Waterways and Urban Morphology of Saigon HCMC Case Study of Xuyen Tam Canal Area in Ward 1 and 2, Binh Thanh District

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Abstract. Saigon- Hochiminh City (HCMC) has a long history of water-based development, defined by entire system of water transport routes, water-based living culture and productivities. Today, due to the declines of water transport and water-related social economic activities, water-based settlements have degraded the qualities of their living and working environments, negatively contributing to images of the city with pollutions, slums and garbage filled. In order to upgrade the conditions, improve water landscape, attract investments and accumulate economic growth, city government, with financial and technical supports from national and international levels, has carried many projects on water upgrading and redevelopment. The general objectives have been recorded as (1) (whole or partly) evictions of water-based communities/households, (2) constructions or widening of water-side roads, and (3) renovations and developments in vacant areas acquired from land pulling and readjustment. However, the effectiveness of evictions and resettlements of large number of households, the incomprehensive and passive plans for spatial renovations and upgrading after road constructions, and the demolitions of lots of valuable buildings have been questioned. If only are the values of water-based characteristics convincingly identified, the responsive and sensitive solutions for these areas are reasonably appropriate. This paper develops a framework to analyze values of these settlements from various aspects of spaces based upon morphological approach: the physical, the behavioral and emotional characters. Then, taking a section of Xuyen Tam canal as a case study, this paper applies the framework to analyze and discuss its future spatial transformation.

1. Introduction
In Saigon-HCMC, areas along sides and on river/canals have been places and homes of many people. Thanks to the dense water network of natural and man-made water channels (together called canals
here), water transport and diverse water-based working and living activities have become identifiable elements [1, 2].

Over long transformations, water-based communities have got smaller and moved away from water whenever they can afford to leave [1-4]; canals are only place for whom having social economic constraints. The so-called messy, polluted and uncontrolled canal communities have expanded to all canal areas in the city center during 1960s – 1970s, and continue to occupy the waterways especially those receive less attention and control from the governments.

To solve the problems of water, air and visual pollutions, the declines of social cultural environments, at the same time to attract more investments and stimulate economic growth, many canal upgrading projects have been carried out, commonly aiming at:
- Evictions of houses on and along sides of water channels;
- Water-side roads constructions;
- Spatial renovation of areas along sides, spare lands for larger scale developments within debatable buffer zones.

If these are appropriate, then the next task is to research and propose suitable spatial development models and resettlements for the evicted communities. However, according to a PhD research done in 2010 (Vu, 2010), every water channel in Saigon HCMC has different roles and contributions to ‘the greats and falls’ of the city; among which belonging spatial elements such as roads, buildings, plants, and living cultures have been also differentiated. As a result, a prototype of either conservation or development applied in such areas has been always questionable. East-West highway (later Vo Van Kiet Boulevard) is an example. Clearly, the road construction and the clearance of canal housing have brought a new ‘civilized, modern clean and tidy image’ to the area [2,3,5]. However, drawbacks remained such as the evictions of a large number of 20,000 households, controversial resettlements sites and policies, the disconcertment of spatial development in ‘post road construction’, and the removal and demolitions of many valuable architecture have been negative points of the project [2].

2. Framework to Analyze Spatial Identities of Spaces
In any human settlement, aspects of spaces include (1) physical attribute, (2) activities and (3) meanings (Relph (1976), Bentley (2012), Vu (2012, 2017) (see Figure 1):
- Physical attributes/forms): include (1) natural elements such as terrain, topography, water surface, water channels, trees and plants, etc), (2) the built fabric such as spatial forms, architecture, road/street, amenities and facilities to serve human’s needs. These elements are perceived by people using human’s senses; resulted in what is called ‘cognitive dimension of space’;
- Activities: including (mostly) human activities and of other creatures on earth. These activities occur in different time, at different spaces and with different routines/manners, however, are divided into two categories: passive activities and active activities. All activities occurring in one space create ‘behavioral dimension’ of that space. Some activities happen regularly in one space in a long enough time soon likely become identifiable elements of that space.
- From those two above spatial dimensions, meanings of physical attributes and activities are formed, transferred through time and spaces, create ‘emotional dimension’ of space. With different individuals participating into this perceiving procedure, this has important meanings, experiences, elements that connect themselves to surrounding environments. This is also base to develop methods to evaluate quality of space, by different perceivers who take part in the transformations of spaces.
3. Results

3.1. Spatial Identities: Values – Based Assessment
Values given to each dimension of space are relatively quantified from a field survey where opinions of whom involve in the transformation of water-based settlements are gathered based upon the framework developed above. And depending on the purpose of the research, different scales of spatial analysis are focused; in many cases, ranging from:
- Locations of typical settlements in a specific area/city/region;
- Distribution of water-based buildings including housing and public facilities; and relationship with water and road/land;
- Characteristics of housing including structure, spatial organization, façade, interior, and furniture, etc.

While morphological approach helps understand physical dimension of space, narrative approach allows understandings of how physical forms relate to social cultural and economic patterns of each settlement/house.

