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Study on Green Residential Space Design

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Abstract. With the ever-changing nature, green ecology has become an international trend of thought. Nowadays, the green ecological design of residential space has become the main melody of people's life. Designers always implement the concept of ecological and environmental protection in the design process, attach importance to the ecological effect of residential space, carry out reasonable budget and use of environmentally friendly decorative materials, reduce the waste of materials, save money and save resources at the same time, and protect the environment. At the same time, people began to put their hopes on the residential space design, which made the green residential space design began to prevail. With the bold exploration and practice of designers, the design of green residential space will be endowed with more distinctive characteristics and unique connotations. Starting from the concept of green design, this paper explores the method of green space design through typical analysis.

Keywords: Green, Residential space, Haze.

1. The Concept of Green Residential Space Design

Residential space refers to the artificially created environment, which is the place where human beings live in the big environment of nature. The traditional concept regards residential space as only a place to provide rest. However, with the change and development of society, the ecological concept of "people-oriented" has been gradually accepted by people. People began to gradually pay attention to their own lives, and put forward higher requirements for residential space not only requires functional perfection, but also hopes to be more comfortable and ensure the health of residents. Therefore, the green house gradually into people's vision [1-3]. Green residential space design refers to the design or transformation of the space environment in which people live by integrating the laws presented by nature. In the green residential space design, designers adhere to the "people-oriented" ecological design concept, on the basis of more attention to the health of residents, put the design focus on the sustainable development of human beings, and improve the concept of green ecological residential space design [4].

2. Analysis of Green Residential Space Design

1. The function and use of housing is to shelter people from the wind and rain. In addition, the living environment that human beings need also needs air and sunlight. Therefore, the interior must be ventilated and lighted. The difference between green house and ordinary house is that in addition to meeting these basic conditions, we should also consider the integration with ecology. From the point of view of protecting the environment, reduce the pollution of decoration materials to the environment. The principles of ecology should be applied reasonably to the planning and design of green houses, and everything should follow the ecological principles of sustainable development in the process of decoration. The effective use of space in space layout, water saving, electricity saving, throttling and so on, including the selection of decoration materials and decorative materials will be different from ordinary residential buildings [5-7].
2. In the process of construction of the overall building, noise reduction materials need to be used for effective sound insulation. For example: mineral wool sound-absorbing board. The interior space of the house, especially the bedroom, should be kept below 40 decibels after the window doors are closed. Otherwise, it will affect the sleep of the occupants, making them irritable and heartbeat racing. The choice of indoor materials can be considered to choose a soft floor, indoor layout of some cloth can also effectively eliminate noise.
3. To ensure that the residential space ventilation is good, natural ventilation vents to ensure that more than 8 percent of the floor area of the room, especially in our northern regions. Opening the window can not only ensure the circulation of indoor air, but also make the vision of the occupants become open, and the line of sight must be avoided between the building and the building. If there are two or more bathrooms in the house,

ensure that at least one of them has a window. And to install a ventilation system in the bathroom, it is best to install air monitoring and other devices.

4. The north is generally installed heating systems, geothermal, heating and so on. In hot places, air conditioners are installed, and residents can adjust the temperature of the air conditioner according to the temperature of the room. Indoor also do a good shading, because the summer sun will shine directly through the Windows of the house into the room, if sitting on the sofa watching TV is lit directly at this time, it will seriously affect the vision, causing damage to the eyes. Of course, we can use solar energy, we can install indoor humidity through energy storage in the bedroom, and improve the air quality of the house.

3. Principles of Green Residential Space Design

The modern residential space environment is to regulate people's spiritual life after work. Therefore, in the design of green residential space, designers should design according to the actual situation of residents' life and work.

