DESIGN AS PROCESS OF RESEARCH
——Case Study for Riverscape Diversity in Tangshan

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Abstract
This paper proposes a new design idea integrated with science and art in order to create the more diversity to riverscape during the waterfront revitalization in China. It reviews the awarded proposal by UP+S Design in the competition of waterfront revitalization along the Douhe River in Tangshan. A particular focus is on exemplifying how UP+S Design to create the diversity to the Douhe River by using the method of “design as a process of research”. The proposal was the product of co-design, therefore, the motivating effect of co-design on the creation of diversity design and on making designers more creativity is discussed.

"Landscape architecture is the art of incorporating functional and aesthetic concerns within the peculiarities of a particular location, inherently marking the character and specificity of the time and place."

-------- Steen Høyer (1999)
Introduction

Over the last few decades most of cities in China have been attempting to respond to shifts in economic and urban structure after factories are shut down or have been moved out of the city. In this case cities are increasingly looking towards the revitalization of post-industrial areas as a means of regenerating urban centers and creating pleasant surroundings for living and business. Often, cities have become more the expression of economic and social forces rather than the result of design (Richard Marshall, 2001), in which the majority of projects seem tedious, with fewer differences from city to city on the one hand, on the other hand, the proposals for revitalizations have typically been finished separately by landscape architects, planners, or architects. Infrequent collaboration among them constrains the multiplicity of designs to be offered, consequently narrowing necessary feedback from other outside professional sources. Can we step back, away from this dilemma, and find the solution to achieving a creative design by “design as a process of research”?

This paper concerns the waterfront revitalization along the Douhe River in Tangshan, China. Tangshan is more than 200km from Beijing, which is a second city in Hebei province. And its name dates back to 645 A.D. (Tang Dynasty). Accordingly the Douhe River was called Tangxi, before the 20th century. Tangshan has been honored as the cradle of Chinese modern industry, with the first mechanized mine, the first standard track for railway, the first steam locomotive manufactured in China. Cement, ceramic, iron and steel factories and power plants were gradually laid out along the sides of the Douhe River since the early beginnings of the twentieth century. Nowadays following the new strategy of development around Bohai Bay, the first national Cyclic Economy Demonstration Area in China is under construction, named as the Caofeidian Industrial Base, located in the south of the Great Tangshan district and adjacent to Bohai Bay. Hence, factories (not closed down) along the sides of the Douhe River should be moved out of the city and into the Industrial Base in the coming future. Undoubtedly, Tangshan city could be greatly challenged as to how to regenerate the post-industrial plots after the move-out (Fig.1).

Here, we present the case (Fig.2) for revitalization of the waterfront along the downstream (from Hebei Bridge, through the city, down to Tangjin Highway, a 15.2km length) of the Douhe River in Tangshan which won first prize for the concept of a “diversity-based riverscape” in the competition by Up+S Design, a Beijing, China-based design and planning studio, in March 2009. Utilizing the globalized trend, designed toward diversity, as opposed to mass design led by the market (Christopher Ireland, 2003), “diversity riverscape” means, creating various riverscapes on the basis of the characteristics of the site or city by means of utilizing as many approaches as possible.

The competition organizer presented five cultural themes should be completely reflected on the proposal. They, one by one, from north to south, are defined as: the Ceramic Culture, for the area of ceramic factories close to Wandaoshan Park; the Longshan Culture, in Dachengshan Park; the Evolutional Culture, for the area close to Xiaoshan, where the city originated; the Cement Culture, for the area close to
the Qixin Cement Factory which produced the first bag of cement in China; finally, the Ecological Culture.

In this paper we argue that waterfront revitalization integrating urban design and landscape planning and design, may create an urbanscape, not only a riverscape. We highlight what the diversity of riverscape might seek to achieve in the method of "design as a process of research", and how any further improvement for the riverscape might be advanced. The body of discussion is divided into four sections: Searching diversity----design as a process of research; telling diversity----case description; mapping diversity----being the process; and rethinking diversity.

