

ECOLOGICAL RESTORATION MODEL AND COUNTERMEASURES OF MAOMING OPEN-PIT MINE IN GUANGDONG PROVINCE

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ABSTRACT

In terms of the sustainable development of the geographical environment, ecological restoration has the leading-edge thinking change and value significance. Under the social background of realizing the coordinated development on economic and social development and ecological environment protection, this paper makes a qualitative analysis from the perspective of ecological restoration of open-pit mines, the effects of restoration and the construction, and the development of ecological parks. Based on the systems theory of mountains, rivers, forests, farmlands, lakes and grasslands (MRFFLG) and the ecological restoration method of abandoned open pit, the demonstration is carried out in combination with field investigation and network questionnaire survey. Besides, the three models of reference and integration design are quantitatively analyzed by using the four dimensions of satisfaction, attraction, improvement and future development. According to the qualitative and quantitative analysis results, the ecological restoration model and strategic thinking suitable for the long-term development of Maoming open pit mine are proposed, which has significant value for the protection and development of the national geographical environment.

KEYWORDS: *Ecological Restoration, Ecological Park, Maoming Strip Mine, Modeling.*

INTRODUCTION

Ecological Restoration is the frontier thinking of environmental protection and sustainable development, and refers to the recovery of the ecosystem damaged by human disturbance. The purpose is to rebuild the original ecosystem as much as possible and restore it to its self-balanced state. It can maintain self-renewal without external intervention [1]. The international ecological restoration of mining wasteland tends to restore the ecological landscape similar to the original landform, and gradually develop into a series of public places, such as mine parks and forest parks [2-3]. The research on the ecological restoration mode of existing open-pit mines in China is mostly concentrated in the field of ecological restoration technology and landscape planning. Mine parks have also become a common transformation model. Most of them are based on the landscape design discipline and integrate the various values of abandoned land [4-5]. There are few studies on the integration of the restoration model of mine parks into the needs of local residents, it needs to be studied to transform China's mine wastelands into mine parks with different characteristics. In particular, there is a lack of case studies in underdeveloped areas, so there are relatively few studies on Maoming open pit mine. Before 2012, research focused on mining technology and environmental issues. The studies that have emerged are related to the ecological restoration of open-pit mines since 2017.

After the 1990s, the transformation achievements of mining wasteland have gradually changed from single artistry to practicality. Since the 21st century, more attention has been paid to the combination of artistry and practicality. The construction of national mine parks has become a new channel for ecological restoration and heritage protection in mining areas [6,-8]. On the basis of fully protecting the natural characteristics and humanistic connotation of the site, the mine park injects elements of landscape architecture design. There have been many successful examples in our country and abroad [4,5,9]. They have all played a significant role in restoration, such as the Eden project in the UK, the Golpa Nord Ferropllis in Germany, and the East Lake scenic spot in Shaoxing, Zhejiang, and the Huangshi National Mine Park in Hubei, in China, and so on, which truly realize the recycling of abandoned open pit.

The study area is located in the open pit ecological park in the northern low hill of Maonan District, Maoming City, Guangdong Province, and its ecological restoration effect has been paid attention to. It is found that the ecological restoration of the mining area will bring greater comprehensive benefits and gradually realize the unification of ecological benefits, economic benefits and social benefits [10].

In 2012, the Maoming government, Guangdong decided to carry out restoration planning for Maoming open pit mine and build an open pit ecological park. In 2014, the construction was carried out in an all-round way, focusing on the four major projects of water diversion, road construction, tree planting and museum building. The main construction includes: sightseeing road around the lake, supporting landscape and greenway; cultivate all kinds of flowers and trees according to local conditions, increase vegetation greening, and the forest land is about 8000 mu; The abandoned factory buildings will be transformed into the site of the mineral museum. At present, according to the requirements of the construction of the National Mine Park, the sorting and construction of mineral mining relics and historical documents are under way, which will comprehensively display Maoming's mining cultural history and a large number of industrial heritage, and build an Urban Memory Project [11].

In 2019, the ecological restoration achievements of open-pit mines will be extended to the surrounding areas. The *good hearted Lake* pastoral complex is being built to promote the overall protection of mountains, rivers, forests and lakes, and gradually integrate into Madam Xian culture, petroleum culture, etc. Through the combination of natural geographical conditions and humanistic culture, a mine restoration model with regional characteristics is gradually being formed, and the goal of building a national mine park is being achieved. The construction of ecological park in Maoming open pit mine reflects the construction and protection of the life community of mountains, rivers, forests, farmlands, lakes and grasslands, which is also the embodiment of the ecological restoration mode based on life community and natural restoration at the micro level. After sorting out the data and documents, this study summarizes the above activity into the conceptual model of construction (Figure 1) according to the process of restoration conception, planning, legislation, and measure and future objectives. Then based on this conceptual model that will be verified, and add some ideas to design a implementing model according to Public opinion of questionnaire survey and my ideas of some theory.

