The optimization model of soil and water conservation ecological construction for power transmission and transformation projects in ecologically sensitive areas in Sichuan and Chongqing area in the new era is analyzed

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Abstract. In the construction and development of modern society, the overall characteristics of soil and water conservation ecological construction are not only reflected in the coordination of biological measures and engineering measures, but also in the sustainable development of economy and technology, which is the fundamental demand of the comprehensive treatment and optimization model of soil and water conservation for power transformation projects in ecologically sensitive areas of Sichuan and Chongqing in the new era. Therefore, after understanding the development requirements of ecological sensitive areas in Sichuan-Chongqing area, this paper mainly studies the optimization model of ecological construction of soil and water conservation according to the construction management content of power transmission and transformation projects, so as to provide technical support for urban construction and development in the new era.

Keywords: Sichuan-Chongqing region; Ecologically sensitive area; Power transmission and transformation projects, soil and water conservation; Ecological construction.

1. Introduction

In the traditional sense, the concept of development of soil and water conservation pays more attention to how to develop rapidly and how to obtain more economic benefits, while in the new era, the ecological construction of soil and water conservation pays more attention to the relationship between human and nature, and how to obtain economic benefits on the basis of protecting ecological and environmental protection. Both development goals and countermeasures are more clear. Therefore, after understanding the construction requirements of power transmission and transformation projects in ecologically sensitive areas in Sichuan and Chongqing region, it is necessary to fully implement the strategy of sustainable development of soil and water conservation, improve the local ecological environment through overall planning, ensure the coordinated operation of social economy and ecological environment, and fully implement effective channels in line with the ecological construction of soil and water conservation in the region. For the

ecologically sensitive areas in Sichuan and Chongqing area, soil and water loss is the main cause of local poverty, and the fragile ecological environment will directly affect the development of national economy and the production and life of social residents, so in recent years, Chinese government departments began to attach great importance to soil and water conservation. Since the ecological construction of soil and water conservation involves multiple departments and disciplines, it is necessary to comprehensively investigate the current situation of soil and water resources in the region during the implementation period, and to prepare the work strictly in accordance with the national ecological construction plan proposed by China, such as ecological restoration, guiding construction, construction planning, etc., actively learn advanced experience at home and abroad, and on the basis of following the laws of nature and economy. Rational use of modern science and technology, fully implement the ecological system protection work and soil and water conservation technology means in the region.[1-6]

In constructing power transmission and transformation projects in ecologically sensitive areas of Sichuan and Chongqing area, we should not only consider the local economic construction needs, but also comprehensively analyze the impact of engineering construction and operation on the ecosystem. Nowadays, in order to reduce the impact of power transmission and transformation projects on the ecological environment, scholars from various countries propose to select suitable site selection methods according to the regional characteristics of the region in which they are located, rationally use modern science and technology to identify ecological protection red lines, formulate scientific site selection plans for power transmission and transformation projects while scientifically dividing environmentally sensitive areas, and finally formulate standardized and effective project construction systems. Under the development trend of economic globalization, in the face of increasingly fierce competition in the market environment, the construction speed of China's over-voltage power grid and extra-voltage power grid is getting faster and faster, and the power transmission and transformation project is facing more and more pressure on environmental protection. Although the State grid enterprise has put forward the goal of environment-friendly and resource-saving construction, and put forward high standards and high requirements for the power grid environmental protection work, how to accurately identify the engineering environmental risk is still the focus of attention. From the perspective of power transmission and transformation construction, its impact on the ecologically sensitive areas in Sichuan and Chongqing area is mainly reflected in three aspects: first, ecological function. Since the construction and operation of power transmission and transformation projects need to occupy a large amount of land area, the original ecosystem structure will change, affecting the local spatial distribution, energy flow, species migration, etc. If no effective treatment measures are proposed, it is difficult to ensure the stability of the local ecosystem. Second, protect species. Most of the animals and plants in the ecologically sensitive areas of Sichuan and Chongqing are rare and endangered species. If they are disturbed by the construction for a long time, the local animal and plant populations will gradually shrink. For wetland biological system, waste water and other pollutants generated during construction will directly affect the local ecological environment, resulting in a large number of suspended substances in the water body. Birds have good eyesight and can quickly find obstacles and avoid them in time, but the transmission line will affect the migration and distribution of local birds. Especially in the construction of transmission lines on bird migration channels, it is easy to appear bird strike phenomenon; Finally, when implementing tower crane construction in power transmission and transformation project construction, it is necessary to excavate the original land, change the original land type and surface vegetation, and cut the original natural ecological

landscape to a certain extent. At the same time, transmission lines are constructed to form a line channel, affecting the overall effect of the local natural landscape and destroying the connectivity and integrity of the original ecosystem. Therefore, this paper mainly studies the optimization model of soil and water conservation ecological construction of power transmission and transformation projects in ecologically sensitive areas in Sichuan and Chongqing area in the new era.[7-9]

