

## THE CLASSIC CHINESE LINGNAN GARDEN IN HOUSING IN SUSTAINABLE DEVELOPMENT ----- A COMPARATIVE STUDY IN CANTON, CHINA

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### Summary

'Sustainable development', is becoming a popular terminology in China. During last twenty years, the whole country, especially Guangdong province, has been experiencing a high speed urbanization trend which accompanied with large-scaled housing development. In Guangdong province, the classic Lingnan Garden is well known for its harmony with the local subtropical environment. It has been imitated and implemented in the modern housing estates. This kind of 'culture heritage' practice is coincident with the principles of sustainability. The purpose of this paper is to investigate the specific relationship between the tradition and modern based on the sustainable development criterion by analyzing two famous gardens in Canton: Yuyin Garden and Kang Garden. Two issues are discussed in this paper: sustaining the garden construction philosophy or copying the pattern and feature. After a comparative analysis, the paper finds that the modern garden hasn't yet inherited the inherent quality of classic Lingnan Garden. Finally, this paper concludes that what should be sustained today is the garden construction philosophy which has a comprehensive consideration of human, nature and culture. It further recommends a better understanding to the classic Lingnan Garden and proposes some hints of applying the holistic concepts into the future housing development of Canton.

### 1. Sustainable Development: Regionality as a Culture Resource

Sustainable development addresses the continuity of the culture, especially in terms of responsibility to the future generation. In 1996, the second United Nations Conference on Human Settlements produced the 'Habitat Agenda and Istanbul Declaration.' It suggested that sustainable development of any human settlement should protect and maintain the historical, cultural, and natural heritage, including traditional shelter and settlement patterns, as appropriate, of indigenous and other people (UN, 1996).

Culture enables people to survive in a particular environment, to express themselves in relation to it – although there is no guarantee that they will operate in harmony with it. Culture concerns our consciousness of the world, how we understand it and how we act in relation to it (Flint and Morphy, 2000). In 1997, the ETH Wohnforum brought up a conceptual framework for sustainable urban development. It composed of six layers: they are, from bottom up, physical and chemical systems, biological systems, human systems, social systems, and cultural systems (Hugentoble and Bräendle-Ströeh, 1997). In the cultural system, the framework concentrates on ways in which the project enhances the adherence, advancement, and diffusion of agreed upon values, rights, and norms. One of the questions is 'In what way does the project preserve the cultural heritage and the achievements of past generations?' It includes three aspects, such as how does the project deal with the cultural landscape, traditions, and the historical heritage of those involved.

From the sustainable development point of view, culture is the mental and material wealth of the human society, and it should be inherited and recreated (Jacobs, 1993). Preservation of cultural heritage can also be treated as a kind of behavior and knowledge (Jia, 2001). Cultural heritage preservation involves the preservation of the physical heritage of living societies, including their buildings, structures, sites, and communities. When cultural heritage preservation is applied to living societies, it seeks to assist groups with retaining, understanding and enjoying their cultural identities. For example, place is defined as 'a building or

space devoted to a special purpose' and culture can be the skills, arts, etc. of a given people in a given period or civilization ([www. cr.nps.gov](http://www.cr.nps.gov)).

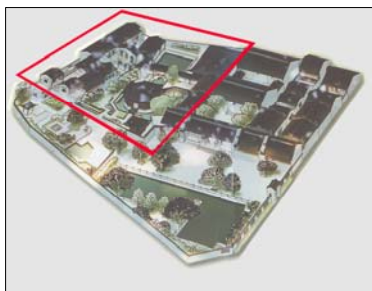
In China, Lingnan culture is famous for its garden art and decorative carving skills. The garden art in this region is the so called 'classic Chinese Lingnan garden type.' It beautifully demonstrates the relationship between a place and its culture: what are the special identities of the place and the special culture generated from the place? Some scholars suggest that the classic Chinese Lingnan garden type could be imitated in today's new housing construction in Canton (the provincial capital of Guangdong province) because its pattern suits local climate and lifestyle very well (Lu, 1999; Xiao and Hu, 2002).