**Searching diversity ---- design as a process of research**

The notion of diversity for the proposal is mainly inspired by both the guideline of competition with different cultures and site visitation. Cultivated landscape, artificial landscape and natural landscape are sequenced north to south along the sides of the Douhe River. Moreover, land use along the waterfront also seems to encourage diversification. Despite the frequent use of diversity related to ecology or sustainability, the term diversity in this paper covers not only design solution, but design method.

How do we create diversity? Christopher Ireland notes that it requires an open attitude to create diversity (2003). And what’s an open attitude? We supposed it is an open system in which we are able to not only ask the "why" of design as research does----research determines what product should be produced for whom, or why (Brenda Laurel, 2003), but also to integrate art and science as well, the need, the pleasure, and aesthetic.

Generally, research-led methods aspire to being more scientific and less artistic. In design methodology, Design Research is a prominent approach which concerns the studies in all fields which undertake research into, or within, the design process since it emerged as a recognizable field of study in the 1960s. "Design as a process of research" is mainly derived from Design Research, which concerns design methods and overwhelmingly emphasizes the process of design (Kees Dorst, 2008). Borrowing from the study of design process, "Design as a process of research" aims mainly at making the creation process objective and scientific, as a point of departure for the site. Furthermore, it enables us to see more than is visible and then to develop a critical understanding of the diversity of the riverscape.

Another inspiration of the method definitely motivated by "design as a form of research"---- which is the thinking way of Steen Høyer, landscape artist in Denmark-- is what Anne W. Spirn called, his "practice of art and design as a form of research" (2006). As we know, Steen Høyer is famous for integrating art into his ideas. For him, the products of design thinking seem not to be traditional, or static drawings or diagrams, but to be presented in artistic form, such as conceptual photography and installations. It could be an active way to keep creativity. That was why we engaged in the creative exploration of art in landscape with "design as a form of research" through the whole design process, and tried to employ it to pursue the typical Tangshan riverscape.

Thus the method of "Design as a process of research" used in the proposal has integrated Design Research with Hoyer’s way of thinking. We defined "Design as a process of research" as, academically or logically formulating the problems and specifying the characteristics of the site, instead of a focus on personal taste, then properly exploring the creativity of diversity-oriented riverscapes by co-design.

**Telling diversity----Proposal description**

The Douhe River has been regarded as a symbol of industrial civilization in Tangshan city, so the industrial culture is markedly put into the proposal by Up+S Design (Fig.3). The proposal covers two levels’ design as follows:

One is in the urban landscape level, combining urban design and landscape planning. The site is divided into five bridge-based sections in the light of the type of existing green quality along the river
Each section has featured its own thematic culture and has comprised a few important node designs. The northern first is the section of Wandaoshan Park with 2.7km length from Hebei Bridge to Changning Bridge, the cultural theme is ceramic. This section embraces one node named Rose-Ceramic Garden, from some of the best and most famous ceramic products locally. The garden is an extension of Ceramic Theme Park (see Fig.4), which is renewed on the basis of the 40-50m wide former park. Next is the section of urban life with 2.08km length from Changning Bridge to Jianhua Bridge; the theme is modern industrial culture. This section embraces also one node named Shinexiujuan Garden from the ancient book <Shanhaijing>, in which the Chinese character Shinie means coal. Shinexiujuan Garden is featured by a geometrical pool, terraced green space, and steps down to the river (see Fig.4), all inspiration is drawn from the shape of the coal mine and railway. Following is the section of Dachengshan Park with 3.74km length from Jianhua Bridge to Xinhua Bridge, the theme of post-industrial culture is related to the cement and steel-iron factories nearby. Three nodes are located in this part including Twin-Tower Park, Memorial Park and New-Agenda Park. Twin-Tower Park is transformed from the former power plant located on the wind course of the river where the building and plant tower is suggested that it be conserved to memorialize its industrial context. The location of Memorial Park is chosen to be in the former stone mine, being a part of Dachengshan Park. It is treated as a rock garden reflecting Longshan Culture, discovered in Dachengshan Park. New-Agenda Park (see Fig.4) is located in a key place where the main road of the city has been planned to pass and connect the sides of Douhe River in the coming future. The river in New-Agenda Park is enlarged, and four small islands are created to imitate a mountain-lake landscape. The fragments of the railway to the power plant are preserved on the top of the island. This park will be particularly typical of a post-industrial memorial. Then is the section of new urban life with 2.76 km length from Xinhua Bridge to Nanxindongdadao Bridge, with the historical culture of the city being maintained through competent guidance. Two nodes are in this part; one is Fountainhead Park, to functionally help local people keep in remembrance the cities’ evolution. Another is Education-Oriented Park, based on a former paper mill and a sewage treatment plant (see Fig.4). This educational park tends to integrate ecological education with the sewage treatment process. A few small gardens are created according to the lay-out of the rooms of the paper mill. Finally, there is a section for ecological recovery with its 3.95km length from Nanxindongdadao Bridge to Tangjin Highway, ecological culture is the theme because there is a natural riverbank and landscape in this part. The principal behind the design is to reduce...
man-made structures as much as possible.

