of national nature reserve has developed step by step. Remarkable achievements have been made during more than 50 years' effort (Fig.1). At the end of 2007, there are a total of 303 national nature reserves in China, and their area has reached 9 365.58 $\times 10^4$ hm^2. China has formed a network system for national nature reserves with reasonable layout, relatively complete types and broad distribution.

According to the statistics, 28 national nature reserves in China are included in the "International Man and Biosphere Reserve Network" by UNESCO, such as Xilinguole, Tianmushan and Shennongjia. And more than 30 national nature reserves in China are in the "List of Wetlands of International Importance" in *Convention on Wetland*, such as Dalai Lake, East Beach of Chongrning Island, and Dafeng Moose Nature Reserve. Since more and more national nature reserves being listed in the relevant international nature reserve networks, the contribution of nature reserves in China to the protection of the world's biodiversity is greatly increased.

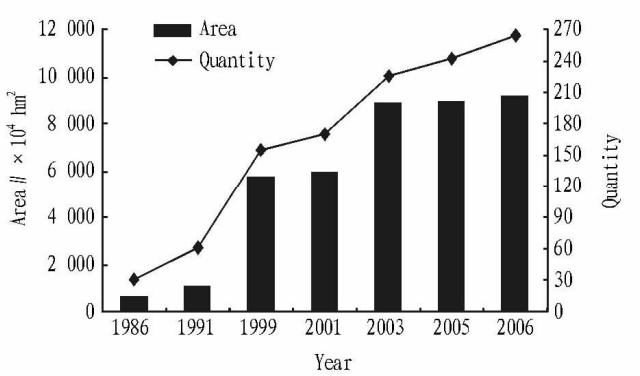

Fig.1 Dynamic development of the area and quantity of national nature reserves in China

1.2 Analysis of the type structure According to the *Principle for Categories and Grades of Nature Reserves* (GB/T-14529 -93), nature reserves in China are divided into 9 types and 3 major categories[1]. Statistical data in Table 1 show that although every type has a certain number of national nature reserves, its type structure is still not rational. The number of 4 types of nature reserves (forest ecosystem, wildlife, inland wetland, ocean coast) is 256, accounting for 84. 49% of the overall national nature reserves. Among them, the number of nature reserves of forest ecosystem type is the most (134), accounting for 44.22% of the total number. Areas of the nature reserves of desert ecosystem, wild animal, inland wetland and forest ecosystem types are relatively large. They have in all 9 117.77 $\times 10^4$ hm^2 land, occupying 97. 35% of the overall area. Among them, area of the nature reserve of desert ecosystem type is the largest (3 633.04 $\times 10^4$ hm^2), accounting

Received: March 9, 2009 Accepted: March 20, 2009

Supported by the National Key Project of Scientific and Technical Pillar Program (2007BAC16B02) and the Operating Expenses Program of the Ministry of Environmental Protection of the People's Republic of China.

* Corresponding author. E-mail: zshappy2006@163.com

for 38.79%. While the number of national nature reserves of plain meadow, ocean coast, wild plant and natural monument types reaches 51; but their overall area is only 247.81 $\times 10^4$ hm^2. Those national nature reserves have smaller proportions both in quantity and area, which are 16.83% and 2.65%, respectively.

Table 1 Statistics of the types of national nature reserves in China in 2007

Category	Type	Number	Proportion//%	Area// $\times 10^4$ hm^2	Proportion//%
Natural ecosystem	Forest ecosystem	134	44.22	1 327.40	14.17
	Plain meadow	4	1.30	81.89	0.87
	Desert ecosystem	12	3.96	3 633.04	38.79
	Inland wetland	29	9.60	1 887.95	20.16
	Ocean coast	16	5.28	55.07	0.59
Wildlife	Wild animal	77	25.41	2 269.38	24.23
	Wild plant	15	4.95	81.38	0.87
Natural monument	Geological relics	10	3.30	14.73	0.16
	Archaeological remains	6	1.98	14.74	0.16
	Total	303	100	9 365.58	100

2 The main existing problems

Nature reserves in China are established under the guidance of the strategic thought of "rescued protection". And the promotion system is adopted in these nature reserves. This approach can speed up the development of nature reserves. However, due to the lack of overall planning in nationwide scale, many problems are caused in constructing the network system of national nature reserves.