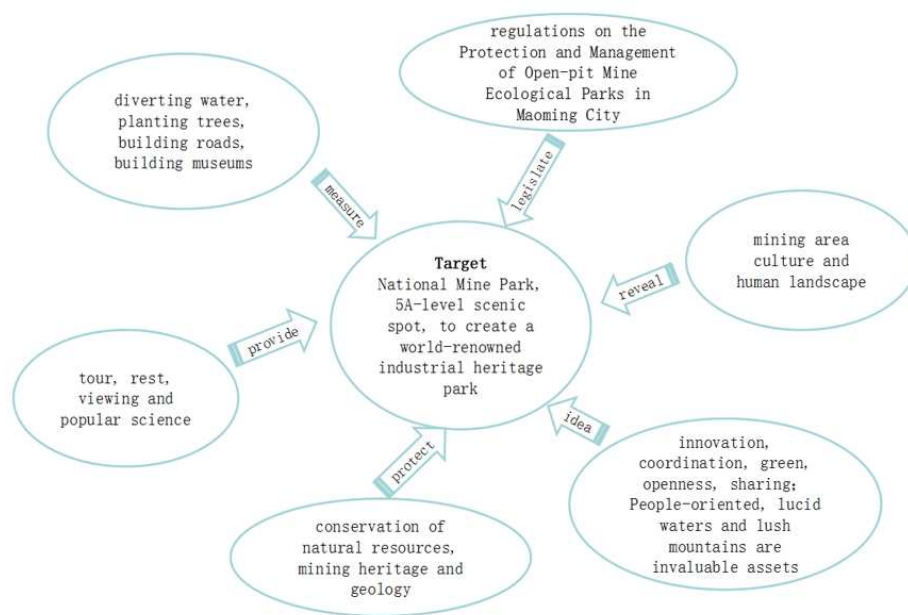


Figure 1: The Conceptual Model of Construction on Maoming Open Pit Ecological Park.

THEORETICAL OVERVIEW

The theories and ideas adopted in this study are described as follows, including Modeling Concept, Ecological Restoration Theory, Ecology-Oriented Development(EOD), Systems theory of mountains, rivers, forests, farmlands, lakes and grasslands(MRFFLG), etc.

Modeling Concepts

Model is the frame summary of experience and the general name of the way of thinking to solve certain problems. Therefore, this study will construct a reasonable and feasible model (modeling for short) through relevant data and development trajectory, so as to visualize the development path and direction of things. The pattern is an abstract simulation, and its main function is to predict the structure and process of unknown things[12-13].

Theory of Ecological Restoration in Open Pit Mining Area

At present, research on restoration ecology has gradually turned into dynamic multi-dimensional ecological restoration. The smooth implementation of ecological restoration requires multi-disciplinary integration, following the principles of circular regeneration, harmonious coexistence, overall optimization and regional differentiation. Meanwhile, Geographic Information System technology (GIS) is used to assist in investigating the repair [14]. It mainly studies the causes and processes of ecosystem degradation, the restoration and reconstruction after degradation, and the technologies and methods to be adopted, which has important guiding significance for ecological restoration [15-17]. The abandoned land of Maoming open pit mine has been planned and implemented for nearly ten years. Its restoration is to clarify the technical ideas and methods to be adopted through appropriate manual intervention, repair ecological functions and structures, and rebuild a self-sustaining ecosystem on the basis of respecting environmental laws.

EOD (Ecology-Oriented Development) Concept

In the application of mine restoration model based on EOD concept, Wu Caixia and others mentioned the definition of EOD model and its specific practice [18]. The EOD model refers to the economic value played in the process of ecological restoration. It is an innovative way of ecological construction and environmental governance. The specific object of practice is the mining areas left over by history and without responsible subjects. The implementation path of introducing social capital, integrating environmental governance with tourism and leisure industry is adopted to achieve the sustainable development goal of regional resources and environment. The EOD model has certain reference significance for constructing the ecological restoration model of Maoming open pit mine.

