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Study on vegetation restoration technology in ecologically sensitive area of power transmission and transformation project in Sichuan-Chongqing area

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Abstract. In the rapid development of urban construction, China's power transmission and transformation engineering construction scope is more and more wide, in order to better cope with the opportunities and challenges proposed by the development of The Times, the National Grid Co., Ltd. technical research team in the proposed a number of key technologies at the same time, mastered a lot of theoretical knowledge and practical experience, which for the new period of ecological environmental protection laid the foundation. Especially for the Sichuan-Chongqing area, the vegetation restoration technology must be considered in the construction management of power transmission and transformation projects during the construction of ecologically sensitive areas, only in this way can the construction requirements of safe production and green environmental protection be met. On the basis of understanding the construction management requirements of power transmission and transformation projects in Sichuan-Chongqing area, and according to the construction status of ecologically sensitive areas during the construction period, I mainly study the construction identification system and construction evaluation system of projects in ecologically sensitive areas, and propose effective vegetation restoration technology according to the requirements of construction sites, so as to ensure the normal operation of power transmission and transformation projects in Sichuan-Chongqing area.

Keywords: Sichuan-Chongqing region; Power transmission and transformation projects; Ecologically sensitive area; Vegetation restoration; Evaluation system.

1. Introduction

According to the analysis of Ecological Impact in Technical Guidelines for Environmental Impact Assessment, ecological sensitive areas can be divided into two forms, one refers to special ecological sensitive areas and the other refers to important ecological sensitive areas. The former includes natural heritage sites, world cultures, nature reserves, etc., while the latter includes important wetlands, geoparks, forest parks, scenic spots and so on. According to the analysis of the Classified Management List of Construction Project Environmental Impact Assessment, the ecologically sensitive areas of power transmission and transformation projects refer to the areas within the ecological protection red line or other following areas: drinking water source protection areas, Marine special protection areas, natural heritage sites, scenic spots, nature reserves, etc. Nowadays, on the basis of understanding the construction management requirements of power transmission and transformation projects, scholars from all over the world have put forward research topics on the whole process integrated management of power transmission and transformation projects in ecologically sensitive areas, mainly by clarifying the main contents such

as project decision-making, design scheme, construction environmental protection, and key links, so as to fully implement the national requirements for environmental protection management of construction projects in ecologically sensitive areas. Form a unified integrated management standard for the whole process of power transmission and transformation projects in ecologically sensitive areas, and orderly guide the ecological protection management of power transmission and transformation projects in ecologically sensitive areas. For example, some scholars have proposed a study on the identification of factors influencing the construction of the Sichuan-Chongqing UHV project on ecologically sensitive areas. [1-6]By investigating the structure, types and functions of ecologically sensitive areas, as well as the corresponding national control and protection policies, the key and difficult points of ecological environmental protection, their potential impact degree and the red line of ecological regulation have been analyzed. Aiming at the problem of engineering disturbance of ecological environment, the new environmental damage potential in the region is analyzed. Vectorized ecologically sensitive area. Some scholars put forward the research on ecological environment protection and soil erosion prevention technology in the ecologically sensitive areas of Sichuan-Chongqing UHV project. Based on the identification results of influencing factors and combined with the monitoring requirements of natural resources in the sensitive areas, a targeted environmental water conservation monitoring scheme was proposed. Combining the original resource endowment conditions, ecological protection objectives, construction disturbance factors and soil erosion problems around the disturbance points of the crossing section, the ecological environmental protection and soil erosion prevention measures for the ecologically sensitive areas of the project are studied. Some scholars also put forward the research on the standard system of environmental protection and soil and water conservation measures in the ecologically sensitive areas of Sichuan-Chongqing UHV project, combined with the potential impact degree and potential protection demand of ecological factors and the key monitoring objects of environmental protection, combined with the construction characteristics of the project, and the corresponding comprehensive technology research results of ecological environmental protection and soil and water loss prevention. To explore the optimal implementation path of environmental protection measures for UHV construction matching the national ecological environment protection management measures system in ecologically sensitive areas under the new situation, and the synchronous standard system of environmental protection measures for each phase of project construction.

