EVALUATING THE ECLOGICAL CONDITION IN SHENZHEN CITY, CHINA, USING A QUANTITATIVE MODEL

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1. INTRODUCTION

The unprecedented urbanization has led to huge environmental impacts at multiple scales, among which the ecological effect is one of the most important [1]. Fortunately, accompanying the negative impacts emerging, ecological restoration and construction are drawing more and more attraction [2-5]. Benefited from the popular concepts of greenway, smart conservation/growth, and green infrastructure, ecological city construction is springing up around the world [4]. However, how to construct the ecological city and evaluate the ecology system condition is still a big issue remaining to be solved. To deal with the above issue, this paper constructs an evaluation model and selects Shenzhen, China as study area.

Benefiting from the economic reform and open policy, Shenzhen have experienced a rapid urbanization process and changed into an international metropolitan city from a small town just 30 years ago. However, the rapid urbanization in Shenzhen led many negative environmental impacts, such as water pollution and fresh water shortage, air pollution and haze increasing, heat island effect, and flood risk rising [6]. At the same time, citizens and government pay great attention to ecological restoration and construction to reduce those negative impacts. Recently, a “smart conservation” program was constructed seeking to establish a framework of necessary green lands that should be preserved and permanently maintained as open space for predominantly ecological functions, without being adversely impacted by development. However, the framework is based on the qualitative analysis by the researchers and subjective cognizance of governors. So it’s necessary to evaluate the ecological condition based on a quantitative method. It’s the only way to effectively evaluate the ecological condition in Shenzhen and to find a better way to ecological city.

Keywords: Urban ecology, Ecological service, Ecological condition evaluation, Distance attenuation, Shenzhen.

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2. DATA AND METHOD

2.1 Data

A cloud-free Landsat TM image of Shenzhen area in 2009 representative of the growing season is used to draw land use condition, based on the decision tree classification method. Land use map for 2009 is classified into eleven categories: (1) water body, (2) traffic land, (3) orchard, (4) spare land, (5) shrub, (6) grassland, (7) forest, (8) farmland, (9) urban land, (10) wetland, and (11) unused land. Other data include ecological service function of the urban ecosystem produce by Yu (the author, 2005), atmospheric, water and noise environment etc. All the spatial data are reproduced at 30m spatial resolution and projected to Universal Transverse Mercator (UTM) zone 49, by using World Geodical System-84 (WGS84) datum.

2.2 Method

This paper constructs a quantitative model to evaluate the ecological landscape condition in Shenzhen, China. Based on the platform of Geography Information System and Matlab software, this model integrates two sub-models: the ecological service calculating model and the evaluation model. In the ecological service calculating model, the study area is divided into 30×30 grids and the grids are divided into two groups: the ecological service provider (green land) and the requisitioner (human habitats, publics, and so on) (Fig. 1). As the evaluation index, ecological service provided by ecological land is considered distance attenuated and can only be allocated to the around requisitioners according to the distance. The amount of ecological service from around provider grids will be added up. As a result, the evaluating model can tell whether the grid's ecological condition is good or not based on the amount of ecological service. So the model in this paper can serves as a quantitative method to evaluate the ecological condition in urban area.

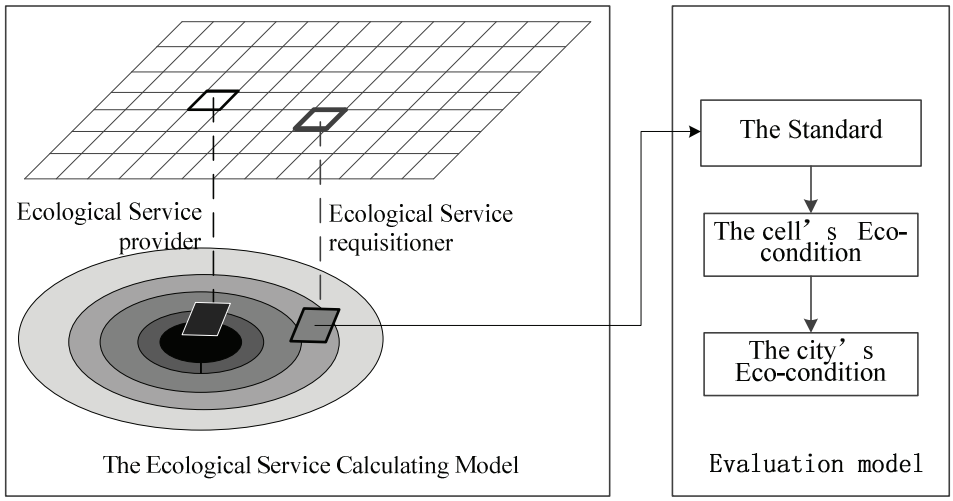

Fig. 1 The quantitative model framework

3. RESULT

Comparing with other evaluation results and certifying the model's effectiveness. Drawing some advices and suggestions to Shenzhen's ecological construction, based on the result.

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