

# *Natural Ecological Protection and Construction Based on AI and Big Data*

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**Abstract:** People living in nature need to respect and protect nature in order to build a harmonious and green home. With the growth and progress of society, natural environment protection and ecological construction have become the issues of public concern, and the development of artificial intelligence (AI) and big data (BD) analysis technology has brought more possibilities to environmental protection. Based on this, this paper applied AI and BD analysis technology to the protection of natural environment. This paper first introduced the significance and current situation of natural resources protection and ecological environment construction, and then analyzed the application of AI and BD in environmental protection. Then, the countermeasures of natural environment protection and ecological environment construction were stated. Finally, the effect of natural protection environment and ecological construction was analyzed. It was concluded that after the adoption of AI and BD analysis technology, the pollution index of each nature reserve decreased, all lower than 6 points. The protection effect of each nature reserve has improved. The biomass of each nature reserve has been significantly improved after the adoption of AI and BD analysis technology compared with that before the adoption of AI and BD analysis technology. It can be learned that AI and BD analysis technology can be applied to the protection of natural environment and the construction of ecological environment in the future.

## **1. Introduction**

Environmental protection is a complex and changeable work, which needs to deal with different types of data across departments, regions and fields, making the solution of the problem more complex. The rapid development of the industrial era threatens the construction of the ecological

environment and the protection of natural resources. Pasture degradation and greenhouse effect are interrelated. Although efforts are being made to protect the environment, due to natural resources and environmental pollution, protection needs to be strengthened. Therefore, for the future development of society and the normal reproduction of human society, it is necessary to accelerate the methods of protecting natural resources and environment. It is most important to solve the contradiction between construction.

The protection of natural environment is a topic of widespread concern to the public, and some scholars have carried out research on this topic. Shahzad Tahir analyzed the attitude of the Pakistani people to the willingness to pay for environmental protection [1]. Sadowski Ryszard F discussed the religious and cultural principles of environmental protection [2]. Soyapi Caiphaz B studied the environmental protection of the Kenya Environment and Land Court [3]. Yildirim Julide analyzed the role of social capital in environmental protection [4]. Pan Dan analyzed the benefits and costs of sports environmental implementation from the evidence from China's central environmental protection supervision system [5]. Rozhnov Viatcheslav V revised the biodiversity of the large Arctic region as the basis for monitoring and protection under the conditions of positive economic development [6]. Abessa Denis analyzed that the systematic dismantling of Brazilian environmental law may cause losses in all aspects [7]. Research on natural protection of the environment is rarely combined with ecological construction.

AI and BD technology have also been applied in natural environment protection. Shneiderman Ben introduced human-oriented AI and analyzed its impact on the environment [8]. VoPham Trang analyzed the new trend of geospatial AI in environmental protection [9]. Kaplan, Andreas analyzed the challenges and opportunities of AI from the perspective of ecological protection [10]. Yaoteng Zhao analyzed the current situation of large-scale application of BD technology in green innovation of energy conservation and environmental protection enterprises [11]. No application combining AI with BD has been found.

In order to analyze the status of natural protection and improve the effect of ecological construction, this paper used AI and BD analysis technology to analyze the natural protection environment. Five natural reserves were selected for analysis, and the effects of natural protection environment and ecological construction were analyzed. Finally, after the adoption of AI and BD analysis technology, the environmental protection effect and ecological construction effect of each nature reserve have been improved. Compared with other people's experiments, this paper has combined AI with BD analysis technology.

## **2. Significance and Current Situation of Natural Resources Protection and Ecological Environment Construction**

### **2.1. Significance of Natural Resources Protection and Ecological Environment Construction**

The protection of natural resources and the creation of ecological environment are the main policies to be followed in the process of modernization [12-13]. However, recent development has focused on economic construction and neglected ecological protection.