1. The residential space pays attention to green aesthetic.
   The green ecological design of residential space needs the attention of the whole society, and we need to reach a consensus on the green ecological concept, and establish the green aesthetic in the residential space. This kind of green aesthetic is to dig deeply into people's traditional aesthetic, and finally absorb the concept of green into the aesthetic, forming a harmonious and symbiotic green aesthetic. The design of residential space should achieve the unity of internal structure and external function, and "ecological beauty" is an external expression. In the design of green residential space, the ecological beauty to be shown can be summarized with idioms, that is, "wisdom in the show outside." The "wisdom" here refers to the reasonable and sound ecological structure; "Xiu outside" refers to ecological beauty. Without the sound ecological structure, there can be no ecological beauty. And that kind of appearance looks good, in fact, there is no value of the design. I think, whether from the traditional point of view, or from the modern aesthetic point of view, it is not beautiful, you can say that it is not the real sense of beauty [8-10].
2. The use of renewable energy in residential space.
   The world's population is constantly growing, and energy resources are decreasing, forcing mankind to urgently solve the problem of energy shortage. More and more people begin to pay attention to renewable energy, such as: solar energy, light energy, biogas and so on. And a variety of "inexhaustible" energy sources throughout human history. Of course, the renewable energy here does not include limited energy sources such as fossil fuels and nuclear power.
   A. Use of solar energy.
   As early as the Warring States period, China began to use solar energy. People use reflected sunlight to light fires; Use the heat of the sun to dry some produce. So far, the use of solar energy is increasingly extensive, and the utilization of solar energy in China has ranked first in the world. As a renewable energy source, the use of solar energy is mainly in two aspects: one is to convert it into heat energy, and the other is to convert it into electricity. To date, solar energy is considered to be the most efficient renewable energy source, and the main application areas are manifested in two main areas: heating and lighting.
   Heating: The use of solar heating can be divided into passive solar heating and active solar heating. Passive solar heating mainly relies on the construction of the building itself, such as: ceilings, walls, floors, etc. Do not use other mechanical equipment to complete solar heat collection and cooling; The most common is to install heat-absorbing panels and heat-reflecting panels in the ceiling design, which can store heat energy and release heat energy at night or in rainy days. The advantage of this passive solar heating is that the building process is simple, but in winter or in the cloudy environment of continuous low temperature, auxiliary energy must be increased. Active solar heating is more flexible and convenient than passive heating, which is composed of solar collectors, radiators, pipelines, heat storage devices, etc., including a forced circulation solar system. Therefore, in the early stage, its investment is relatively large, and the technology is relatively high-end and complex [11-13].
   Lighting: Solar lighting, including natural lighting, is to let natural light into the building, this way of lighting is clean and safe. Generally, the method of designing the window of light is reasonable; The use of new technologies to expand natural light, such as: optical fiber or optical tube high light transmission and so on. In the design of green residential space, solar energy can make indoor landscape plants grow normally under photosynthesis. Solar energy can also be used to heat water, and this solar heated hot water can be recycled indoors.
   B. Use of other energy sources.
   In addition to solar energy, some renewable energy such as wind energy, tidal energy, ocean current energy, wave energy, geothermal energy and so on are also very important to us and can be used. However, the utilization of these energy sources is still in the stage of development and research.

C. Water features and greenery in the residential space.
With the serious development of smog, people increasingly hope that they can enjoy the once beautiful state of nature indoors. Therefore, more and more designers introduce natural landscapes such as pools, rocks, flowers and trees into the residential space.
Water feature. Because of the shortage of resources in our country, we should adhere to the concept of sustainable development in the design of residential space. The design of residential space waterscape should make full use of renewable energy, use water organisms with strong adaptability in the area as raw materials, maximize the natural beauty and rhythmic beauty of water organisms with scientific and reasonable design, and reproduce the natural waterscape in nature.
Greening. A certain number of plants are placed in the residential space, so that the occupants can enjoy the beauty of nature in the residential space, making people feel as if they are in nature. The greening of residential space will have a certain impact on people's physical and mental health, and is very beneficial to study, rest and work. The greening of the residential space is like "green air conditioning", which can improve the local microclimate in the space. In hot summer, it can increase the humidity of the air. In the cold winter, the green space can increase the temperature. Greening of residential Spaces can clean the air of harmful gases. For example: interior wall coatings, chemical fiber carpets, etc., they release benzene, formaldehyde, carbon monoxide and other harmful gases to the body. Some special plants can absorb these harmful gases and release a lot of oxygen through photosynthesis, which can improve the air quality of the residential space, block the dust, and provide a good residential space for the occupants.
Greening of residential Spaces filters noise and reduces radiation. Noise can be said to be a special kind of pollution in life, which can affect people's sleep and rest, and can cause diseases in serious cases. Placing green plants in the doorway, window and other locations can effectively play the role of a barrier. In addition, plants can also absorb electromagnetic radiation, reducing some of the harm caused by radiation to the human body [14-16].

4. Green Residential Space Design Method

1. The application of green building materials.
   In the application of materials, the project chooses ecologically healthy materials, and uses recyclable natural gravel. Natural resources, pollution-free, non-toxic new materials. Compared with traditional materials, this material has the advantage of renewable utilization. In the construction, the use of relatively mature technology, low energy consumption of auxiliary materials, equipment and connectors. Clean production is carried out, which can save time, labor and materials.
2. Container greening method.
   Containerized greening is the greening method of artificially planting plants into containers, such as planting bowls, planting boxes, pond planting, potted plants, and so on. In this graduation design, according to the characteristics of residential space, I choose the form of potted plants, its advantage is that it occupies a small area and can move flexibly.

5. Spatial and Temporal Differentiation of Green Housing

5.1. Analysis of Spatial Overall Difference Characteristics

It can be seen from Figure 1 and Figure 2 that the coefficient of variation and Gini coefficient both decrease first and then increase, and the overall trend is downward, which indicates that the spatial distribution of green housing is very different, but there is a balanced development trend. The narrowing of the development gap of green housing in different regions may be affected by national regional policies, and the development of green housing in the central and western regions has been further promoted.

