

# Discussions on the Design of the Pool Landscape in the Rain Garden Construction

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**Abstract.** With rapid urbanization, the environmental problems are becoming increasingly prominent and diversified ecological landscape designs consequently appear with the rain garden landscape design as a typical. Based on the introduction to rain garden ecological functions and in combination with domestic and international rain garden landscape design cases, this paper discussed the rain garden pool landscape design.

## 1. Introduction

With rapid urbanization, the environmental problems are becoming increasingly prominent and diversified ecological landscape designs consequently appear. Influenced by international low-impact development and domestic sponge city, the application of rain garden ecological technical measures has become an inevitable choice. As an ecological landscape design, the rain garden must have its landscape design meet the garden's retention, storage, purification and other functions. "Practicality precedes aesthetics, and functions outweigh forms, which are followed by all the primitive national arts." <sup>[1]</sup> In combination with rain garden pool landscape forms and applications, from the perspective of artistic philosophy, this paper discussed the art-form beauty embodied in the rain garden landscape design.

## 2. Rain garden origin and principle

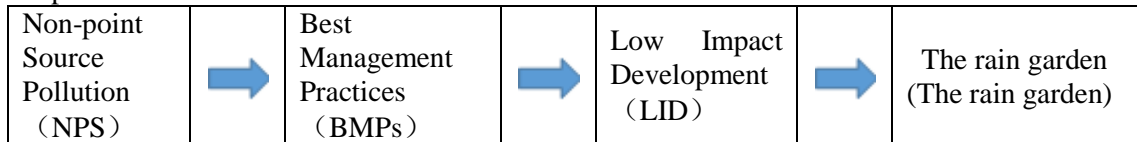
In the 1960s, rain garden design was originated in the West. Western scholars noted the surface rain runoff in urban areas and farmland was one of the water pollution sources, which was defined as non-point source pollution. In the 1970s, relevant sectors of the United States put forward consequent Best Management Practices, attracting high concern from the government and relevant laws and regulations, promoting effective implementation and fast development of BMPs. Later, BMPs were widely used in urban rain management systems. However, with the development of modern cities, impermeable pavement was accelerated and BMPs relying on terminal treatment technology of urban artificial wetlands, ecological parks, biological detention pools failed to effectively cope with instantaneous high-intensity rain runoff pollution in case of city rainstorms. Thus, the US

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Environmental Protection Agency proposed the source control technology Low Impact Development. In the 1980s, Larry Kaufman of the United States, in cooperation with Prince George County, Maryland, studied a rain filtration facility designed for plant and soil particles to simulate the hydrological and geographical characteristics of natural forests, which is one of today's LID important technical measures - the rain garden embryonic form. "[2] Now, it is proper to simplify the rain garden development as follows:



"The rain garden is effective natural rain water purification and disposal technology, and a biological detention facility, generally built in low-lying areas, purified through natural soil or replacement with artificial soil and planted plants, consuming small-scale confluence initial rain." "[3]" The garden is mainly composed of the 5 parts of aquifer, cladding, vegetation and planting soil, artificial fillers and gravel layer with its main functions as collecting rain, reconstructing rain circulation systems, purifying rain water, reducing rain runoff pollution, evaporating rain water, alleviating local heat island effect, protecting species, maintaining biodiversity, broadening horizons and enhancing landscape perception. "[4]"

### 3. Analysis of current rain garden pool landscape main forms

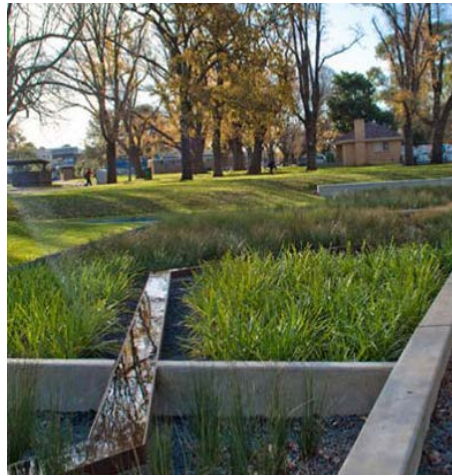
#### 3.1. Straight line formal style

The straight line, representing sincere, honest, simple and staunch personality characteristics, is a main expression technique in the formal pool landscape design. The formal pool landscape design highlights simple, generous, regular and solemn psychological feelings, generally taking the symmetric and regular geometric shape composition consisting of one or more axes. The formal style requires honest, sincere, and authentic design, almost identical to one of the motion characteristics of arts and crafts, namely the "honesty" of the design advocated by the arts and crafts, highlighting "real" experience and perception.

