



ARTICLE

The Application of Dead Trees or Dying Trees in Landscape Design

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ABSTRACT

In the development of landscape design, plants have always been one of the important elements in the landscape design, and play a very important role in the landscape. In the selection and application of landscape plants, living plants have always occupied a dominant position, but the research and application of dead trees are few. People tend to think that dead plants are no longer valuable, and all dead trees should be removed or replaced. In a sense, this is a waste of resources, and also increases the cost of landscape. In fact, the proper use of dead trees in landscapes design is more likely to display the artistic conception and theme of the landscape. In many natural landscapes, large trees, ancient trees and precious tree die because of natural laws or natural disasters, forming withered trees. This kind of withered tree endows the site with certain historical connotation, which could narrate the history and ecological change of site to people and evoke the imagination of people to the past. In addition, these dead wood still have high economic, ornamental, ecological and cultural values. This study focused on dead trees and dying trees as its subject, analyzing the outstanding dead trees application cases in natural landscape, and discusses the different functions of dead tree, such as ecological function, ornamental function, cultural function and others. In addition, the Beijing Wild Duck Lake National Wetland Park will serve as a special experimental site, dead tree will be designed and applied in the lake of park. And based on these data analyses, the final chapter will return to address the research questions and offer advice on how to apply dead tree to urban landscape and further enhance the value of dead trees in landscape design.

1. Introduction

1.1 Background of the Research

The types of dead trees are varied, including coarse woody debris, large woody debris and snag (Nilsson et al., 2002).^[11] In the meantime, the distribution of dead trees is also extensive, they can be often seen on rivers, forests, wetlands and even both sides of the streets, gardens or centre parks. In general, these dead

trees should be removed. But since 1970s forest managers around the world have found that the dead trees still contain a lot of nutrients and provide food and habitat for a variety of organisms, dead trees and wood residues were encouraged to stay in the woodland/ forests. As Keddy and Drummond (1996) points out these dead trees play an significant role in the protection of biodiversity, particularly in wetlands and deltas.^[9] Such as bats in forests rely far more on dead wood than people know about it.

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For instance, animals such as bats in the forest rely far more on dead wood than people know about it. In recent years, people have gradually realized that dead and dying trees play an important role not only in forests, but also in oceans and lakes. Some of the dead wood in the water can provide enough nutrients for bacteria, worms, shellfish and even fish sold on the market. Salmon and other animals in rivers also rely on dead wood for their habitats (Ren, 2002).^[12] In addition, in some mountainous areas or forests, due to the crustal movement or climate change, the growth environment of trees has changed greatly, forming a number of unique dead tree groves, such as Namibian Deadvalley, China ShuangQiao Gou natural protection area, Kazakhstan Kaindy Lake. They have produced a strong contrast with the surrounding environment, forming unique landscape ornamental value, which attracts tens of thousands of visitors every year. These unique natural landscapes with dead trees generate considerable income for local residents and further boost local economic development.

However, in the urban landscape, the function of dead tree is often overlooked. Generally, most of the dead trees result from improper later-period management (Huang & Zhu, 2014).^[6] These dead trees caused by human factors lead to incompatibility with the preset landscape. Therefore, they have to be removed. In addition, the reuse of dead trees is very limited. Most of the dead trees can only be burned or made into handicrafts. As for actively planting dead wood, designing the dead wood as a landscape element is even more rare. In fact, the proper application of dead trees will play a key role in landscape design (Zhang, 2009).^[18] Filpo (2008) pointed that in the landscape construction, while meeting the reasonable functions and formal aesthetic perception, using some drying or dead trees will bring great benefit to forming the time and space dialogues of ancient and modern.^[3] In 2011, World Horticultural Exposition, Xi'an, China, dead wood was placed as decoration on the lakeside, showing a unique history of plants.

Dead tree has a strong symbolic significance in different regional cultures (Gough, 2011).^[5] In Western culture, dead wood is mainly a symbol of destruction and death. It often used to express the cruelty of war, reminding people to cherish peace, and it is often applied in memorial parks or cemeteries. Besides, the dead tree is also an important part of Oriental traditional culture (Wang, Peng & Li, 2003).^[16] Due to its unique shape and texture, deadwood art, endowed with natural, primitive and naive charm, was deeply loved by Chinese artists. As early as the Tang Dynasty (AD 8 century), dead wood as the main element, appeared in a large number of Chinese traditional poet-

ry sculpture and painting works. In these works of art, dead wood shows the characteristics of human simplicity, which is consistent with the aesthetic philosophy of respecting the nature in traditional Chinese Taoist culture. Therefore, dead wood art and landscape occupy a special position in the fields of Chinese traditional aesthetics.

1.2 Research Aims and Objectives

This research aims to evaluate the art quality and function of dead tree in urban landscape design, to identify the problem of the application of dead trees in the urban landscape and thus achieve the maximum value of the dead tree.

This aim is addressed through four objectives

- (1) To review and analyse the representative cases of the performance of dead trees in landscape design.
- (2) To investigate the texture color structure and time change of different dead tree species.
- (3) To find and reveal the symbolic meaning of dead tree in Chinese traditional art.
- (4) Taking Beijing wild duck lake wetland park as the art experimental project site, to test and evaluate the function of the dead tree by combining the natural dead wood landscape and the unique Chinese traditional withered wood aesthetics.

