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Based on spatial information technology theory and method of urban landscape ecological planning research

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ABSTRACT

Along with the development of the economy, the speeding up of urbanization, planning and design methods based on the traditional method has been increasingly shows inadaptability. In view of this, this article attempts with the support of spatial information technology to achieve urban district scale of ecological evaluation, and based on the evaluation results of urban landscape ecological landscape planning, at the same time study will enrich and develop based on the theory and method system of urban landscape ecological planning.

KEYWORDS

Space information technology; Urban; Landscape ecology and planning.

INTRODUCTION

City is the product of human social, economic and cultural development, it is the most complex ecosystem types, are highly susceptible to natural environment condition and artificial interference. Worldwide in recent decades, along with the acceleration of urbanization, urban population density, traffic congestion, shortage of resources, environmental pollution and ecological deterioration and other issues, has become the focus of our society. In terms of city in China's current environmental conditions, the problem is very serious, in some urban areas; the pollution is serious, greatly influences and restricts the sustainable development of the city[1].

Urban environment is related to the body, economy for use, innovative ecology and culture. Urban landscape ecological planning refers to the ecosystem carrying capacity range using the landscape ecology principle and system design method to guide change urban ways of production and consumption, mining area, both inside and outside of all available resources potential, the construction of a kind of industry, ecological efficiency of the cultural system of the system is reasonable, the social harmony as well as ecological health, landscape suitable space environment[1], realize the socialist market economy under the conditions of economic development and environmental protection, material civilization and spiritual civilization, and a high degree of unity of natural ecology and human ecology and the sustainable development of a kind of planning method.

However, the current landscape space planning and design, or the traditional urban planning and design of a set of programs and methods, however, the traditional planning and design for technical foundation is bad, often caused by lagging information incomplete, planning work, not on the plan formulation science, etc[2]. With the development of economy, the speeding up of urbanization, planning and design methods based on the traditional method has been increasingly shows inadaptability.

In view of this, this paper presents an example of a city to carry out the research, attempts to supported by space information technology to achieve ecological evaluation of urban district scale, and urban landscape ecological landscape planning based on the evaluation results, at the same time study will enrich and develop based on SIT theory and method system of urban ecological planning.

TRADITIONAL LANDSCAPE PLANNING AND DESIGN PROBLEMS

The efficiency of the basic information

As the urban landscape planning and design need a lot of basic data, information, wide coverage, large amount of data, the basic data is still not fully digital, data lack of efficient management, cause a lot of data loss and data changes[3], it is in the different degree of planning scheme.

Qualitative analysis and quantitative analysis

Traditional urban planning analysis is based on a large number of data sorting is proposed on the basis of planning and design of the guiding ideology, principles and methods. Mainly on qualitative analysis, quantitative analysis is complementary[3], to effectively combine both. As a matter of fact, because of the large amount of basic data, area wide, complex, and the content of the quantitative analysis is often become a mere formality.

Conception of the scheme and the actual effect is different

Conception of the scheme and the actual to achieve the effect of the differences due to the lack of traditional planning for people's behavior and psychological research, therefore, good effect of the project and the actual tend to have very big disparity[4].

The lack of effective evaluation system for scheme after implementation

Planning, without an effective evaluation system and the influence of the actual use effect is very good evaluation, this creates a lot of scheme actually became a prestige projects[4], use efficiency is low. Due to the lack of evaluation system, it is relevant personnel for effective restriction and supervision.

The property of the space information technology in urban ecological planning

With the development of science and technology and city planning subjects, the traditional methods, technology and means has already can't adapt to the needs of the industry, new technology and new method will gradually introduce the urban planning industry[4]. New science and technology can broaden the professional field of vision, make new breakthroughs.

3 D sketch thinking

New technology will enable designers thinking of three-dimensional expression, designers can directly convert the three-dimensional thinking in their mind to 3 d performance[5], reduce the traditional way of expression of the limitation on the design thinking, will bring great changes to the designer's thinking.