Another is at the detail level; focus has been put on the strategy for landscaping the former concrete-banks of the Douhe River. That is to say, the riverbank as landscape is an important idea of design. We dealt with it in two different ways: one, the former riverbanks located at the nodes were categorized into five prototypes according to its shape and vertical height over the waters' surface, then given corresponding solutions required to prevent flooding. Another is for the remaining part to be standardized in three types of riverbank, including two-terraced, three-terraced and more than three-terraced, then they are subdivided further into six kinds (Fig. 5). Some are improved, integrating the canal’s rainwater, or cascade; others deal with the pavement or terrace of the waterfront. In the section for ecological recovery, the well-preserved natural riverbank is still kept.

Mapping diversity----being the process

We regard design as a process of research motivated by the significance of design depending on the process (question) itself rather than in the final proposal (answer). That is why we engaged in creative explorations to study and map the diversity of the riverscape in the process of research. Diversity in the proposal is featured with unusual meaning in four perspectives below.

First of all, the scheme tended to create an urbanscape and not only a riverscape from the study's perspective, although the task of competition is with the latter. We extended the nodes to one-block (around 300-500m) width beyond the given site in order to build an intimate relationship between the waterfront and urban space around its periphery (see Fig. 4). Meanwhile the principle of “Waterfronts are part of the existing urban fabric” led us to keep an open mind of the integral urbanscape instead of riverscape. On the other hand, we are sure that we did not make an extension without a rational reason. Furthermore, the waterfront is a precious urban resource, as well, a non-renewable asset, and it must be taken into consideration as to how to embrace and integrate its redevelopment with the new masterplan of Tangshan city (which will be on its way to promulgation whilst the proposal is done) in a vision for the future of Tangshan’s riverscape. A mainly landscaped road was suggested, starting from the exit of Jingshen Highway, across Donghu Park and down to Jianhua Bridge. We tried to leave more grounds for people as well as to impress deeply upon them the beautiful scenery while driving to Tangshan (Fig. 6). In the nodes’ design mentioned above, it was indicated that the integral layout of a given site and its extended blocks had not only created riverscape, but also urbanscape. For example, Educational Park was created at a joining between the Douhe River and Nanhu Lake Canal, like a pearl of a looped-water necklace.
Secondly, we focused on multi-target solutions which included the client and city, not only the user. In spite of a classic answer for the user-centred solution, we respected the client as both the profit- and decision-makers who would be responsible for bringing the delight and art of design to the users (the public) as the designers themselves do. So we had made optional solutions for them. For example, Shiniexiuyuan Garden lays in-between part of the Douhe River and the northern sewage plant. The given site was only 50m in width which is almost 100m away from the plant. We extended the limited site toward the plant so as to provide a broader visual to decision-makers making exception for the creation of urbscape (see Fig.5). Even if the extension part of the plan were carried out later than the original plan for the given site, the idea for the integral scheme would be much more preferred, otherwise it might appear out of place and fragmented. Besides, for the key nodes, like the Rose-Ceramic Garden and New-Agenda Park, we offered two solutions respectively to demonstrate our thoughts, and provided decision-maker options (Fig.7).