## 2. Significance and Methodology

China is now experiencing a high speed urbanization trend which has been accompanied by large-scale real estate development. Take Canton as an example: a large-scale and multi-level new residential district has evolved in the southern suburban area which is attached to the downtown. A Large portion of housing investment has been spent on landscape construction, including importing foreign plant species, paving and maintaining large areas of lawn in order to achieve a high green-rate of the estate. In fact, most of the estates in Canton have already exceeded the national 'greenery-coverage-rate' criterion of 34%. However, people are still complaining about the poor quality of their residential landscape arrangements. For example, they cite large lawns with a low biodiversity, which turned out to be tedious in appearance; poor shading in hot summer caused by the dominant concept of 'how it looks,' rather than 'how it works.' Residential landscapes are mostly designed for visual pleasure (He and Jia, 2003; He and Jia, 2004). Therefore, building up a sustainable and comfortable residential environment has become an urgent issue in Canton's current housing development.

A classic Lingnan Garden is an ancient garden pattern which developed in South China's subtropical climate. It belongs to the private residential garden in China and shows a very close relationship between housing and human habitation (Zhou, 1999). It is also called the Lingnan housing garden (Lu, 2000). It is very famous for its low energy input, comfortable living environment, as well as its variable plant species. In Canton, there has been much research related to the Classic Lingnan Garden, such as the discussion about the relationship between the Lingnan Garden and human settlement (Lu, 2000), green culture in Lingnan Architecture (Xiao and Hu, 2002), the art of the Lingnan garden (Li, 2000; Lu, 2003), etc. However, most of the present studies lack practical tests and have even less connection to sustainable development. What aspects are the key points which should be learned and utilized according to sustainable development? Has the Lingnan garden culture been comprehensively revitalized in modern housing development? The purpose of this paper is to find the distinguishing characteristics of the classic Lingnan Garden, which have a tight link with sustainable development, and develop concepts and patterns which might be useful in today's housing development.

The research methodology in this paper is that of a comparative study. Both selected cases belong to the Lingnan Garden type and both for residential purposes (Fig.1). However, they present totally different situations in total area, garden size, density, and housing type. Yuyin Garden, located in Canton, is one of the four great famous gardens in Guangdong province, which was built in 1866 (Qing-Dynasty). Kang Garden is a residential garden in a modern housing estate in Canton, built in 1998. Its design is based on a classic Lingnan type garden.



a)



b)

Figure 1 Images of a)Yuyin Garden and b)Kang Garden

In this research, the two gardens are compared, based on the classic Chinese Lingnan Garden construction philosophy and approach which is widely known in China in order to find out whether the traditional culture has been vigorously revitalized in terms of modern residential garden culture; how to adapt the traditional concept (originally intended for low-rise courtyard houses) to a large-scale and highly dense housing estate. This paper is a preliminary study on Lingnan Garden culture. It will mainly focus on the design aspect of the physical environment in the housing estate, and the social issues will not be included at this time. Some possible implementation methods, as well as limitations, will be discussed in the final part.

### 3. Classic Chinese Lingnan Garden

The Chinese garden has a long history. As one of the branches of the world garden system, it has some distinguishing characteristics compared to gardens that are found in other countries. It integrates buildings and flora with rockeries and water, combining natural beauty and artificial scene in one, thus forming the unique character of garden construction (Lu, 2003; Shi, 1998; Zhou, 1999). It originated from nature, but it is superior to it; it wonderfully combines the art of architecture with natural beauty in a fixed space; it encourages artistic conceptions which are inspired by poems and paintings, as well as the themes of the gardens. These are the four aspects of the traditional Chinese garden. The Lingnan garden is one of the forms of Chinese gardens; it has a regional feature, due to its specific geographical environment and the social customs of the Lingnan region (Lu, 2003). In the Lingnan garden, entertainment and leisure are combined as a whole; it pays attention to the mutual harmony of human and nature, building and landscapes, life and ecology as well. The Lingnan Garden creates a very comfortable living environment for the people who reside there. It is also famous for its artistic conception of natural returning (Zhao, 1997).

The Lingnan garden used to be private and located within highly dense housing construction. In these gardens, plants were carefully selected and landscaping designed in an ecologically sensitive way, responding to the subtropical climate of South China. Various and intensive plants, ponds, architectural construction, stones, and terraces integrated and performed clear ecological functions: (1) reducing the reflection of sunlight and providing shade for the architecture; (2) forming a micro climate with a central water body; (3) creating a lively outdoor space for the residents; (4) the planting of some fruit trees for the enjoyment of the residents; and (5) having the potential to form a self sustaining micro-ecosystem.

