Residential Waterscape Design Based on Traditional Healing Garden Theory

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Abstract — Waterscape is an important element of residential landscape design, and the traditional healing garden theory provides an important set of principles that guides modern landscape design. The paper first analyzes the current situation and the existing problems of residential waterscapes, and then on this basis puts forward a new set of waterscape design principles by combining ideas from traditional healing garden theory. Finally we discuss the residential waterscape design and building methods from the perspective of vision, auditory and tactile senses.

Keywords - Healing garden theory; Residential district; Waterscape

I. INTRODUCTION

The globalization does not just bring about the advance of the technology, but also the degradation of the environment and the health problem of modern people. Garden landscape, as the closest part to nature in human settlement, is of great significance to the health of human beings, both mentally and physically. People are paying more and more attention to their living situations, and the landscape has also diversified its functions. While it shoulders on the responsibility of improving the urban ecological environment, it also becomes necessary for protecting and improving people’s mental and physical health.

The purpose of the residential waterscape design is not only to improve its landscape and ecological values, but also to enhance the residents’ health, and provide them with a comfortable living situation. Healing garden refers to the landscape that is built on the natural environment and sees the outdoor view as the important medical resources. On the basis of that, to guild the modern residential waterscape design with the healing garden theory is very important to establish a residential district that pays equal attention to ecology and health care.

II. CONCEPT AND CHARACTERISTICS OF THE HEALING GARDEN

A. Concept of The Healing Garden

In the Middle Age, the rudiment of healing garden already appeared in Europe. It was the arcade courtyard built for the invalid and the people who were in poor health by the monastery. In 1990s, the healing garden prospered in America and some developed countries.

Eckerling points out that a garden in a healing setting designed to make people feel better. The goal of a healing garden is to make people feel safe, less stressed, more comfortable and even invigorated [1]. Professor Westphal of Michigan State University holds that, the healing garden can provide the invalid with opportunities to revive the functions of human bodies, mainly from the aspects of physiology, mentality, and spirit, or either one aspect, and then they can return to be healthy as a whole [2]. Roger Ulrich thinks that, the healing garden should has a considerable amount of green vegetable, flowers and water. It should offer medical help for most of the users[3]. Yang Huan and Liu Binyi think that the healing garden should consist of natural landscape and cultural landscape. Only in this way can it help the invalid return to be healthy, release their pressure, and improve their physical and mental statement, and thus achieve the purpose of cure[4]. Dong Liang, Guo Tinghong believes that the rehabilitation of the garden is to build on the natural environment, and the outdoor landscape as an important medical resource landscape environment[5].

B. Characteristics of The Healing Garden

The difference between the healing garden and the normal garden is that the former explores and expresses the healing characteristics of the garden spaces. The healing garden contains the elements and characteristics that the normal garden has, but it pays more attention to the healing environment according to different group of people. It focuses on the healing functions, and ensures that the invalid can use the garden spaces conveniently and comfortably, so they can be recovered better[6]. To build the healing garden we must make clear who will use it, and what their needs and psychological behaviors are. In this way it can be designed to meet the good healing effects. The main characteristics of the healing garden are mainly as follows:

1) Natural and friendly: Healing garden should be closely related with the natural environment. It should have various vegetation and the air should be pleasant.

2) Secure and reliable: the garden should avoid any poisoned vegetation. All equipment and materials should be safe and convenient.

3) Readily access: the whole layout of the garden should be easy to recognize. The road signs should be clear and readily accessible.

4) Diversified space: the garden should contain the public space which is suitable for social intercourse and the private space that is suitable for staying alone, and the exercise space that is suitable for the invalid.
5) Clear and active: the healing garden should not have the form that is too abstract and too bizarre. The content should be active, and the form should be concise.

III. FUNCTION AND CATEGORIZATION OF THE WATERSCAPE

A. Function of The Waterscape

1) Beautify Environment

Water is the very attractive element of the waterscape design. Its biggest character is “alive”. The fluidity of the water and those things that cannot move like stones and mountains and buildings integrate with each other perfectly. The moving water and the still things or the moving water around the still things all amplify the space of the human senses and make them unlimited, which offers people rich landscape levels and visual effects. The landscape without the water would seem rigid. The waterscape that combines the moving water and the still things, that has various forms, that contains cultural meanings could always bring people happiness, and feast their eyes.