2. Literature Review

2.1 Introduction

The value of the dead tree was first recognised by people in 1970s, and has become an indispensable part of the ecological balance in nature (Keddy & Drummond, 1996).^[9] Throughout history, people are afraid of the death of trees, as far as possible to cure and prevent dead trees. Therefore, a large number of academic literature are dedicated to the topic of the cause and prevention of dead tree, ranging from academic journal to monograph book. In the meantime, the way of dead trees as a landscape element to design has constantly been a topic of low attention and exposure. In fact, dead tree is an essential link in the landscape design, considering whether from the aspect of art and culture, visual appeal, or the function of ecology (Huang & Zhu, 2014).^[6] This literature review primarily bases on three basic threads to establish the theory and underpinning of dead tree (Gough, 2011; Huang & Zhu, 2014; Ehnström, 2001).^[2,5,6] It is necessary to begin by illustrating the characteristics and meaning of withered tree art aesthetics in different regional culture and historical dimension. Subsequently, starting from the ornamental value of dead wood, this literature review continues to discuss how to use the dead wood to form a unity or

contrast landscape with the surrounding environment, creating strong visual appeal. Whilst recognising the importance of dead trees in ecological balance, the following section further examines how to maximise the ecological value of dead tree through the reasonable layout of dead wood. Finally, this chapter concludes with the view that in the actual application of dead trees, the proper integration of different functions can form a high-quality landscape, which is also the core theory of this dissertation and the gap of current research.

2.2 The Art and Culture of Dead Wood

In terms of culture, in the creation process of western artists, the means of expressing the meaning of life with a dead tree as a carrier is very popular (Gough, 2011).^[5] It is seen in 'Cultivating dead trees': The legacy of Paul Nash as an artist of trauma by Gough; Frozen Flame and Slain Tree: The Dead Tree Theme in New Zealand Art of the Thirties and Forties by Dunn and Paul Nash's paintings (Dunn, 1979).^[11]

In the meantime, such artistic techniques in Eastern culture are also common. Take Japan as an example, Japanese artists prefer to use mountains, white sand, and dead trees to design the courtyard landscape, which provides citizens with quiet enjoyment. And it is such a life-free expression that formed Japan the "Karesansui" (dry landscape) culture (Van Tonder, Lyons and Ejima., 2002).^[14] While for the specific application of dead trees in landscape, according to Application of tree in landscape garden by Huang & Zhu and Landscape Application of Withered, Older Dead Trees by Zhang, by recycling the dead trees, dead branches, fallen leaves, bark and so on, and combining with the processing techniques of art, many different landscapes have been created. For example, Hainan Jianfengling Park, Hangzhou Taizi Lake Park, these parks reuse dead wood to build wooden houses, grass pavilions, simple wooden bridges, guardrails, signboards, etc (Zhang, 2009).^[18]

Given the above, dead wood in the aspect of artistic value and symbolic meaning may play a more significant role than has previously been proved. Therefore, more attention should be paid in regards of dead trees in specific landscape.

2.3 The Attraction of Dead Wood Landscape

From ancient private gardens to modern landscape designs, the shapes and colors of common tree species have formed deep stereotypes in people minds. However, the unique posture and color composition of the dead trees can not only change people's thinking patterns on the

aesthetic, but also give people a bright sense of surprise, achieving a focused and eye-catching landscape effect (Huang & Zhu, 2014).^[6]

In the application of landscape plants, plants with colorful leaves often play a striking and prominent role. As an alternative colorful leaves tree, dead trees also play a role as well as colorful leaves tree in the landscape application (Kingsbury & P, 2016).^[10] Drivers are prone to drowsiness when driving on expressways because the landscape and vegetation on both sides of the expressway remain unchanged. Today, trees on both sides of the highway have begun to wither, and dead trees produced contrast in color with normal trees, alleviating visual fatigue caused by long driving hours (Zhang, 2009).^[18]

As Zhu (2016) has indicated, the branches of dead trees of dead plants often attract people's attention in an instant. And it can often form an independent landscape and become a unique dry tree landscape.^[19] In addition, a large number of dead tree groups can better reflect the breath of nature. And the dead grove of Shuangqiao Valley Nature Reserve in Sichuan, China provides a good example of this. The dead tree and the lake have the static and dynamic comparison and the black tree trunk is also contrasted with the background color, forming a unique and interesting landscape.

2.4 The Impact of Dead Wood on Ecology

With the continuous improvement of people's eco-awareness, the ecological function of dead wood has been gradually recognised by the public (Franklin, 1987).^[4] This part will explore the ecological function of dead wood from two different site types (forests and lakes).

2.4.1 Dead Wood in the Forest

In order to maintain the diversity of insects, flowers and fungi in northern forests, the dead wood as substrate is probably the best choice (Samuelsson et al, 1994).^[13] The U.S. Forest Service statistics shows that in the virgin forest, there are up to 70-100 dead trees in per hectare, which have been standing for 40 years or more. When they fall down, dead trees become logs and large volumes of logs can usually be kept for 300 years.

