

PAPER • OPEN ACCESS

Beauty of Slope Land: Strategies and Practice of Slope Landscape Planning

To cite this article: Y Li *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **310** 022067

View the [article online](#) for updates and enhancements.



IOP | ebooks™

Bringing you innovative digital publishing with leading voices to create your essential collection of books in STEM research.

Start exploring the collection - download the first chapter of every title for free.

Beauty of Slope Land: Strategies and Practice of Slope Landscape Planning

Y Li^{1*}, R Zhang¹, D W Shen¹ and X Q Wang²

¹ Architectural and Urban Planning Department, Chongqing Real Estate College, Chongqing, 401331, China

² Artificial intelligence Department, Chongqing Real Estate College, Chongqing, 401331, China

* Corresponding author's e-mail: cqfdc2008@163.com

Abstract. In the process of slope landscape planning, landscape designers should fully combine local climate characteristics, excavate cultural connotations, integrate architectural functions, and use appropriate landscape order and rich hierarchical layout strategies to better integrate the artificial environment with the natural environment, so as to shorten the distance between man and nature, highlight local characteristics and attract resonance. In the practice of landscape planning project of Wuxi People's Hospital in Chongqing, the designers made full use of the summarized planning strategies and achieved the desired results.

1. Introduction

In the whole world, mountainous region accounts for about 1/5 of the total land area, and China's mountains account for about 67% of land. According to statistics, at least 50% of the cities and towns in China are mountainous[1,2]. Under China's policy background of "strictly abiding by the red line of cultivated land protection, ensuring permanent basic farmland to be maintained at more than 1.546 billion mu, and controlling the total scale of construction land to be within 40.7193 million hectares (610.79 million mu)" [3], landscape architects and relevant workers are required to make full use of all kinds of terrain, especially the mountainous land in construction land.

Considering the difficulty of construction and safety of use, it is considered that the gradient of human settlements in sloping farmland is generally between 3% to 50%[4]. According to the Code for Vertical Planning of Urban and Rural Construction Land in China, the slope of main functional places of sloping landscape is not more than 25%(as shown in Figure 1)[5]. Therefore, the ideal slope for creating sloping landscape is 3% to 25%. On the premise of safety, the slope can be more than 25%.

The mountainous ridge, steep ridge, gully and other environments on sloping land increase the difficulty of spatial layout and structural design analysis of landscape design. With the acceleration of urbanization process, the improper development of land resources has caused many questions, such as serious damage to mountain topography and landform, and the loss of localism characteristics of urban landscape. Therefore, this study summarizes the sloping landscape planning strategies, and applies them to specific project practice in order to provide reference for the construction of sloping landscape.



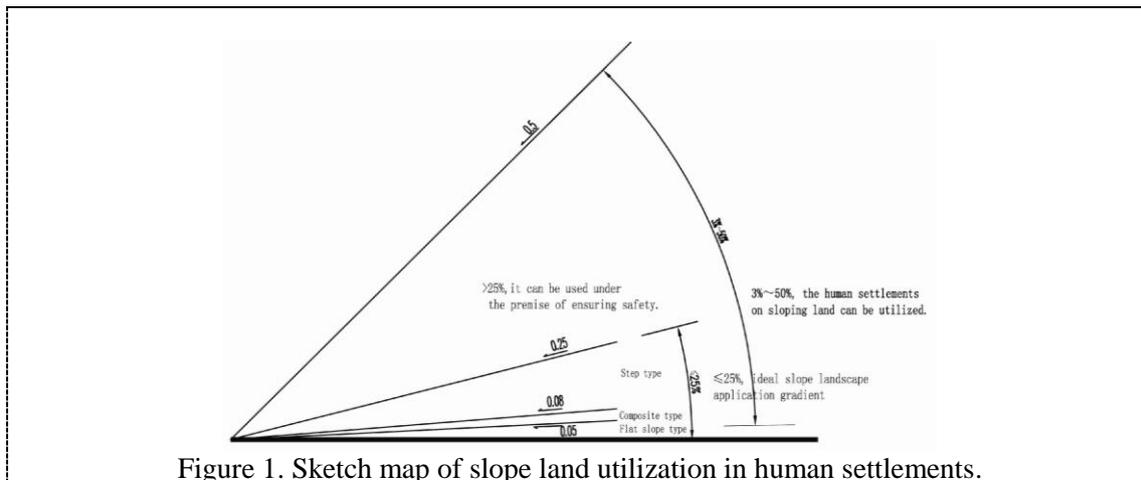


Figure 1. Sketch map of slope land utilization in human settlements.