2. Method

2.1 Area Identification

Before the planning and construction of power transmission and transformation project, it is necessary to use geographic information system to accurately identify environmental sensitive areas. Due to the many problems in traditional area identification, such as heavy workload, long cycle, slow construction schedule and large personnel consumption, some scholars proposed to use GIS to build an environmentally sensitive area identification system for power transmission and transformation projects. The specific architecture is shown in FIG. 1 below:

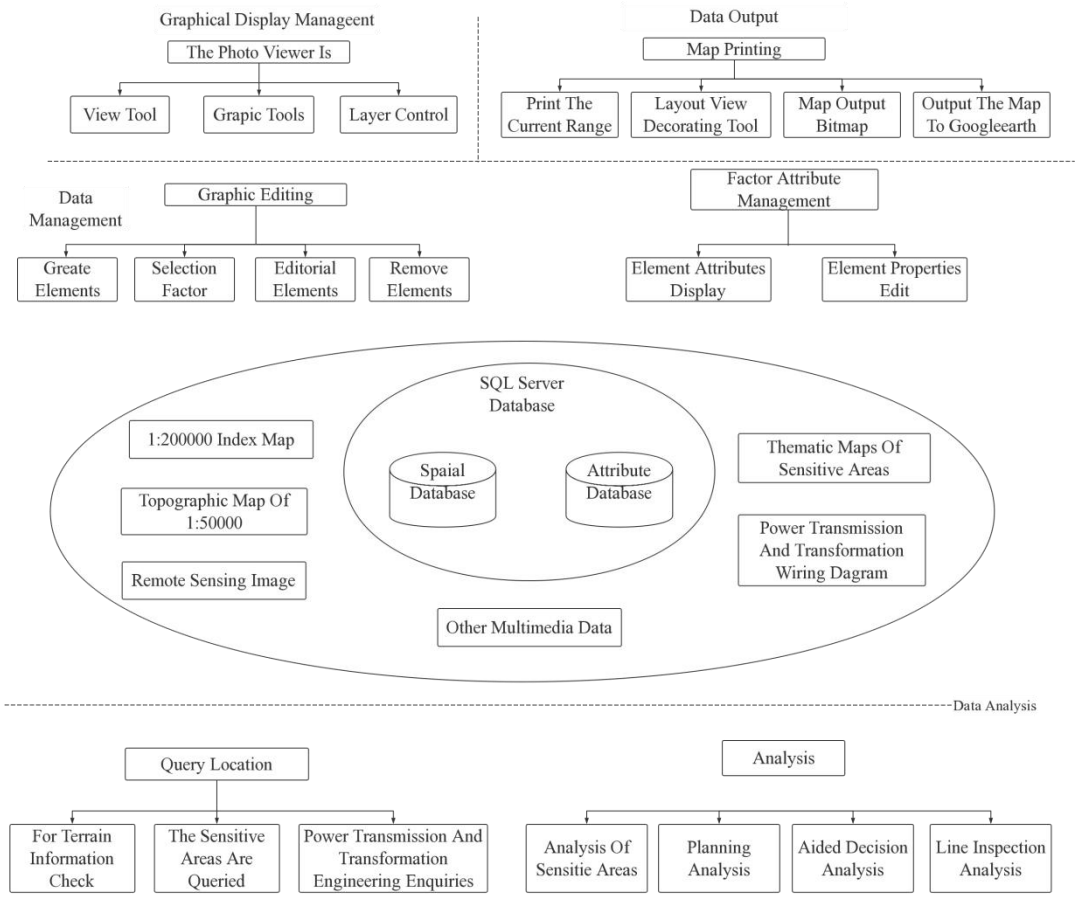

FIG. 1 System architecture diagram

Based on the above analysis, it can be seen that the overall system is developed and designed using C/S mode and chooses distributed architecture to form a system, which is mainly divided into database and client, in which the database will build spatial database and attribute database. From the perspective of system operation, the functional design and development of the system add sensitive area analysis, auxiliary decision analysis, project management and other modules on the basis of the original modules, which can facilitate the construction units and power enterprises to

accurately identify the ecologically sensitive areas in Sichuan and Chongqing region. The specific process is shown in FIG. 2 below:[10-13]