Following are the aspects of a Classic Chinese Lingnan garden and they will be used as the criteria to elaborate the case later.

#### 3.1 The Philosophy of Garden Construction

Qi Lu has raised three main principles of garden construction philosophy in his book *Art of Lingnan Garden*, which have been cited in this paper as the criteria.

Emphasis on regional characteristics. Lingnan garden construction prefers the layout of garden courts or courtyards. This is because of the influence of climate. The Lingnan region has a subtropical climate; it is very hot, with high humidity. Therefore, the local Lingnan people like to set courtyards or garden courts in their houses for the purpose of adjusting the micro-climate. Thus, planning a Lingnan garden involves serious consideration in terms of the climate factor; thought is given to the garden location and layout, such as the orientation of the house, ventilation, how to avoid too much sunshine and heat, and the insulation of the house, etc.

Combination of humanistic and natural elements. The Lingnan region has a diversity of beautiful natural locations which affect the aesthetic tendency of garden construction. The priority in setting a garden is the location selection, which can best show the aesthetic tastes of the owners. Then is the humanistic spirit expression in the garden, such as the horizontal tablet with inscriptions and antithetical couplets, which are artistic conceptions of sublimation of the garden theme.

Commitment to practicality in garden-building. The practicality of the Lingnan garden was mainly shown in the close relationship between garden building and people's daily lives. The Lingnan garden is mainly for enjoying life and for entertainment, so its layout is well integrated with the housing and recreation area. Meanwhile, Lingnan is also a region which produces plenty of fruit. Therefore, another characteristic of the Lingnan garden is the planting fruit trees.

#### 3.2. Garden Construction Approaches

Following are the main approaches which are widely recognized and used in traditional Chinese garden construction (Lu, 2003; Shi, 1998; Zhou, 1999).

Piling rocks and distributing water body: They are the most important approaches in garden construction. Rock and water are the basic factors of Chinese gardens; they are a metaphor for the skeleton and blood of a garden. The purpose is to imitate nature in the man-made landscape garden.

Layout of plants: Plants are also a key element in a Chinese garden. It is not only for visual pleasure, but also for creating movable scenery in the garden, thus enriching the space. Plant selection should follow the requirements of indigenous plants; they should be appropriate for their location and the surrounding color, etc.

Layouts of buildings: In a Chinese garden, hills and water bodies are the main elements, and buildings are the secondary ones. The layout of the building should combine very well with the hills, water bodies, plants, and different scenery spots.

#### 4. Case Comparison

Yuyin Garden is a residential garden that belonged to Bing Wu, a senior official of the Qing Dynasty. It is famous and attractive because of two significant characteristics. One is the good design and ingenious layout in terms of architecture and landscape. The other is the scholar element. Each step is seen as a single scene which links with the others, one by one and endless. Yuyin Garden is a superior example of ancient garden architecture and landscape art in South China.

Kang Garden is an imitation of the classic Lingnan Garden. It was developed so as to use traditional culture to attract consumers in order to obtain a remarkable result: 200 flats sold in one day, reaching a best sell record. It seems that traditional garden culture still retains its charm and feasibility in contemporary applications. It has also become famous in Canton because of its adapting the traditional concept to a large-scale and highly dense housing estate.

The two gardens have a gap of 132 years between them, and present different characters in the following aspects (Table 1):

Table 1 Basic information of two gardens

	Yuyin Garden	Kang Garden
Total area	1598m <sup>2</sup>	40500 m <sup>2</sup>
Garden size	1280 m <sup>2</sup>	6890 m <sup>2</sup>
House hold(s)	1	983
Plot ratio	0.2	2.8
Building type	One floor building	Ten floors building

The density and household numbers have changed a lot. It is very important to investigate when the population density changed and household numbers increased; how do we use the traditional way to solve modern problems? In what way can we sustain the traditional culture?

#### 4.1 Philosophy of Garden Construction

Emphasis on regional characteristics: Because of the hot and high humid climate, serious consideration had to be given to the climate factor in Yuyin Garden. The prevailing wind in Canton in summer is from the southeast and in winter it is from the north (Fig.2). In a classic Lingnan Garden, the layout of the garden or courtyard has a common characteristic, which is the architecture in the front (south) is lower than at the back (north). This is a frequently used method in garden-settings in Lingnan because it can allow the south and southeast winds in summer to go across the courtyard and it blocks the north wind from entering in winter.