The representative of the Scottish New Art Movement should be the Glasgow Style, and its main founders are Glasgow's four people (McIntosh, McNair, Madonna sisters) who, in particular, advocate straight lines, simple geometric shapes, and neutral color designs. "[5]" Glasgow Style design is reflected in today's pool landscape design. It is common to see large and small straight line regular geometric pools in parks and residential quarters, verifying their extensive application and favor of residents. Example of the straight line formal rain garden - Figure 1 and Figure 2



**Figure 1** Mount Tabor High School Rain Garden

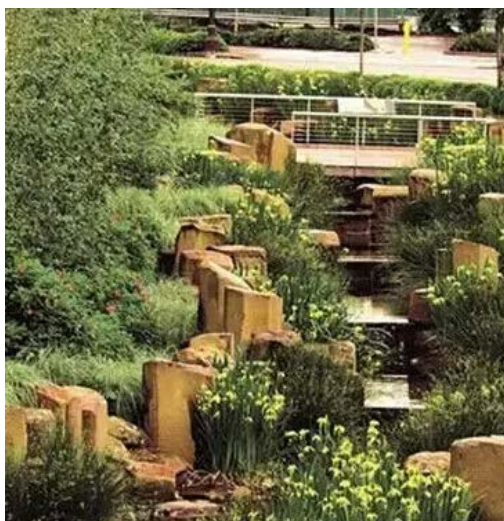


**Figure 2:** Rain Garden in Melbourne, Australia

### 3.2. Curve natural style

The curve represents gentle, elegant and simple personality, embodying mobile and exquisite beauty. The curve is another expression technique of the natural pool landscape design. The natural pool landscape design highlights lively, smart and light psychological feelings, generally taking meandering line composition instead of axis control, requiring elegant and flexible designs, and focusing on "beauty" experience and feelings.

Curve and natural style design is similar to the decorative technique of arts and crafts and novel arts, favoring naturalism. In particular, novel arts centers on curves and organic forms of decorative design instead of straight lines and planes. John Laskin, theoretical director of the arts and crafts, proposed "learning from nature", advocating absorption of nutrients from natural forms. Horta, one of the leaders of the Belgian Art Nouveau 21-member Team (Free Aesthetics Institute), had his design center on curves, while highlighting the relationship between decoration and function.<sup>[6]</sup> He excavated curve modeling elements from fine art or arts, or patterns, and applying them to the rain garden pool landscape, providing more choices and "beauty" expression techniques. Examples of the curve and natural style rain garden - Figure 3 and Figure 4



**Figure 3:** Portland rain garden in the United States



**Figure 4:** Qinhuangdao Tanghe Park

### 3.3. Straight line and curve combination and mixation style

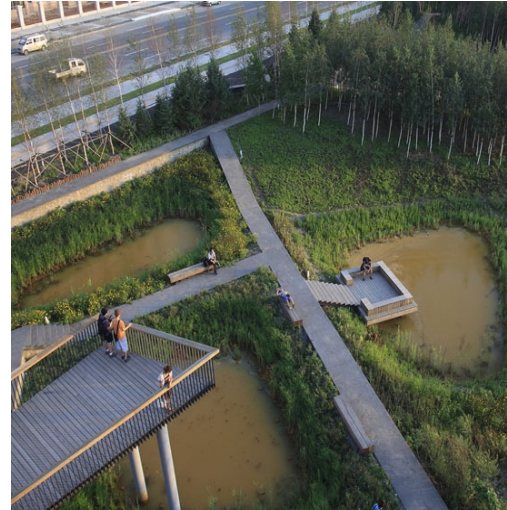
If the aesthetic orientation is different, the art judgment will be different. Some people think the



straight line formal pool landscape is boring and others think it is volatile, expecting to find a harmonious artistic atmosphere. On this basis, it is proper to combine the two into a mixed pool landscape style, which is not necessarily harmonious or perfect. It is necessary to constantly explore and control their relationship, forming a mood of mutual benefit and unity of knowing and doing so as find the truth of art and seek perfection, ultimately achieving perfect realm. Examples of the straight line and curve combination and mixation rain garden - Figure 5 and Figure 6