### **2.2. Current Situation of Natural Resources Protection and Ecological Environment Construction**

#### **2.2.1. Lack of Scientific Understanding of Natural Resources and Ecological Environment Protection**

With the continuous development of economic level and the continuous improvement of people's

quality of life, people are more and more eager for nature. More and more people choose to approach nature, unintentionally causing damage to the forest system. On the one hand, household garbage, man-made pollution and destruction and man-made forest fire have caused irreparable damage to forest resources. Others believe that resources and the environment do not need production costs, and are more reckless in the free possession of resources, blind exploitation and even direct destruction of resources. On the other hand, in order to maximize economic benefits, many factories have increased industrial production, which has caused partial damage to the natural environment, polluted the ecological environment and damaged the normal use of forest resources in the Reserve. This requires raising awareness and control of environmental protection and increasing publicity to attract public attention [14]. At the same time, relevant departments and committees can strengthen supervision and sanctions and take seriously those who violate the protection rules.

### **2.2.2. Lack of Scientific Coordination Mechanism and Imperfect Laws for the Protection of Natural Resources and Ecological Environment**

Although the laws related to environmental and resource protection have mitigated the deterioration of environmental damage to some extent, some laws and regulations are too industry-oriented, leading to considerable gaps, overlaps and even conflicts in law enforcement. Scientific coordination and protection are to some extent impossible to implement [15]. For example, the Forest Law proposes a system to control forest degradation. However, the environmental impact on important forest resources has not been assessed and appropriate preventive measures have not been put forward. This has led to the unreasonable allocation of forest resources within the scope of the relevant natural resources allocation rules, and the abuse of forest resources to protect the relevant natural environment.

## **3. Application of AI and BD in Environmental Protection**

### **3.1. Status of Environmental Protection Data**

At present, environmental data resources mainly include soil monitoring, remote sensing and geographic information. The basic data of soil monitoring is mainly from the online environmental monitoring system. The development time varies from system to system, and the technical methods used are also different. Therefore, the different output formats make the data exchange and unified processing between different systems more difficult. Remote sensing data is mainly obtained through satellite and aerial remote sensing. Geoinformatics data collection technology mainly includes on-site data collection, including aerospace remote sensing data collection and digital map collection. At present, the integration of environmental data still depends on traditional information technology, and the application of BD is relatively one-way. To maximize the advantages of BD technology, it needs to be used to unify data storage and arrangement, and accordingly realize the advantages of BD technology. The data platform should be established to make the application and data sharing more efficient and convenient.

### **3.2. Application of BD in the Field of Environmental Protection**

With the rapid growth of modern science and technology, AI has attracted more and more attention and has been widely used in human daily life. AI technology is developed by analyzing the law of human intelligence activities, and has a high application in the field of control systems and modeling. In this technology, the application of BD technology can take advantage of the internal

laws of BD. By analyzing and summarizing data, transforming supplementary data into knowledge and insights, and then into BD, the technological progress of AI can be promoted. It is summarized in Figure 1.