The scientific analysis method

Traditional planning method based on qualitative, quantitative and auxiliary. The introduction of new technology will increase the quantitative analysis of the planning and design of components; reduce the influence of human factors in the

planning scheme, to improve the scientificity and the rationality of the planning scheme analysis. For example: light environment for the material space and the quantitative analysis of wind environment, visual environment, etc, to plan the scientific and quantitative index is of positive significance.

Multidimensional achievement performance

Planning achievements can realize the real three-dimensional, three-dimensional; it is completely different from the traditional design drawings and effect drawings of two-dimensional plane, sand table model, etc. It can make the observer in which any roaming, multi-angle comprehensive observation in the form of a variety of sports can make the person produces a true feeling of intimacy[4], and with the combination of the virtual reality environment will make the planning more convincing.

The advantageous of the plan implementation effect evaluation

Plan the establishment of the evaluation system of information, can to plan the effect after the implementation of effective evaluation[3]. At the same time, the related statistical data has effective guiding significance for spatial planning of urban landscape.

SPATIAL INFORMATION TECHNOLOGY IN URBAN LANDSCAPE ECOLOGICAL PLANNING AND DESIGN

The characteristics of urban ecological system

Modern city is a kind of fragile artificial ecosystem, it is exhausted on ecological process, its biggest characteristic is the highly intensive population; Urban ecosystem is incomplete and open, mainly reflected in need the support of other ecosystem (such as agricultural ecosystem, forest ecosystem and Marine ecosystem, etc.)[5], the need for human input large amounts of energy and matter, at the same time, the human production and life in the city in the discharge of wastes, cannot be completely within the system decomposition, also need other ecosystems, such as farmland, ocean, etc.) in dealing with digestion.

The characteristics of city landscape and space design

City is an open complex system, it contains a lot of material factors and several subsystems, is the material carrier of human activity. City landscape and space form is the material form of the people's subjective will, embodies the human intelligence, emotion, imagination, and the pursuit of the ideal. City landscape space is closely related to people's life, there is mutual influence between: men subjective will guide the establishment of the city landscape and space, and the existing environmental influence[4]; City landscape and space to convey the infinite information, supporting the activities of people, enrich the content of people's lives.

City is a continuous process of development, the evolution of the urban landscape and the space form from the "space" and "time" the effect of two dimensions, namely pieces at any one time, people can get all kinds of material elements of city landscape and space; Also, any one is construction of city landscape environment and have to think about the meaning of time: "the past", the history of "present tense" application significance and the ideal pursuit of "the future". The essence of urban landscape are a physical expression of subjective intention, reflect the people in different periods of values and world view[6]. Therefore, we can say, correct and reasonable design of urban landscape planning concept essentially does not conflict with the theory of sustainable development, but should be complementary to each other.

The modern city landscape and the relationship between ecological planning

Landscape ecology is an emerging interdisciplinary, mainly studies the interaction of spatial patterns and ecological processes, it is the theme of the cross of geography and ecology. It is an object with the whole landscape, through the material flow, energy flow and information flow and value flow in the earth's surface in the transmission and exchange, through biological and non-biological and the interaction between human beings and transformation, by utilizing the method of ecological system theory and system research landscape structure and function, landscape dynamic change has interaction mechanism, the research of landscape beautification pattern, optimization of structure, the rational utilization and protection, have very strong practicability. Urban ecosystem is a natural, economic, and social complex artificial ecological system, it includes the life system and environmental system, with a complex multi-level structure[5], can from different angles this paper deals with the relationship between human activities and city and influence.