Fungi are the first to enjoy the dead or diseased trees, which begin to grow outward from the inside, followed by bacteria, yeasts and small arthropods. Then life chains are extended. For example, in the Pacific, about 80 species of animals depend on dead trees, such as woodpeckers and owls (Humphrey and Bailey, 2012).^[7]

Humphrey and Bailey (2012) also pointed out that dead trees provide nests for certain forest animals. If the

remains of many ancient forests are removed, then a large number of wild animals will be trapped in the plight of survival, especially birds.^[7]

2.4.2 Dead Wood in the Water

It is generally believed that the dead wood that blocks streams or rivers not only interferes with human navigation, but also affects the lives of fish. But according to the latest research, the benefits of dead wood to fish far outweigh the disadvantages (Ren, 2002).^[12] In 2000, a symposium on "Wood in Global Rivers" was held in Corvallis, Oregon, USA, where many scholars fully articulated the ecological role of dead wood in water. North American spruce, for example, has been present for more than 1500 years in Cutis, Washington, where these spruces provide more than 50% of food for fish in rivers. The increasing number of fish has also attracted a large number of hawks and other predatory birds, contributing to the local ecological diversity.

Robert Reiman (1997), a marine biologist at the University of Washington in Seattle, pointed out that without piles of dead trees along the river, the forests on the banks of the river would be impossible to exist because they can store sediment and protect the forests from flooding, while new plants can grow again where floods wash away.

Over the past century, wood from rivers has been cleaned up, but now the U.S. government has to spend huge amounts of money placing man-made piles in parts of the Pacific Northwest.

2.5 Summary

Many researchers have done lots of elaborated studies on the application of dead wood. Although a large number of literatures have provided us with much enlightenment, they always only focus on one certain aspect of the function of dead wood and yet not closely to the combination of all the functions. Furthermore, up to now, there have been not many studies on how to reuse and plant dead trees with artistic technique in landscape design. Under these circumstances, there is still some space for further probe in this field. On the basis of previous studies, my research seeks to discuss the following questions:

(1) Which kind of dead tree is more popular? (Take Chinese as an example)

(2) What are the application scopes and ways of dead trees in landscape design?

(3) What problems should be noticed in the application of dead trees in urban landscape?

The purpose of my research is to identify the common art method of the application of dead tree in urban land-

scape, maximising the value of dead wood.

3. Methods

3.1 Case Study

In order to comprehensively understand the role of dead trees in different landscape and scenes, this part mainly analyses two representative natural dead tree landscape cases: Dead-Valley in Namibia and Kaindy Lake in Kazakhstan. In addition, combined with Beijing Olympic forest park case study, this chapter attempts to research how the dead trees are transformed and reused. Finally, this part will also explore all kinds of art forms based on dead wood and exploration of reuse of dead trees will also be included.

3.1.1 Dead-Valley in Namibia

Dead Valley Deadvlei is one of the main natural attractions in the Namibian National Park Namib-Naukluft (Figure 1&2). It was a lake thousands of years ago, but with the movement of the earth's crust and changes in nature, the lake has dried up. Moreover, because of the severe water shortage, it is difficult for any plant to grow here, and only dead trees are still standing on the land. The climate of Dead Valley is hot and dry, and even in summer there is no any wind. Because of this, the withered trees do not decompose and are well stored under the scorching sun for so many centuries. It has been more than 900 years now. In addition, these black withered trees with red sand and blue sky, produce a powerful colour contrast and roaming in the valley, this mesmerizing beauty of nature makes people feel as if they were in a picturesque oil painting. During sunrise and sunset, visitors are enchanted by the incredible scenery (Figure 3&4).



Figure 1&2. Dead Valley Deadvlei. Namibia



Figure 3&4. Sunrise and Sunset in Dead Valley. Namibia

Dead wood, as a product of nature, plays a key role in Namibia's natural parks. On the one hand, it records the

changes of natural history, and provides an important reference for botanists to study the earth's changes. In addition, it forms incredible landscape value and even tourists regard it as "the place where everything ends" and endow it with the meaning of life thinking. Hence, dead wood or withered tree is an indispensable part in certain landscape space.

3.1.2 Kaindy Lake in Kazakhstan

The unique lake called Kaindy is located in the mountain range of Tian Shan at an altitude of about 1900 meters above sea level, Kazakhstan. This natural attraction was formed by a strong earthquake in 1911. Mountain collapse blocked the river and the valley became filled with water (Figure 5).



Figure 5. Kaindy Lake. Kazakhstan

Perennial spruces (*Picea schrenkiana* trees), growing along the river, suddenly became flooded. However, the mighty tree trunks haven't rotted and instead remained standing over time. Although these spruces vary in length, there is vertically upward growth pattern that echoes the living spruces around the lake, forming the unique natural landscape of Kaindy Lake. And now, they rise majestically above the water surface of the lake. The tops of the spruce trees, sticking out of the surface of the lake, seem lifeless, but in the turquoise water, it is easy to see the branches and needles which are perfectly preserved (Figure 6 & 7). The spruce above the water with strong life force contrasts sharply with its lifeless counterpart underwater, exuding unique charisma (Figure 8).



Figure 6 & 7. Above and below lake. Kaindy Lake. Kazakhstan



Figure 8. Kaindy Lake landscape with people. Kazakhstan.