After understanding the requirements of social residents and economic development on power demand, this paper deeply discusses the technical means of vegetation restoration in the ecologically sensitive areas of power transmission and transformation projects in Sichuan and Chongqing area during construction, so as to reduce man-made soil and water loss caused by construction management and lay a foundation for realizing the goal of constructing environmentally friendly and resource-saving power transmission lines.[7-9]

2. Method

2.1 Area Identification

In view of the existing problems in the identification technology of environmentally sensitive areas in power transmission and transformation engineering, some scholars put forward a GIS based geographic information system for environmentally sensitive areas in power transmission and transformation engineering. The specific structure is shown as follows:

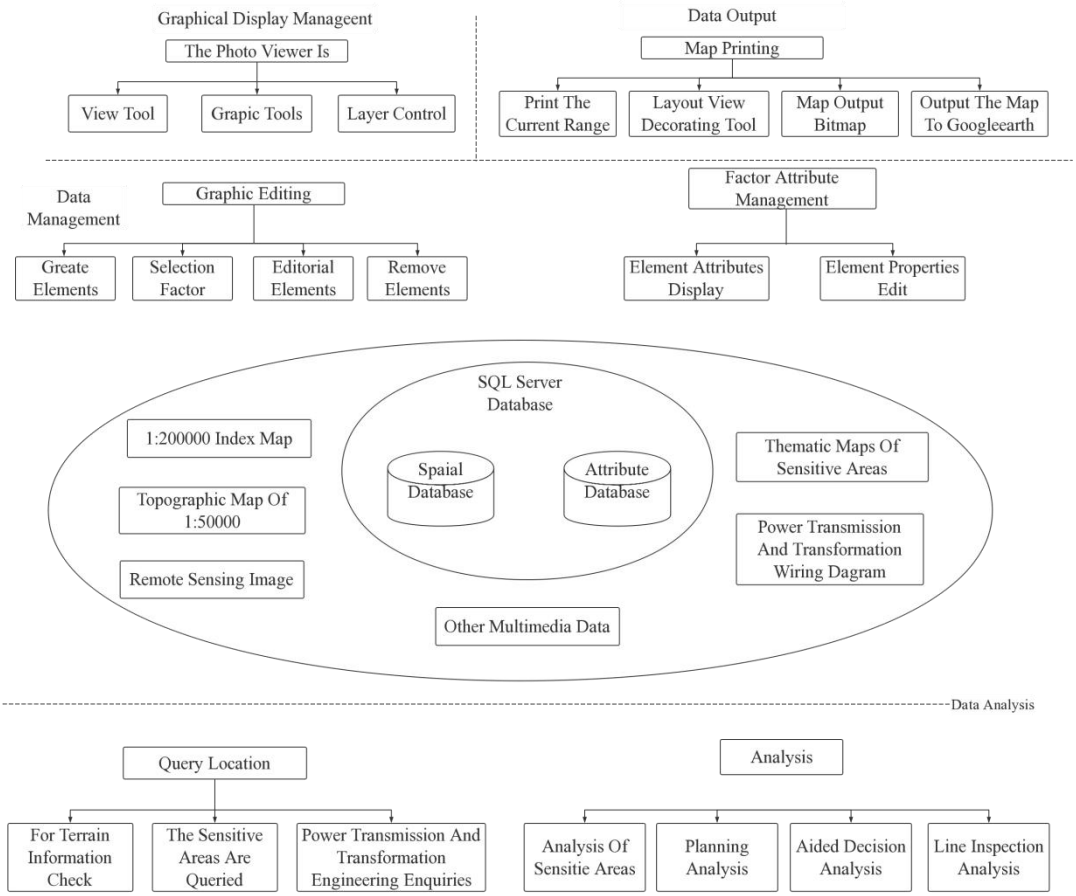

Figure 1 Architecture diagram of the system

According to the above analysis, it can be seen that C/S mode is mainly used for development and design, distributed architecture is selected for functional analysis, and it is finally divided into database layer and client layer, and attribute database and spatial database can be established in the database layer. This system architecture is mainly used to meet the environmental risk control requirements of power transmission and transformation engineering. On the one hand, it can grasp the geographical location information of various sensitive areas and project paths, etc. On the other hand, it can add new functions such as auxiliary decision-making, project management and sensitive area analysis on the basis of traditional data input, graph management and information query function modules. It provides an effective tool for accurately identifying ecologically sensitive areas. At the same time, in order to better classify the sensitive areas of ecological environment, it is necessary to establish a separate sub-database inside the system and set the corresponding layers in the system, so as to facilitate the staff to further divide the information in the natural ecological reserves into different categories. From the perspective of the construction management of power transmission and transformation projects in Sichuan and Chongqing region, the identification of ecologically sensitive areas is closely related to the specific construction projects. In order to truly realize the automatic identification goal, data must be provided to increase or decrease tools, which are usually divided into multiple layers according to voltage level. The actual identification process is shown in the figure below:[10-13]