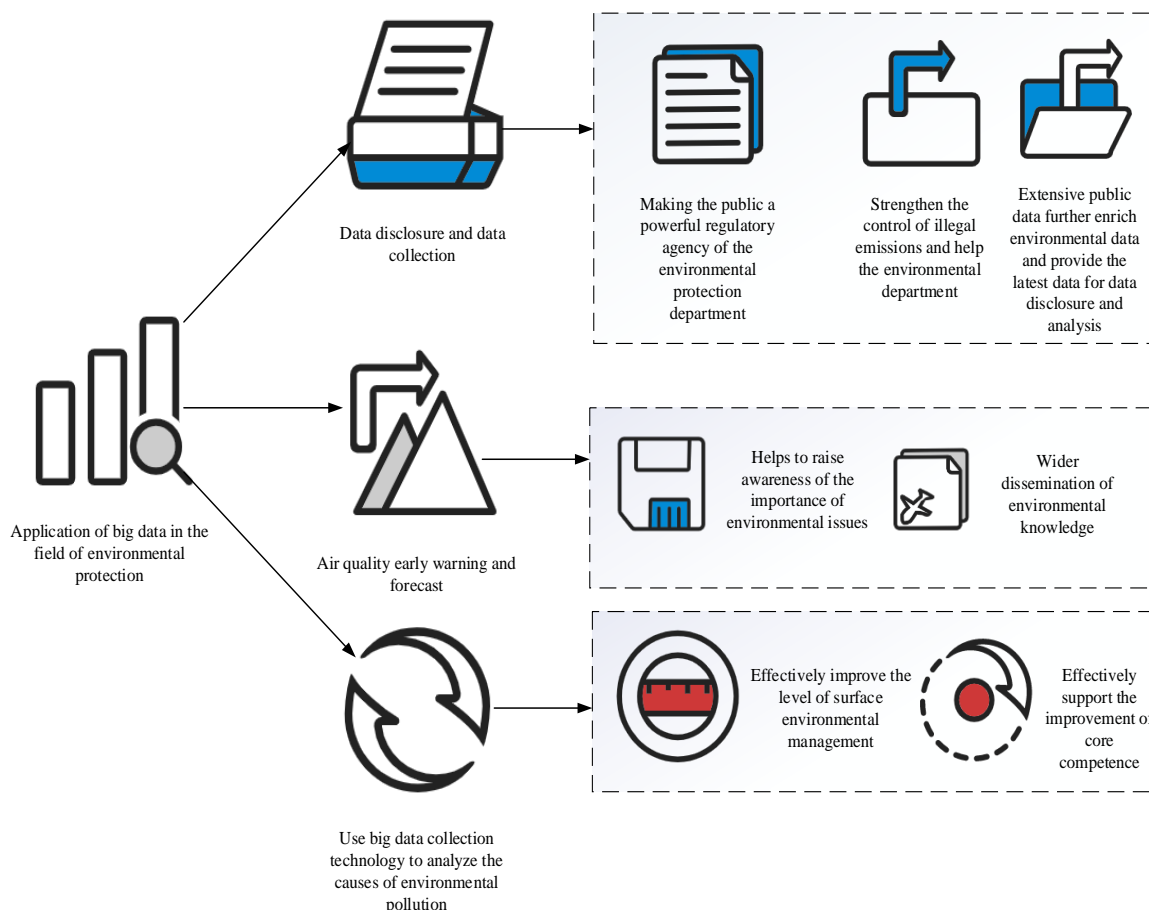


Figure 1. Application of BD in the field of environmental protection

### 3.2.1. Data Disclosure and Data Collection

Only by further improving the disclosure level of departments related to the environmental system can innovation in the field of BD application be promoted. The change of the attitude of the government and the promotion of data disclosure are crucial to promoting the development of BD. The government transmits data to all areas of life, and then collects, classifies, which plays a leading role in storage and analysis. If the analysis results are fully displayed to the public, data can be freely moved as production factors, thus gradually increasing added value throughout the process. At the same time, environmental management departments and environmental volunteers use advanced technologies such as the Internet and sensor networks. The collected data is easily transmitted to the data center, which indirectly makes the public a powerful regulatory agency of the environmental protection department, thus helping the environmental management department to strengthen the control of illegal emissions. Extensive public data can further enrich environmental data and provide the latest data for data disclosure and analysis.

### 3.2.2. Air Quality Early Warning and Forecast

Meteorological data, automatic air quality monitoring data and automatic pollution source

monitoring data shall be used for air quality early warning and prediction. At the same time, it is necessary to continue to explore the internal laws of the construction of ecological civilization, realize the interconnection of BD technology, and serve the long-term survival and development of mankind from a macro perspective. BD technology is used for air quality early warning and prediction, which helps to raise awareness of the importance of environmental issues and spread environmental knowledge more widely.

### 3.2.3. Causes of Environmental Pollution Analyzed by BD Collection Technology

Many things that cannot be quantified must be understood through one's mind. However, BD technology can help people better understand the world and predict the future. The use of BD technology can effectively improve the overall environmental management level and effectively support the improvement of core capabilities.

### 3.3. BD Algorithm

For "joint" operations, there is a measure called support. For set M, the following are supported:

$$\text{sup}(m) = \frac{|\{r_j | M \subset r_j, r_j \subset R\}|}{|R|} \quad (1)$$

Among them: R is all data, and  $r_j$  is the transaction of all transactions (that is, the original element set).

