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Discussion on the changes of bird resources and eco-environment around nanwan reservoir area in recent years

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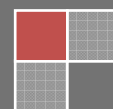
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ABSTRACT

In recent years there are some problems with the development of bird resources and ecological environment in Nanwan reservoir area, resulting in damages to bird resources and ecological environment to some extent. To start with, this study reviews and explores the species composition and protection of birds, makes a factual investigation of the species composition of birds, and shows the changes in recent years of the bird resources around Nanwan reservoir area through comparative study of the related documents. Then an valid statics is achieved through residential types fauna analysis, in order to summarize the actual existence and condition of the original of birds in the area, and show the impact bird resources has suffered by comparison of the statics. In the end, the study explores the current situation of growth and damages of the vegetation within the area, analyzes the causes in detail, proposes the corresponding suggestions on the restoration of vegetation based on the causes, and thus intends to realize the ultimate aim of continuous development of bird resources within Nanwan reservoir area.

KEYWORDS

Nanwan reservoir area; Bird resources; Ecological environment; Changes; Investigation.



INTRODUCTION

Theoretically, bird resources and vegetation conditions can reflect the status of regional eco-environmental conservation and development. However, in the factual investigation, this status isn't reflected despite the abundant bird resources and vegetation types in Nanwan reservoir area. This study based on species composition and protect birds, residence and floristic analyses, bird diversity and distribution in the South Bay area, area plant resource and vegetation characteristics, the theoretical basis of forest vegetation restoration in the South Bay area for research and exploration, thus effectively reflected in recent years in the South Bay area bird resources and ecological environment changes of circumstances.

SPECIES COMPOSITION AND PROTECTED SPECIES OF BIRDS

According to the birds investigation in Nanwan reservoir area, there are 251 species recorded here, belonging to 54 families and 18 orders. This figure accounts for 18.6% of the total amount of birds nationally, and 45.8% provincially in Henan. And Passeriformes tops the list for its large number^[1]. Apart from these two orders, the other 16 orders occupy 35.46% of the total number of birds in the area. In terms of total number of individuals, there are 5 orders with population of more than 1000, and 10 orders with population from 500 to 1000.

According to the investigation and statistics of the total number of birds in Nanwan reservoir area, there are one species of the first-grade State protection and 22 species of the second-class State protection, and 24 species are enlisted as provincial key protection, which can be told from TABLE 1. However, there are up to 5 species belonging to endangered species. Based on the field visits and surveys on the composition of birds in Nanwan reservoir area, there draws a conclusion: it has a variety of species, but they are in urgent need of effective protection.

STATUS OF RESIDENTS AND FAUNA ANALYSIS

According to the investigation and statistics, the species of residents are large in number up to 123 species, occupying 49% of the total number. Migratory birds reach to 88 species, occupying 35.06% of the total number. And these two composes the main body of residence type birds in Nanwan reservoir area, while there are others such as passing migrant birds, summer birds and so on. To classify from faunal distribution level, the Oriental Bird has a large occupation^[2], with a number of over 130 species, occupying 51.79% of the total number. Then is Palearctic Bird with a number of 107 species, occupying 42.63% of the total number. These two, of a certain representation, are the main body of residents in fauna analysis. In investigation of the birds in different regions, the forest has the largest population of birds up to 164 species, occupying 65.34% of the total survey number according to the records. And number of birds in farmland and scrub region is second large amounting to 147 species, occupying 58.7% of the total survey number. From the view of bird biodiversity, forest areas and farmland shrub region have the largest percentage, which is clear in TABLE 1.

TABLE 1 : Comparison of bird resources in the four investigated areas

Region	Species	Overall bird quantity	Shannon index	Evenness index	Density
Forest	164	3017.83±545.44a	3.395±0.079b	0.431±0.017b	246.99±38.73a
Farmland and scrub	147	2242.33±641.43a	3.250±0.577b	0.437±0.018b	118.09±11.04a
City	116	1228.83±151.65a	3.008±0.080b	0.425±0.008b	142.68±12.97a
Wetland	105	4281.67±2135.03a	2407±0.241a	0.326±0.039a	894.88±545.04a

According to the features of fluctuations in the four quarters of 2006, the volatility among bird species was big in the first quarter and fourth-quarter of the year, involving 130 and 126 species respectively. The volatility was relatively small in the second quarter involving only 90 species. To rank months according to the volatility from high to low, the sequence is December, March, June and September. In December, the biodiversity and evenness were low with coefficients only up to 2.424, 0.501 respectively, and clearly there is a big gap between December with other months. TABLE 2 displays this clearly.

