

The difference of the Biophilic Design between Canada and China

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Abstract. With the continuous increase of urban density, people gradually find that the city that is isolated from nature is contrary to the instinct of human desire for nature. The pro-nature design born to alleviate this dilemma has naturally become the focus of attention and the direction of future urban development. trend. The purpose of this paper is to find out the differences of the same concept in different environments and the reasons for the differences by studying and comparing the biophilic design cases and environmental differences between Canada and China. By listing and comparing the different human and natural environments of two countries, as well as the comparison of two cases, the article studies the different influences of people's living environment on the new biological design. Finally, it is concluded that the different levels of people's pressure and desire for nature will have an impact on biophilic design, and the degree of pressure and desire for nature is proportional to the number of biophilic elements in the design. This paper expects that biophilic design can focus on the sustainability and practicality of buildings, and at the same time, this paper provides information for future biophilic development and a theoretical basis for design.

Keywords: biophilic; biophilic design; biophilic architecture; human settlements; healthy.

1. Introduction

With the acceleration of urbanization around the world, the contradiction between man and nature is gradually intensifying. The topic of pro-nature design that advocates the integration of urban architecture and nature has gradually become a hot topic and has been discussed by everyone. People are still unable to fully adapt to the living environment and become a dense city surrounded by modern technology and high-rise buildings. The isolation from nature is not conducive to people's physical and mental development. The development of biophilic design can effectively alleviate and solve people's physical and mental health due to their desire for nature.

The term "biophilia" was popularized by psychoanalyst Erich Fromm in the 1960s to describe the biological drive for self-preservation. It wasn't until 1984 that Harvard biologist Edward Wilson wrote about Biophilia to popularize the idea, defining "biophilia" as "an innate tendency to focus on life and lifelike processes" [1]. That is, to realize the relationship of mutual respect and mutual respect between man and nature, rather than unilateral domination. With the acceleration of urbanization around the world, the contradiction between man and nature is gradually intensifying. The topic of pro-nature design that advocates the integration of urban architecture and nature has gradually become a hot topic and has been discussed by everyone. At the same time, it also helps to meet people's closeness to biological nature, sustainable development and protection of the natural environment. It wasn't until 1984 that Harvard biologist Edward Wilson wrote about Biophilia to popularize the idea, defining "biophilia" as "an innate tendency to focus on life and lifelike processes" [1]. That is, to realize the relationship of mutual respect and love between man and nature, rather than unilateral domination.

In the second half of the 20th century, some countries began to study biophilia. But at the same time, the scope and direction of biophilic research in other countries are not the same. This paper focuses on and compares the differences in biophilic design concepts in different countries and environments, in order to provide references for the development of biophilic design in the future. And introduce the working environment and natural environment in Canada and China, respectively, and give a case of pro-nature design: Biosquare and Harbin Zhongchuang Bookstore. For analysis

and research. Further, this paper analyzes the impact of the environment on biophilic design by comparing the average weekly work hours and natural forest cover rates in Canada and the Chinese people, as well as case studies. Finally, this paper summarizes the characteristics of biophilic designs in the two countries and predicts future development directions.

2. Canada

2.1. Environment

2.1.1 People's living environment

Differences in living environment can affect people's desire for biophilia. According to the Organization for Economic Co-operation and Development (OECD) 2021 statistics, people in Canada will work an average of 32.4 hours a week, while the average of member countries in the Organization for Economic Co-operation and Development (OECD) The working week is 33 hours. Job stress in Canada is low compared to the rest of the OECD [2]. Because of Canada's vast land and sparse population, people's work pressure and competition pressure are small. At the same time, people's pace of life is slower than in other developed countries. People living here also prefer to release stress through outdoor activities. Therefore, the time in contact with nature is longer, and longing for 'nature' in architecture are more easily satisfied [3].

2.1.2 Natural Environment

Canada is a country with beautiful natural scenery, rich natural resources, developed economy. Among them, the vast forest and vegetation coverage are most worthy of mention. Canada's total forest area of 4,916,438 square kilometers ranks second in the world after Russia, and the forest coverage rate is 49.24% [4]. Because of Canada's extremely high forest coverage and forest parks that can be seen everywhere in densely populated cities, it is easy for people to get in touch with nature. It is precisely because of Canada's excellent natural environment, low work pressure and people's low demand for nature that biophilic design becomes simple here, and the problem that people need to consider is simplified to how to make natural Integrate with architecture.