**Figure 5:** Paris Serge Gainsbourg Garden



**Figure 6:** Harbin Transformed Stormwater Park: Qunli National Urban Wetland

#### **4. Discussion on the Trends of the Pool Landscape Design in the Rain Garden**

Pools are widely applied in the contemporary landscape program and design, aiming at beautifying the environment and contrast the atmosphere. At present, such pool landscape centers on elegant forms and different styles. Some blindly pursue visual effects, ignoring the coordination in the environment, resulting in utopian ivory tower works. In addition, pools are applied to close and control pollution, and restore ecology. With environmental problems increasingly prominent, contemporary landscape has begun to develop ecological landscape, making the pool landscape natural and ecological, without considering proper expression forms, namely excessive and stiff design or insufficient and shortsighted design. Thus, the current design of China's pool landscape is still in the choice period of aesthetic and functional factors.

Influenced by international low-impact development and domestic sponge city, the application of rain garden ecological technology measures has become the inevitable choice. The rain garden pool landscape soundly combines aesthetic and functions, witnessing a contemporary pool landscape design breakthrough. This author proposes the following factors in the future rain garden pool landscape design:

##### *4.1. Graphic Creativity - Pluralism*

At the beginning of the pool landscape design, it is necessary to conduct the form graphic creative design, obtaining meaningful graphics. Creative graphs have diversified origins, focusing on the following three: First, the traditional formal style conducting exploration, amplification or reorganization of classic natural patterns and obtaining substantial new graphics; Second, observing something new, exploring new elements, and constituting new graphics; Third, independent innovation design graphics.

##### *4.2. Structural Materials - Judgment*

Except basic building materials, the rain garden has its external materials with certain judgment, and it is necessary to determine according to the practical situation. The formal pool external building

material is usually cement mortar, which is conducive to shaping and rain water retaining. In traditional Chinese gardens, including imperial gardens and private courtyards, natural pool landscape prevails. In terms of materials, the natural pool outweighs the formal pool material, such as Taihu stone and aquatic plants. Natural and mixed pools can have their outer contour composed of strange rocks and emergent aquatic plants, ecological and elegant. Cement is applied as their convergence material.

#### 4.3. Aquatic Plants -Adaptability

Rain garden aquatic plants should be carefully selected. First, they should be applicable to the local plant growth environment, focusing on local plants. For the diversity, it is proper to have some alien plants. Second, it is necessary to have their form and cultivation adapt to the pool. Formal pools center on symmetry and array, adjusting them into formal geometric patterns, neat, dignified and elegant. Natural pools should also have appropriate aquatic plants, centering on harmony in size and height, taking linear planting and mass planting, constituting attractive landscape with the sense of curves and rhythms. Mixed pools should focus on harmonious planting, avoiding stiff and rigid forms or indulgent and messy arrangements.

#### 4.4. Water Landscape - Craftiness

The water area is an important part of the rain garden pool landscape. All the pools, including formal, natural pool or mixed ones, should focus on the water area design highlighting craftiness and enjoyment. Rain garden entrances, exits and storages can have waterscape. Entrances and exits can have drop structures and small waterfalls and storages can have artificial small fountains, creating elegant waterscape. At the same time, water areas can have art lighting, creating attractive night scenes.

Perfect combination of rain garden pool shape, plants and water areas lead to attractive landscape. It is vital to exert landscape elements. For example, German Hannover Kronsberg Residential Quarters has its rain garden set a vocal system in drop and overflow areas, witnessing different sweet sounding based on different currents and amounts. <sup>[7]</sup> The pools can have slab-stone with different rugged grooves, resulting in the sense of rhythm and continuation based on the small grooves with varied rain water storages, depths and evaporations.

### 5. Conclusion

The rain garden pool design should achieve ecological functions. It is necessary to explore the pool landscape forms, following Louis Sullivan's design concept of "forms following functions".<sup>[8]</sup> The discussion on pool landscape forms focus on the 3 styles, namely the formal, natural and mixed styles. Against this framework, it is necessary to excavate and apply proper elements, constituting the ecological and elegant rain garden pool landscape, achieving the true-good-beautiful realm in the artistic philosophy.

### Acknowledgement

Fund Project: 2014 Jiangxi Provincial Social Science "12th Five-Year Plan" Program Topic 2014 (14YS19)

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