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Management Modes at Different Levels and Management Effectiveness of Nature Reserve

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Abstract Classification management is one of nature reserves management system in China. But state nature reserves and local administration nature reserves under the regulations are only the approval system and embody the concept of protection. Management pattern of nature reserves can be divided into nine types. There are big differences in the nine patterns in management foundation and coordination ability of management because different management pattern occupies different resources of administration, personnel, financial and law enforcement. By analyzing management pattern, thirty-eight indexes in thirteen categories were selected to evaluate the management effectiveness of national nature reserves subordinate to the State Forestry Administration (SFA). Results show that the management effectiveness of national nature reserves is good as a whole, and the management effectiveness is direct proportional to administration level. Provincial administration has the higher efficiency than municipal and county administration. Direct administration by governments at all levels has the higher efficiency than departments' administration at the same level.

Key words Nature reserve; Classification management; Management pattern

1 Study background

The management system of natural reserve specifies the management range, obligation, interests and interpersonal relations in central party, and each department. Its core is the management organization, distribution of each management organization and their coordination among each organization. Through more than fifty years of study, the management system has moved from forestry department to environmental protection departments. The recent two decades witnessed rapid development in the natural reserve, with the national natural reserve rising from 7.19% of national land in 1995 to 14.72% in the end of 2010^[1-2]. However, with the rapid expansion of nature reserve, addition of reserve types and cross-location of functional nature, there are many problems such as obscure duty and mismanagement^[3], which affects the effectiveness of natural reserve management. The objective description is compatible with the management system of natural reserve in China, which has great significance in improving management level.

The management mechanism of natural reserve has become the focus of scholars in China and abroad. Relevant studies focus on three aspects. Firstly, Wang Xianpu^[4], Ouyangzhiyun^[3] and Zhou Lin^[5] put forward the idea of improving management system. Secondly, Han Lianyong^[6], Wang Juan^[7], and Zhou Ke^[8] *et al.* introduced the system of international union for conservation and national resources, which improves various management policies. Thirdly, Ge Huaqing^[9] and Xia Shaoming *et al.* came up with the idea of obligation within management system, guidance to relieve pressure and isolation of actual management. Yu Jiuhua^[11] pro-

posed the plan of grade management system and "visual" management system. Zou Limei^[12] suggested the management.

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2 Analysis of the current situation of classification management system

2.1 Classification management system According to the eleventh and twenty-first article of *Chinese Natural Reserve*, natural reserve can be divided into state natural reserve and regional natural reserve. State natural reserve is supervised by local provincial or municipal governments, while regional natural reserve can be management by different departments. The current natural reserve is managed through four administrative departments. However, the natural reserve is different from classified management lev-

els, and administrative level is reflected on the examination and approval guidance, while the classification management is shown through the natural reserve management organization. In fact, the natural reserve of same administrative level can be managed by governments of different levels. Taking national natural reserve as an example, except Wolong, Baishuijiang and Foping being managed by State Forestry Administration, other state natural reserves are supervised by provincial, urban and countryside governments. After the foundation of national natural reserve, state council doesn't shoulder the duty to manage state natural reserve.

Classification management system is a set of effective management mechanism based on Chinese situation and the diversity of animals, which can give the most advantage of central and regional governments and departments. The natural reserves of same administrative levels differ great in the resource location and coordination.

2.2 Main mode of classification management According to the subordination relation of the management of natural reserve, and management mechanism of personnel, finance and land, it is evident to reveal the management level of natural reserve. The classification management mode of nature reserve in China can be divided into nine categories.

Mode 1: Provincial administrative department. Generally, administrative departments such as provincial forestry, agriculture and environmental protection sent out people to supervise the project. Gansu, Ningxia, Guangdong, Jiangxi, and Shanghai apply this management mechanism, so are several other affiliated groups.

Mode 2: Direct management by provincial government. Provincial governments assign administrative organizations to specific region, such as administrative region, ecological management region and development zone, etc.

Mode 3: Regional administrative management. Urban administrative departments set up organizations to manage, usually in natural reserves which are established by local government.

Mode 4: Municipality management. Regional governments build independent management organizations, especially in natural

reserves of wetland type. Regional government divides the natural reserves into specific places. Direct management includes relevant business within the natural reserve, such as Sichuan Gongga Mountain, etc.