MRFFLG

Systems theory of mountains, rivers, forests, farmlands, lakes and grasslands (MRFFLG), emphasize mutual restriction and interdependence among the forests, grasslands, wetlands, rivers, lakes, farmlands and other elements of the regional ecosystem. It reflects the synergy and organic connection among the ecosystems of the mountains, rivers, forests, farmlands, lakes and grasslands system. It is an important methodology to promote the construction of ecological civilization in China now and future. The goal of restoration is to comprehensively protect ecological functions and balance the relationship between environmental protection, economic development and resource utilization. Combined with the mine restoration model of MRFFLG, including the life community of ecological restoration model and the ecological restoration model based on natural work and supplemented by manual regulation, thus a novel idea model we illustrate as Figure 2 and Figure 3[19-20]. In general, the ecological restoration model of life community is a coordinated restoration model that follows the concept of life community of MRFFLG, focuses on natural restoration, supplemented by manual intervention, and carries out land reclamation, environmental governance, industrial transformation and landscape reconstruction.

In view of the above, through qualitative and quantitative research methods, based on the theory and practice of ecological restoration, this study take the development status of Maoming open pit mine and the results of data investigation and analysis as empirical experience, sort out and summarize, to conceive the ecological restoration model of open pit mine. This paper provides innovative thinking for the future planning of the National Mine Park, which is conducive to promoting the ecological transformation of mine relics in Guangdong Province, improving the urban ecological environment of Maoming, protecting the urban memory, and promoting the development of Maoming.

The model established in this paper, combined with the theory of MRFFLG and the ecological restoration method of abandoned open pit, proposed the restoration model with local characteristics according to the remarkable results of Maoming open pit since the ecological restoration and the survey results of public demand data. The purpose of the construction model is providing a visual model for the construction and development of ecological restoration in Maoming open pit mine.

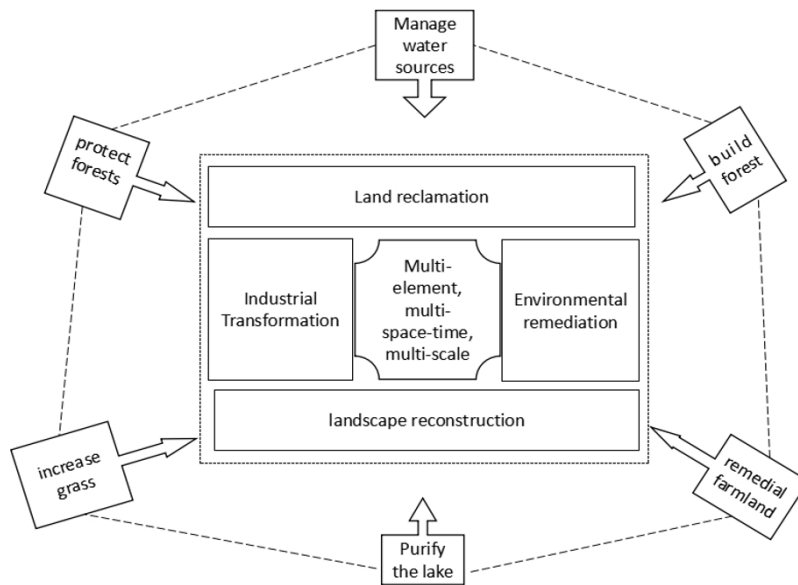


Figure 2: The Ecological Restoration Model of Life Community.

(The model’s idea is modified from the Yuan et al. (2020)^[37])

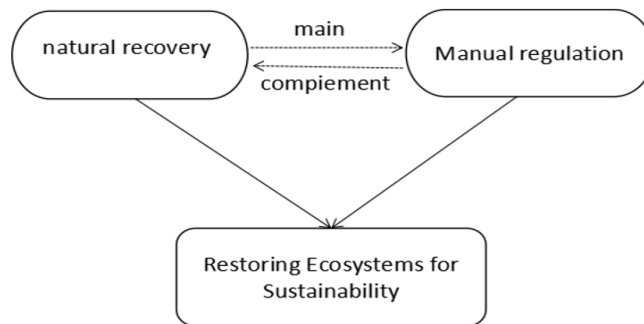


Figure 3: The Ecological Restoration Model.

ESTABLISHMENT PROCESS OF ECOLOGICAL RESTORATION MODEL

This paper draws lessons from different mine ecological restoration models, and experiences the process of induction and design, revision and arrangement, combination and construction. The whole process’s procedure that we draw such as Figure 4.

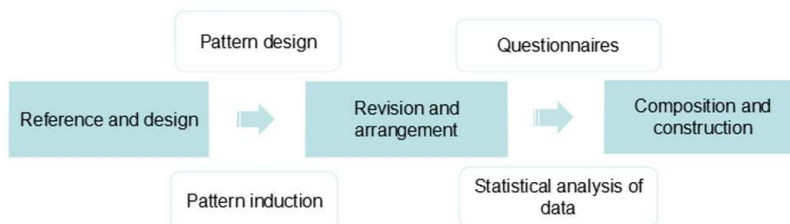


Figure 4: The Flowchart of Model Construction.