After long-term soak in water, a large number of fungi and microorganisms attach to the trunk surface, and become an important food source of fish. Furthermore, some of the dead trees that sank to the bottom of lake became vital habitats for aquatic organisms to spawn and grow, ensuring local biodiversity.

3.1.3 Beijing Olympic Forest Park

Populus euphratica is one of the oldest poplar in the world. According to a saying that *populus euphratica* can survive through millennia and stand upright after withering. Even it fall down, it will keep unrotten as least thousand years. It is deeply rooted in Gobi and enjoys a world-renowned reputation for its tolerance to drought, waterlogging and vitality. This artificially transplanted dead *Populus euphratica* grove is located in the Beijing Olympic Park (Figure 9). The unique texture and shape of *Populus euphratica* makes visitors feel the illusion of returning to the Gobi Desert, giving them a sense of period and vicissitudes.



Figure 9. North Garden of Beijing Olympic Forest Park. China

Due to the unique growth environment and vitality of the dead poplar, people endowed it with the humanistic spirit of challenging fate and nature. It brings people not

only the enlightenment of life, but also a kind of spirit symbol and always keep an uncompromising attitude towards life. In this case, the symbolic significance of dead wood in landscape remains unsurpassed (Figure 10).



Figure 10. North Garden of Beijing Olympic Forest Park

3.1.4 Dead Wood in Daily Life

Dead wood is closely related to people's daily life, it is not hard to find it whether in large indoor furniture, or small clothes rack. For example, Silver birch is highly decorative because of its white branches and trunk. Many stores tend to use dead birch as an important collocation of window display, which could better highlight the show subjects (Figure 11&12).

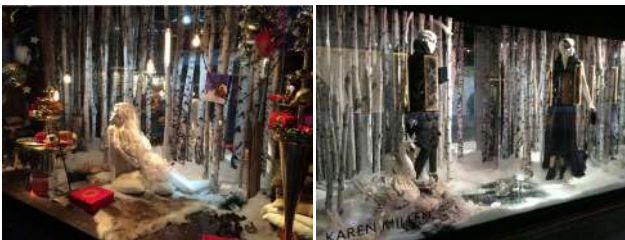


Figure 11&12. Harrods' shop window display

For some thinner dead branches, after simple collection and trim, people could create many interesting handicrafts, such as coaster, hanger, flowerpot and others (Figure 13&14).



Figure 13&14. Handicrafts by dead wood

3.1.5 Summary

In fact, the function of dead wood is particularly diverse, and different functions interact with each other, which cannot be separated, but focuses in different scenes vary a lot. Therefore, the range of practical application of dead wood is much larger than people imagine. Dead wood could form a new landscape through permutation and combination, and can also be an individual landscape or temporary art sculpture, which makes itself an indispensable part of landscape design elements.

3.2 Materials Research

There are tens of thousands of species of trees, and any kind of trees may wither or die. However, different types of dead wood will have different shapes, colours and textures, creating a large number of diverse landscapes. This part of the study attempts to classify and compare the shape, colour and texture of dead wood, exploring the landscape collocation of dead wood.

3.2.1 The Shape of Dead Tree

One of the prerequisites for creating high-quality landscapes is to choose the right tree species. Theoretically, any tree species can be used as garden seedlings, but not all tree species have decorative or ornamental function in landscape. In order to satisfy some special requirements, ornamental landscape trees must be flexibly used on the basis of artificial pruning or layout changes, which will be beneficial to achieving the people envisaged image of plant art (Joyce & Stoddart, 1999).^[8]

If only from the appearance and shape of trees, the different age and species of trees will affect the size of trees, resulting in different visual effects, such as birch, camel thorn trees, pine trees (Figure 15).



Figure 15. Tree Size. Source from: author's own photograph

Thin trunks always give people a sense of freedom and easiness. In landscape design, these trees are often displayed in groups, forming a unique atmosphere (Figure 16). Moderately thick trunks give people a strong and powerful impression. In addition, some old trees, such as pine trees with twisted roots and gnarled branches, are suitable for created independent landscape (Figure 17).



Figure 16. Dead birch tree in Manasquan Reservoir



Figure 17. Dead pine tree

Besides, different kinds of trees also have diverse appearance branches. Although a large number of trees keep upwardly diagonal branches, branches could be horizontal, vertical, or diagonal (Figure 18). The dead tree forests of the suburbs of Beijing clearly reflect this feature (Figure 19).

The different structure of the tree branches

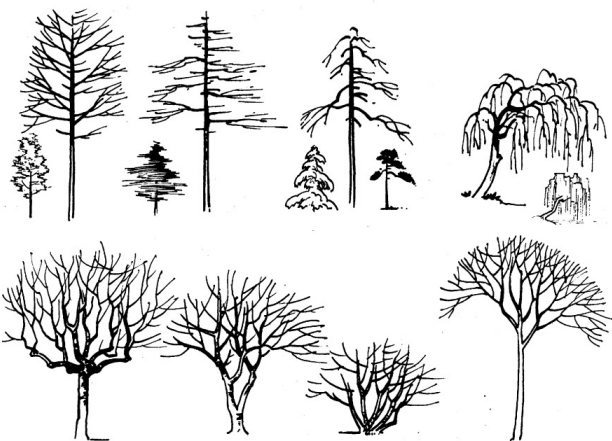


Figure 18. The different structure of the tree branches.



