
Exploration and Application of Three-dimensional Geographic Information Technology in the Protection Planning and Decision Making of Royal Tombs of Han Dynasty in Lu'an

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Abstract:

In the national key cultural relics protection units - cemetery Lu 'an tomb of great site protection plan, using GIS technology, on the basis of high resolution remote sensing images, digital elevation model and three-dimensional imaging model of cultural objects, through the full 3d visualization expression of the space, established the evaluation data, improve the scientific planning of the protection of cultural relics.

Keywords: Lu 'an royal cemetery, Protection planning, GIS, Visualization.

I. INTRODUCTION

Due to its ability to analyze spatial data and attribute data, 3d geographic information system makes up for the defects of pure graphics and text in original urban planning, and greatly improves the graphical representation of spatial data and spatial analysis of attribute data, providing an intuitive and rational planning tool for urban planning [1,2].

As a technical means and future development trend, in the practical application of planning, GIS can provide corresponding services in different business stages, and realize the functions of unified management of information, planning, analysis and decision, and display of digital achievements. And the function of analysis and decision is bound to greatly improve the technical content and scientific basis of cultural heritage protection planning. In the process of practice, the evaluation of its data analysis results is taken as a main objective. According to the specific requirements and implementation conditions of cultural heritage planning, in the planning analysis and decision-making stage, the accurate analysis of the data model is an effective relying tool to ensure and improve the planning accuracy and reliability [3].

II. OVERVIEW OF THE SITE GROUP OF LU 'AN ROYAL CEMETERY

The tomb of wang ling of the han dynasty is located in the south of the city of Lu 'an, with a

total area of about 15 square kilometers. In this range, the distribution of Double pier, Tall pier, Ma,da pier, Sanxing temple pier, the same shape of the north and south side parallel double tomb, the tomb between 500-1200 meters. These four tombs are huge, even like hills, and the local people call them "four pairs of eight piers". In addition to wang mausoleum, there are more than 40 mounds of different sizes in the royal cemetery. At present, it is rare to find the royal mausoleum area that is distributed and completely preserved like the state of Lu 'an, and can correspond to the genealogical records of four generations of princes. Therefore, the discovery of the mausoleum site of king Lu 'an is of great historical value for the study of the royal mausoleum system of princes in the western han dynasty. Secondly, it fills the gap in the history of the state of Lu 'an in the western han dynasty. The tomb structure, unearthed words and objects of the no. In addition, the royal tomb tomb area of the Lu 'an han dynasty is the royal tomb tomb group of vassal states in the western han dynasty. Its huge construction scale, complete preservation and exquisite unearthed cultural relics reflect the heavy burial style of the han dynasty, which provides material materials for the study of the funeral system and burial customs at that time, and has important historical value.

III. SPATIAL INFORMATION VISUALIZATION OF LARGE RUINS IN THE TOMB AREA OF LU 'AN ROYAL CEMETERY

In the traditional plane planning and design practice, there are often design defects that are not easy to find and hidden planning risks due to the lack of authentic on-site experience. Using three-dimensional visualization of geographic information technology, it can analyze the planning scheme and the relationship between the mountain and height, dimension, appearance of solution and the spatial relationship with the whole city were analyzed, and the more can from any Angle, direction and along any routes to compare different schemes, thus for the space Angle evaluation provides a more direct and effective means.

3.1 Selection and Establishment of Digital Elevation Model (DEM) and Satellite Image

The tomb area of the king's mausoleum in Lu 'an covers a total area of about 15 square kilometers, reaching hangbi canal in the north, baiyan river in the east, sancha river in the west, and south of qinglonggang in the south. Han rong with Shanghai railway passenger dedicated line (railway), for more effective analysis site memory status and a wide range of spatial relations, the location of auxiliary site form interpretation, especially the relationship with the river, so that the overall pattern of site there is a whole, the essence is understanding, support reserve demarcation, choose the DEM and satellite image map (figure 1) expanded for the west to the Pi river, east to the Pi river main canal, within the scope of the total area of 200 square kilometers. After processing and extracting the acquired data, and using the existing 1:100,000 topographic map, the vector map of the current situation of the tomb group and topographic map were superimposed (figure 3), so as to intuitively obtain the relationship between the tomb area of the king of Lu 'an tomb and the current topography and its surrounding environment. According to existing surveys, higher-grade graves are concentrated in the northern area, to the north of hewu railway, to the south of pishihanggan canal. At the same time, the scale and

spatial relationship data of several important single tombs are processed and processed on the 1:1000 large scale map obtained.