Benchmarking and Design

Benchmarking and design in the process of literature collation, it is found that the research on the ecological restoration of abandoned land in the mining area pays more attention to resource utilization, cultural inheritance and the internal value of abandoned land. The restoration model is holistic, comprehensive and functional, and tends to be diversified[2,3,5,21-24]. This paper combs, summarizes and inductions various ecological restoration schemes, and draws and sorts them into five models (Shown as Table 1):

Table 1: The Model Induction Table

	Division Angle	Pattern	Characteristic	
First type	Value of abandoned land	Re-greening and reclamation model	Greening and nitrogen fixation	
		Landscape model of scenery gardening	Integration of landscape art and ecological wetland	
		Cultural industry model	Cultural creative space and heritage tourism	
		Urban open space model	The whole association between the restored space and urban space	
Second type	Landscape reconstruction	Sightseeing and popular science model	Mining history and culture	
		Wetland landscape model	Integration of wetland protection and eco-tourism	
		Ecological greening model	Comprehensive utilization of agriculture, forestry and fishery economy	
		Theme culture deduction model	Revolutionary culture	
Third type	Intrinsic value orientation of mine wasteland	Cultural protection model	Combination of Mine Theme Park and open pit Mine Museum	
		Recreational model	Combination of country park and City Park	
		Ecological restoration model	Combination of vegetation restoration and agricultural reclamation	
Fourth type	Based on Theory	Model under the theory of ecological restoration	Secondary wetland maintenance area with environmental, economic and social benefits	
		Mode under the theory of industrial structure optimization	Agriculture Industry	Urban agricultural model
				Urban industrial model
			the service sector	Compound tourism development model, including industrial tourism model, ecological tourism model and agricultural sightseeing experience tourism model
Fifth type	Analysis of practical case materials of landscape reconstruction of mine wasteland at home and abroad	Landscape park model	Featured underground space landscape park, restored natural ecological landscape park and heritage industrial cultural landscape park	
		Landscape area (zone) model	Restored natural ecological landscape area (belt), relic industrial cultural landscape area (belt), comprehensive landscape area	
		Ruhr model	Take the North Duisburg Landscape Park as an example, and use the ecological landscape design method of reservation and reuse to form a diversified open space of cultural landscape	
		European model	Interact with the ecological landscape transformation of industrial wasteland and the innovation and development of all walks of life, and form a multi type European tourism route that is transnational and cross regional	

The abandoned land of Maoming open pit mine has many utilization values to be developed, including historical value, social value and so on. Thus, according to the above five models, this paper comprehensively considers the audience experience, spatial structure and ecological effect of Maoming open pit mine, combines the actual situation of Maoming open pit mine, integrates and draws lessons from the above five models, and summarizes and designs them as cultural industry model, ecological landscape model and urban open space model. The model of cultural industry includes industrial and mining historical and cultural zone, cultural creative space and educational development zone; the ecological landscape model includes Wetland Park and plant garden; the urban open space model includes two aspects: country ecological park and theme experience area (Shown as Figure 5).

Cultural industry model refers to the emerging industry model that mainly meets people's spiritual and cultural needs. The open space of Maoming open pit mine provides a broad space for cultural industry developers to play. With the opening of exhibition halls and museums, it can create a place for practice and experience for education, bring cultural industry to Maoming open pit mine. The open-pit mining area can become a design atmosphere full of literary atmosphere, improving the landscape quality of the open-pit ecological park to the spiritual level of art, so the life of urban residents will be enriched.

Ecological landscape model refers to the model of rebuilding under the current ecological environment and further strengthening the formation of urban green lungs. Maoming open pit mine has undergone comprehensive transformation such as soil and water treatment, terrain and vegetation restoration, and has formed Wetland Park and plant garden by using the terrain and water of the site. It has created a new look at the open pit ecosystem and improved the surrounding environment of the mining area and the urban ecological cycle system.

Urban open space refers to outdoor urban public spaces, such as scenic spots, parks, etc. The urban open space model refers to the model of integrating the urban overall space by fully considering the connection between the restored open-pit ecological environment and the urban overall environment in the development of outdoor urban public space. Maoming open pit mine is located on the outskirts of the city. It is convenient for residents to have outdoor leisure and entertainment activities. The appearance of the city is improved, providing people with comfortable recreational spaces.

Overall, these three models do not exist in isolation, and there are differences in classification and characteristic functions (Shown as Table 2).