Figure 19. Withered trees in winter. Yanqing. Beijing

3.2.2 The Colour and Texture of Dead Tree

The nursery stock of colourful branches not only enriches the landscape colour, but also reflects the strong aesthetic feeling of form and visual impact, which could make people directly experience the dual aesthetic sense of colour and form. And it contributes to improving the attraction and cultural connotation of the site (Wang, 2016).^[15] Since dead trees cannot rely on colourful leaves, the colour and texture changes of trunk and branches are more important in regards of aesthetic expression (Figure 20).

Common tree trunk texture

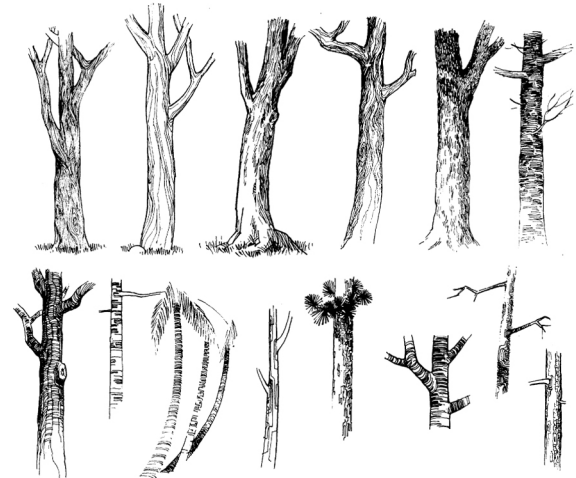


Figure 20. Common tree trunk texture

Sliver birch is widely used in landscape design. Being all white and endowed with a smooth surface all around trunk, silver birch could be integrated with the surrounding environment when it's snowy (Figure 21). In other seasons, even if the dead birch has no leaves, but the shape of tall and thin with white colour can still play a very-well decorative role. In addition, combination of dead birch and various colourful leaf trees could constitute an inter-

esting scenic spot, conveying a diverse image of warmth, tranquillity or playful youthfulness (Figure 22).



Figure 21. Sliver birch landscape in winter. Figure 22: Sliver birch with colourful leaf trees

As far as pine trees are concerned, their surface is rough with dark red colour, giving people a sense of aging. For hundreds of years of withered pine, they are easy to grow moss on the surface with dark green colour, which seems to blend in with nature (Figure 23). It is completely different from birch landscape, each has its own characteristics.



Figure 23. Pine tree surface texture

Generally, since color is the most important factor of catching tourists' eyes, top priority to reuse a characterless withered tress is to paint if a bright color (Figure 24). But the truth is landscape effect of high quality would not be achieved by changing the color only.



Figure 24. Dead Wood with bright colour

3.2.3 Summary

Research of this part has shown that the species, the co-

lour and texture of trees cannot be separated from each other, otherwise there will be a tendency to generalise the visual effect of dead trees in landscape design. Only when the landscape designers select the appropriate species and structure of dead wood and place it in the specific place, can the landscape effect with rich artistic characteristics be created.

3.3 The Individual Art Practice Experimental Project

In this part, I will choose Beijing Wild Duck Lake National Wetland Park as my art project site to design the landscape of withered trees, and then make a critical reflection on dead trees landscape from various aspects, including ornamental, ecological, economic and cultural aspects.

3.3.1 Site Location and Introduction

The Wild Duck Lake National Wetland Park is located in the northwestern Beijing city of Xia Du - Yanqing. It is a natural artificial compound wetland consisting of tidal flat, rivers, reservoirs, and marshes. It is an important bird habitat in the Beijing area, and it is also the international transfer station of the East Asia to Australia route. The birds like to take a rest here in the annual migration season, with the largest number of wild geese and ducks, and the wild duck lake was named after that (Wild Duck Lake Park Office, 2012).^[17] As the largest natural wetland ecosystem in Beijing, wild duck lake has important protection significance and wetland ecotourism potential, at the same time, it also faces a severe test of water resources reduction and biodiversity degradation (Figure 25).



Figure 25. Wild Duck Lake National Wetland Park

Wild Duck Lake Bio-diversity

The site has a high diversity of wetland plants and upland species. Among 31 species of higher plants, 357 are wetland species. This includes families of shallow water vegetation and 20 within the marshes (Wild Duck Lake Park Office, 2012).^[17] In addition, the site has a high diversity of insects. Most species live in the croplands and meadows, some of which are pest species. There are 21 Odonata species (dragonflies and butterflies), using ripar-

ian areas as habitat, which indicates good water quality in some areas of the site (Figure 26).



Figure 26. Wild Duck Lake Bio-diversity. Source from: author's own photograph

Wild Duck Lake is an important spot for migratory birds, especially in winter (Figure 27). The meadows and shrubs are important habitats for birds as well. The site has a high diversity of raptors, indicating a diverse food pyramid on the site. Raptor species include: Accipitridae 16, and Falconidae 7. But birds in the wild duck lake are being threatened: increasing freeze of rivers in winter; human disturbances such as fishing, farming and noise; and decreasing numbers of fish. All these factors above affect the survival of birds.