2.1 Uneven spatial distribution Spatial distribution of national nature reserves in China is uneven, mainly distributed in 9 provincial-level administrative regions of Inner Mongolia, Sichuan, Heilongjiang, Yunnan, Guangxi, Hunan, Gansu, Fujian and Liaoning. The number of those national nature reserves is 147, accounting for 48.5% of the total number of national nature reserves. Number of national nature reserves in Inner Mongolia Autonomous Region is the largest (23), while that of Beijing and Shanghai are the least (Table 2). Tibet Autonomous Region has the largest area of national nature reserves, following with Qinghai Province. They account for 39.67% and 21.62% of the total area of national nature reserves in China. In general, the western area of China (Tibet, Qinghai, Xinjiang, Gansu, Yunnan, Inner Mongolia) has the largest area of national nature reserves, with the total area of 8 314.84 $\times 10^4$ hm^2. These provinces account for 88.8% of the total area of national nature reserves in China. However, the area of national nature reserves in eastern developed area of China is relatively small.

Table 2 Distribution of national nature reserves in China in 2007

Administrative region	Number	Area// $\times 10^4$ hm^2	Administrative region	Number	Area// $\times 10^4$ hm^2
Beijing	2	2.64	Hubei	9	21.76
Tianjin	3	10.09	Hunan	14	45.20
Hebei	11	21.65	Guangdong	11	23.64
Shanxi	5	8.30	Guangxi	15	28.62
Inner Mongolia	23	384.38	Hainan	9	10.20
Liaoning	12	93.64	Chongqing	3	19.55
Jilin	11	78.37	Sichuan	22	210.05
Heilongjiang	20	205.84	Guizhou	8	24.35
Shanghai	2	6.62	Yunnan	16	143.17
Jiangsu	3	33.62	Tibet	9	3 715.31
Zhejiang	9	9.67	Shaanxi	9	32.00
Anhui	6	16.43	Gansu	13	686.12
Fujian	12	20.58	Qinghai	5	2 025.25
Jiangxi	8	14.02	Ningxia	6	43.92
Shandong	7	25.68	Xinjiang	9	1 360.62
Henan	11	44.30	Total	303	9 365.58

2.2 Large proportion of protected area Nature reserves in China are classified into national level, provincial level (autonomous region and municipality), municipal level (autonomous prefecture) and county level (autonomous county, county-level city, banner) according to their constructed administrative ranks. Although the number of national nature reserves only occupies 11.97% of the total number of nature reserves in China, their area is as high as 61.70% of the total area. This hier-

archical structure reduces the importance of national nature reserves. At the same time, it causes the lack of funds, and the difficulty in implementing effective management in national nature reserves[2] (Fig. 2).

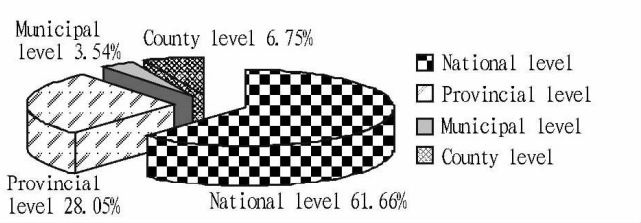

Fig. 2 Area percentage of different levels of nature reserves in China in 2007

2.3 Lack of the protection of biodiversity According to incomplete statistics, the vast majority of China's important ecological systems have been incorporated into the national nature reserve system. But more than 20 ecological systems needed to be protected are lacked in the national nature reserve system[3]. They are some important ecosystems, such as *Castanopsis delavayi* Franch-*Cyclobalanopsis delavayi* living in high latitude, *Roscoea alpine*, *Gueldenstaedtia yunnanensis* Franch and other weedy meadows, *Pinus sylvestris* var. *mongolica* Litv forest with small distribution area and high degree of fragmentation, Haloxylon ammodendron desert in remote areas and less affected by human activities, *Tamarix chinensis* desert, and *Philydrum lamuginosum* swamp[4-5].

According to the result of the " National Survey of Species Resources" carried out by the State Environmental Protection Administration, the national nature reserves have effectively protected the *Davidia involucrate*, *Abies beshanzuensis*, *Elaphurus davidianus Grus japonensis*, *Syrmaticus ellioti* and other rare and endangered species[6]. However, less than 1 000 species, accounting for 20.00%, do not or rarely distribute in the national nature reserves. In particular, some national key protected species has not been well protected in the national nature reserve system, such as the *Christensenia assamica*, *Cymonsphaera lampricaulon*, *Cycas szechuanensis*, *Cyprinus pellegrini*, *Arborophila ardens* and *Arborophila rufipectus*[7]. In addition, network system of the national nature reserve is not complete. And ecological corridor with other nature reserves at different levels is lacked. As a result, many key protected wildlife populations are usually isolated and can not realize genetic exchanges.