Urban environmental planning as a macro guidance and coordination department interests, optimizes the allocation of urban land resources, rational organization of urban space environment is the important strategic deployment of, must have the ecological view. Only with the ecological view, directing the construction of a city in the future to the goal of ecological city, set up efficient, harmonious living environment. In recent years, the landscape planning in urban landscape features protection and has been widely used in the design of the urban environment. In the early 1960 s[6], the United States and other developed countries began to use it in architecture, planning, created a precedent in landscape planning and environmental design. The goal is to create coordination between humans and their environment and harmonious atmosphere, establish land development and utilization and the harmonious relationship between the environment and resources protection

Urban landscape, ecological planning and design were fusion in each other

City landscape and ecological planning design reflects a new dream of mankind, it is accompanied by the process of industrialization and the arrival of the post-industrial era and increasingly clear, from a new harmonious socialist movement

pioneer Owen's industrial village, Howard's garden city and 20 s 70 s ~ 80 s the rise of ecological city and sustainable cities[3]. This dream is the natural and cultural, design of environment and the environment of life, beautiful form and real full integration of ecological function, it will make park is no longer isolated city in particular, but let it melt, enter homes; It will let nature involved in design, Let the natural process within each person's daily life; Let people to perception, experience and care of natural processes and natural design.

Urban landscape ecological planning and design should follow the general principles

1)Local principle. That is to say, the design should be rooted in place. For any design problem, the designer should consider the first problem is where we are? Nature allows us to do? Natural and can help us to do? We often wonder peach garden layout and magnificent houses in rural China, in fact they are not designers, but the person that reside in the long-term experience with place, on the basis of the understanding of natural harmony with the natural process of creative design of the locals[1]. Follow this principle, main show is: respect the traditional culture and local knowledge, to adapt to the natural process, and use local materials plant and building materials.

2)To protect and conserve natural resources. The earth's natural resources, renewable resources (such as water, forest, animals, etc.) and the non-renewable resources (such as oil, coal, etc.) should be protected in order to achieve the sustainability of human survival environment, protect and save non-renewable resources to use. Even is a renewable resource, the regeneration ability is limited, so their use also need to use the way of interest rather than kill the goose that lays golden eggs.

3)Respect for nature, nature. Modern urban residents from nature more and more far, increasingly invisible natural elements and natural process, the skyline of the remote mountains, at the foot of the horizon and horizontal line, are going to be an abstract noun. As a natural process disappear from the public eye, in the traditional design of urban life support systems also tend to be hidden. Sewage treatment plants, landfills, power plants and transformer substations are as ugly object and consciously try to hide. Natural landscape and urban life support system structure and process and blanking process, make people don't care about the environment, the present and future will not care about the environment ecological natural landscape and moderation of daily behavior and blanking process, make people don't care about the environment, the present and future are not care about the environment ecological daily behavior and moderation. So, want to let everyone participate in the design, caring environment, have to show the natural process, to make urban residents feel again stream rises after the rain, surface runoff in the pond; The natural wind through the branches and leaves of shaking, felt; From the flowers bloom, see the change of the seasons; From the natural bacterial leaf blight of vane wing, see the natural decay and degradation process.

The research framework of urban landscape space

Space planning and design of urban landscape study has two ideas: one is the city of the ontology research; the second is the study of the city the main body. The city of the ontology research based on the traditional understanding on appearance, on the basis of theory of urban landscape through urban skin texture, urban structure, urban morphology research, explore the inherent law of evolution of urban development. Urban main body of the research is based on urban area social objects, discusses the interaction between human activities and city, mainly on the method of behaviorism and humanism method[7]. The research framework is shown in Figure 1.