Figure 27. Bird species diversity

3.3.2 Withered or Dead Tree Landscape Design

The project site is located in the center of the lake and its northwest side is the viewing platform. When birds need

to migrate (late October to early November), park managers will hold an annual bird-watching cultural festival and many visitors and photographers will gather here. But there are not trees for birds to stay, and visitors cannot observe and photograph birds carefully. The planting of dead trees could solve this problem very well (Figure 28&29). In addition, planting dead trees in the water is conducive to the survival and reproduction of fish, providing food source for birds, and ensures biological diversity of wetland.

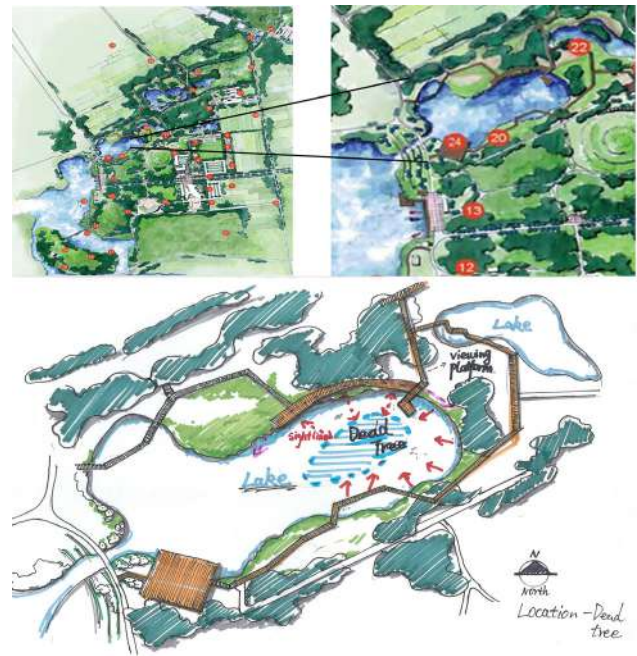


Figure 28. Analysis of landscape site. Source from: author's own photograph



Figure 29. Viewing platform in project site. Source from: author's own photograph

- (1) Three Different Landscape Schemes
- A. Individual Dead Pine Tree (Figure 30)



Figure 30. Individual dead pine tree. Source from: author's own photograph

Chinese people have a special emotion for pine and cypress since ancient times, because pine trees grow in barren land and have strong vitality. And people often use pine and cypress to symbolise the character of strong and unyielding. As early as the Song dynasty (AD 960), the great writer Su Dongpo said: “the pine could make people tenacious when your life is difficult, the pine also could make people excited when your life is going well”. He also had a large number of poems and paintings to express his fondness for pine (Figure 31). Today, pine trees are still recognised and loved by the Chinese people. Wu Guan-zhong, a master of contemporary painting, creates a large number of works of pine (Figure 32). Selecting dead pine as the main landscape is in line with the Chinese people's aesthetic standards, which achieves the purpose of attracting tourists.



Figure 31. Su, D.P. (11C). Grotesque Stone and Dead Wood. [Ink painting]



Figure 32. Wu, G.Z. (1980). The soul of pine tree. [Oil on canvas]

As a kind of great arbor, the branches of most pine trees are straight or curved, with different forms and rough wrinkles, symbolizing the passing of time. As one kind of great arbor, the branches of most pine trees are straight or curved and combined with their different forms and rough wrinkles, all these characteristics remind people of the passing of time. The pine tree selected by the project extends naturally in different directions and it looks like peacock spreading its tail, which provides tourists with high visual enjoyment. Moreover, due to the particularity of the shape and texture of the dead pine tree, it will contrast sharply with the surrounding scenery and a popular landscape project will thus be formed. In addition, as time goes on, there may be new shoots on dead branches, generating a contrast between life and death, expressing the cultural spirit of survival in harshest environments (Figure 33).

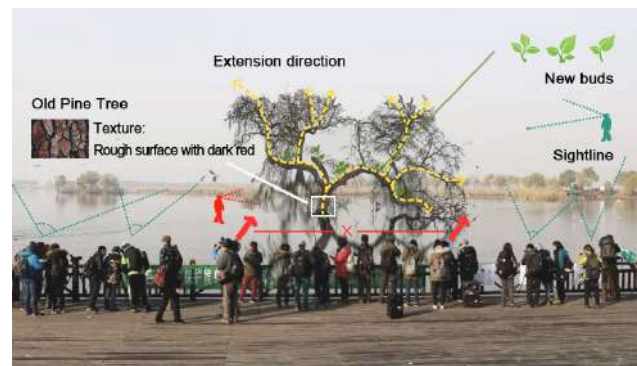


Figure 33. Analysis of dead pine landscape. Source from: author's own photograph

In terms of ecological effect, planting withered pine could create a small ecological cycle, which is beneficial to biological diversity (Figure 34).