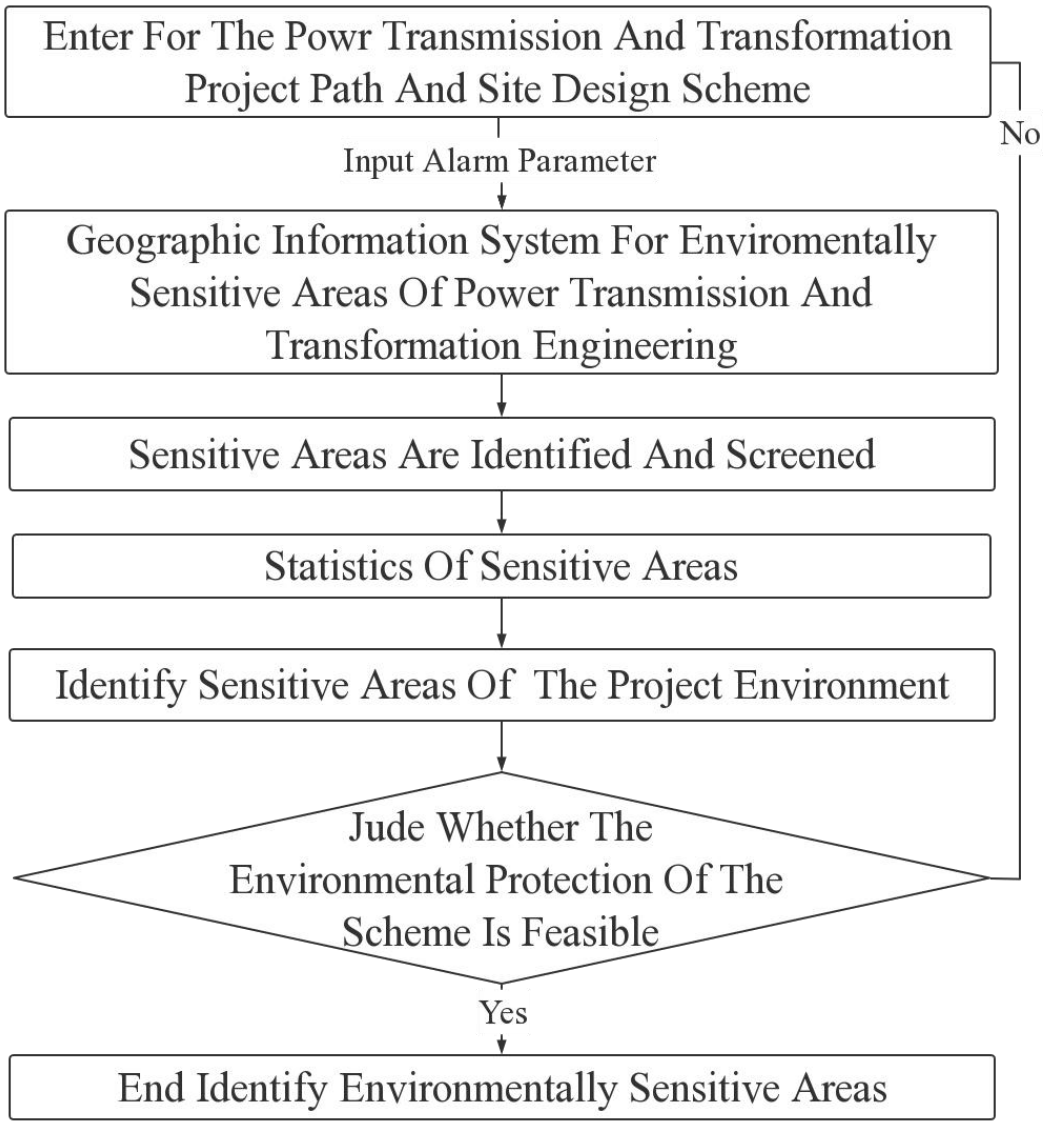

FIG. 2 Flowchart of identification of environmentally sensitive areas

First, it is necessary to obtain the pole and tower coordinates of the inflection point of the transmission line and the location coordinates of the substation, input the relevant information into the identification system, and automatically generate the geographical wiring diagram of the transmission line through calculation; Second, set the replication and alarm distance of marginal properties in sensitive areas. The marginal attribute of the sensitive area refers to the geographical position and boundary contour of the sensitive area. The latitude and longitude coordinates of each point are entered into the recognition system, or the inflection point coordinates of the boundary contour of the sensitive area are directly imported into the management module. At the same time, the alarm distance between different types of sensitive areas and transmission and transformation projects should be defined in the system, that is, the horizontal distance between the boundary contour of the sensitive area and the center line of the transmission line corridor; Third, topological technology is used to regard the center line of the transmission line as the starting point, and the length of the alarm distance as the radius. A circular buffer region is constructed. Based on the spatial index and spatial query module, the marginal attribute information related to the sensitive

region is quickly searched in the spatial database. If the boundary contour of the sensitive area overlaps with the buffer area, basic information such as geographical location, contour and name should be presented in different colors in the map to complete data identification; Fourthly, it is necessary to identify the results of the spatial database of sensitive areas, build a connection relationship with the attribute database, import the relevant attribute information into Excel, and finally generate the project environmental risk statistical report. Fifth, according to the information provided by the above statistical report, accurately judge the potential risk factors that meet the alarm parameters in the power transmission and transformation project construction project and need to focus on. Among them, the distance between the sensitive area and the power transmission and transformation project is less than the alarm parameter, and the environmental risk generated by the project beyond this range can be directly ignored. This information is mainly used to judge the ecological and environmental protection of transmission and transformation engineering design.[14-15]

2.2 Optimization model of soil and water conservation ecological construction

On the one hand, make clear the comprehensive evaluation objective of soil and water conservation ecological construction. For the ecologically sensitive areas in Sichuan and Chongqing region, when constructing and running power transmission and transformation projects, on the one hand, the basic income and consumption level of local residents should be improved, and on the other hand, water and soil resources should be protected, ecological environment should be improved, and win-win development goals should be realized.