For the measurement of "enough credibility", there is a metric called confidence.

$$\text{conf}(C \rightarrow D) = \frac{\text{sup}(C \cup D)}{\text{sup}(C)} \quad (2)$$

The sample-based clustering algorithm applies the clustering algorithm to a single sample in the dataset, focusing on small data, and effectively reducing the time and space of clustering. It improves the cost efficiency of data processing and can be extended to the entire dataset. The sample size is mainly calculated according to the following formula:

$$C = d \times m + \frac{m}{m} \times \log\left(\frac{1}{\alpha}\right) + \frac{m}{m_j} \sqrt{\log\left(\left(\frac{1}{\alpha}\right)^2 + 2 \times d \times m \times \log\left(\frac{1}{\alpha}\right)\right)} \quad (3)$$

Among them, d is the proportion of the specified data, and m is the data rule.

## 4. Countermeasures for Natural Environment Protection and Ecological Environment Construction

With regard to the natural environment, it is urgent to strengthen the protection of natural resources and ecological construction. However, there is still a lot of work to be done, and it is not easy to solve the current problems. On the basis of the current social development process, the protection of natural resources and the environment needs to be accelerated. The harmonious development of human and nature is promoted in the following areas, which is summarized in Figure 2.

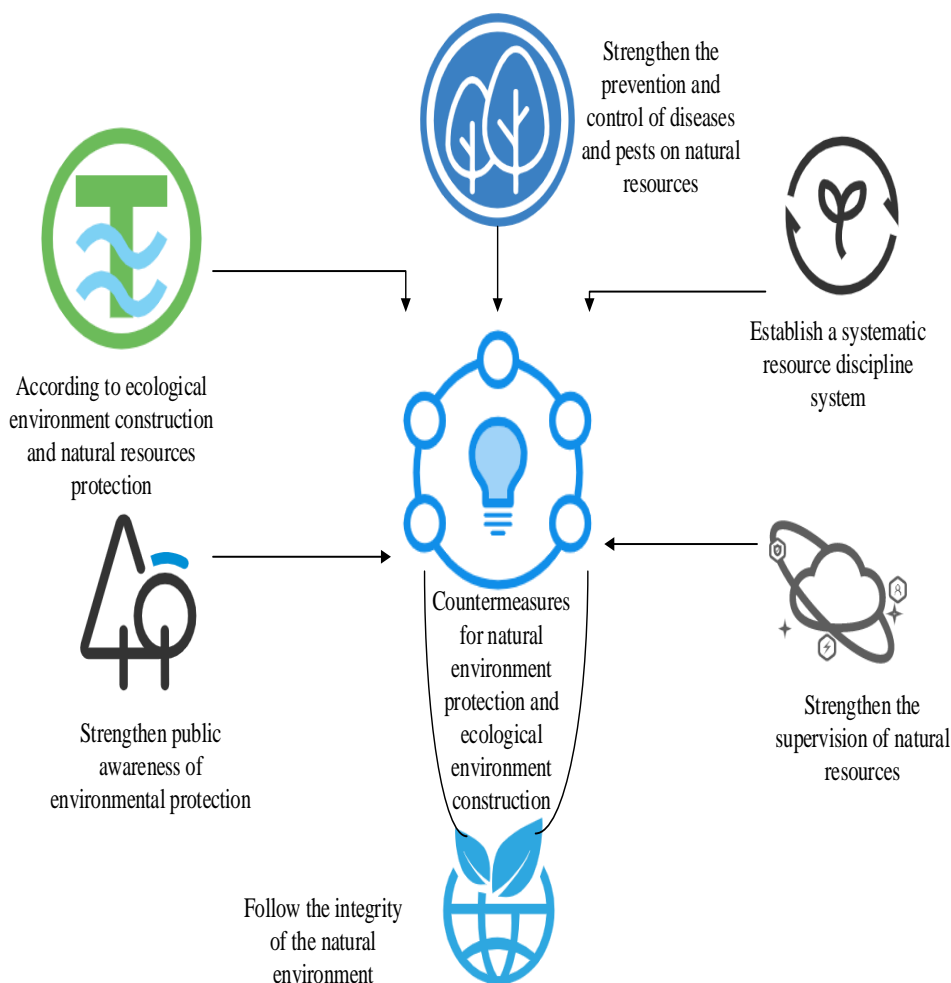


Figure 2. Countermeasures for natural environment protection and ecological environment construction