2. Slope Landscape Planning Strategy

2.1. Considering local climate characteristics

Because of China's vast territory, the North-South latitude spanning nearly 50 degrees, the East-West longitude spanning more than 60 degrees [6]. There are not only a variety of temperature zones, but also rich dry wetland areas. In addition, the diverse topographic and geomorphological conditions also increase the complexity and diversity of climate. Therefore, in the landscape design of mountainous city slopes, the overall climate characteristics should be fully considered.

At the same time, due to the existence of elevation difference, it is easy to form local pressure difference and generate airflow on sloping land. In the design of sloping landscape, we should fully combine the sunny side and the shady side, and carefully design the recreational space which not only bathes in the sunshine, but also avoids the strong cold air according to the actual terrain. Designers should also carefully allocate plants to create a beautiful and pleasant micro-environment for all seasons.

2.2. Excavating Regional Culture

The historical and cultural connotations of different regions are their important "regional business cards". Under the impact of globalization and multiculturalism, urban regional culture is facing great impact. For example, some mountainous cities with local characteristics such as Stilted buildings, pillboxes, etc. [7], have been seriously damaged in the process of urbanization. Therefore, when creating sloping landscape, we should respect the original environment, pay attention to the protection and excavation of regional culture, build a sense of cultural identity, realize the integration of regional culture and global multiculturalism, and create a more resonant landscape (Fig. 2).

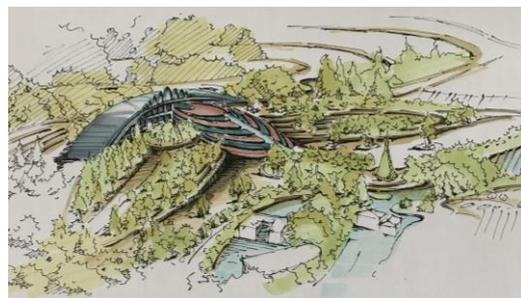


Figure 2. Sacred tree Vatican city Buddhist culture park scheme (Yunnan).



Figure 3. Teaching Building of Ewha Womans University (Seoul).

2.3. Integrating Architecture into Slope Landscape

Because of the complexity and changeability of mountain terrain, there are many constraints in urban design. Therefore, the architectural layout should be highly consistent with the natural environment in order to create a unique slope landscape. In the design, we should combine the characteristics of sloping land and adopt the landscape contrast of sloping land, which can not only save land resources, but also improve the environment, beautify the facade, enrich the relationship between virtual-essence and light-shade. The three-dimensional landscape is introduced into the architectural space to enrich the spatial changes, shorten the distance between man and nature, and reflect the coordination between the natural environment and the artificial environment (Fig. 3). Such careful design can not only enrich the landscape pattern, avoid the embarrassment of "one side of a thousand cities", but also bring more abundant activity space to the citizens.

2.4. Organizing Landscape Order



Figure 4. Santander Wetland Park (Cantabria).



Figure 5. Awaji-yumebutai (Osaka).

Because of the particularity of topography and landform, it is easy to scatter the spatial form when designing the organization and system of landscape order on slopes. In the process of planning, we should respect the original landform and use the natural and flexible landscape axis to form a unique landscape order. At the same time, in terms of functional organization, make full use of site characteristics and existing resources, so that each landscape in the site has its own characteristics and interrelated, forming an organic whole (Fig. 4).

2.5. Planning Landscape Layer

Landscape space on slopes is an open space with undulating topography, so it is particularly important to realize the freedom of landscape. In the overall layout and spatial level planning, we should break through the constraints of the plot, make full use of the terrain, and skillfully borrow the off-site landscape. At the same time, the landscape layout of the site should also consider the off-site borrowing scenery, so as to achieve the interaction between on-site and off-site, and achieve an open and transparent effect (Fig. 5). Appropriate layout can form near, middle and far orderly landscape horizons, while the ups and downs of the slope landscape can also form a rich multi-dimensional landscape space.

3. Practice of Slope Landscape Design

Wuxi People's Hospital Landscape Engineering Planning Project is located in the hinterland of the Three Gorges in the southern section of Daba Mountain, which is known as "the gate of Qin and Chu" in Wuxi County. Landscape designers adhere to the concept of "using visual design language, that is, using landscape form to highlight cultural connotations, creating a cultural carrier of hospital spirit and humanities", and use the combination of natural ecology and Eastern-Western landscape to create a theme of natural and non-natural dialogue - blending of the East and the West. Landscape design positioning is based on natural mountain forests and other original ecological environment landscape,

with Wuxi historical and traditional culture as its characteristics, the project will be built into a second-class hospital with treatment, recuperation and leisure as its main function (as shown in Figures 6, 7).