Model 5: Managed by administrative departments at county level. The administrative departments at county level built organizations to supervise natural reserves which has single object of protection.

Model 6: Managed by country government. The government at county level is independent from the specific organization of each administrative department. Such mode is often applied in natural reserves at county level.

Model 7: Managed by State Forestry Administration. Natural reserves are established in key national forestry administrations, managed by State Forestry Administration or Forestry Management Bureau.

Model 8: Managed by each town. Governments at town level would manage the natural reserves, but they are monitored by administrative departments at county level. A group of natural reserves are built around the natural reserves in Inner Mongolia. Some national or provincial natural reserves would apply this kind of mode, such as Huping Mountain in Hunan, etc.

Model 9: Other management modes. They are directly managed by scientific research institutes and schools, such as Liangshui in Heilongjiang and Dinghushan in Guangdong, etc.

By the end of 2010, there were 247 natural reserves of state level, which accounted for 74% of the total state natural reserves in China. According to the above-mentioned classification mode, most were managed by governments at county level, including 36.9% of governments at county level, followed by regional government, which accounted for 28.7%. The natural reserves managed by provincial governments accounted by 25.9%. The management of each natural reserve varies, in that there is much provincial management of wetland natural reserves, and the ratio of direct management by governments at each level is higher than other forms. (Table 1)

Table 1 Distribution of management mode of national natural reserve

Management mode	Forest	Wetland	Desert	Wild animals	Wild plants	Total	Percentage in national natural reserve //%
Mode 1	33	9	3	13	2	60	24.3
Mode 2	1	2		1		4	1.6
Mode 3	32	6	1	7	3	49	19.8
Mode 4	10	11		1		22	8.9
Mode 5	26	3	1	8	2	40	16.2
Mode 6	31	7	2	5	2	47	19.1
Mode 7	7	7		2	3	19	7.7
Mode 8	4					4	1.6
Mode 9	2					2	0.8
Total	146	45	7	37	12	247	100

3 Effective analysis of the management of natural reserve at each level

3.1 Effective management evaluation method

From 2009 to

2010, the State Forestry Administration conducted an all-round evaluation of the effective management in national natural reserve. The standard of the Effective Management Standard of LY/T 1726

-2008 Natural Reserve^[13] assessed the achievement of provincial and some regional natural reserves. The evaluation indicators include planning, ownership, management system, management team, management policy, protection facility, resource protection, scientific research and monitoring, education, coordination, eco-

logical tourism and supervision. The management basics include planning, ownership, management team, management system, management facility and fees. Other indicators are related to the management capacity in the natural reserve. (Table 2)

Table 2 Effective evaluation factors and indicator table of natural reserve

No.	Evaluation factors	Score	Main indicators
1	Plan design	9	General plan, border range, function division
2	Ownership	6	Clarity of land ownership
3	Management system	12	Management organization
4	Management team	9	Personnel training
5	Management policy	12	Work plan, policies
6	Protection management facility	6	The number and maintenance of facilities
7	Resource protection	12	Protection achievement
8	Scientific research and monitoring	9	Resources investigation and monitoring
9	Publication	6	Popular science education
10	Fees	9	Salary and bonus
11	Community coordination	12	Neighborhood cooperation and participation
12	Ecological management	6	Tourism plan and management
13	Supervision evaluation	6	Observation mechanism and evaluation policy

3.2 Analysis of appraisal result The general score of each natural reserve is obtained through appraisal of each indicator. 231 national natural reserves are applied for the study of the effective

management. Model 9 is not assessed because of few samples. (Table 3)

Table 3 Scores based on different evaluation factors of each mode in national natural reserve