2) Adjust Local Ecological Environment

Water has life. Its life lies in the ecological cycle system that consists of the water and the earth as well as all creatures. Comparing with the concrete pavement and the barren land, the temperature of the water surface is relatively low. Especially in Summer, although the water absorbs lots of sun radiation and does not heat up and becomes the temperature regulator of the city, it is also the source region of the water evaporation. Therefore, the air above and beside the water has relatively high humidity. Besides, the water surface also has the function of absorbing the contamination and the dusts in the air. The anion that it emits is especially good for human bodies.

3) Adjust Mental Emotion

The development of the urban cities has weaken the contact between human beings and the natural environment and the freedom of human activities. Fast-paced city life and pressure also make people nervous. A research of environmental psychology suggests that the water environment can lower the body’s temperature and steady the pulse, and then relax the nervous nerves, making you feel comfortable. Besides, waterscape can also excite one’s senses, provoking mental or psychological responses. The waterscape in the city public spaces like fountains can entertain people, which is of great significance to adjust people’s mood and psychology.

B. Categorization of The Waterscape

1) Static Waterscape

The static waterscape takes a static form that consists of water and landscape. The water has no sound, and it is clear, and it can reflect the colors surrounding it, giving people the visual illusion of expanding the space. It offers an unlimited space sense in a cramped space. In the healing garden, static waterscape can be established in a small container like the flower bed, and some aquatic plant can be planted to entertain the travelers. We can also dig a square of pool. It does not need to be big. The still water surface surrounded by the chairs and the bamboos can naturally comfort people.

2) For author/s of only one affiliation

The dynamic waterscape is the combination of moving water and the landscape, and then a dynamic beauty can be shown. The dynamic waterscape can be divided into three kinds:

a) Falling water scene.

If the garden is on the mountain or high place, the water can take the advantage to be designed as the falling water. The direction of the flowing water will unconsciously lead the travelers to move further. This can indirectly stimulate the invalid to walk outside.

b) Gushing water scene.

In the garden center where is broad and opening, or in the cross of the roads, the small fountain or swell can be designed to attract people’s intention, so they can be led into the garden. When the invalid get close to the fountain, the negative oxygen ion caused by the friction of water and air can make people exciting and increase their traveling mood. The healing garden can also introduce this kind of design. Children and teenager are the high risk group of suffering infantile autism. The lack of communication of the society can make them even lonely. If in a small public space in the city, the gushing scene can be designed in the residential green land, or the city garden square, etc, which can bring the children much fun and make them laugh as well as open their hearts.

c) Flowing water scene.

It has not a fixed route, but winds along naturally, and forms the waterscape with the surrounding things. In the healing garden, the waterscape can be designed as a circulatory water system, in which, the water flows out of the pool quietly and into the man-made rocks and brooks, and then flows into the garden through numerous winding walls, and finally flows into a quite pool, which symbolizes the circle of the life. This artistic layout integrates the local designed style. It not only has the ecological science but also has comprehensive functions.

IV. CURRENT SITUATION AND EXISTING PROBLEMS OF THE RESIDENTIAL WATERSCAPE DESIGN

A. The Function Is Not Good

The user of the waterscape is people. The residential waterscape’s function is not as good as it is ought to be. Most of the waterscape is designed for the “image project”, instead of considering the need of the dwellers first. The main functions of the waterscape are for ornament, entertainment, and exercise. Some waterscape forms are rigid in style and cannot make people feel the beauty of the waterscape (as is shown in Figure 1). The waterscape cannot entertain people and involve people. They separate people can drive them away. Moreover, such a waterscape lacks the security. The waterscape does not have warning signs and separation facilities around it(as is shown in Figure 2).
B. Waterscape Does Not Match With Surroundings

Some residential waterscapes do not match with the environment, terrain, or the building (as is shown in Figure 3). It applies mechanically the European style. Falling water, gushing water, dropping water, cascading water and the fake mountains and water appear in different housing estate again and again. The homogenization phenomenon is evident (as is shown in Figure 4).