The major buildings in Yuyin Garden are mostly facing toward the summer dominated wind direction and, combine with the corridor, patio, courtyard, etc to achieve good natural ventilation. In Kang Garden, the high buildings block the natural summer wind from the southeast direction, which makes the central garden more humid in the summer. Meanwhile, the lawn and plants in front of the northwest building are easily die in the winter time. This shows how important the garden layout is, according to a successful residential environment (Fig.3).

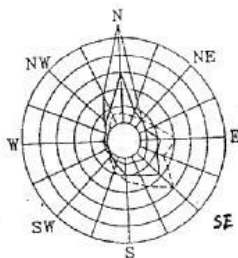


Figure 2 Wind rose of Canton  
(winter: solid line; summer: dotted line)

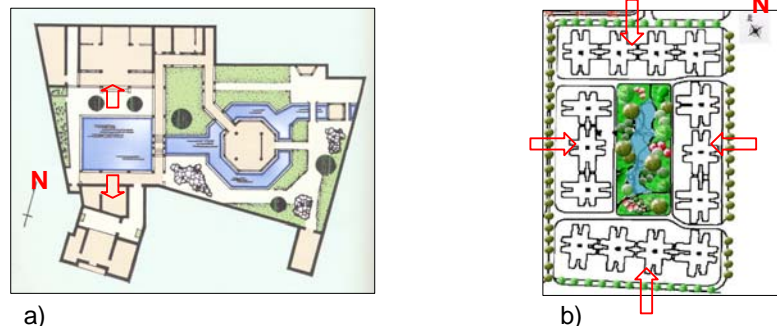


Figure 3 Garden layout plan of a)Yuyin Garden and b)Kang Garden  
→ Building entrance orientation

The landscape in Yuyin Garden has an intensified relationship with the architecture in the garden. The plants can be found either at the roof terrace, in the water, or along the foundation. The landscape is part of the daily

life and people can enjoy it everywhere. While in Kang Garden, the landscape is centrally located and the building entrances are on the opposite side of the garden and away from each other (Fig.3). They are separated from residents' daily activity except for visiting purposes.

The water body in Yuyin Garden was made without artificial water leakage proof at the bottom, so it directly attaches with the soil and the underground water, which has proven to be more ecological and cheaper than in modern gardens. In Kang Garden, the central water body is the only water surface in the garden, which is away from the residential building. Therefore, it is not there to cool the surrounding architecture. Tap water and recycled grey water are the main resources of this artificial water leakage proof pond (Fig.4).



a)



b)

Figure 4 The bank of water body in a) Yuyin Garden and b) Kang Garden

Summary: The traditional living pattern in south China is 'courtyard surrounded by housing.' Therefore, the courtyard becomes a pleasant outdoor space for the residents and thus, forms a private and quiet residential environment. In the high-rise building, it is also found that the performance of courtyards depends greatly on detailed treatment when analyzing thermal comfort and energy consumption (Givoni, 1997). From table 2, it is easily found that the designers of the Kang Garden neighborhood didn't consider carefully the regional characteristics. Although it is a high density neighborhood, the landscape proportion can be increased by designing a roof garden at the building design phase, and including climbing plants. Site investigation is also very important at the design phase in order to set the building reasonably, thus creating good ventilation for the whole neighborhood. Meanwhile, the buildings should have a connection with each other and an easy approach to the landscape. When there is a waterbody in the neighborhood, the ecological and natural way should be encouraged. Water, soil, and the surrounding plants may help to develop an ecological community.

Table 2 Garden components comparison

	Yuyin Garden	Kang Garden
Residential form	Garden surrounded by building	Garden surrounded by building
Proportion of landscape: housing	4:1	1:5
Courtyards distribution	Attached open spaces outside the wall's line; internal courtyards; semi-enclosed spaces	Centered only
Garden layout	Northwest-Higher, back Southeast-Lower, front	At the same horizontal level
Building Orientation	Southeast: Facing to the garden	4 different direction: northeast, southeast, southwest, northwest All opposite to the garden
Building connection	Continued open corridor	Separated
Water body	Direct to the soil	Artificial water leakage proof at bottom

Combination of humanistic and natural elements: Yuyin Garden is small in size. But it is elegant and delicate, deep and serene. The name 'Yuyin Garden' means ancestral beneficence villa. There is also an antithetical couplet in the garden which uses 'Yu' and 'Yin' as the initial corresponding words in order to request that his ancestors pray for his descendants. Kang Garden also has its theme. 'Kang' in Chinese means health. There

are some healthy facilities inside the garden, such as the oval-shaped pebble pavement pathway for the residents. The name gives the garden a soul.