#### 4.1. Paying Attention to Ecological Environment Construction and Natural Resources Protection

In order to strengthen the protection of natural resources and the construction of the ecological environment, it is necessary to first attach importance to the construction of the ecological environment, and rationally use and protect natural resources. By raising awareness of environmental protection, all unqualified or prohibited factories that affect the development of environmental protection are thoroughly cleaned up to improve the level of modernization and standardization. In order to develop social production, it is necessary to maximize the use of energy-saving resources and avoid wasting natural resources.

#### 4.2. Strengthening Public Awareness of Environmental Protection

The public’ awareness of the protection of the environment and forest resources in the Reserve is improved, and the public’s full awareness of environmental protection changes the way of using natural resources. At the same time, it is necessary to continue to maintain a high level of environmental awareness in basic education, and pay special attention to early environmental education.

#### **4.3. Following the Integrity of the Natural Environment**

In fact, nature is vast. In the normal biosphere, water evaporation, precipitation, snowfall and other continuous ecological cycles can be carried out. However, the unusual human intervention hinders the natural circulation, brings problems to some parts of the natural environment, and causes natural and man-made disasters. For example, soil erosion and greenhouse effect mean that the natural geographical environment is composed of static and dynamic inorganic and organic natural substances and the energy of the earth's surface, which is characterized by geographical structure and controlled by natural laws. Human activities affect the natural geographical environment, which affects human activities.

#### **4.4. Strengthening the Supervision of Natural Resources**

In order to protect forest resources more effectively, the authorities can monitor forest resources and strengthen forest inspection. Several checkpoints are added to avoid further damage to forest resources. At the same time, tourists are trained to protect forest resources by themselves, and tourists are forbidden to carry some dangerous and flammable materials. This material should be strictly controlled to avoid forest fire. In addition, while making rational use of natural resources, enterprises should strengthen environmental protection and comprehensive pollution management, and integrate economic benefits and ecological environment of enterprises. This is sustainable, a necessary prerequisite for achieving sustainable development and a means to maintain productivity. In order to achieve sustainable socio-economic growth, the path of sustainable and coordinated development must be taken to avoid environmental degradation and damage to long-term economic development.

#### **4.5. Establishing a Systematic Resource Discipline System**

Because the natural environment is disturbed by human beings, many problems have been caused. The best way to protect natural resources is to establish a natural resources law system. Through the study of natural resources, the distribution and causes of natural resources are analyzed and systematized, so that researchers can better understand the actual situation of natural resources and the environment. In the past, the purpose of human activities was to develop resources. Today, through in-depth understanding of nature, fuzzy knowledge that causes unnecessary protection and resource destruction can be avoided. Researchers can more effectively protect natural resources and create ecological environment by using scientific means.

#### **4.6. Strengthening the Prevention and Control of Diseases and Pests on Natural Resources**

The spread of diseases and pests poses a serious threat to natural resources. The strengthening of control measures can greatly protect forest resources, ensure the healthy development of the forest system and fully coordinate the diversity of forest species. The management system has been strengthened to protect the forest resources from the impact of alien species, thus ensuring the sustainable development of natural resources and ecosystems.