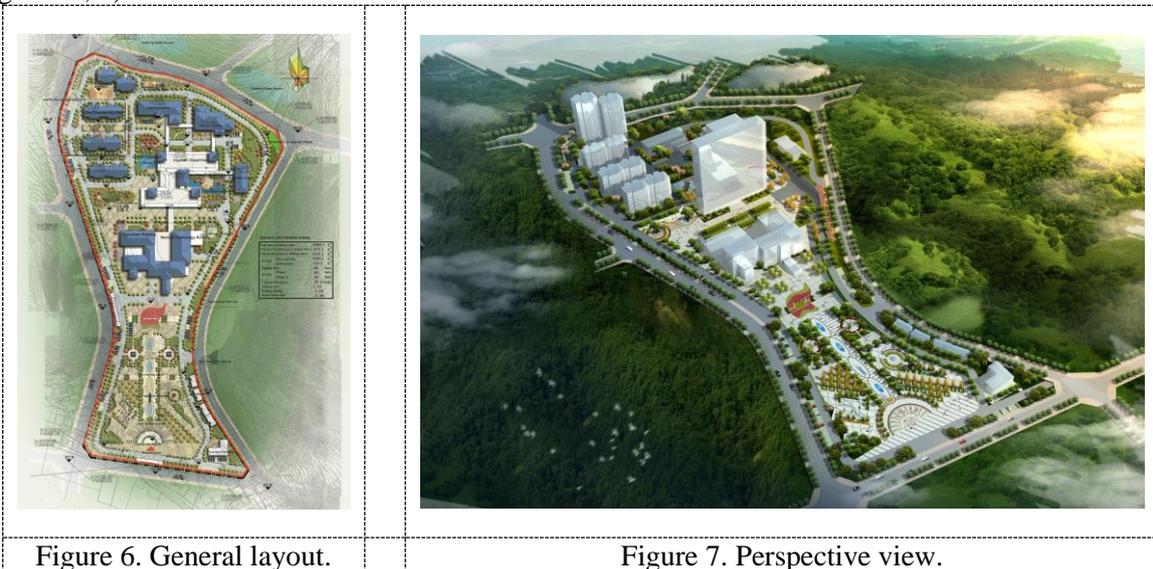


Figure 6. General layout.

Figure 7. Perspective view.

3.1. Climate Characteristics and Plant Allocation

Wuxi has a mild climate, distinct seasons, abundant rainfall and plentiful sunshine. Considering the local climate characteristics, the plant allocation is based on bamboo, and 13 landscape plants in Wuxi, namely Osmanthus fragrans, peach blossom, rose, peony, camellia, plum blossom, plum, banana, willow, magnolia, lamei, crabapple and maple, are taken as the landmark cultural plants in 13 villages [8]. Combining with the surrounding environment of the plot, we can create the beauty of the four seasons: rape blossoms in spring, azalea blossoms in summer, wild chrysanthemums in autumn and Chimonanthus stands tall in the winter frost and snow.

3.2. Culture Heritage

"The capital is far away and the past cannot be returned. Only ancient stones and gardens remain and float to the World". With "leaves" as the theme, it is mosaic on the ground and wall, which makes the mottled old stone wall emit jingling lights. Far-reaching fireworks, handed down from generation to generation, reflect the integration of Wu culture and Chu culture, resulting in the first great works of literature - "The Book of Songs" and "Chu Ci", and the artistic conception of "The Wind in Autumn, Dongting wave under leaves", which is the cultural and historical embodiment of Wuxi [9]. At the same time, from intention to reality, the landscape can be extended and endless associations can be generated (Fig. 8, 9).



Figure 8. Paving scene.

Figure 9. Landscape wall scene.