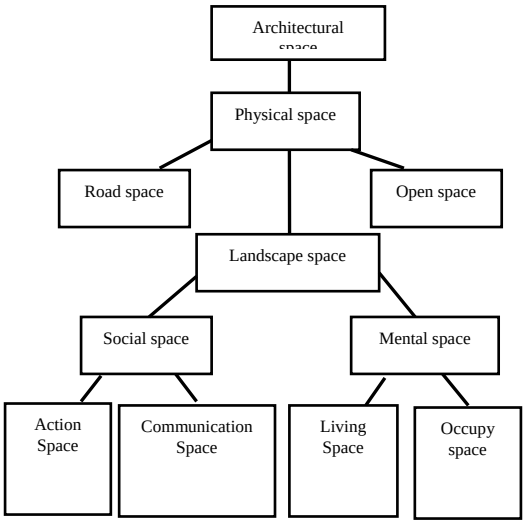

Figure 1 : Urban landscape space research framework

Technology planning and design of landscape space research framework that based on spatial information

Comprehensive analysis of the research framework of urban landscape planning and design, you can see, the landscape space which emphasizes the coordination of landscape space itself, and focus on landscape space material, the unity of the social, psychological level, so as to realize the overall landscape system and unified experience. Based on the

landscape planning and design of digital technique, due to the limitations of the technology itself, at present also only stay in the physical space planning and design level[7]. And space of urban landscape planning and design requires not only from the perspective of visual to design the 3 d material space, and it is the concept of a site, including ecological environment, society, economy, etc. As shown in Figure 2.

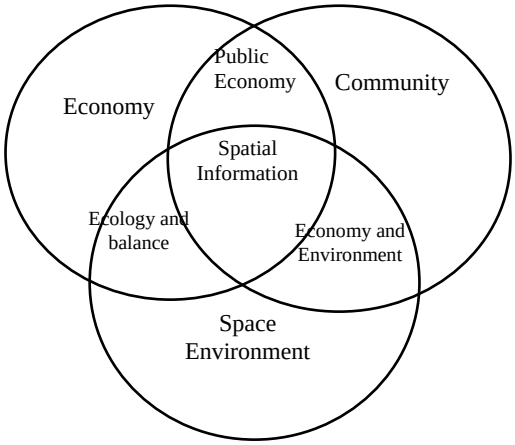

Figure 2 : Spatial information relevance and ecological environment

3 s technology integrated application of data collection and processing system

Geographic information system (GIS), remote sensing (RS), global positioning system (GPS), PS (G) of the integrated application of, is to make the space to be clear, the scope of two-dimensional projection orientation to accurate positioning, space environment to the preliminary knowledge and understanding. At the same time, to the basic geographic data update and management effectively.

Database technology knowledge, methods, and the establishment of model library

The establishment of the basic knowledge, method, model base, is the relevant knowledge about space planning and design, methods, models, effective organization and calls in a timely manner. Such as the scale of the city square design relevant statistics, the scale of the square and the surrounding buildings proportion relations, the relationship between square and surrounding roads organization mode for effective organization, such as make this information available in the virtual design, scheme and evaluation stages can be effectively calls[8].

Visual spatial quantitative analysis system - based on virtual reality technology

The establishment of this system is that before the virtual design, to design the space has a quantitative measurement.

The virtual design system--based on virtual reality technology

Virtual design is in the virtual three-dimensional urban environment planning and design. Planning and design personnel in a three-dimensional visual and interactive environment can accord your own visual habit that flexible intuitive for urban planning and design[8], easier to plan the layout of the adjustment, get your satisfactory results, finally in the actual interactive experience to create a city.

The planning scheme of quantitative evaluation system

The establishment of quantitative evaluation system is the quantitative comparison of many alternatives; finally choose the most appropriate solution. This system is mainly from two aspects to evaluate schemes comparison. One is the evaluation of the material space, mainly from the visual space, light, wind environment, a quantitative analysis for the solution. The other one is the evaluation of social space, more focus on the system from the psychology Angle of the behavior of the people, for the scale of the space and ancillary facilities, such as sketch, chairs, trees and shrubs, etc.)[9].

The implementation of the evaluation system of physical space, can respectively from the following perspective:

1)Visual environment evaluation. It is evaluated based on the visual analysis of 3 d virtual geographic environment of the city, through the simulation of the person under normal circumstances the visual parameters for visual visual calculation and analysis, through the public space of the visual landscape visibility proportion distribution of urban space in the characterization of visual openness.