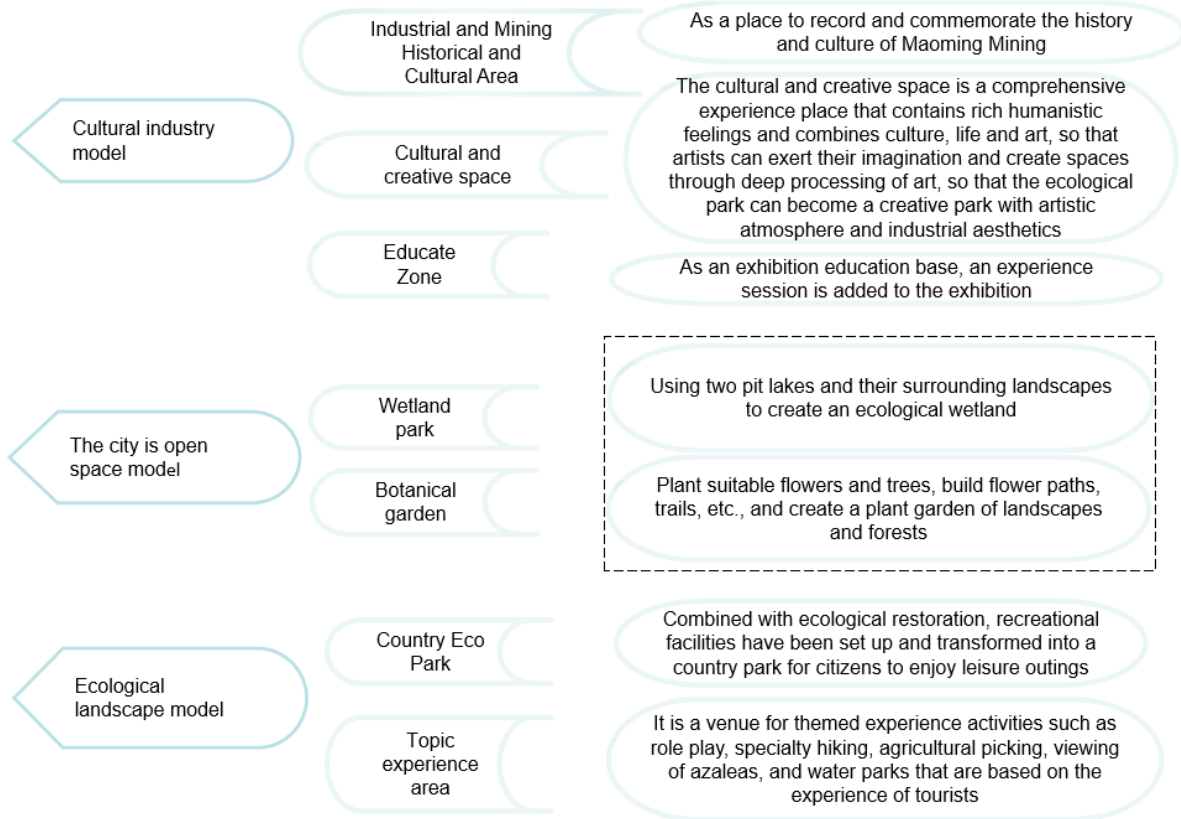


Figure 5: The Design Model of Maoming Open Pit Ecological Park.

Table 2: The Differences among Three Design Models

Classification	Cultural Industry Model	Ecological Landscape Model	Urban Open Space Model
Featured features	History and culture of industry and mining area	Wetland Park	Country ecological park
	Cultural creative space	Botanical Garden	Recreation Area
	Education Zone		Theme experience area
	Memorial and education	Mainly for viewing	Leisure and recreation experience

Revision and Arrangement

The online questionnaire was used to investigate the needs and attitudes of tourists. The respondents were mainly tourists and local residents who had gone to the ecological park of Maoming open pit mine. A total of 363 questionnaires were distributed and 360 valid questionnaires were recovered.

The questionnaire mainly includes three parts. The first part is the basic information of the respondents. The first part is the basic information of the respondents; the second part is the tourist satisfaction survey; the third part is the survey of tourists' recognition of the model. The six level scale is adopted, and the scores of degree are expressed by the values of 1-6. Through the calculation of descriptive statistics, the results are shown in Table3:

Satisfaction

From the average values of tourists' satisfaction with the construction of the ecological park, it can be seen that the overall satisfaction is close to very satisfactory, indicating that the respondents are very satisfied with the restoration results of Maoming open pit mine related to fruit planting, environment and industrial, and mining heritage protection.

Attractive Force

It can be seen from the average values of the attraction of the ecological park to tourists that the overall situation is close to very attractive, indicating that the respondents are very attractive to the design mode of the mining lake and its surrounding landscape, Maoming characteristic culture, Maoming characteristic food, tree planting and flowers, and industrial and mining history and culture.