TABLE 2 : Seasonal distribution of biodiversity in the investigated area

Time (Month)	Species	Overall bird quantity	Biodiversity index	Evenness index
3	130	8183	3.587	0.737
6	90	4100	3.555	0.790
9	102	3343	3.637	0.786
12	126	19714	2.424	0.501

TABLE 4 : The main types of vegetation (associations) and its basic features

Type	Association Type	Distribution	Intensity of Anthropogenic Disturbance	Recovery and Development
Coniferous Forest	Cunninghamia forest	Artificial forest, low hill area, wide range	Single species, simple structure	Suitable for mixed forest of coniferous and broad-leaved timber
	Pinus massoniana	Mainly artificial forest, low hill area, wide range	Arbor, shrub and herb layers well arranged	Forest conservation, for renewal
	Pinus taiwanensis forest	Artificial forest, alpine region, strip	Arbor, shrub and herb layers well arranged	Forest conservation, for renewal
	Cryptomeria fortunei	Artificial forest, alpine region, strip	Simple structure	Suitable for mixed forest of coniferous and broad-leaved timber
	Taxodium distichum	Artificial forest, low hill area, strip	Simple structure	Suitable for mixed forest of coniferous and broad-leaved timber
	Slash pine, Loblolly pine	Artificial forest, low hill area, schistose	Simple structure	Mixed forest conversion
	Populus forest	Artificial forest, along the road and farmland	Arbor, shrub and herb layers well arranged	Appropriate protection for natural regeneration
Broad-leaved Forest	Sassafras tzumu	Artificial forest, low hill area, bar-like	Comparative serious degree of human disturbance	Main species for soil and water conservation
	Quercus acutissima Forest	Natural secondary forest, the widest distribution, bar-like	Comparative serious degree of human disturbance	Forest conservation, for renewal
	喜树林	Artificial forest, low hill area, scattered small block	Few shrub and herb under the woods	Mixed forest conversion
	Liriodendron chinense	Artificial forest, low hill area, sporadic block	General degree of human disturbance	Mixed forest conversion
	Ginkgo	Artificial forest, low hill area, sporadic block	Simple structure	Mixed forest conversion
	Liquidambar formosana	Natural secondary forest, the widest distribution, sporadic block	Comparative good renewal	Appropriate protection for natural regeneration
	Bamboo Forest	Phyllostachys pubescens	Artificial forest, wide distribution, patches	Artificial community
Phyllostachys bambusoides		Artificial forest, sporadic patches	General degree of human disturbance	Easy degradation, management should be strengthened
Lespedeza bicolor		Natural wild plants, the widest distribution, sporadic	Formed after the damages of the original vegetation	Appropriate artificial regeneration to restore the arbor group
Bush	Crataegus cuneata	Natural wild plants, the widest distribution, sporadic	Formed after the damages of the original vegetation, serious	Difficult for original vegetation restoration
	Rhododendron	Natural wild plants, dry, infertile soil and rock seams	Formed after the damages of the original vegetation, serious	Conservation and protection
Economic Forest	Tea	Artificial forest, large area, patches	Delicate management, severe soil and water erosion	Intercropping
	Chestnut	Mainly wild chestnut grafting, large area, patches	Extensive management	Improvement and intensive management
	Eucommia	Artificial forest, sporadic patches	Simple structure, extensive management	Mixed forest conversion

CHARACTERS OF BIRD DIVERSITY AND SPATIAL DISTRIBUTION IN NANWAN RESERVOIR AREA

Diversity of birds in nanwan reservoir area

According to China Bird Report, the total number of birds in Nanwan reservoir area reaches to 296 species. Based on the analysis of the recorded birds on the standards of photos and concepts manuals, by combination of related documents with the data in this investigation, the birds species actually has reached to 316. However, it can be told by the statistics that some species cannot be seen in Nanwan reservoir area due to the increasing difficulty of birds' reservations resulting from the accelerated process of urbanization. However, there is still a large part of the species are reserved, with a number of around 300. There is big difference in data of previous yearly investigations of birds in Nanwan reservoir area, and this phenomenon may be because the limited investigations of partial area cannot ensure valid records and statistics. So previous survey data is not complete, cannot reflect the current status of biological resources in Nanwan reservoir area fully. Since the fast development of the times left a negative impact on the nature, it is necessary to strengthen the survey in natural biological status of Nanwan reservoir area, and effective investigation of its birds. Though it is a heavy task, continuous efforts will be made to arouse great importance to this issue^[3].

Characteristics of spatial distribution of birds in nanwan reservoir area

The so-called bird diversity index refers to the effective statistics and process of the population of birds depending on the special difference, and the index represents the level of diversity. According to the index of diversity of birds in Nanwan reservoir area, the forest area has the highest diversity index, followed by farmland and shrub area. In terms of evenness, however, the ranking is totally inversed of these two areas. Regarding evenness index, the forest area ranks second. And the birds' biodiversity and evenness of the forest area is different with other regions. During this analysis, it is concluded that due to the pine trees and ponds in Nanwan reservoir area, this area is a natural habitat for some birds providing them adequate supplies, thus can attract more geese and ducks to live through winter. But such kinds of species are short in number, if there is a large amount, the biodiversity and evenness will be great.

PLANT RESOURCES AND VEGETATION FEATURES IN NANWAN RESERVOIR AREA

Plant resources

The area is located in the transition zone from south to north between subtropical zone and warm-temperate zone geographically. Therefore, the species of plants and floristic composition are complicated. In term of seed plants, there are more than 152 families, 565 species.