C. Bad Ecology Sustainability

Some residential waterscape use concrete bottom, waterfront construction, rubble, and concrete, which blocks the water’s natural circle, breaks the ecological environment of aquatic animals and plants, results in the devastation of the water ecological system. It is easy to eutrophicate the waterscape (as is shown in Figure 5). The live, natural, and beautiful waterscape is getting far and far from us, and it drifts apart us from the water. Some residential waterscape are dried up, especially those residential estates that were built early. The dried up situation and the aging problem of the waterscape are getting severe (as is shown in Figure 6).
V. WATERSCAPE DESIGN PRINCIPLES ON THE BASIS OF HEALING GARDEN THEORY

A. The Function Principle
The core of the healing garden design is to offer the users a comfortable and quiet and a relax experience so that they can relax themselves and revive. Therefore, when we design the residential waterscape we should consider that there should be multiple-way to meet the demand of different people. For example, some are to be played; some are to be looked at; some are to express the texture of the water; some are to express the magnificent of the water; there should be quiet waterscape, but there are also should be lively waterscape. By different styles of design, the waterscape can meet the demand of people, who can thus relax themselves, and adjust their mood and pressure.

B. The Security Principle
The security problem of the waterscape in the residential environment is very important. The hydrophilic design of the waterscape should understand fully the citizens’ age group, the body’s health, etc. For instance, children should step in to the pool or brook that the depth is from 0.2-0.3m; the bottom material should do the anti-skid treatment; the height of the step should meet the need of the children, and the water should also stay clean. To those pools, lakes that cannot enter the step should meet the need of the children, and the water material should do the anti-skid treatment; the height of the pool or brook that the depth is from 0.2-0.3m; the bottom

C. The Comfortable Principle
When we are designing the waterscape we should notice the gradient, the height and the size that all is suitable with the human size, because this can make people comfortable and also is vision-charming. By comfort I mean the whole hydrophilic environment, including walking along the bank, running, sitting, lying down, and touching the water, etc. Besides, we should pay more attention to the senior, the children, and the invalid, and to equip them with corresponding facilities.

D. The Ecological Harmony Principle
The main principle of the healing garden design is based on the natural scene. The natural ecological environment can provide the residents with visual, smelling and touching excitement, wake up their senses, release their pressure, relax themselves, and enhance their physical recovery capability. The residential waterscape design should blend with the place and the surrounding ecological environment. It should deal with the form of the waterscape correctly, and let it match the layout of the buildings and consider its function to living environment. Through the reasonable layout, the waterscape can blend with the surrounding environment, and forms the outside space that inter-infiltrate with each other and interactive with each other. At the same time, it should pay attention to the infusion between men and nature and the aspect of functional adaptation.

VI. DESIGN AND BUILDING METHOD OF RESIDENTIAL WATERSCAPE ON THE BASIS OF HEALING GARDEN THEORY

The important theory of the healing garden satisfies the users' sensual experience greatly expands the purpose of the landscape and the range of application. The residential waterscape design should build various sensational excitments, and change the use way of the waterscape from the one dimension visual type into the multi-dimension type of vison, hearing and touching. The the using value of the waterscape can be improved.

A. Vision
Vision is the most important sense of human beings. Though vision, people can have the direct feeling of the seeing forms, colors, sizes, and spaces, etc. The residential waterscape can realize the visual expression of the waterscape form, color, space by adding water plants and mountain stones. A good design can give people a sense of beauty and some visual impact. It also helps people to relieve fatigue, contain irritation, adjust mood, and improve the body functions, As are shown in Figure 7, 8, 9, 10.