2.2. Biophilic Design Case Study

Biosquare is a 78, 400 sq.ft. office in Place Ville Marie. Place Ville Marie is a large office and shopping complex skyscraper in Downtown Montreal, Quebec, Canada (Fig. 1). At the same time, It serves as the main and official headquarters for RCB, Canada's Largest Bank. In this project, the designer used a grid that constructs the spatial organization to create a visual continuity to achieve the continuity of the city's exterior and interior offices. Part of the skylight is peeled off to display the structure and green plants, strategically enlarged to increase the amount of natural light. The combination of light and plants brings people a feeling of warmth and relaxation, which can better help people release the pressure at work. The main material type on the ground floor is minerals, with boulders made of bush hammered stone rising up to form the cafe, kitchen and restroom spaces. The delicacy in the details of this stone maintains a sense of lightness. The fusion between the different elements in this part of the area enhances the integrity and continuity of the entire space. For this entire project, the two offices are contrasting and distinctive. On one side, the designers removed skylights to enhance the structure of the building. The skylight on the other side is intentionally enlarged, and the feature of the upper grid guides our sight upwards to the expansive sky. At the same time, the designer cleverly uses light to render the space of the entire transparent building, focusing on the use of materials such as minerals, plants and stones to fill the office with natural elements. Biosquare is a 78, 400 sq.ft. office in Place Ville Marie. Place Ville Marie is a large office and shopping complex skyscraper in Downtown Montreal, Quebec, Canada. At the same time, it serves as the main and official headquarters for RCB, Canada's Largest Bank. In this project, the designer used a grid that constructs the spatial organization to create a visual continuity to achieve the continuity of the city's exterior and interior offices. Part of the skylight is peeled off to display the

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Figure 1. Bioaquare [5]

3. China

3.1. Environment

3.1.1 People's living environment

According to the National Bureau of Statistics of China, the average weekly working hours in China is 46.7 hours [6]. Compared with the average working hours per week according to the OECD statistics, the working hours in China are too long [2]. At the same time, China, as a country with a large population, has a lot of pressure on people's jobs and job competition, which has led to some problems. Problems such as insomnia, fatigue, weakness, obesity are rapidly increasing due to work pressure, family obligations and the impact of long working hours, especially among young people. People in China urgently need to improve their working and living environment to relieve stress. And exposure to nature can reduce these negative emotions [7].

3.1.2 Natural Environment

With a land area of 9,600,000 square kilometers, China is the third largest country in the world by land area, and it is also the most populous country in the world. China has a total forest area of 2,200,000 square kilometers, but the forest coverage rate is only 22.96% [8]. The density of population and buildings in Chinese cities is very high, and there are few forest parks in cities like North American countries. In the fast-paced daily life, it is difficult for people to take time to leave the city to get close to nature, and most people's entertainment is indoors after work. People have been in contact with nature for too short a time, and there is no way to meet people's needs for nature.

3.2. Biophilic Design Case Study

The project name, Zhongchuang Bookstore In Harbin, is located on the sixth to eighth floors of Jinjue Wanxiang Commercial Plaza, Nangang District, Harbin City (Fig. 2). The overall area is 2000 square meters. Designed by HMA architects&Designers. The whole is designed with steel structure. According to HMA, their design inspiration comes from the forests of the Greater Khingan Mountains, "In winter, the snow is covered with white snow, and life is born under the snow. In spring, the land is fertile, the sun is abundant, and there is abundant water. Everything is full of vitality and ready to go. Give life. Everything that will happen has become possible [9]." Entering the bookstore, people's eyes will naturally be attracted to the central area. In the central area of the bookstore is a large central book tower, which is like a towering tree, standing in the bookstore, exuding a sense of strength and vitality to people. Platforms and steps surround this giant tree, and walking up to the seventh floor brings people a huge contrast on both sides of the platform. One side is the busy city outside the glass window, and the other side is a quiet reading area. When you go up to the eighth floor and pass through the corridor, you can reach the reading platform in the air. The designer used lines and plants to create two translucent bird nests in the air. Their own concealment and privacy create a private space for people to read quietly. In this project, the designer uses natural and rustic materials, wood grain, steel structure and overall warm colors to present intimacy and warmth. The book tower in the center and the columns on both sides are designed in the shape of trees and the two bird's nest-shaped reading spaces in the air together create an atmosphere for people in the forest composed of books.



Figure 2. Zhongchuang Bookstore in Harbin [9]

4. Comparison of Canada and China

4.1. Environment

The bar chart (Fig. 3) shows the average weekly working hours of people in Canada, OECD countries and China. The data shows that China's working hours are far higher than those of Canada and OECD countries. The pressure of people working in China is much higher than that of Canada and OECD countries. In contrast, people working in Canada are more relaxed, work hours are below the average, and the pressure is less than that in China. The other two figures represent the total forest cover area (Fig. 4) and the respective forest cover rate (Fig. 5) of Canada and China, respectively. China's total forest area and coverage are significantly smaller than Canada's, and Canada's forest area and coverage are more than twice that of China. In this environment, people living in Canada will have more contact with the natural environment than people living in China. The interesting thing is that in Canada, people generally live in houses, and some people live in apartments. In China, most people live in apartments, and only a small number of people live in houses. Therefore, people in

China have almost always lived in a steel jungle composed of high-rise buildings, and their contact with nature in their daily work and life is extremely limited. This way of life goes against human instinct and goes against biophilic.