On the other hand, consider the external economy comprehensively. In essence, external economics refers to the unreimbursed positive or negative effects of the behavior of one producer or consumer on other producers or consumers. From the perspective of the development of ecologically sensitive areas in Sichuan-Chongqing area, soil and water loss control in power transmission and transformation projects has external economics. For example, the control of soil and water loss in upstream basins has led to the reduction of siltation in downstream reservoirs, the improvement of water quality, the reduction of ecological pollution, and the harvest of a large number of economic and social benefits. This benefit is that the downstream residents can enjoy without paying any capital, and the upstream residents have paid the capital to generate this part of the income but have not received a return. Nowadays, most areas in the treatment of soil erosion control work in power transmission and transformation projects, ignore the direct and internal benefits, resulting in a contradiction between the economic and ecological benefits of the work, practical governance activities, lack of internal economic power, can only rely on external resources, and ultimately it is difficult to achieve the construction goal of sustainable development in China. If the uncertainty of soil erosion control benefits is reduced, the contradiction between residents' pursuit of short-term benefits and sustainable use of land resources will be alleviated, so as to attract more individuals and organizations to participate in the work related to soil and water conservation ecological construction of power transmission and transformation projects.

3. Result analysis

Taking a power enterprise in Sichuan-Chongqing area as an example, it proposed the construction contents as shown in Table 1, and clarified the main causes and basic characteristics of soil and water loss caused by power transmission and transformation projects.

Table 1 Construction contents

number	Construction content
1	Site construction drawing
2	Level the earthwork and the entrance road.
3	Soil retaining, fence and slope protection in war zone
4	110kv external power supply project
5	Main control building pile machine
6	Main road in station area
7	Main drainage in station area
8	500kv Frame Pile Foundation Project
9	500kv structural support foundation
10	Foundation and main body of main control communication building
11	Main grounding grid of the whole station
12	Adjustment and installation of 500kv frame
13	Main transformer and 110kv protection chamber, station power room
14	Auxiliary production buildings such as comprehensive pump oil pool.
15	500kv equipment foundation, chamber protection, cable trench
16	Zhu kong Lou Chu decoration
17	Main control building decoration
18	1000kv frame foundation
19	Pile foundation of main transformer and firewall
20	High resistance foundation and firewall of main transformer
21	Installation of 110kv structural support
22	Installation of 1000kv structural support
23	1000kv Protective chamber

Due to the different construction technology of different towers, the degree of soil and water loss is also different. Therefore, the construction unit has arranged the monitoring points as shown in Table 2 below on the construction site, and implemented the monitoring points of each bid section into the construction and operation of the overall power transmission and transformation project, which can accurately and perfectly monitor the amount of soil and water loss of different types of towers. It provides an effective basis for the next ecological environmental protection construction.