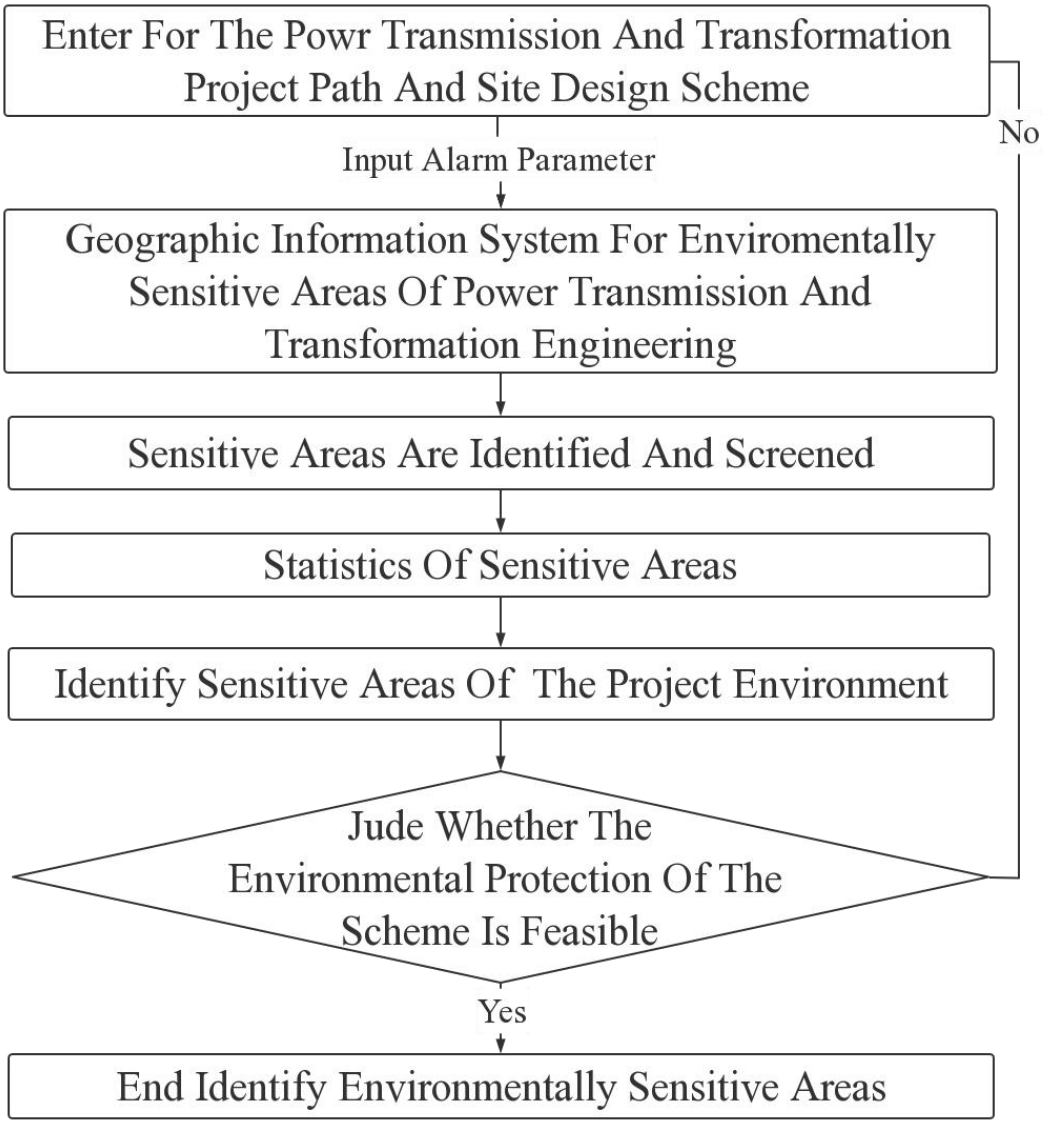

FIG. 2 Flowchart of identification of ecologically sensitive areas

According to the analysis of the above flow chart, it can be seen that it is mainly divided into the following steps: First, obtain the location coordinates of the high tower and substation of the transmission and transformation line, input them into the geographic information system of the ecological environment sensitive area of the transmission and transformation project, and obtain the geographical wiring diagram through automatic calculation; Secondly, the negative value of boundary attributes and alarm distance of sensitive areas are scientifically set, which belong to the boundary contour of sensitive areas and the center line of corridors. The staff can directly use the keyboard to input them into the attribute database, so as to lay the foundation for subsequent data analysis and engineering evaluation. Third, after completing the above two operations, topological technology, spatial index and spatial query module should be used to grasp the marginal attribute information of the ecologically sensitive area, determine whether the boundary contour of the sensitive area overlaps with the buffer area, and then use different colors to present basic information such as contour, name and geographical location to complete the identification and analysis of the sensitive area. Fourthly, according to the identification results of the spatial database, which lies in the attribute database, after establishing a good connection, the relevant information is exported to the table to obtain the statistical analysis report of the ecological environmental risk of

the project, which includes the name, category and layer of the ecologically sensitive area of the project construction. Fifth, the sensitive areas in the above-mentioned statistical reports are transformed into potential environmental risk sources required for project construction management. The distance between various sensitive areas and the project is less than the alarm parameter, which is the environmental risk source, which is mainly used to judge whether the project design scheme is environmentally friendly.[14-15]