Improvements

From the average values of various improvements in the construction of the ecological park, it can be seen that the overall situation is close to the need for improvement. The respondents think that the accommodation, safety, capital investment and experience of the ecological park of Maoming open pit mine need to be improved very much.

Future Development

It can be seen from the average values of the future development of the ecological park that the overall situation is close to very agreed. The respondents have more support and recognition for the construction of Maoming open pit ecological park into a cultural and creative space with industrial and mining culture, an open popular science education base, a botanical park and a wetland park centered on the mining lake.

Table 3: The Average Value and Standard Deviation of each Item in Questionnaires

Dimension	Variable Name	Average Value	Standard Deviation	Sort
Satisfaction	Fruit planting and afforestation	4.650	1.00	2
	Air environment	4.728	1.01	1
	Environmental remediation status	4.533	1.01	4
	Protection of industrial and mining relics	4.539	1.02	3
	Fish culture in mining lake	4.475	1.06	5
	Operation and management	4.372	1.03	6
	traffic	4.278	1.15	7
Attractive force	Mine lake and surrounding landscape	4.725	0.92	1
	Planting trees and flowers	4.594	1.02	4
	Industrial and mining history and culture	4.594	1.02	4
	Maoming characteristic culture	4.631	0.99	2
	Maoming specialty food	4.622	1.05	3
	Entertainment experience activities	4.536	1.03	6
	Public welfare activities	4.536	1.00	6
Improvements	Infrastructure	2.469	1.04	7
	Accommodation	2.517	1.07	1
	Restaurant	2.436	1.06	9
	propaganda	2.483	1.07	5
	Security	2.506	1.09	2
	Capital investment	2.506	1.06	2
	Experiential	2.497	1.10	4
	Cultural nature	2.475	1.11	6
Characteristics	2.464	1.14	8	
Improvements	Building a cultural and creative space with industrial and mining culture	4.786	0.95	4
	As an open popular science education base	4.814	0.95	2
	Become a place for leisure and entertainment	4.758	0.99	6
	Build a wetland park centered on the mining lake	4.789	0.98	3
	Construction of historical and cultural corridor	4.683	1.01	7

Table 3: Contd.,

Equipped with children's amusement facilities	4.453	1.14	8
Build plank roads and pavilions along and near the mine Lake	4.778	0.97	5
Building a botanical garden in the ecological park	4.817	0.98	1

Composition and Construction

According to the analysis results of satisfaction, improvement, attractiveness and future development, it shows that: 1) accommodation, safety, capital investment and experience need to be improved; 2) The design patterns of the mining lake and its surrounding landscape, Maoming characteristic culture, Maoming characteristic food, tree planting and flowers, and industrial and mining history and culture are attractive to the respondents; 3) The interviewees have more support and recognition for the construction of Maoming open pit ecological park into a cultural, creative space with representative industrial, mining culture, an open popular science education base, a botanical park and a wetland park centered on the mining lake.

There are similarities between the three models of attractiveness and improvement. According to the average values of attractiveness and improvement, this paper selects projects with an average value of more than 4.6 points for combination (Shown as Table 4).

Table 4: The Dimension (Attraction, Future Development) and Model Combination Table

	Attractive Force	Future Development
History and culture of industry and mining area Cultural creative space Education Zone Memorial and education	Industrial and mining history and culture Maoming characteristic culture	Construction of historical and cultural corridor Building a cultural and creative space representative of industrial and mining culture As an open popular science education base
Wetland Park Botanical Park	Mine lake and surrounding landscape Planting trees and flowers	Build a wetland park centered on the mining lake Build plank roads and pavilions along and near the mine Lake Building a botanical garden in the ecological park
Country ecological park Theme experience area	Maoming local food	In the future, it will become a place for leisure and entertainment

Note: the cultural industry model includes industrial and mining historical and cultural zones, cultural and creative spaces, and education development zones; the ecological landscape model includes Wetland Park and plant garden; the urban open space model includes country ecological park and theme experience area.

RESULTS

In the final, this study adopts three stages (including design, investigation and construction model) to establish the model, which is mainly based on the combination relationship between dimensions and models in Table 4, draws lessons from the theory of landscape, forest, field, lake and grass system, and uses the mutual integration of the three models to form the ecological restoration model of Maoming open pit mine (Shown as Figure 6).