Table 2 Monitoring points of soil and water conservation

PT	way	Monitoring content	explain
Entrance road slope	Simple sedimentation tank	Soil loss, effect of soil and water conservation project	The number of pools depends on different slopes, one for each slope.
External skeleton slope protection	Simple sedimentation tank	Soil loss, effect of soil and water conservation project	The number of pools depends on different slopes, one for each slope.
Temporary dump	Erosion ditch method	Soil loss	Temporary use
The flat land in the wall is not afforested.	Template method	Soil loss	

In the actual monitoring process, the frequency of soil and water conservation monitoring in

power transmission and transformation projects is not stable and needs to be flexibly handled according to the climate change of different seasons. For example, when the rainfall increases, the monitoring frequency can be appropriately expanded, which helps the construction unit to propose scientific treatment measures according to the characteristics of soil and water loss, and truly combine the point, line and surface. To form a perfect soil erosion protection system.

Combined with the soil and water loss modes and main ways shown in FIG.3 below, the construction activities of power transmission and transformation projects include excavation and filling of foundations, disposal of waste soil and slag, construction of road and relocation areas. According to the types and main forms of soil and water loss caused by different tasks, the construction unit should do the following work: on the one hand, lay down afforestation on both sides of the road, pay attention to the process characteristics of the power transmission and transformation project and the basic principle of local operation, so as to partially improve the local ecological environment and operating conditions; On the other hand, it is necessary to do a good job in the construction and management of road hardening and drainage facilities. On the basis of ensuring the stability of slope, retaining walls are set according to the natural terrain, and protective countermeasures are proposed for temporary soil dumping sites, so as to avoid man-made increase of new soil erosion.

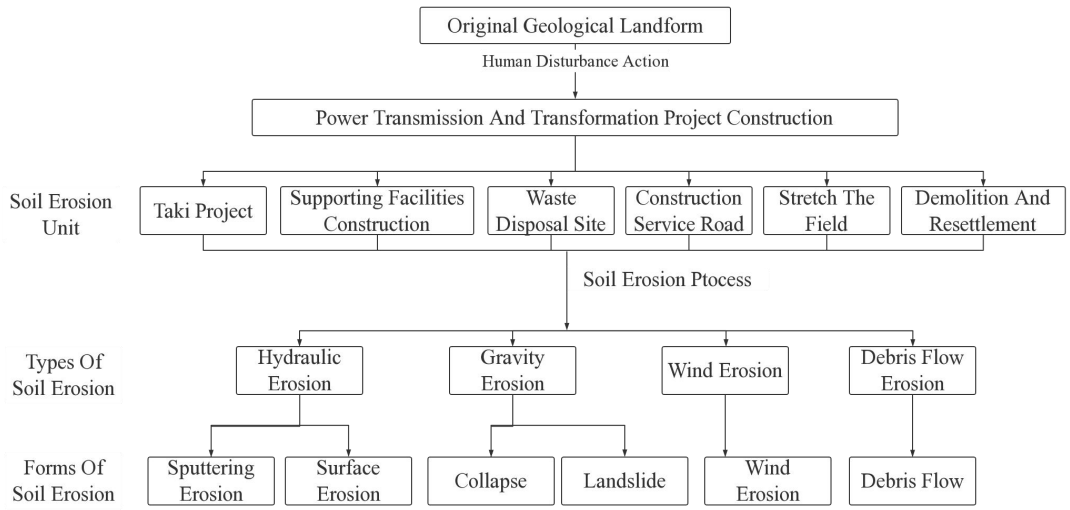

FIG. 3 Modes and main ways of soil and water loss

Conclusion

To sum up, power transmission and transformation projects are the basic conditions for urban construction and development and market economy innovation, and soil erosion caused during construction and operation will not only affect the surrounding ecological environment, but also reduce the feasibility and effectiveness of the project. Therefore, Chinese scholars should strengthen the optimization of soil and water conservation ecological construction in order to solve the problem of soil and water loss control as soon as possible.

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