<table>
<thead>
<tr>
<th>Color names</th>
<th>Meanings</th>
<th>Functions</th>
<th>Using suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Natural, grow, harmonious</td>
<td>Calm the mood, and relax the nerves</td>
<td>Suitable for all the landscape designs</td>
</tr>
<tr>
<td>Blue</td>
<td>Calm, slow, cool</td>
<td>Relieve the intensity of the muscle, relax the nerves, and lower the blood pressure</td>
<td>Suitable for the embellish spots in the landscape edge</td>
</tr>
<tr>
<td>Yellow</td>
<td>Vital, bright, warm</td>
<td>Excite the nerve system, and improve the brain function</td>
<td>Suitable for the desolate and dark corners</td>
</tr>
<tr>
<td>Purple</td>
<td>Quiet, bright, warm</td>
<td>Relax the nerves and relieve the pains</td>
<td>Suitable for the special groups like Alzheimer's disease patients</td>
</tr>
<tr>
<td>Red</td>
<td>Enthusiasm, desire, bold</td>
<td>Stimulate the circulation of the blood, and revive the spirit</td>
<td>Suitable to embellish; not suitable for a large scale decoration</td>
</tr>
<tr>
<td>Orange</td>
<td>Optimism, likeness, relieve</td>
<td>Stimulate the circulation of the blood, improve the function of the digestive system, active the mind and excite the mood</td>
<td>Suitable to use with other colors</td>
</tr>
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Harmonious colors can make people feel active, easy, relaxed, and cheerful, while disharmonious colors can make people feel depressed, passive, fatigue, and other bad moods. The British color expert doctor Aaug says, among all the
natural colors, green is the most suitable for human visual nerves. It is the live color of the grass. It can make people feel cool. It infuses people with lively vitality. It excites people. The color match method in landscape includes contrasting colors, analogous colors, similar colors. The color knowledge that it involves includes hue, purity, lightness, changes in temperature of the colors and the color psychology, etc. The chart 1indicates different colors’ meaning and functions in the landscape, and also offers some using suggestions [7-8].

B. Touch

Among all the people’s senses, touch is the basis experience. Though touch we can realize the reality of the world even deeper. We can feel the contact, the slide, the press, and the temperature. We can understand the object’s texture, material, hardness, volume, shape, etc. Upon touching, we can combine with the object for a while, which surpasses the distance, the control of the time. It provides wonderful texture and details, exciting people’s physiological reaction. It passes the emotion to the individual, at that time, people and the object can have resonance, so that it can have the active healing functions.

The residential waterscape design based on the healing garden theory should let other people touch the water as much as possible and play in water. Therefore, when designing, with the consideration of the healing garden design principles, the waterscape elements design should be suitable for the size of the human body activities. We should create the waterscape that is close, intimate with the water, with the purpose of decreasing the barrier of people and the waterscape. In this way, it could give people intimacy and security, and then attract people to do the spontaneous activities(as are shown in Figure 11 and 12). For example, to process the edge of the water by making the natural transition will attract people into the water; the pleasant size of the brook allure children very much. The decorations in the waterscape that has a modest size can also attract people to touch[9].
C. Auditory

The landscape design based on the healing garden theory cannot only provide the users with comfortable environment, but also can create suitable sound environment to help the users recover.

In the garden landscape, sound elements are very important. Sound is divided into natural sound (bird and insect chipping, water sound, and wind sound etc) and the manual sound. The sound in the garden are most natural sound which coordinates with the manual sound (the slow music, etc). According to the data, the chord sound influences mainly the blood circulation; the sound of violin and piano have sedative effect. When the patients with hypertension hear it, the blood pressure of them can decline 10-20mm mercury. The flute sound can relax people.

Therefore, in the residential waterscape, we can design the murmuring water sound, which is intoxicating, or offer some soft music, which can relax people. As are shown in Figure 13, 14.

VII. CONCLUSIONS

The residential waterscape can improve the living environment effectively, and stimulate people’s health. To design the waterscape that meet the demand of the citizens from the users’ perspective, needs the waterscape designers’ active exploration. We still need to discuss and explore how to build up the ecological, beautiful, suitable, and healthy residential waterscape on the basis of the healing garden theory.

ACKNOWLEDGMENT

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