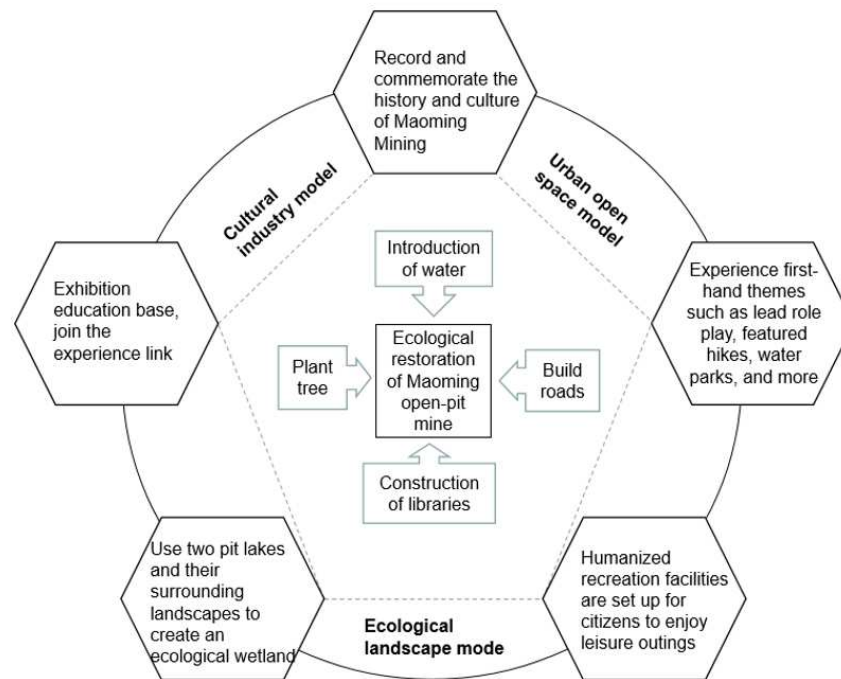


Figure 6: The Framework of Ecological Restoration Model of Maoming Open Pit Mine.

The ecological restoration model of Maoming open pit mine refers to the model of urban open space + cultural industry + ecological landscape, that is, on the basis of protecting the ecological environment of the park and mining sites. It is mainly to build wetland parks and country parks, supplemented by the construction of scientific education bases and theme experience areas, open the outdoor urban public space, and fully consider the connection and correlation between the restored open pit ecological environment and the overall urban environment, forming a model of integration in the overall space of the city.

Special note, the construction model is to turn the development of ecological restoration construction of Maoming open pit mine into a visual model, which indicates the general direction of ecological restoration development of the open pit mine at present, and the deployment of details is dynamic development.

CONCLUSION

In the process of ecological restoration, in addition to restoring ecosystem functions and integrating regional landscape elements, human beings should always pay attention to social needs, realize the coordination of multiple measures, achieve the integrated development of urban and rural areas and create a good residential environment [25]. Specific recommendations are as follows (Shown as Figure 7):

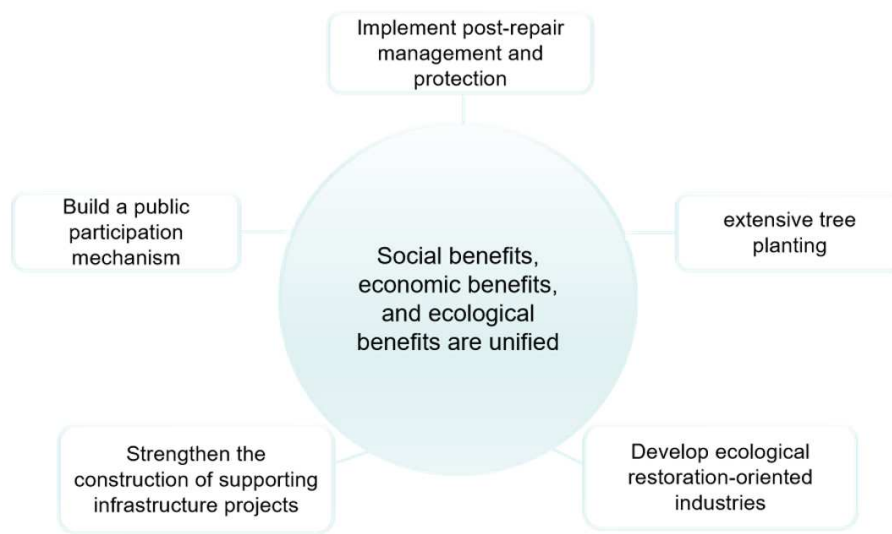


Figure 7: The Relevant Recommendations and Countermeasures by this Study.

Build Public Participation Mechanism

Public participation mainly refers to the surrounding people, local village committees and stakeholders of mining enterprises. Build a public participation mechanism, protect the interests of all parties through multiple channels and directions, coordinate contradictions and conflicts, and jointly participate in construction and development. Public participation is required for ecological restoration in mining areas, and public demand plays a guiding and decisive role in the protection and reuse of Industrial Heritage [26-27].