2.4 Increasingly acute contradictions between resources protection and development construction With the rapid development of economy, many national important engineering programs usually have impact on the national nature reserve, and have occupied the land resources in nature reserve, caused the fragmentation of habitat, and even influenced the protection effectiveness of biodiversity. What is more, a small number of localities only consider the current benefits, and have carried out economic development activities in nature reserves incompatible with the laws and regulations. Some of the development constructions have already influenced the resources and environment in nature reserves. Some nature reserves are forced to make certain concessions due to the above phenomenon. According to incomplete statistics, a total of 29 national nature reserves had adjusted their scopes and functions at the end of 2007, which was approved by the relevant authorities of China, due to the national highway, water conservancy and other key construction projects. These account for 9.60% of the total national nature reserves. And a small number of national nature reserves have been adjusted more than two times.

3 Suggestions

There still has much room for the development of construction system of the national nature reserves in China. Therefore, we put forward the following countermeasures in order to maintain the regional ecological security, to better promote the biodiversity conservation, and to further improve the construction and management level of national nature reserves.

3.1 Scientific demonstration, overall planning, and reasonable optimization of the spatial network system for national nature reserve Combining with the vacancy analysis result of biodiversity conservation in China, the national division of biogeographical units is used as the references. Based on the existing network of national nature reserve, a number of national nature reserves are re-established through restructuring, upgrading and building the overall planning, in order to improve the spatial network of national nature reserve. Specifically, government should focus on strengthening the national nature reserve protection of forest, wide plant, nature relics, ocean marine, desert and other natural ecosystem with insufficient area or proportion. In geographical distribution, government should focus on strengthening the national nature reserve construction in some of the key and hot biodiversity areas in China. Besides, the state should strengthen the ecological corridor construction between national nature reserve and other nature reserves, and promote the migration and communication among species in different habitats.

3.2 Scale control, quality insure, and strengthening the construction of national nature reserve based on the diversity of vacancy biology Area of the national nature reserves has accounted for a high proportion at present. Therefore, the area of national nature reserve to be developed in future should be reasonably controlled. We should focus on strengthening the construction protection of national nature reserves, which have not been effectively protected or have vacancies in protection. Functions of the established national nature reserves should be rationally designed; and the total area of nature reserves should be rationally controlled. We should enlarge the area of core region gradually, ensure that the area of core region accounts for more than 1/3 of the total area, and make the area proportion in accord with the *Regulations on Natural Reserve*. In addition, we should correctly deal with the relationship between nature reserve and its surrounding areas, and steadily promote the harmonious and healthy development of national nature reserve.

3.3 Accelerating the formulation of related laws and regulations, strengthening the environmental management of construction projects in national nature reserve According to the more prominent contradictions between protection and

economic development in nature reserves at present, environmental management approach related to the nature reserves should be made as soon as possible. Environmental management of construction projects involving in nature reserves should be strengthened. The national key projects, which ought to be proved by the national nature reserves due to construction demand, should appropriately and strictly adjust the function zoning, scope, or boundary of nature reserves in accordance with the *Regulations on Nature Reserve* and the *Management Regulation on the Scope and Function Adjustment of National Nature Reserves and Their Change of Name*. Meanwhile, we should establish a strict environmental impact assessment system and an ecological compensation mechanism for construction project.

3.4 Actively adopting effective measures, effectively improving the management capacity of national nature reserve The key for improving the in situ conservation of biodiversity is to implement effective management in nature reserves. ① We should establish and improve the management organization in nature reserves, set up a mechanism to attract and retain qualified personnel, implement civil servant system for the staffs in nature reserves, recruit a group of high-qualified professional and technical personnel to add into the existing management team[8]. ② In the aspect of fund guarantee, we should continue to increase the national and local funding to support financial. Moreover, nature reserves can make use of its own resource characteristics under the permission of relevant laws and policies of China, in order to expand the characteristic industries in nature reserves. Financial source is increased by collecting fund of nature reserves themselves[9]. ③ We should actively carry out the management model of community co-management, encourage and support the residents in the surrounding communities to participate in the management nature reserves. ④ We should further strengthen the evaluation and standardization construction of national nature reserves. The management and assessment on national nature reserves of six provinces and one city in eastern China in 2008 should be taken as an opportunity to promote the management and assessment on national nature reserves based on the *Measures for the Supervision and Inspection of National Nature Reserves*. Management level in nature reserves should be improved and the integrated management should be strengthened. In addition, we should carry out the law execution inspection from time to time, investigate and deal with various illegal behaviors during construction.

