Index System Research on Environmental Impact Assessment of Ecological Project in Xishui River

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Abstract. The problems were analyzed about the environmental impact in the construction projects of water conservancy in China. Some relevant data and relevant guidelines were combined with the actual work which were referred to several environmental impact assessment reports. An index system was proposed about environmental impact assessment of ecological improvement project in Xishui River.

Keywords: Index system; Environmental quality; Environmental assessment.

1 Introduction

As an important part of water conservancy projects, river comprehensive management has always been valued by governments. River harnessing should not only meet the requirements of water conservancy and drainage, but also consider the requirements of comprehensive management such as the ecological environment protection of the project[1].

In 1969, the United States first proposed the concept and system of environmental impact assessment, and required that all water conservancy projects be subject to environmental impact assessment [2]. In 1984, China completed the "Water Environmental Impact Assessment Standards." At present, China's water conservancy projects have carried out different degrees of environmental impact assessment[3].

However, at present, the methodology for comprehensive evaluation of environmental impact assessment of water conservancy projects has not yet been established. Based on the environmental impact assessment method, this article closely combines with the actual project of the Xishui River Ecological Comprehensive Improvement Project, conducts research from many aspects of environmental impact assessment, and finally makes suggestions for the environmental impact assessment system.

2 Index structure

Based on the analysis of the EIA report, the EIA approval and the EIA expert opinions, and combined with the existing index system to form a preliminary indicator system. Then seek expert advice and get a indicator system.

| First-level indicators | Secondary indicators | Third-level indicators |
|------------------------|----------------------|-----------------------|
| Engineering Analysis   | Legal planning compliance | Policy compliance |
|                        | Reasonable location selection | Reasonable layout of the project |
|                        | Construction Environmental Impact Analysis | Reasonable site layout |
|                        |                                | Construction Wastewater Analysis |
|                        |                                | Construction waste analysis |
|                        |                                | Construction noise analysis |
|                        |                                | Construction Solid Waste Analysis |

Table 2.1 Structure of Engineering Analysis Indicators.

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Table 2.2 Status of Investigation Index Structure of Environmental Quality.

| First-level indicators | Secondary indicators | Third-level indicators |
|------------------------|----------------------|-----------------------|
| Environmental Quality Survey | Regional natural environment | Regional natural environment |
|                        | Water Environment Quality Status Monitoring | Pollution Source Investigation |
|                        | Ecological Environment Status Survey | The status of terrestrial ecology |
|                        | Air quality status monitoring | Environmental air quality status |
|                        | Acoustic quality monitoring | Acoustic environment quality |

Table 2.3 Environmental Impact Prediction and Analysis Index Structure Table.

| First-level indicators | Secondary indicators | Third-level indicators |
|------------------------|----------------------|-----------------------|
| Environmental Impact Prediction | Water impact prediction | Water environment change forecast |
|                        | Ecological environmental impact forecast | Terrestrial ecological impact prediction |
|                        | Aquarium ecological impact prediction |

Table 2.4 Main environmental protection measures indicators structure table.

| First-level indicators | Secondary indicators | Third-level indicators |
|------------------------|----------------------|-----------------------|
| Major Environmental Protection Measures | Water environmental protection measures | During construction |
|                        | During operation period |
|                        | Terrestrial ecological |
|                        | Aquarium ecological |
|                        | Atmospheric protection measures | Air pollution control measures |
|                        | Environmental protection measures | Noise prevention measures |
|                        | Solid waste prevention measures | Solid waste control measures |

3 Case study

3.1 Engineering analysis

3.1.1 Legal planning compliance

This project is subject to the encouragement of the "Industrial Structure Adjustment Guidance Catalogue (2011 edition)" (2013 Revision).

3.2 Survey of environmental quality

3.2.1 Survey of surface water quality

The table shows the results of surface water quality inspection in the project area.

Table 2.2-1 List of surface water environmental quality (unit: mg/L, pH dimensionless).

| Time | Section | Monitoring Project |
|------|---------|--------------------|
|      | pH | Permanganate index | SS | NH₃-N | Total phosphorus | Petro |
| Class III | 6~9 | 6 | 70 | 1.0 | 0.2 | 0.05 |
| 28-Nov  | 1# | 7.36 | 4.1 | 5 | 0.771 | 0.15 | 0.03 |
| Standard Index | 0.56 | 0.65 | 0.75 | 0.771 | 0.23 | 0.8 |
| 2# | 7.19 | 5.42 | 7 | 0.868 | 0.15 | 0.02 |
| Standard Index | 0.905 | 0.903 | 0.95 | 0.868 | 0.75 | 0.8 |
| 3# | 7.56 | 4.88 | 9 | 0.924 | 0.08 | 0.03 |
| Standard Index | 0.72 | 0.813 | 0.951 | 0.924 | 0.4 | 0.8 |
From the table, it can be seen that the water quality index of the Xishui River can meet the requirements of the Class III standard in Environmental Quality Standards for Surface Water (GB3838-2002).