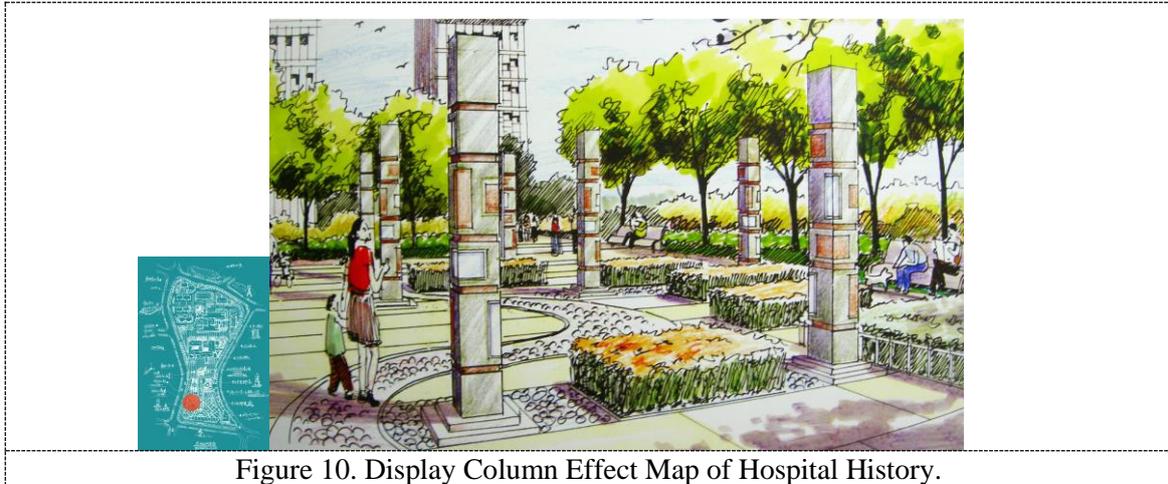


Figure 10. Display Column Effect Map of Hospital History.

In the aspect of building hospital humanistic spirit, according to the concept of "creating fine products and emphasizing model", the plane layout of European style is adopted, and the decorative flower pool and stone pillars of hospital history are used to form the space image of indoor and outdoor, looking at the high and low and examining the left and right. The deep relief between the pillars and the shallow wood relief chant the spirit of selflessness, dedication, no complaint and no regret. The Towering Pillar style makes people feel lofty and respectful, so as to achieve the goal of "garden for human transmission, garden for human spread; garden for human manifestation, human for garden model" (Fig. 10).

3.3. Function and Slope Landscape

The project site is located on sloping land, not only the geology is mostly rock, but also the land is relatively tight. Considering the cost and function requirements, the large-scale parking of the hospital is integrated with the sloping landscape, which enriches the landscape pattern. At the same time, it is conducive to vehicle evacuation. It also introduces the three-dimensional landscape into the parking space, so that the parking and the site will naturally integrate (Fig. 11).

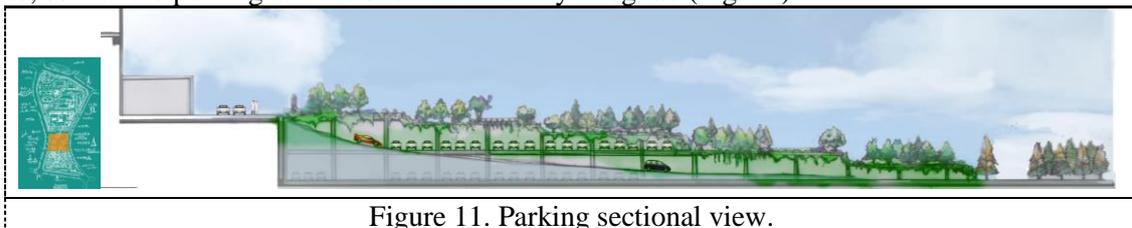


Figure 11. Parking sectional view.

3.4. Landscape Order Organization

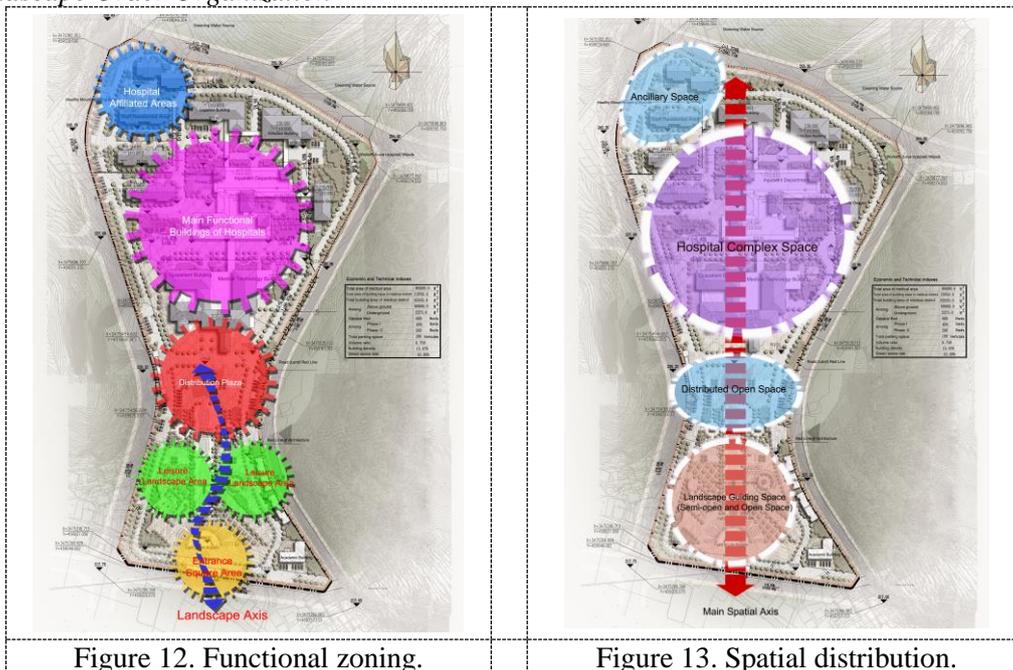


Figure 12. Functional zoning.