Vegetation features

Among the vegetation features, forest vegetation types hold the main position. And the features have been manifested in TABLE 4. In this area, forest vegetation is dominated by evergreen broad-leaved forest and coniferous forest, whose features are explained from the following four aspects:

(1) In this area, forest vegetation is large in quantity, with an occupation of nearly 50% of the total amount. And there are over 20 species belonging to this kind of vegetation, distributing at an altitude of range between 110m and 900m.

(2) Among the vegetation types, artificial vegetation is the main body of this area, and forest vegetation is mainly composed by economic forest and wood forest, mainly distributing at altitude lower than 600m, while artificial vegetation like Chinese fir distributes widely with a very large area cover^[4]. But according to these features, vegetation structure is relatively simple, and does not have a strong sense of stability, and less able to resist pests and diseases, thus leading to serious effects on production capacity.

(3) In this area, secondary forest occupies a relatively large number of these forest, such kind of forests are primarily formed by natural growth after cutting the original vegetation. Because of the complicated terrain for the growth, it is hard to be close to the secondary forest, which is growing in an adverse environment. However the scope of this forest grows relatively large, but the total area is not very big. Besides, the environment for the natural growth of vegetation after the felling of the original ones and the geological environment restrict the scope of the secondary forest to a certain extent. So these forests are generally in irregular shape, such as islands or patches.

(4) In the forest vegetation of this area, parts of State-level nature reserve forests are well protected, while others are damaged to a certain degree. In addition, many places within the area are planted with crops. Precisely because of the existence of this human disturbance, the growth of trees was impacted negatively to some extent, resulting the degradation of forest vegetation within the area.

ANALYSIS OF THE CAUSES OF ECOLOGICAL ENVIRONMENT PROBLEMS IN NANWAN RESERVOIR AREA

From a historical perspective, Nanwan reservoir area is an important region for economic activities historically, with a relatively intact agricultural base, and perfect forestry resources as well as operating base. However, with the completion of reservoir, the development of agriculture and forestry was hindered. The local economy was affected, which further aggravating the removal of the forest cover to serious degree. Thus the ecological environment has been severely damaged^[5].

Management system factor

Viewed from the condition of long-term development of this area, surroundings are closely related administrative units of villages and towns, while the dam around the reservoir is managed by Nanwan Zone, so there emerges difference in development strategy. The difference in administration system will cause efficient cooperation in management. Therefore, the phenomenon of deforestation is widespread, and the destruction of the ecological environment has gradually worsened. This is the main causes of major ecological problems of the Nanwan reservoir area, as well as an important breakthrough in reason changing the ecological environment.

Resource utilization and benefit distribution factors

The building of Nanwan reservoir has pushed the economic development of the surroundings. However, due to various reasons, during the operation process, the importance of ecological environment protection itself is ignored^[6], resulting serious damages to the surrounding environment, serious drain of resources, and in turn bad effects on the residents living around. There emerges the severe inharmonious of the ecological environment and economic development.

The regional natural conditions and economic and social development level among reservoirs in Xinyang City share similarities. And the above mentioned problems in Nanwan reservoir also happen to the other four reservoirs. The difference lies in degree and weight of effects. To see these problems clearly and the surface and deep causes will be helpful for a win-win long-term development mechanism in a continuous coordinate development of the area.

THEORETICAL BASE FOR RESTORATION OF VEGETATION IN NANWAN RESERVOIR AREA

Coupling theory of vegetation with climate and climatic changes or biology with environment

This theory is one of the important theories of the effective recovery of vegetation in Nanwan reservoir area. This theory is based on the foundation of factual environment. To construct the artificial communities effectively, and to collocate effectively based on the difference of environment at the same time, the own survival ability of vegetation will be better able to show, so that the climate can provide effective help in ecological landscape restoration. In this process, resources like water, air, light and others can be in effective use for the transformation of ability. Thus the auto production of vegetation communities will be enhanced^[7].

Ecological succession theory

This theory is an important theoretical idea for effective restoration of forest vegetation. In the whole process of ecological restoration, by altering the natural evolution process of vegetation, to make effective use of the reverse stress process of environmental factors on plant communities, vegetation will be reversed if the stress and intervention is lower than its maximum with a faster speed than ever. This theory has been applied and achieved significant effects.

Landscape ecology

Landscape ecology theory is one of the guiding theories in effective recovery of vegetation. The scientific and effective application of its patch-corridor-matrix theory will build a more complete forest vegetation ecosystem in Nanwan reservoir area. Based on this, a reasonable match among the vegetations is needed. Therefore, the fundamental purpose of maintaining the consistency of the landscape can be achieved.

CONCLUSION

This study researches and investigates the changes of bird resources and ecological environment in Nanwan reservoir area in recent years, focuses on species composition and the protected species of birds, its bird diversity and spatial distribution, and the theoretical basis of forest vegetation restoration, therefore, the changes can be explicitly shown. Besides, discussions have been made on valid measures for changes. It is hoped that this study can be helpful in further study for its solid theoretical foundation and data.

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