2.2 Evaluation system

According to the construction management requirements of power transmission and transformation projects, expert scoring and analytic hierarchy process are selected to re-weight the selected evaluation indicators, and finally build the quality evaluation system as shown in Table 1 below:

Table 1 Quality evaluation system of project construction management

Target layer	score	System layer	Variable layer	score
Quality evaluation system of vegetation restoration and ecological construction for engineering soil and water conservation	0.66	Ecological evaluation unit of soil and water conservation	0.17	68%
				6
				74.00%
				8
				20.5
				70%
				3
		Ecological evaluation unit of landscape construction	0.28	83%
				9
				82%
				6.5
				40.5
				90%
				4.5
		Functional guarantee ecological evaluation unit	0.21	75%
				7
				77%
				7
				40.5
				81%
				7

Through the standardization of the above evaluation indicators, the treated indicators are weighted linearly according to the corresponding weights, and finally the comprehensive evaluation value can be obtained. In order to ensure that the obtained value is more intuitive and effective, the

calculated comprehensive evaluation value is ×100, and then divided into five levels, as shown in Table 2 below:

Table 2 Quality evaluation grade table

grade	excellent	good	middle	be poor	Extreme difference
Value range	＞75	75-55	55-40	40-20	＜20

3. Result analysis

3.1 Case Analysis

Taking a power transmission and transformation project in Sichuan and Chongqing area as an example, this paper applies the identification system and evaluation system proposed in the above research to propose an effective project construction scheme after selecting a suitable project construction site, and then comprehensively analyzes soil and water conservation, vegetation restoration and ecological construction measures. The final analysis results are shown in Table 3 below:

Table 3 Results of case evaluation

Target layer	System layer	weight	Variable layer	weight
Quality evaluation system of vegetation restoration and ecological construction for engineering soil and water conservation	Ecological evaluation unit of soil and water conservation	0.33	Ecological compensation rate 1	0.09
			Species richness 2	0.15
			Coverage 3	0.21
			Comprehensive resistance 4	0.9
			Interception flow 5	0.32
			Vegetation restoration rate 6	0.09
			Landscape beauty 7	0.05
	Ecological evaluation unit of landscape construction	0.33	Ecological compensation rate 1	0.12
			Species richness 2	0.13
			Coverage 3	0.09
			Comprehensive resistance 4	0.05
			Interception flow 5	0.05
			Vegetation restoration rate 6	0.21
			Landscape beauty 7	0.35
	Functional guarantee ecological evaluation unit	0.33	Ecological compensation rate 1	0.09
			Species richness 2	0.06
			Coverage 3	0.19
			Comprehensive resistance 4	0.24
			Interception flow 5	0.31
			Vegetation restoration rate 6	0.08
			Landscape beauty 7	0.03

3.2 Plant restoration techniques

According to the dual requirements of the existing evaluation system and ecological environment supervision, the construction management of power transmission and transformation projects in Sichuan and Chongqing region began to comprehensively consider the identification of ecologically sensitive areas and vegetation restoration technology, with the purpose of solving the ecological problems arising from traditional engineering construction, reducing the damage to vegetation, animals, natural landscape and other ecological elements, and promoting the long-term development of power transmission and transformation projects. Therefore, the following work should be done during the project construction management:

First, hydraulic spray seeding. According to the implementation of highway greening technology, in the late stage of the construction of power transmission and transformation project, in the treatment of slow grass, we can choose hydraulic spray grass planting measures to implement effective greening. This method will be adhesive, water retention agent, wood fiber, grass seed and fertilizer and water mixed together, the use of professional hydraulic spraying machine directly sprayed to the predetermined area, is a very efficient green technology means. From the perspective of practical application, this technology has the characteristics of high construction efficiency, fast product speed and high mechanization level.

Second, afforestation with large seedlings in the native soil. According to the restoration technology of sparse vegetation area caused by mining, when dealing with sparse vegetation problem caused by stretch field, temporary road and excavation of foundation, etc., the method of afforestation with guest soil can be chosen to restore ecological stability. The staff needs to plant native flowers and shrubs on the slope of partially exposed areas with guest soil to improve the vegetation coverage rate of the project construction area.

Third, the soil is silted and the seeds sown. If there is less soil on the surface of the slag platform, the dredging soil can be spread on the surface to effectively improve the residue, and then plant mixed seeds can be sown to orderly restore the ecosystem.

Fourth, other technologies. According to the job restoration measures of other development and construction projects, when treating areas with too high or too low pH value, an appropriate amount of chemical materials can be added to help improve the soil and ensure that it meets the needs of plant growth, so as to improve the level of soil and water conservation of project construction. At the same time, polymeric polyacrylamide can also be regarded as a coagulant to enhance the survival rate of soil and facilitate plants to obtain more nutrients. From the experimental point of view, polyacrylamide can optimize soil structure, increase soil water content, reduce surface runoff, and ensure that the local construction soil has corrosion resistance and water resistance.

Conclusion

To sum up, after the depth of research on soil and water conservation technology of power transmission and transformation projects in China has increased, the problem of soil and water loss caused by traditional power transmission and transformation projects has been paid more and more attention, and the ecological and environmental protection awareness of social residents has become higher and higher, and the concept of how to build environmentally friendly and environmentally friendly power transmission lines has become the main issue for comprehensive discussion of power transmission and transformation projects and enterprises. According to the accumulated experience in the construction of power transmission and transformation projects in Sichuan and

Chongqing area, the use of advanced technologies to accurately identify ecologically sensitive areas and propose effective soil and water conservation technologies and vegetation restoration technologies during the project construction can not only ensure the orderly construction of the project, but also reduce the impact of engineering design and construction on the ecological environment and actively improve the effect of soil and water conservation. Reasonable use of advanced technology and auxiliary measures to provide sufficient electric energy for social residents. Therefore, in the future, China's power transmission and transformation engineering industry should pay attention to ecological environmental protection, soil and water conservation and vegetation restoration and other important technologies at the same time, increase the training of professional and technical personnel, gradually change the traditional project construction system, and pay attention to fundamentally achieve sustainable development goals.

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