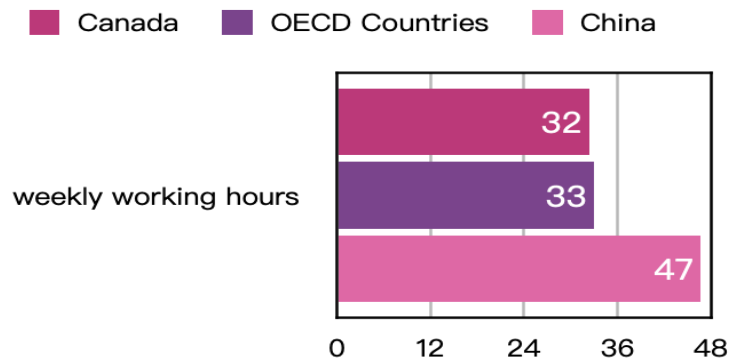


Figure 3. Weekly working hours comparison

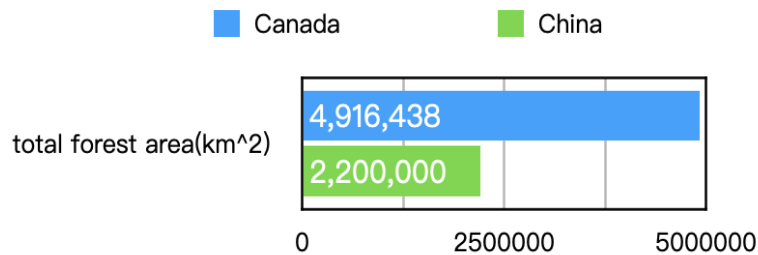


Figure 4. Total forest area comparison

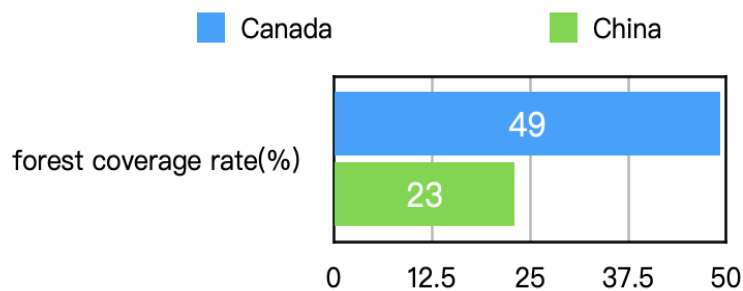


Figure 5. Forest coverage rate comparison

4.2. Case Studies

Comparing Canada's Biosquare and China's Zhongchuang Bookstore in Harbin, they both use the concept of biophilic design, such as Daylight, Plants, Materials, Texture, and Color [10]. There are also different strategies they use, such as in Complexity and Order used in Biosquare, Forms and Shapes, risk used in Zhongchuang Bookstore in Harbin, etc. The combination and use of these Design Strategies makes their designs complex and stunning. However, after comparison, it can also be found that these designs also have a relationship with environmental impact. There are not too many natural landscapes in Biosquare, only a small amount of plants and materials are embellished, which is related to the beautiful local natural scenery. People's needs for nature have been basically satisfied, so there are not too many natural elements in the room. Too much repetition will make people lose interest. In the design of Bookstore, an indoor forest in a high-rise building is directly created to satisfy people's desire for nature while living in a crowded building complex, while releasing the pressure of

work and life for people. The natural environment and people's living environment in different regions have an important impact on the local biophilic design concept.

5. Future research

Biophilic design has been applied in the field of design under construction for less than 20 years, but a systematic design method has been initially formed. At the same time, the biophilic design also provided inspiration for the architectural design. However, with the trend of architectural greening exemplary, part of the biophilic design only focuses on how to integrate natural elements into the building and ignores whether it really promotes the sustainability of the building and whether it improves the quality of the building. For China, they started even later. The theories and methods of biophilic design are not perfect, and it is necessary to learn from other countries and explore the development that truly suits their own national conditions.

6. Conclusion

By comparing the case of Harbin Zhongchuang Bookstore Biophilia with environmental factors in Canada and China. Biophilic design can be greatly influenced by environmental factors, reflecting differences. If building users have greater psychological pressure in daily life and work, and have less contact with green plants in daily life, people will need the surrounding environment to soothe their body and mind, and their desire for the natural environment will also be amplified. Therefore, the use of rich natural elements in the design can achieve the effect of helping users relieve stress and meet their instinctual needs. In the opposite environment, when the user's pressure is normal, and the local natural scenery is good, the appearance of too many natural elements in the building will cause the user's visual fatigue due to repeated occurrence, resulting in a bad effect. The environment is one of the most important factors in pro-nature design. It is hoped that in the development of pro-nature design in the future, human must take into account the problems that the environment brings to people and how to solve these problems, rather than simply adding natural elements to the building monotonously, making the building a formulaic product, and there is no Play its original role and its due effect. At the same time, it is hoped that this paper can provide more information and theoretical support for the development of biophilia.

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