Yuyin Garden represents a layout of buildings surrounding the garden. Kang Garden is the same. This is a pattern in which buildings are placed around the garden and, thus, walls and corridors form an enclosure. However, the two gardens are different in detail. In Yuyin Garden, different scenery is created in each step through the array of rockery, bridges, and plants. Using the continued open corridor is another main approach in a Lingnan garden. The corridor can not only connect the different buildings in the garden, but it also separates variable spaces. The aesthetic framing scenery enriches the space of the garden, making the landscape appear more like a painting and diversifying the space from 2-Dimension to 3-Dimension. The vertical landscaping in Yuyin Garden is more plentiful than in Kang Garden. Lianas climb on the canopy and building side, potted plants are located on the fence, and bamboo is planted by the side of the wall to enrich the vertical scenery. The landscape in Kang Garden is simple in these aspects and far away from the criteria of a traditional landscape (Fig.5)

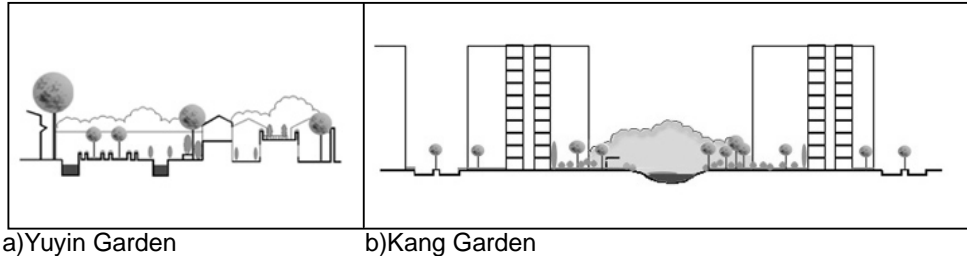


Figure 5 Landscaping sections comparison of a) Yuyin Garden and b) Kang Garden

Summary: The aesthetic tendency of a garden setting in Lingnan is mostly affected by landforms and scenery in the region. The beautiful natural environment has brought two advantages to garden building. One is that real scenery becomes the materials and the imitated model in the garden; the other is that the garden can be built right in the beautiful environment, for example temples. However, it is very difficult to find such a good place for the residential purpose. Therefore, people usually hope to imitate nature in their small gardens. Both of the gardens use rock arrangement, plants, and water body in order to form a pleasant natural environment. Due to the land limitation of the modern housing development, residential landscape will have the tendency of evolving from horizontal to the vertical. In this point, a classic Lingnan garden has already given a good example of implementing a vertical landscape in the real world. Roof gardens and climbing plants are the possible choices for modern housing estates.

Commitment to practicality in garden-building: Due to land restrictions, Yuyin Garden is in a small scale with residential and garden areas integrated. The irregular landscape and housing distribution make a more flexible and diverse space, which provides joy to the people who live there. The landscape practicality in Kang Garden is very low, not only because the building entrance is opposite to the garden, but also due to the fact that the monotonous space variation and plants species.

Summary: Practicality in a Lingnan garden was specifically shown in the forms and patterns which are not restrained by tradition and emphasize appropriate use (Lu, 2003). It is a good point for the modern, tense land use situation. Landscaping can be arranged everywhere in order to get the full use of the space and the land. Architecture can be used to separate variable spaces and help people to enjoy life in the garden and escape from the rain and sunshine. Lingnan is also famous for fruit production, for example, Longan and Litchi. Planting of fruit trees in gardens is one of the characteristics. There are more fruit trees in Yuyin Garden (3 species) than in Kang Garden (only 1 species). This kind of simple natural happiness should be encouraged in modern housing developments and it is easily implemented.

#### 4.2 Garden Construction Approaches

Piling rocks in the gardens is of great artistic charm. It not only links the scenes, but also organizes the spaces in the garden. Because of the size limitation of the Lingnan garden, it is uncommon that a rockery alone is made as the major landscape, but mixtures of ponds, buildings and plants are used to form the scene of the garden. Therefore, though small, the garden has great variation due to the rockery in it. In Yuyin Garden, the Ying Stone is used in the rock arrangement (like Eagle Mountain) or just scattered here and there, forming a group of settings with the walls and bamboo. In Kang Garden, piling of rockery is used for more than the purpose of decorating: there is an electricity facility located in the middle part of the garden; the rockery is set there to hide it.