By calculating the locational entropy of green housing development in China from 2008 to 2016, the characteristics of green housing development in China are analyzed. The greater the location entropy, the more concentrated the green housing. As can be seen from Figure 3, there are great differences in the development of green housing across the country. Seven provinces have locational entropy greater than 1, namely Tianjin, Shanghai, Jiangsu, Beijing, Hubei, Shaanxi and Zhejiang. Among them, Tianjin, Shanghai, Jiangsu, Beijing, Hubei and Shaanxi have locational entropy greater than 2, indicating a high level of green housing development. These areas are located in the economically sound central China and the eastern coastal areas, have a strong economic foundation and policy foundation, green housing development is rapid and high concentration. At present, the location entropy of green housing in 14 provinces is less than 0.5, which indicates that the development of green housing in a considerable number of areas in China is at a low level, and there is still considerable room for development of green housing in China.

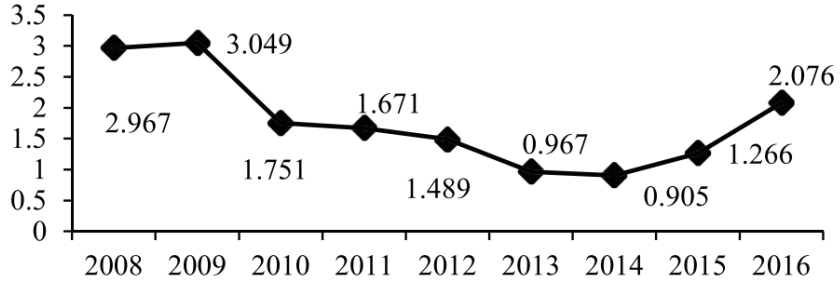

Fig. 1. Distribution map of coefficient of variation

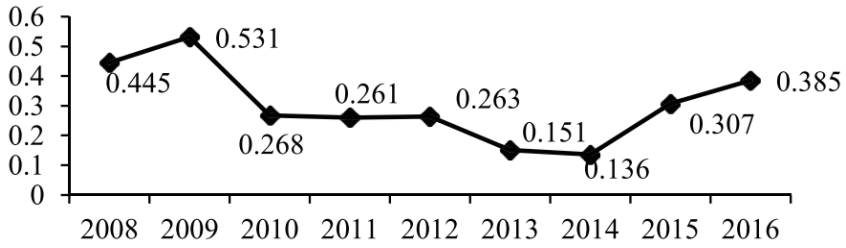

Fig. 2. Gini coefficient distribution map

5.2. Regional Analysis

In order to better study the spatial characteristics of green housing development, 31 provinces were divided into four regions (east, central, west and northeast). According to the average location entropy of green residential buildings, it is divided into four levels: A is high (location entropy is greater than 2), B is high (average location entropy is between 1 and 2), C is average (average location entropy is between 0.5 and 1), and D is low (average location entropy is between 0 and 0.5). The provinces with the I and II I gradients are mainly located in the eastern region, Hebei, Fujian and Shandong in the east are in the first gradient, and Hainan is in the IV gradient. The central part of Hubei is in the first gradient, the western part of Shaanxi is in the first gradient, and the other provinces are in the third, second and fourth gradient. According to the gradient regional distribution characteristics, there are obvious differences in the development level of green housing in eastern and western regions, and the development level of green housing in eastern regions is significantly higher than that in central and western regions and northeast regions. The phenomenon of agglomeration and dispersion exists in each region, and the development level of green housing in central and western and northeastern provinces is low. The development level of green housing in the eastern region is generally high, but there are also areas with relatively low development level of green housing [17-22].

The unbalanced development of regional economy in China is a long-term social phenomenon, and the development of green housing also has unbalanced characteristics in space. From the proportion of green residential building area to new construction area in 2010, 2012, 2014 and 2016, it can be seen that China's green residential development is rapid, and the number of new buildings is rising every year, but the development gap between different regions is large. In 2016, compared with 2010, the development level of green housing in the core areas has been improved to varying degrees. In addition, Shaanxi, Inner Mongolia and Northeast China are supported by policies such as the Western Development and the revitalization Plan of Northeast China, and the development potential of green housing is huge. In 2016, the pattern of green housing development decreased from the northeast to the southwest, which is greatly related to the gap between the east and west in terms of economic foundation, policy level, environmental quality and education level. Due to the low income of urban residents, weak economic foundation and other factors, the development of green housing is slow in the western region.

6. Conclusions

At present, with the continuous enhancement of urban residents' ecological awareness, the requirements for living environment quality continue to improve. The concept of green ecological building design has gradually become the common pursuit of designers and owners, which requires following the principles of ecological environment, environmental protection and humanity in architectural design, making full use of natural resources, scientific

design from lighting, ventilation, plant landscape design, traffic flow design and other aspects to achieve a harmonious coexistence between architecture and nature, and between man and nature. Meet the city residents' yearning and pursuit of a better life.

7. Conflict of Interest

The authors declare that there are no conflict of interests, we do not have any possible conflicts of interest.

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Biography

Yu Jiang is with the Shenyang Normal University. Research direction is art computer application and AI.