Mode	Plan	Ownership	Management system	Management team	Management policy	Facility	Resources	Scientific research and monitoring	Publication	Fees	Coordination	Ecological management	Evaluation
Mean	8.5	2.6	10.2	7.5	9.9	4.7	10.7	7.3	2.6	4.6	9.6	2.1	2.2
1	8.4	2.6	10.7	7.6	9.9	4.8	10.7	7.3	2.7	4.7	9.7	2.2	2.4
2	8.7	2.7	11.3	8.3	10.7	5.0	11.0	7.3	3.0	5.7	8.7	2.3	2.3
3	8.5	2.7	10.2	7.6	9.8	4.7	10.6	7.1	2.5	4.7	9.9	2.0	2.3
4	8.6	2.1	10.8	8.2	10.0	5.2	10.7	8.0	2.8	5.0	9.7	1.8	2.2
5	8.2	2.5	9.7	6.9	9.4	4.3	10.2	6.7	2.4	4.3	8.8	1.9	1.8
6	8.5	2.5	9.8	7.3	10.2	4.6	10.8	7.1	2.4	4.6	9.6	2.0	2.2
7	8.8	2.9	10.8	7.9	10.5	5.5	11.3	8.1	2.8	4.3	10.4	2.4	2.7
8	6.5	3.0	9.0	6.0	10.5	4.0	10.5	5.5	2.0	3.5	7.0	2.0	2.0

Considering the evaluation result, following characteristics are shown.

(1) The general management of natural reserve is quite well and the mean value is 82.4. However, the management of natural reserve at different levels varied. The mean value of effective management in provincial natural reserve is 83.9. The mean value of regional management is 83.4 and the management at county level is 79.4. Compared with the provincial natural reserves, it is evident to see that the natural reserves at county level has low score in management system, management team, management facility, scientific research and monitoring, and ecological tourism management. The former four factors involve management background, while the later three factors are about management capacity, which is because the natural reserve is a public career requiring lots of attention, while the lower government can mobilize limited resources. (Fig. 1)

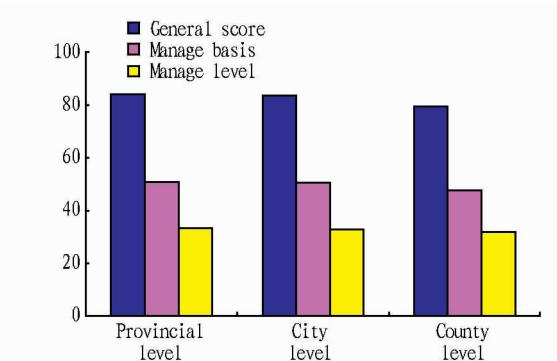


Fig. 1 Effective management of different management levels in national natural reserves

(2) The management effectiveness in natural reserves of different management modes varies. The effective management in natural reserves supervised by state forestry departments (Model

7) is the highest one, followed by provincial (Model 2) and municipal governments (Model 4). Although the evaluation score in natural reserves in state forestry department is high, it performs poorly in financial management, which is because that such natural reserve spends little money in protection management. Most natural reserves, managed by township or forestry department, have the lowest mark, while the ownership and other management modes are similar, which is compatible with the reality. (Fig. 2)

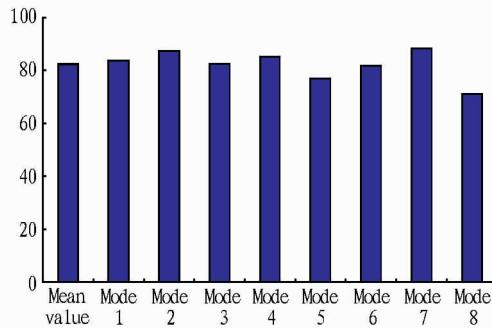


Fig. 2 The score of effective management of different management modes in national natural reserve

(3) In natural reserves of each level, the natural reserve, directly managed by government, performs better than other departments in aspects such as management foundation and management coordination capacity, but was worse in community coordination, ecological tourism management and supervision.

(4) Considering the evaluation factors, plan design, resource management and ownership have the highest score, 94, 89 and 87 respectively, while the expenditure management, ecological tourism management and supervision have the lowest score, 51, 69 and 74. Each mode shows similar changes, which is related to the general plan, feasibility study and project construction.

4 Discussions

Classification management is an essential part of the natural reserve in China. However, generally speaking, there are four levels of management, and the differences among each management mode are reflected clearly. In order to improve the effectiveness of natural reserve management, it is necessary to improve the management system of nature reserve. The best mode is to let government

directly set up management organization and ask the third party to supervise. This study only discusses the national natural reserves managed by forestry system. It is essential to include the regional nature reserve into study in future.

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