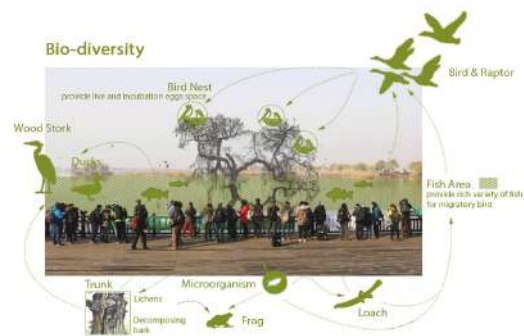


Figure 34. Bio-diversity Analysis. Source from: author's own photograph

B. Three Stumps with Branches (Figure 35)



Figure 35. Three stumps with branches. Source from: author's own photograph

The combination of Stumps and branches can create a quiet and peaceful atmosphere, bringing people more of the thinking of time, rather than the understanding of life and death. In addition, due to the fact that thick short stumps and thin branches are similar in height, a comparative and unified effect is achieved, which rarely can be seen in landscape design. In terms of stumps, they all have obvious bend, like three dancing fat girls, with different poses, forming a eye-catching view. At the same time, the three stumps as the main body of the landscape, gathered in the center of the sightline, also conforms to the aesthetics of layout. However, a large number of branches may affect the line of sight in people and waste the scenery on the opposite bank of the river, which makes it not conducive to take photos of distant view on this viewing platform (Figure 36)

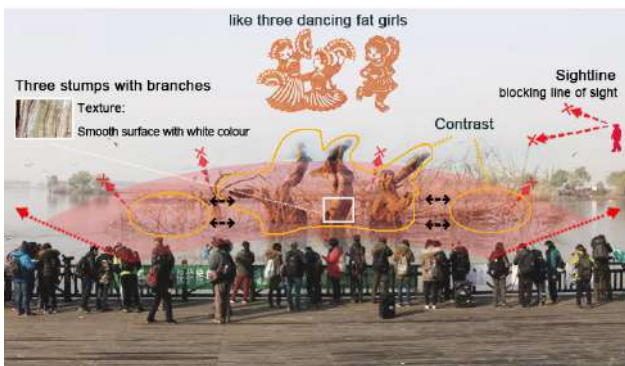


Figure 36. Analysis of stumps with branches design. Source from: author's own photograph

As for ecology, it is similar to the first design. Moreover, due to the application of branch elements, more microorganisms and aquatic plants may be bred, which is conducive to the diversity of underwater plants. However, stumps are not suitable for birds nesting, and instead it functions more as a temporary resting place for birds.

C. Dead Birch Tree Grove (Figure 37)



Figure 37. Dead birch tree grove. Source from: author's own photograph

The slender, long birch trunks with reflections in the river could blend perfectly with the park environment, creating beautiful scenery in the morning and at sunset. Manasquan reservoir is a good example in Monmouth County, New Jersey, United States, and "Dead tree forest" is a part of park, playing the role of attracting tourists (Figure 38).



Figure 38. Landscape changes of Dead birch tree grove in the morning and evening

As for their own shapes, slender trunks with a smooth white skin, after layout and design, are like a performance team on stage, and let people unconsciously stop and enjoy. In addition, considering the lake water level changes in winter and summer, planting different height of birch can create different landscape in dry season and flood season (Figure 39). Most importantly, this design hardly blocks the sightline of visitors. People can see the overall view of the lake through gaps between dead trees (Figure 40).

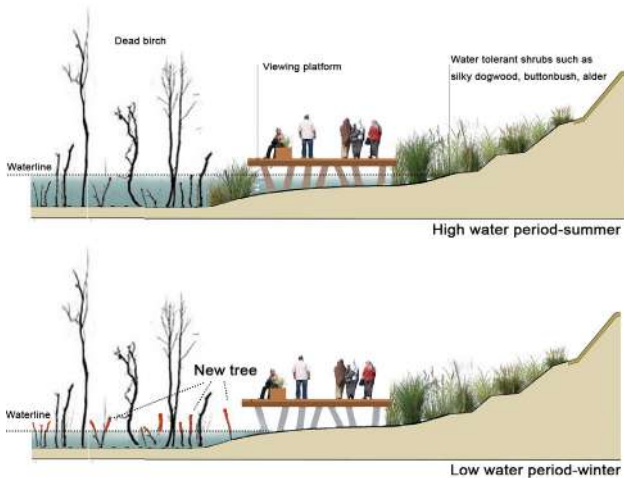


Figure 39. variation in water level. Source from: author's own photograph



Figure 40. Analysis of sightline. Source from: author's own photograph

The function of wetlands in ecological conservation is self-evident, and this design is also beneficial for biodiversity conservation. The dead birch grove has provided excellent habitats for the eagles and for ospreys. It also provides microhabitats that protect fish and invertebrate water species for predators.

(2) Comparison and Choice

Although Chinese have a special feeling for pine trees, the birch group is obviously better considering the unity of environment. With the change of season and time, third plan uses a concise style, showing different visual beauty, which is the most varied of the three plans. Besides, the second design has a more serious problem of sightline, but the birch grove minimises the impact on the sightline of tourists. At the same time, compared with other plans, numerous trees inserted into the bottom of the lake could reduce soil erosion in wetlands. The most important point is that there has been a good example of application of large-scale dead birch grove in Manasquan Reservoir (U.S). The result shows that the birch grove works well both ecological function and ornamental function. Therefore, in my

opinion, the birch grove is better than the other two.