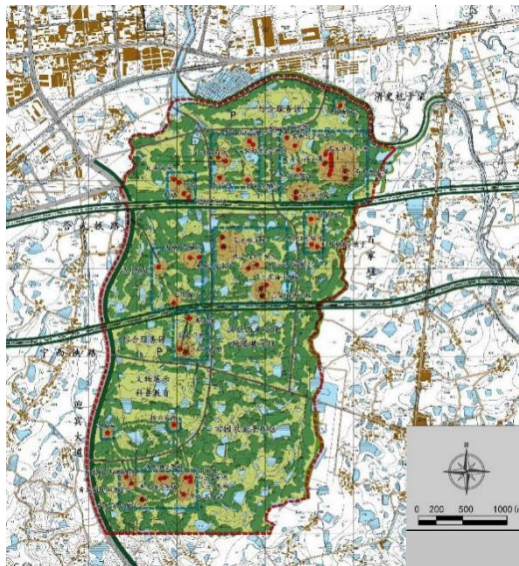


Fig 1: satellite images of the tomb area and the downtown area of Lu 'an



Fig 2: distribution of tombs, sites and relics in Lu, anshuangdun tomb area

3.2 Visual Analysis and Data Simulation

Spatial information visualization refers to the use of cartography, computer graphics and image processing technology, the geological information input, processing, query, analysis and forecast data and results of use of graphical symbols, graphics, figure, as combined with chart, text, tables, video and other forms of visual display and interaction theory, method and technology of processing.

The information in geographical space has broad scope, rich content and complex structure. In order to express, transmit and use geospatial information in a systematic and essential way, it is necessary to grasp their basic features. Visualization can grasp the basic features of geospatial information in a comprehensive and essential way and facilitate the most rapid and vivid transmission and reception of geospatial information. Therefore, spatial information is always inseparable from visualization. And visualization technology becomes the most important tool to read, understand and interact spatial information.

3.2.1 Three-dimensional Smudge Analysis

After data sorting and extraction, the DEM (Digital Elevation Model) is processed by GIS

software, and the three-dimensional effect is expressed by simulating the changes of geomorphology brightness and shadow (figure 3), which actually reflects the features of topographic relief. Through stereoscopic display properties, the characteristics of ground area, length, slope, slope direction, valley density and surface roughness can be intuitively displayed. On the whole, the royal tomb burial area is relatively high in elevation, and the tomb area itself is the highest in southwest China.

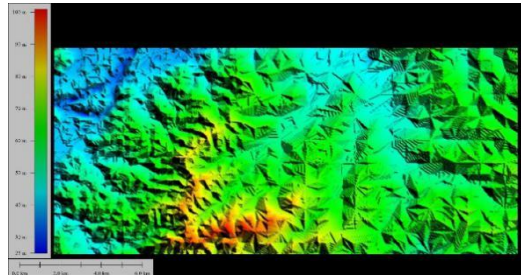
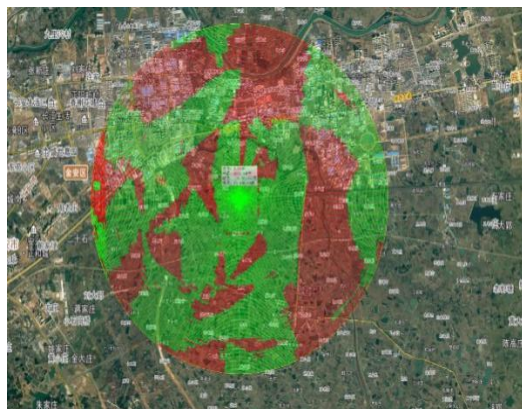


Fig 3: three-dimensional halo map of the tomb area and surrounding areas of Lu 'an royal cemetery

3.2.2 Visibility Analysis

Terrain visibility analysis is an important part of terrain analysis and an indispensable content in spatial analysis. The visible range of the earth's surface from one or more observations. Viewable analysis is based on the raster data set. For a given observation point, based on a certain relative height, the area covered by the observation point within a given range is found, that is, the range of the observation point. The analysis result is to obtain a raster data set and make a graph based on it. As can be seen from figure 4, the visibility within a radius of 4 kilometers is relatively good with shuangdun tomb as the center; the poor visibility in the northern and eastern regions is obviously affected by modern architecture; and the relatively high height in the southwest region is the reason.