Figure 13. Spatial distribution.

In order to avoid the fragmentation of space form, the original terrain is respected in the process of conception, and the unique landscape order is created by using the natural and flexible landscape axis (Fig. 12). In the design of spatial order, it is divided into five functional zones: entrance square area, leisure landscape area, distribution square, main functional building group of hospital and affiliated area of hospital (Fig. 13). so as to make full use of the site features, and use the landscape to integrate all functional areas organically.

3.5. Layer of Landscape Layout

Relying on the high and low terrain of the block, the spatial layout of "one axis and five belts" is constructed. That is to say, the spatial axis of the north is higher than that of the south, the landscape guiding space belt, the distribution space belt, the theme building space belt, the living park space belt and the greening plant space belt.

The main axis of the park is from north to southeast, open from top to bottom, clear primary and secondary, order gathering and scattering; the square is flat, the ascent is steep, the light Avenue of life is expressive and naturalistic (figs. 14, 15), the water surface is stacked; The layers of layout recover and release, the mountains rise and fall regularly, and the scenery is moving and living.



Figure 14. Top view of light of life.

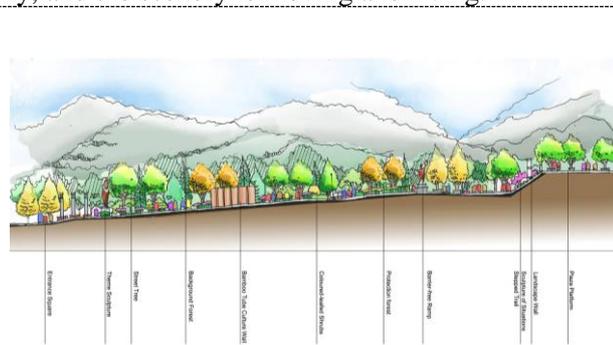


Figure 15. Sectional view of light of life.

4. Conclusion

In the practice of landscape planning project of Wuxi People's Hospital in Chongqing, designers fully

combined local climate characteristics, excavated cultural connotations, integrated architectural functions, used appropriate landscape order and abundant hierarchical layout, drew closer the distance between man and nature, and made better combination of artificial environment and natural environment. The project demonstrates the local characteristics and evokes resonance, and realizes the artistic conception of "thin-spoken scenes, long-lasting rhyme, harmonious thinking and environment, beyond image and returning it".

References

- [1] Huang, G. Y. (2002) Principles of Mountain Urbanology. China Construction Industry Press. Beijing.
- [2] Huang, G. Y. (1994) Planning and Construction of Mountain Towns and Environmental Ecology. Science Press. Beijing
- [3] State Council. (2019) Some Opinions of the State Council of the Central Committee of the Communist Party of China on Adhering to the Priority of Agricultural and Rural Development and Performing the Work of "Agriculture, Countryside and Agriculture". People's Publishing House. Beijing.
- [4] Xu, J. (2008) Urban Design for Ecological Adaptability of Mountain Towns. China Construction Industry Press. Beijing.
- [5] Ministry of Housing and Urban-Rural Construction of the People's Republic of China. (2016) Code for Vertical Planning of Urban-Rural Construction Land. China Construction Industry Press. Beijing.
- [6] Wang, J. B. etc. (2019) Spatial and temporal patterns of anthropogenic impacts of vegetation cover in China from 2001 to 2015. *Journal of Geography*, 74: 504–519
- [7] Yang, J. (2014) Slopes Landscape Design study on Mountain Urban Residential Areas . Master's Thesis of Chongqing University, 11–13.
- [8] Wu, B X, Deng, H. (2018) Research on the Spatial Characteristics and Protection Strategies of Traditional Villages in Bashu Taking Longxi Town,Wushan County, Chongqing as an Example. *Creative Design Source*, 21: 67–72
- [9] He, Y. (2016) A Rational Approach to the Protection of Wuba Mountain Witch Cultural Heritage [J]. *Journal of China Three Gorges University(Humanities & Social Sciences)*, 41: 1–5