### 3.2.2 Survey of air quality

#### Table 3.2-2 Air status assessment results

| Numbering | Monitoring points        | Project                  | Pollutants | Concentration range (mg/m³) | Standard value (mg/m³) | Maximum concentration of standard (%) | Standard conditions |
|-----------|--------------------------|--------------------------|------------|-----------------------------|------------------------|---------------------------------------|---------------------|
| 1#        | Xishui Runde Experimental School | Hourly average range | SO₂       | 0.015–0.064                 | 0.5                    | 6.60                                 | Qualified           |
|           |                          |                          | NO₂       | 0.019–0.138                 | 0.2                    | 18.10                                | Qualified           |
|           |                          | Daily average range      | SO₂       | 0.016–0.032                 | 0.15                   | 14.70                                | Qualified           |
|           |                          |                          | NO₂       | 0.017–0.024                 | 0.08                   | 28.75                                | Qualified           |
|           |                          |                          | PM₁₀      | 0.071–0.076                 | 0.15                   | 51                                    | Qualified           |
| 2#        | Confucian Temple         | Hourly average range     | SO₂       | 0.019–0.025                 | 0.5                    | 7.29                                 | Qualified           |
|           |                          |                          | NO₂       | 0.020–0.029                 | 0.2                    | 15                                    | Qualified           |
|           |                          | Daily average range      | SO₂       | 0.016–0.025                 | 0.15                   | 15.66                                | Qualified           |
|           |                          |                          | NO₂       | 0.020–0.023                 | 0.08                   | 27.75                                | Qualified           |
|           |                          |                          | PM₁₀      | 0.053–0.065                 | 0.15                   | 48                                    | Qualified           |
| 3#        | Railway Bridge           | Hourly average range     | SO₂       | 0.017–0.028                 | 0.5                    | 8.16                                 | Qualified           |
|           |                          |                          | NO₂       | 0.017–0.027                 | 0.2                    | 14                                    | Qualified           |
|           |                          | Daily average range      | SO₂       | 0.018–0.022                 | 0.15                   | 13.67                                | Qualified           |
|           |                          |                          | NO₂       | 0.020–0.023                 | 0.08                   | 27.50                                | Qualified           |
|           |                          |                          | PM₁₀      | 0.072–0.078                 | 0.15                   | 49                                    | Qualified           |

The air quality indicators of SO₂, NO₂, and PM₁₀ at each sensitive point meet the requirements of Class II standard of the Ambient Air Quality Standard (GB3095-2012).

### 3.2.3 Survey of ecological environment

The vegetation in the project area mainly belongs to the evergreen broad-leaved forest. Due to the long-term economic activities of human beings, the main types of land are farmland and bushes. There are no national protected animals in the range.

The main water in the assessment area is the Xishui River, and the fish are mainly common species.

### 3.3 Environmental impact prediction

#### 3.3.1 Prediction of water impact

The waste water mainly comes from the construction machinery and vehicle cleaning, it has a small impact on the surrounding environment.

#### 3.3.2 Prediction of ambient air impact

The power source for transport vehicles and work machines is diesel, and the main pollutants produced are CO, THC, and NOₓ. Due to its small amount of production, limited discharge time, it makes less impact on the surrounding environment. Finally, these effects will disappear with the completion of the project.

#### 3.3.3 Prediction of acoustic impact

The impact of this project on the acoustic is limited to the construction period. The noise equivalent sound pressure level of engineering equipment is about 77-90dB (A).

#### 3.3.4 Prediction of ecological environment

The impact of the project on the waters is mainly the suspended solids generated by river dredging during construction and the domestic sewage discharge of...
construction workers. If the domestic sewage of the construction workers is included in the existing domestic sewage treatment system, the ecological environment of the waters will not be affected.

During the construction period of this project, bare openings will be formed, which will damage the vegetation and cause damage to the ecological environment. Besides, construction workers and traffic activities will interfere with the ecological environment in the surrounding areas, we need to provide drainage ditch outside the excavation area and temporary road to prevent the surface runoff from scouring the site.

3.4 Major environmental protection measures

1) Covering the construction area, covering the temporary soil, and greening the exposed land.

2) Monitoring the atmosphere, water quality, noise, etc.

3) Add chemical agents to reduce the amount of pollutants in the water, and use it for surrounding greening after treatment.

4 Conclusion

Based on the research, some prospects for the environmental impact assessment of future water conservancy projects will be made:

1) Constructing an Environmental Impact Assessment Index Information System.

2) Improve the technical guidelines for environmental impact assessment.

3) Conduct post-evaluation of environmental impact of water conservancy and hydropower projects.

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