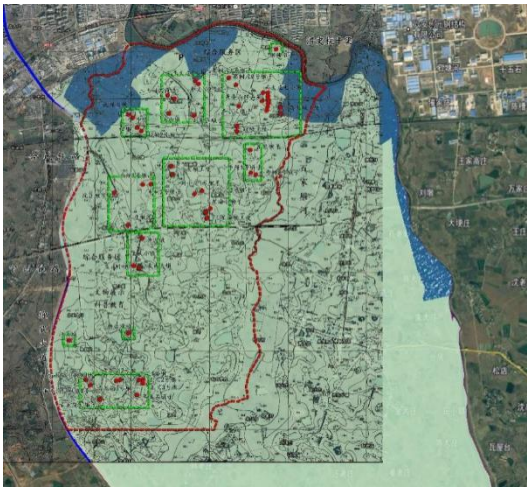


Fig 4: viewable analysis of Lu 'anShuangdun tomb

3.2.3 Flood Basin Analysis

According to the law of "south, left, north and right" of deflection force (that is, the southern hemisphere is left, and the northern hemisphere is right), rivers flowing from west to east in our country should flow to the right bank (that is, the south bank). Then the scour force generated by the river will scour the south bank, which, in turn, is prone to flooding. In this paper, the flooding simulation of pihe river, pihe main trunk canal, and the peripheral pishihang trunk canal of Lu 'an wang ling cemetery is carried out. The submersion model was passive submersion, and the surface water level was increased by 0.1 meter. The results showed that due to the relatively high elevation and a certain distance from the river, the royal tomb area was relatively difficult to be submerged (figure 5, figure 6), and the submergence gradually deepened from north to south.

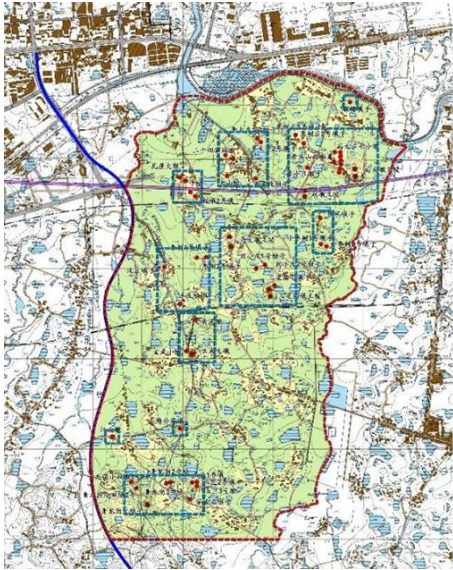


Fig 5: flood analysis of the Po river and the main canal of the Po river

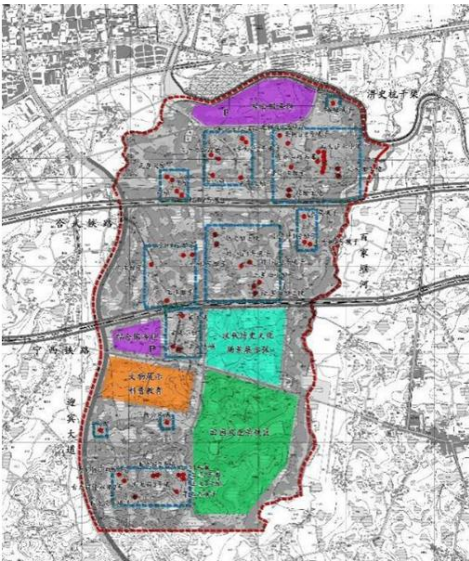


Fig 6: analysis of flood and inundation around Pi-shi-hang trunk canal of Lu'an wang ling tomb area

3.3 Connect the Evaluation Results of the Model with Various Plans, and Complete Special Plans

Cultural heritage protection planning is to evaluate the value of various cultural objects, and to plan the problems faced by the protected objects and the safe and necessary protection behaviors to be taken in the future. All relevant protection methods and measures should be based on effective and reliable assessment. Therefore, the scientificity and objectivity of the assessment directly determine the reasonable and possible operation of the corresponding protection scheme, and therefore determine whether the authenticity and integrity of the heritage and its whole value can be effectively protected. Large sites have a wide distribution area, rich historical information, multiple value levels and complex composition, so the extraction and expression of their spatial information have many professional requirements in exploration, mapping, planning and computer. It is necessary to integrate, analyze and visually express all kinds of nature and value attributes through geographic graphics, so as to provide data support and analysis and decision-making for the protection and planning work of Lu 'an royal mausoleum.

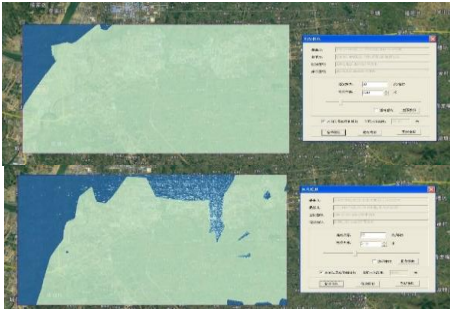


Fig 7: protection measures and service facilities planning of the tomb area of Lu 'an royal cemetery

IV. BEAR FRUIT

The exploration and practice of three-dimensional geographic information technology in the protection planning of wang mausoleum in Lu 'an is a successful application in the field of Anhui provincial cultural relic protection planning. In this paper, some technical analysis ideas and methods were listed in the planning process. Data analysis and the final simulation results laid a solid foundation for the determination of the protection planning scope, the setting of functional zoning and the formulation of protection measures, which effectively improved the reliability and accuracy of the planning. It can be predicted that 3d geographic information technology is bound to further promote the development of heritage conservation planning.

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