4. Findings and Conclusions

This paper is based on the comprehensive analysis of dead trees and the art practice project of Wild Duck Lake National Wetland Park, trying to change people's inherent impression of dead trees and improves the secondary utilisation rate of dead trees, which provides valuable reference for the landscape application of dead trees in the future.

4.1 Research Conclusions

At present, protecting nature and building an environment-friendly society has become the core objective of urban landscape construction. And using dead trees to create landscapes not only has ornamental and cultural values, but also has significant ecological function, which is an important medium to achieve the goal of landscape construction. It is worth spreading and applying widely.

The study found that dead wood has different characteristics in colour, texture, form and symbolism aspects. Therefore, in regards of the reuse of withered trees, using the root, stem and branch of different withered trees as the material to design, will form a landscape that combines natural beauty with artistic beauty. In terms of landscape design, designers should combine the characteristics of withered trees with artistic methods to create a unique dead tree landscape. For example, in the art project of Wild Duck Lake Park, stumps and twigs can be combined to create a dead tree landscape through the various shapes of change; an individual pine tree could also create a unique landscape through appropriate artificial pruning for crown; the birch grove, after artificial arrangement and layout, has also formed a high quality dead wood landscape.

In addition, in human civilization, people would like to add a large number of symbolic meanings to dead wood. In Asian culture, the dead wood often appears as a stubborn image in poems and paintings, which inspires people to struggle in difficult environment. In many memorial parks in Europe, the dead wood is often used to express respect and remembrance to dead soldiers. Using dead trees could create unexpected landscape when landscape architects combine the natural and cultural attributes of dead wood, which cannot be replaced by ordinary living trees.

In terms of ecological attributes of dead wood, a large number of literature and experimental results have shown that dead wood is an essential element to ensure ecological diversity, because it provides nest spaces and food sources for birds and fish. Therefore, for the disposal of dead wood in nature, these dead trees cannot simply be remove. Even in some ecologically fragile nature reserves,

managers need to cultivate dead wood to repair the local ecological environment.

4.2 Research Limitation

Compared with living trees, the dead trees will lose their ecological functions of absorbing carbon and releasing oxygen, cooling, humidifying, and so on. Therefore, the dead trees should not be widely used in landscape applications. Only under some special landscape conditions and needs, can dead tree achieve its greatest value.

On the one hand, it is best to use the dead tree on the spot so as to avoid the secondary environment damage which occurs in the transit process; On the other hand, in the garden landscape design, the dead tree is preferably adapted to local conditions, and is used for environmental characteristics so as to be coordinated with the surrounding buildings and the environment, and we should not apply dead trees mechanically without considering the specific conditions. For example, in Wild Duck lake Park, dead wood could play a very good ecological role no matter using which design plan. However, if the site is changed into a residential park, these dead trees without anti-septic treatment may have a negative impact on the surrounding trees and local residents. With the change of site, the landscape effect of dead trees may be the opposite. The art experimental project of Wild Duck lake Park could only prove the effect of dead wood in wetland and lake landscape, and the function of dead wood in forest; urban centre park and other sites require further study and discussion.

4.3 Dead Trees and Contemporary Art

As a special plant form, dead wood has a high artistic quality, and its application is far beyond the scope of landscape design. Just like the love of ancient artists to dead tree, the dead tree is still an important material of contemporary art.

Due to the randomness of the shape, color and texture of dead wood, a large number of artists are fascinated by it, such as Bennett Ewing. He could feel and design different kinds of dead trees with the artistic technique of carving and collage, endows the dead wood with new form and meaning, and also forms the artist's own language (Figure 41). Besides, some new media or installation artists would like to utilise the special meaning of dead wood "inanimate", combined with music, lighting and other media, to create new experiential landscape, which brings people sensory stimulation, such as Dead Garden by Carlos Teixeira (Figure 42). Dead wood can also be used as a medium for movies or optic artistry. In the TV series

«Deadwood», dead wood is used to allude to the chaos of the American West Development. But as time goes on, there will always be new life (buds, microbes) coming out of dead wood, expressing the end of the chaotic era and the beginning of a new era (Figure 43).



Figure 41. Bennett, E. (2018) Eyevan Tumbleweed. Sculpture by dead wood



Figure 42. Carlos, T. (2012) Dead Garden. Rio De Janeiro, Brazil

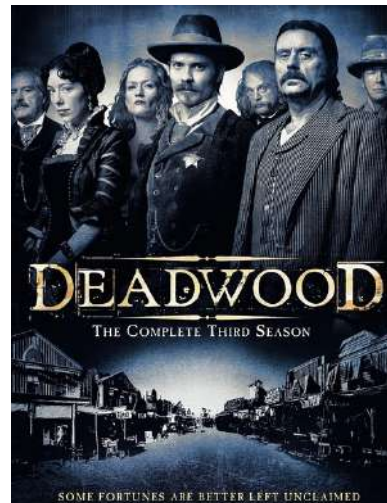


Figure 43. Deadwood (2004) Directed by Walter Hill [TV]. USA: Home Box Office

Nowadays, the dead wood art has already had both appreciation value and practical value, and does not destroy the environment, which is in line with the direction of social development. In my opinion, with the improvement of people's awareness of environmental protection, whether in landscape architecture or in contemporary art, dead wood will be more and more appreciated and accepted by people all around the world.

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