As an important component of the gardens in the Lingnan region, water, is a necessity for almost all the Lingnan gardens. In Yuyin Garden, a water body occupies one third of the total garden area. It is used to divide and organize the space. Different from the other Chinese gardens, a Lingnan garden applies geometrical shapes in the garden setting. Lingnan gardens have been influenced by exotic cultures during the

long history of foreign communications, ever since the 'Silk Road' era. Therefore, the water body of Yuyin Garden displays a geometrical shape which is different from Kang Garden (Table 3).

A Lingnan garden prefers to use large and beautiful trees and shrubs to provide intensive shadows. It uses flowers, bushes, and small plants for covering, but seldom uses grass. Although the total area of the Kang Garden neighborhood is 25 times that of Yuyin Garden, the latter embraces a similar number of plants species number as the former one (Table 3). Three fruits trees can be found in Yuyin Garden, which has a history of over one hundred years.

Table 3 Comparison: Piling of rocks, layout of water and layout of plants

	Yuyin Garden	Kang Garden
Rockery type	Piled-up rocks; scattered rocks	Piled-up rocks
Rockery amount	4	1
Purpose	For enjoying (fig.6)	Decorated for the electricity facility of the neighborhood (fig.7)
Water area	1/3	1/5
Water resource	Natural water	tap water and recycled grey water
Water body shape	Geometrical	Natural and organic
Plants species	27	31
Indigenous species	27	30
Fruit tree species	3	1
Labor management	1 people	4 people
Vertical landscape	Yes	None

Summary: From table 3, it is evident that Kang Garden has implemented almost all the garden construction approaches in its process. However, the construction philosophy is still far below the criteria. Compared with Yuyin Garden, Kang Garden shows differences in the following aspects: a) Ecological layout according to the wind direction; b) Intensified relationship between buildings and landscapes; c) High mixture of local species; d). Water layout and pavement; and e). Vertical landscaping. Therefore, it can not provide as a good micro climate environment and plentiful open space for residents as a classic Lingnan Garden. In addition, the lawn in Kang Garden is another major drawback. Large lawns will intensify both the summer heat and winter wind. It is unsuitable for Canton's subtropical climate. And the lawn may easily die in the winter time. The lawn in the north part of the Kang Garden neighborhood has been replanted 3 times in the past 4 years.

## 5. Concluding Discussion

In conclusion, Kang Garden is a result of imitating the construction approach of a classic Lingnan Garden, rather than learning the philosophy. According to the modern urban housing development, a classic Lingnan garden type may have an inherent limitation in terms of implementing the construction approaches in today's practice, such as the rockery piling and the water layout techniques. Through the comparison between a classic Lingnan garden (Yuyin Garden) and a modern residential garden (Kang Garden), it is illustrated that what we should sustain is the PHILOSOPHY, besides the technique. The building layout, the relationship between building and landscape, location and orientation according to the wind, encouraging indigenous plants species and fruit trees, as well as more ecological designs are particularly important.

However, there still remain some difficulties in applying the traditional philosophy in modern development due to the economic profit goal and people's extravagant attitudes. Up to now, the approach of incorporating foreign cultural characteristics to residential landscapes has been just a means for attracting consumers and making more market profit. Consumers seem to like this approach because they hope to experience different cultural backgrounds. How to keep the inherent continuity between non-local culture and local traditional culture becomes a challenge. Property companies prefer high plot ratio and are not willing to set up roof gardens. Manager companies are not willing to put so much effort into taking care of climbing plants. But the fact is that it is difficult to meet residents and house owners who are demanding clean and tidy, modern styled gardens. For example, some residents complain of "bad management" because they saw leaves or grass turning yellow in winter, which is actually a natural phenomenon of deciduous plants species.

Sustainable development treats human wealth as a kind of resource. Cultural heritage is one of the important resources which can be easily destroyed and is non renewable. Local garden culture is also approved to be the living type which best suits the place. Modern people should change their attitudes toward traditional culture and, thus, the classic Lingnan Garden could be regenerated in the future housing development of Canton, China.

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