3.5 Continuous increasing the strength of monitoring and scientific research, carrying out the information sharing and cooperation of biodiversity resources We should make use of the rich biological resources and high ecological value of national nature reserves, strengthen the cooperation with relevant universities and research institutes, establish the ecological monitoring system in nature reserve, actively carry out the dynamic monitoring of biological resources, and implement information-sharing system for biodiversity[10]. Some conditional nature reserves can establish a certain area of biodiversity fixed plot. These nature reserves can use 3S technology and other advanced means to carry out ecological monitoring, to master the dynamic change of key species resources, and to accumulate the first-hand information for the protection and scientific research work. Moreover, these reserves should pay attention to and participate in international cooperation. As a member of the Man and Biosphere Network, national nature reserve should actively cooperate with the IUCN, WWF and other international agencies, apply for scientific research funds, and carry out scientific research in multi-directions.

References

[1] XUE DY, JIANG MK. A study on categoring standard of nature reserves in China[J]. China Environmental Science, 1994, 14(4): 246-251. (in Chinese).

[2] XIE Y. Analysis to China nature preservation zone system[J]. Green China, 2004(19):60-63. (in Chinese).

[3] XU WH. Terrestrial ecosystem nature reserve system planning in China[D]. Changsha: Hunan Agricultural University Press, 2002:20-68. (in Chinese).

[4] TANG XP. Analysis of the current situation of China's nature reserve network and a draft plan for its optimization[J]. Biodiversity Science, 2005, 13(1):81-88. (in Chinese).

[5] XU WH, OUYANG ZY, HUANG H. Priority analysis on conserving China's terrestrial ecosystems[J]. Acta Ecologica Sinica, 2006, 26(1):271-280. (in Chinese).

[6] JIANG MK, WANG Z, QIN WH, *et al*. Effectiveness of national priority wildlife protection in nature reserves[J]. Journal of Ecology and Rural Environment, 2006, 22(4):35-38. (in Chinese).

[7] LIU GQ. Analysis, assessment and development of the national nature reserves under the jurisdiction of the state forestry administration of China[J]. Forest Resources Management, 2005(6):8-13. (in Chinese).

[8] HAN NY. Study on the sustainable management policy of nature reserves in China[J]. Journal of Natural Resources, 2000, 15(3):201-207. (in Chinese).

[9] XU HG. Financial policies for nature reserves in China[J]. Rural Eco-environment, 2001, 17(1):13-16. (in Chinese).

[10] CHENG K, MA JZ. The measures of improving effectiveness of nature reserve management in China[J]. Forest Resources Management, 2008(4):11-14. (in Chinese).

[11] ZHOU K, HOU JR. Legislative improvement for natural reserve protection zones classification system in China[J]. Journal of Capital Normal University: Social Sciences Edition, 2007(2):58-63. (in Chinese).

[12] ZHANG D, CAO Y, ZHENG L. The relationship between biodiversity conservation and nature reserve in Jiangxi Province[J]. Journal of Anhui Agricultural Sciences, 2009, 37(6):2672. (in Chinese).

[13] LU K, LI XY. The problem and the solution of natural reserve of China—perfecting the management system of the natural reserve [J]. Journal of Huaihua University, 2007, 26(6):17-19. (in Chinese).

[14] FANG BH. Preliminary research on the forestry nature reserve system building in Henan Province[J]. Journal of Henan Forestry Science and Technology, 2007, 27(2):5-7. (in Chinese).

[15] NIU X, ZHAO HY. Study on management mode of provincial natural protection area of Suya Lake Wetland in Henan Province[J]. Journal of Anhui Agricultural Sciences, 2007, 35(23):7250-7251. (in Chinese).

[16] XIE GL. On nature reserve sustainable protection & management [J]. Central South Forest Inventory and Planning, 2002, 21(3):31-35. (in Chinese).

(To page 44)

With the efficiency improvement of the transfer of agricultural land to construction land (reflected in the land use grade of state-owned land), financial resources dominated by government and used for the requisition compensation and social security of peasants will have a substantial increase. Taking the transfer of 6-grade residential land as an example, the rest part is $C=589.72\times10^4$ yuan/hm^2 after discounting the land development cost, profits and some taxes and fees.

3 Conclusion

Based on the rationalization discussion of the two compensation methods and the calculation of the existing compensation standard for land expropriation, it is correct to take Income Capitalization Method as the basic method of compensation for land requisition. However, the current standard of compensation still needs to be further improved. Government has adequate ability to pay for the compensation of land requisition. Moreover, it has sufficient funds for the construction of peasants' social security system and re-employment training.