Thirdly, searching for diversity in the design process, during site visitation, we were mainly concerned with land use, spatial structure and composition, architectural quality, user activities, traffic, the existing green system, the situation of water level and riverbank. Then these combinations were expressed with diagrams (Fig.8). The diagram of land use indicated that industrial plots were the overwhelming majority on both sides of river. In its composition, the Douhe River is winding, the buildings on the banks are mostly rectangle. Of buildings, the majority of housing is arranged parallel to each other, against the river bank. The shape of spatial structure seems to be the Chinese character "非". The main space was defined by the walls of buildings facing the river. And water surface and soil to grow plants were considered its floor, the sky as its ceiling. Those factories standing on the sides of river told us about the evolution of industrial history in Tangshan. The towers of power plants are as a peculiar landmark for people who drive to downtown from Hebei Bridge. They would be worthy of conserving and should be allowed to be adapted for new use to increase their viability. Local people often walked and exercised in the existing parks along the river on the one side. 17 existing bridges led to low-density traffic connecting both of the sides of the river. There is difficulty in accessing the water because a 3-4m height is between the water surface.

Figure 7 optional solutions: (above: Rose Ceramic garden; Bottom: New Agenda Park)

Figure 8 Diagrams: left, Analysis of visual landscape; middle: Elevation analysis, right: Population density and density of land use
and riverbank top (Fig.9). This was described in a poem named, Tangxi Zashi, written by Zhao Cao (曹钊) in the Qing Dynasty (1616-1911), as beautiful scenes on the sides of the river, and as a pleasant daily life, with such scenes as fishing and boating. But they have been changed greatly since the industrial age.

The waterfront of the Douhe River is not only one of the biggest open spaces in the city, but a key part of the looped river system currently under construction, which is the largest project in Tangshan ever undertaken (Fig.10). Therefore, in the joint part of the water system we formulated the problems from as a multi-disciplinary perspective as possible, with solutions being made one by one; overlapping them again created the divers effect. For example, in order to build an interactive relationship on the sides of river, we suggested that the “丰”-shaped syntax in the proposal could be useful to enhance the spatial and functional connection.

Finally, is mapping diversity into riverscape. It is overwhelmingly a greater effort to create the diversity desired from the former riverbank, because both riverscape and budget are of consideration when speaking of how to improve or reuse it. We managed to find the solution from within three elements: people, river and urban settings. For people, the riverbank would be accessible to the water, as well as safe for the people. This motivation gave us thoughts on lowering the height of the existing concrete riverbank, this, for the river, might guarantee its health. For instance, its running must be kept at a continuous pace, and not at risk to flooding. Consequently we were able to combine a terraced riverbank with storm water management built around it. As a result, it caused small cascades in the riverbank. From an urban vantage point, the riverbank embraces the physical and spiritual needs of the community. The former is functional in that it prevents the city and community from being flooded. On the other hand, the latter links the aesthetics to the visual landscape, as well as it making for a pleasant experience whilst driving or walking along the river. From our analysis of the visual view along the riverbank (Fig.11), we can draw a conclusion, that it is necessary to reduce the height of the former riverbank, and that the riverbank is terraced to gain a better all around view, as well as being able to see the water (see Fig.5). In the proposal, therefore, the diversity of the riverbank was formed by mainly depending on the surroundings as a guide. Most of the parts were done as a whole in relation to the green plot nearby, which is illustrated in the section (see Fig.11). For example, we beautified the former riverbank with a viewing platform, steps and ramp.