2)Light environment evaluation. It is based on the urban environment spatial light environmental analysis, environmental analysis from city sunset method to evaluate a specific point of the total annual sunshine.

3)Wind environment evaluation. Using the method of computational fluid dynamics, wind load on the surface of buildings, building groups of wind environment of computer numerical simulation, at the same time, combining with the visualization technology, the solution space. The wind environment has a straightforward quantitative evaluation.

Landscape planning and design process of digital technology. Based on the landscape planning and design process of digital technique, as shown in Figure 3.

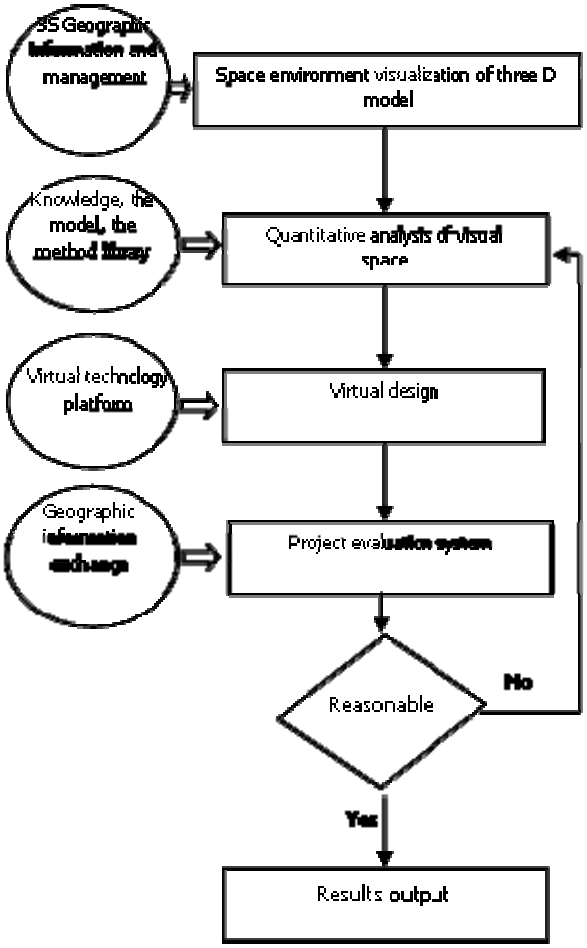

Figure 3 : Spatial Information in landscape ecology planning approach

In traditional GIS and analysis of surveying and mapping applications, the number is based on the actual landform data for simulation and analysis and gradually generated based on the results of the analysis of the abstract model of the computer[9]. With the application requirement of architecture and urban planning, in the early stages is often only abstract brief information for your reference, and are easily caused by data missing or incomplete based data practical difficulties.

In addition, social space analysis and evaluation system, due to need a great deal of data statistics and analysis and due to the complicated and changeful increased the difficulty of this quantitative evaluation system. At the same time, the material in the space program evaluation system involves analysis theory to calculate the expansion due to lack of elasticity fusion, and thus increase the practical difficulty of the operation.

CONCLUSIONS

In this paper, in support of spatial information technology to achieve under the eco-city field scale evaluation of urban and landscape ecological pattern of urban planning based on the evaluation results, and research will enrich and develop the theory and methodology based on the urban landscape ecological planning. Show: The core ofandspace ecology theory is that attention to the harmonious coexistence between humans and nature, and its proposed use, making the maintenance of the ecological environment and the rational exploitation of resources is no longer economic or contrary to the theory of landscape ecology construction of an ideal human urban ecological environment provides a new way of thinking. Therefore, the landscape ecology theory and harmonious development concept into the design of urban green space, you can make the further integration of theory and practice, the only way to meet the needs of the community, thereby creating a higher quality of living environment.

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