References

[1] LIU WD, PENG J. Rational calculation of the compensation standard of land expropriation[J]. China Land Science, 2006, 20(1):7-12. (in Chinese).

[2] LIU WD, LOU LM. A review on the land expropriation and its management in China[J]. Journal of Zhejiang University: Agriculture & Life Sciences, 2004, 30(1):63-68. (in Chinese).

[3] YANG XX, HUANG XL, ZHU XG, *et al*. On the multi-calculation methods and result confirmation of the compensation criterion for land expropriation[J]. Journal of Guangxi Normal University: Philosophy and Social Sciences Edition, 2007, 43(1):16-20. (in Chinese).

[4] SHEN Q, JIN YQ. Research on system of land-expropriation and compensation-measures in countryside[J]. Journal of Anhui Agricultural Sciences, 2007, 35(33):10875. (in Chinese).

[5] WEI X, WANG YC. Perfection of land expropriation system and protection of land-losing farmers' rights and interests[J]. Journal of Northwest A & F University: Social Science Edition, 2008, 8(6):1-4. (in Chinese).

[6] WANG JH, XU YM, WANG JG, *et al*. Study on correlative influencing factors of land acquisition compensation price[J]. Journal of Anhui Agricultural Sciences, 2007, 35(7):2154-2155. (in Chinese).

农地征用补偿方法和标准的合理化探讨

薛明川 (西南大学经济管理学院, 重庆 400715)

摘要 探讨了在农地征用过程中,运用收益还原法与市场比较法确定补偿金额存在的问题。收益还原法是把土地产值作为收益,按产值倍数法确定征地补偿金额,它的思路是正确的,但在具体实施中存在一些问题:产值倍数法没有考虑到农民对土地使用的选择权,会极大的损害农民的利益;土地的年产值额度难以确定,具体标准有待深入研究;合理的补偿倍数难以确定,不能公正的补偿失地农民的财产损失。市场比较法是指按照市场价格对被征地人的财产进行赔偿,以最大限度的弥补被征收人因征收造成的损失,这一方法也存在一些问题:不符合目前中国的基本国情,不得促进工业化和城市化的快速发展;不利于社会公平,在解决现有矛盾的情况下,可能会引发更大的社会矛盾。介绍了中国农地的价值构成,主要由绝对地租和级差地租构成,并进一步得出了二级土地开发市场上的土地价格构成与分配。以中国重庆市为例,采用成本反推法对现行农地征用补偿标准的不合理之处进行了探讨。研究表明:以收益还原法进行征地补偿的基本方法是正确的,但是现行的补偿标准有待于进一步完善;政府对于土地征用补偿的支付能力是足够的,并且有足够的资金用于农民福利保障体系建设和再就业培训。

关键词 征地补偿;方法;标准;测算

(From page 30)

中国国家级自然保护区体系建设分析

郑海洋*,王国祥
(南京师范大学地理科学学院,江苏省环境演变与生态建设重点实验室,江苏南京 210046)

摘要 从数量和面积、类型结构两方面介绍了中国国家级自然保护区建设的现状。截止2007年底,中国共建有国家级自然保护区303个,总面积9 365.58万hm^2,已初步形成了布局基本合理、类型比较齐全、分布相对广泛的国家级自然保护区网络体系,但中国的国家级自然保护区类型结构不尽合理。分析了中国国家级自然保护区网络体系建设中存在的一些问题:空间分布不均衡,集中分布在经济相对落后的西部地区,而东部经济发达地区的国家级自然保护区数量和面积所占比例相对较小;国家级自然保护区所占面积比例过大,加重了保护区的经费保障负担,影响了管理水平;生物多样性保护存在空缺,一些重要物种和生态系统尚未纳入到国家级自然保护区体系中;受国家重大建设工程项目影响,资源保护与开发建设的矛盾日益尖锐。提出了提升国家级自然保护区建设与管理水平的相关对策。科学论证、统筹规划,合理优化国家级自然保护区空间网络体系;控制规模、确保质量,重点加强以保护空缺生物多样性为主的国家级自然保护区建设;加快制定相关法律法规,强化涉及国家级自然保护区建设项目的环境管理;积极采取各种有效措施,切实提高国家级自然保护区的有效管理能力;继续加大科研监测力度,实现生物多样性资源信息共享与交流合作。

关键词 国家级自然保护区;建设现状;生物多样性保护;管理;发展对策