Firstly, in practical work, ecological restoration products with certain benefits are designed according to the needs of residents and tourists in the mining area. Secondly, to establish a diversified form of public participation and enhance public trust, we should not only meet the legal requirements of public participation in the decision-making process, but also require Park planners to maintain continuous interaction with the public. Finally, build information infrastructure to release information, manage data and public feedback, or take the park as a place for social practice and exploration, such as summer camps and volunteer activities.

Large Scale Afforestation

According to the research results on ecological landscape planning based on landscape aesthetics show that users feel more comfortable with diversified green spaces, and it is very important to use vegetation for landscape. From the perspective of users, comfortable landscapes include diverse vegetation, cool space, appropriate color combinations, etc.[28, 29].

In addition, soil plants can effectively reduce the content of soil pollutants, especially tree species with strong adaptability and repair function, such as leguminous, herbaceous and other nitrogen fixing species [30-32]. Through planting plants that adapt to the growth of the mining area, regenerate and improve the soil and environment of the mining area, and combine the ecological and beautification effects; Vegetation landscape is advocated, and a plant park is built in the ecological park. In the process of construction, the shaping of plant landscape should take into account the functions of citizens' leisure and cooling, plant science popularization and so on, pay attention to people's life and improve the practicality of the space.

Strengthen the Construction of Consciousness Level

During the restoration and construction of the mining area, more attention should be paid to the historical, political and social aspects of the local mining area, and more attention should be paid to the comprehensive benefits after restoration [33]. In the restoration and construction of all parks, on the premise of protecting the ecological environment, we should make rational use of tourism resources such as museums, dental elephant rural complexes and ten mile Azalea. It is suggested that the government should plan and design uniformly, introduce hotels and restaurants with the theme of farmhouses, encourage the surrounding areas to build homestays, properly cooperate with travel agencies, launch tourism experiential projects focusing on tourist experience, and build a tourist service area to attract more tourists.

According to the results of afield investigation and questionnaire survey, it is suggested we build a wetland park centered on the mining lake, and build plank roads and pavilions along and near the mining lake. It is necessary to build a historical and cultural corridor near the lake, enhance the aesthetic feeling of the road, build a cultural and creative space representative of industrial and mining culture, make rational use of the resources of the museum, take the ecological park as an open popular science education base, develop ecological agriculture in combination with the garden complex of Haoxin lake, integrate Maoming characteristic culture, and form a unique symbol of the urban landscape.

Develop Ecological Restoration Oriented Industries

In the process of ecological restoration, we should take the ecological environment as the guide and create the economic value within the region. Create economic value and maintain ecological value, explore the market-oriented mechanism of ecological restoration in the mining area, build an industrial development model of tourism, agricultural products and fitness, build an industrial chain integrating ecological landscape and leisure and entertainment, focus on the land availability after restoration, and verify the self-regulation ability of the mining area after restoration for a long time, so as to transform a single restoration into a comprehensive utilization [25]. Therefore, in terms of economic benefits, it is suggested that we provide large-scale sports facilities, tourist accommodation, cinemas and other services; considering the social benefits, it is suggested that plan the path of education theme, the venue of large-scale cultural activities, and build concert halls and leisure halls.

Manage and Protect After Repair

Continuous monitoring and management is crucial [34-35]. First of all, the relevant management departments need to pay attention at all times to strengthen the quality of patrols, and do a good job in the long-term supervision of ecological restoration by means of satellite remote sensing detection, so as to ensure the long-term results after restoration. Secondly, if there are acts of man-made secondary damage to the environment, it is necessary to find out the main problems, clarify the responsibilities and deal with them to the end. Finally, strengthen and improve the management system of open-pit ecological parks to contribute to safe and civilized urban construction. We will continue to strengthen people's awareness of environmental protection and jointly protect and restore the successful ecological environment.

To sum up, the ecological restoration of mining wasteland is a long-term process, which requires the organic integration of mountains, rivers, forests, fields, lakes and caokuang Village-13[19]. The construction of Maoming open pit ecological park is a successful practice of ecological restoration of Maoming oil shale mining wasteland. Combined with the construction of ecological park landscape, promote the development of tourism in Maoming City, drive the

development of surrounding areas, create a sense of spatial belonging, and jointly meet the needs of the construction of ecological park and the planning of Maoming's creation of culture, health and forest.

In the future, China will take the construction of green mine parks integrating economic, cultural and ecological factors as the key research direction of mining ecological restoration [36]. Maoming open pit ecological park is a place to look for the memory of the city. It can remember the history of a city and continue to help the city create the future. The ecological environment of Maoming open pit mine is connected with the overall environment of the city, forming a model of integration in the overall space of the city, that is, a comprehensive development model focusing on natural recovery, adjustment and optimization, supplemented by landscape ecological design and ecological engineering construction.

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