### **5. Natural Protection Environment and Ecological Construction Effect**

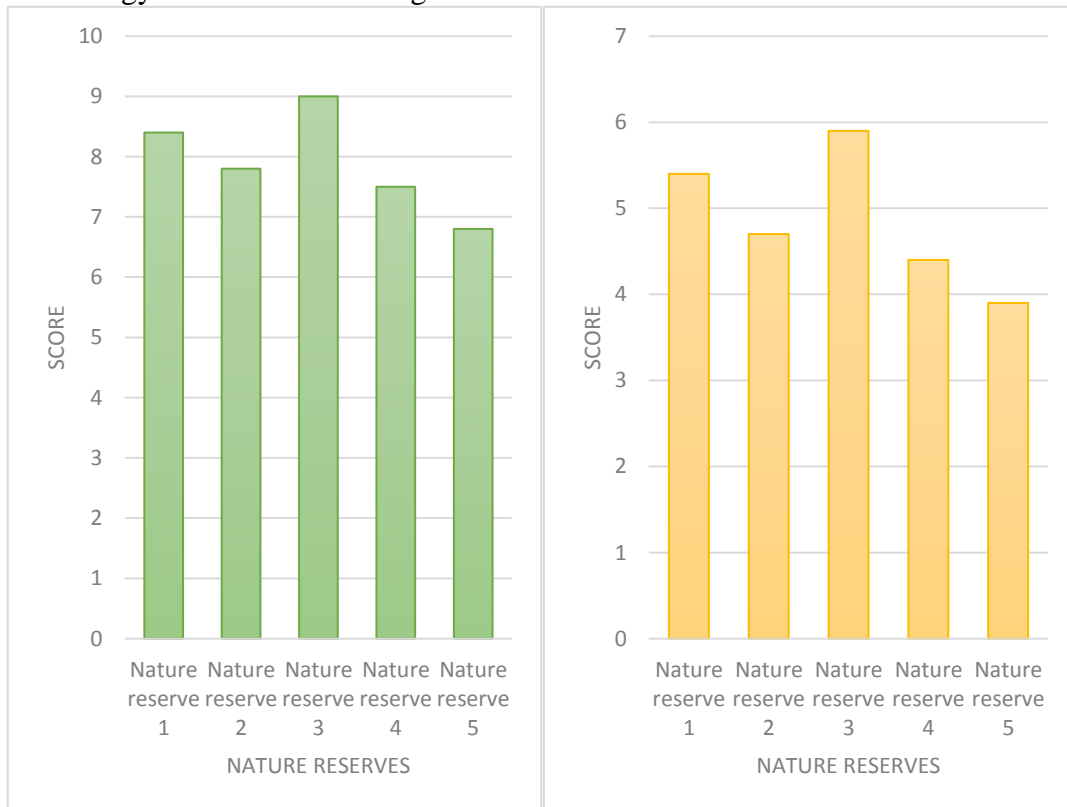
In order to analyze the application effect of AI and BD analysis technology in natural protection environment and ecological construction, this paper selected five natural reserves for investigation. The basic information of the selected nature reserves was recorded in Table 1.

Table 1. Basic information of respondents

Natural reserves	Type
Nature reserve 1	Forest ecology
Nature reserve 2	Inland wetland
Nature reserve 3	Marine coast
Nature reserve 4	Desert ecology
Nature reserve 5	Grassland meadow

### 5.1. Natural Environment Protection Effect

According to the analysis of the protection effect of the natural environment, this paper selected the pollution index as the index for investigation, with 10 points as the highest pollution score. The pollution index survey results of the nature reserve before and after the adoption of AI and BD analysis technology were recorded in Figure 3.



A. Survey results of pollution index of natural reserves before using AI and BD analysis

B. Survey results of pollution index of natural reserves after using AI and BD analysis

Figure 3. Investigation results of pollution index of natural reserves before and after using AI and BD analysis