Rethinking diversity

Diversity, as mentioned, does not only concern a diversity of solutions, but the exploration of design method. In this project,
we built a collaborative design group consisting of six landscape architects, two planners and two architects. It was a co-designed, open dialogue that created possibilities for the members of the group to share their understanding and to argue differences that eventually led to a diversified landscape concept. In the group, landscape architects were responsible for the whole design process, planners and architects joined it. Planners’ insight had contributed to the creation of urbanscape and the organization of spatial structure. Architects had played an important role in contextual understanding, especially the reading of architectural quality and the conceptual design of pavilions in the parks. A variety of professional collaboration enriched the design strategies and solutions, also realizing the creation of riverscape diversity, as we had expected. Nevertheless, mutual differences among the members had influenced both the effectiveness and quality of the design process (Kleinsmann M. and Valkenburg R., 2008). We still encountered a low-efficient working platform whilst sharing understanding even though we took practical measures from the beginning, for instance, the allocation of tasks. On the other hand, we expected the arguments and brainstorming, in the co-design, might be helpful for designers and be in keeping with their creativity. In fact, this expectation had been understood as a possible ingredient to the conceptual design for most of the nodes. For instance, in Twin-Tower Park, architects presented many solutions for reusing former buildings, or for making higher plant towers a part of the landscape. One of them was to use a particular colorful surface on the tower and add viewing platforms inspired by an argument from the landscape architects.

Additionally, although we defined "design as a process of research" as a design method integrating science and art, the final proposal seems to use more technology and less art. We failed to keep the balance between technology and art as we expected. The main problem might be our collaboration during the process. Sometimes creative and artistic suggestions were spoken out in brainstorm meetings, but later they were seldom reflected on diagrams or drawings. Presently we cannot confirm what kind of factors had impacted it without a further study.

Even though the proposal seemed more technical, there may still be some mistakes or personal taste involved when visiting the site or reading about the sites context. The scientific design method could be improved if we applied an analytical reading of Malene’s academic method (Hauxner M., 2009) in order to discover the significance of the site. In her method it includes reading spatial morphology and syntax. Morphology is defined as concerning space and its components, such as structure, texture, spatial factors and components. Syntax is interpreted as the order or force in how things are organized. If following morphology and syntax, personal taste might possibly be disregarded by critics. Also analysis might become more objective as well as become closer to the nature of "design as a process of research".

Conclusion

The revitalization of the Douhe River waterfront provided insight to landscape architects who wished to create a diverse riverscape in the collaborative design processes using the method—"design as a process of research".

"Design as a process of research" is an open-ended process which omits ones personal tastes in favour of an academic or logical formula which analyzes problems and identifies the characteristics of the site, with the intention of integrating a scientific and artistic thought process. By means of this method, we were able to dig up and utilize its divers qualities at the site and refine the creation process for the riverscape. Furthermore, the results demonstrated that the diversity of riverscape could be created upon four aspects. This means that the creation of diversity not only reflects the combining of urbanscape with riverscape, and provides a multi-target solution, but also on the details--design process and measures consistent with the former riverbank as landscape.
Future research should investigate how multidisciplinary collaboration works within the field of urban landscaping as Kleinsmann M. and Valkenburg R. have done within the industrial field (2008).

In brief, design has been often stressed for the need and for the delight of user-centered solutions since the end of 1960s. Now we prefer to add one more—design for the city. We believe it would be better to consider design responsibility in the coming future: for people, city and society.

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Notes

1 Collective or collaborative part of the design process is called co-design. Kleinsmann M. and Valkenburg R., 2008
2 “Waterfronts are part of the existing urban fabric” is the second of ten Principles for a Sustainable Development of Urban Waterfront Areas in the Global Conference on the Urban Future (URBAN 21, 2000) held in Berlin.
3 The looped water system is framed by Douhe River, Qinglonghe River (located the west of downtown which was built in 1960s in order to prevent from flood water), Nanhu Lake (transformed from subsided ground underneath the coal mine) and the constructing canals in order to connect them.
4 Hauxner M., 2009. Drawing and reading, University of Copenhagen. published online.

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