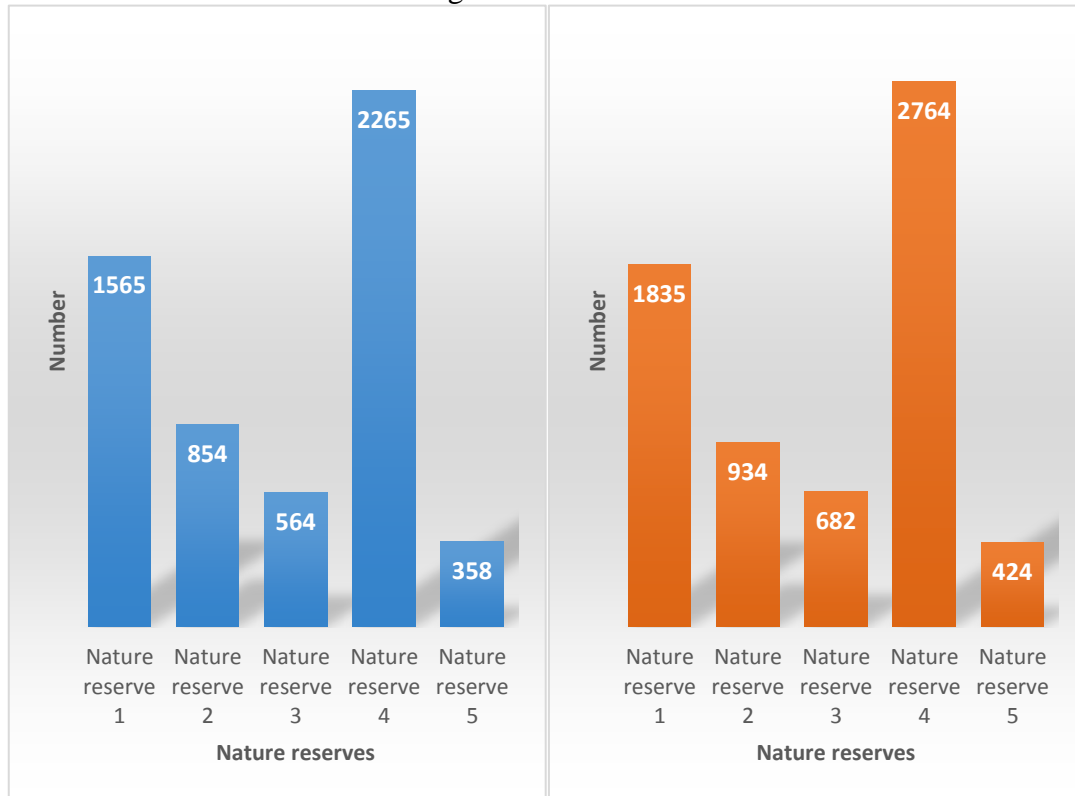
In Figure 3, A represents the pollution index survey results of the nature reserve before the adoption of AI and BD analysis technology, and B represents the pollution index survey results of the nature reserve after the adoption of AI and BD analysis technology. Before the adoption of AI and BD analysis technology, the pollution index of each nature reserve was at a high level, higher than 6 points. However, after the adoption of AI and BD analysis technology, the pollution index of



each nature reserve has declined, all lower than 6 points. The protection effect of each nature reserve has improved.

### 5.2. Ecological Construction Effect

The focus of ecological construction is to manage the natural resources in the ecological environment, mainly including the protection of biological resources. Accordingly, the effect of ecological construction was recorded in Figure 4.



A. Survey results of ecological construction of nature reserves before analysis of AI and BD

B. Survey results of ecological construction of nature reserves after analysis of AI and BD

Figure 4. Survey results of ecological construction of natural reserves before and after the analysis of AI and BD

In Figure 4, A represents the ecological construction survey results of the nature reserve before the adoption of AI and BD analysis technology, and B represents the ecological construction survey results of the nature reserve after the adoption of AI and BD analysis technology. Before the adoption of AI and BD analysis technology, the biological number of Nature Reserve 1 was 1565. The biological number of Nature Reserve 2 was 854, and the biological number of Nature Reserve 3 was 564. The biological number of Nature Reserve 4 was 2265, and the biological number of Nature Reserve 5 was 358. However, after the adoption of AI and BD analysis technology, the biological number of Nature Reserve 1 was 1835. The biological number of Nature Reserve 2 was 934, and the biological number of Nature Reserve 3 was 682. The biological number of Nature Reserve 4 was 2764, and the biological number of Nature Reserve 5 was 424, which was significantly higher than that before the adoption of AI and BD analysis technology. In general, the ecological construction effect of each nature reserve is good.

## 6. Conclusion

In order to improve the effect of natural protection and ecological construction, this paper applied AI and BD analysis technology to the construction of natural reserves. The effects of natural protection and ecological construction before and after the adoption of AI and BD analysis technology were analyzed, and conclusions were drawn. After the adoption of AI and BD analysis technology, the ecological construction effect and natural protection effect of each nature reserve have been improved compared with those before the adoption of AI and BD analysis technology. AI and BD analysis technology have obvious effects in natural protection.

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## Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

## Conflict of Interest

The author states that this article has no conflict of interest.

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