3.2. Canals and Spatial Identities of Saigon HCMC – An Analytical Example
A research in 2010 [2,3] figured out 05 different water classes of which the location of each class in distance relationship with the city center was not necessarily important (see Figure 2 with 5 classes in Figure 2 below). Instead, human settlements and their living culture attached have influenced the ways people perceived spaces; therefore, their behavioral and emotional dimensions of spaces consequently affected. Yet, it is evidenced that water in Saigon HCMC has played crucial impacts on the three dimensions of city space/form, from the existence of dense water network, countless bridges, and many road names starting with water-related figures such as Port/Dock/Quay (Bến) (i.e Bến Bình Đông, Bến...
Ba Đình (District 8), Bến Chương Dương (District 1), Bến Nhà Rồng, Bến Vân Đồn (Dist 4), Bến Hấm Tử (District 6)), to layers of houses on and along Saigon river, and canals in the city.

Figure 2. Classifications of canals according to ‘values’ – a case of Saigon HCMC [2,3].
(Although water network is hierarchical like road/street network, individual values and its contributions to the identities of relating areas are not necessarily accordingly).

According to the research on the roles of canals and identities of Saigon HCMC [2], the perceptions are as following:
- Regardless of ethnic backgrounds, gender, age, and social political roles, majority of people were aware and appreciate the important roles of canals in the identities of Saigon HCMC, contributing to not only physical but also behavioral and emotional attributes of Saigon HCMC’s image.
- Housing along canals and open spaces along have been crucial elements of urban morphology generally and waterfront landscape in particularly; however, in certain periods especially currently have not fulfilled the roles and negatively impacted on both the historic values and future potentials.
- Social aspects such as living culture, jobs, behaviors, personal distinctive characteristics, surprisingly, have not been affected by water. People who live long enough in this land can easily adapt to constantly changing living conditions.
- The local people easily accept upgrading solutions as long as they bring green, clean and beautiful living environment, facilitating variety of social cultural activities along canals (the physical and the behavioral dimensions). However, the emotional dimension of space is achieved if only do they feel familiar with both.

Based upon the understand of different aspects of spaces and the roles of water system in the transformations of Saigon HCMC, a framework to analyzes how waterways contribute to the identities of urban landscape in Saigon HCMC is developed (see Figure 3 below).
Figure 3. Framework to analyze how waterways help diversify the identities of urban landscape of Saigon HCMC [2].

4. Which Direction for The Future of Waterways in Saigon HCMC

4.1. Current Directions
In many canal upgrading projects, it is commonly seen:

- **The removal/eviction of water-related communities due to new developments**: this is questionable since many researches have shown the demolition of many historic valuable buildings and landscape architecture, the eviction of more than 20,000 canal households; the new chaotic spatial development and the ongoing drawbacks of resettlement policies/program.

- **Waterside road(s) construction**: Roads along water channels with high-speed vehicles tend to disconnect the water from surrounding activities; a linear park next to the water hardly accommodates variety of social and cultural activities for local people in daily lives. In addition, from the perspective of commuters using waterways, this stereotype is not so interesting too.

- **Changes of water-based buildings/architecture due to new demanded land uses and renovation/new development**:
  - Conservations of ‘heritage buildings’: since ‘heritage buildings’ normally listed under different administrative agencies (national, provincial, and local levels), the lists miss quite a lot, especially since they only focus on public uses and physical aspects of buildings;
  - Renovation: This tendency is applied mainly to areas with private properties that hardly withdraw and readjust land uses or be combined plots. These are commonly seen in the waterside architecture, not ‘floating’ architecture or settlements;
  - New development: applied to big land plots, possible to withdraw and readjust land uses, potential for new investments and tourism-related development.

4.2. Value-Based Assessment and an Example for a Canal Section Rehabilitation

In reality, architecture development tends to go in after waterside road construction, resulted in chaotic images with odd shapes and size plots, controversial architecture styles, height, and densities.
As spatial character of areas along sides and nearby a water channel is more or less affected by that water course, the value-based analysis should not be statically limited in any distances from the water edges or buffer zones. The surveyed areas should consider the comprehensive site that specifically defined and amended throughout the survey, historically and currently. For that reason, the following example chose the area of Xuyen Tam canal in Binh Thanh District.

![Diagram showing the deduction of greenery and water areas over time](image)

**Figure 4.** Canal helps identify morphological patterns at Xuyen Tam canal Section [8].

From a wetland located in the edge of the citadel and later out skirt of a modern colonial city, disguising the Gia Dinh of Viet people from the French colonists and their allies, this place has significant water landscape values dated back to 1690-1860 (natural blue and green spaces, Le Van Duyet temples, the citadel gate, the port-boat market). Later, with its first roads and tramway, it is crucial for the city transportation, connecting the core center to the North-East areas (1860-1960), following settlements with colonial architectural stereotypes; the water edges somehow still remain wild. During 1960-1975, this area was one of the busiest locations for commercial and trading activities, following diverse social cultural footprints evidenced via architecture and public spaces which are somehow relating to water (1975- today); the built fabric along the canal is sadly considered less valuable. Figure 4 above shows the analytical transformations of different morphological layers of the chosen section of Xuyen Tam canal. The changes of architecture and its surrounding public spaces including the old temple (1698), Ba Chieu market (1960), the Cathedral (1970s), however, lesser
relevant to the canal itself but rather serve needs of people through time. The disappearance of the railway once running along this canal which connect Gia Dinh of Viet people to Saigon – the French colonies’ quarter during 1900s is noticed (see Figure 5). The revitalization of this historic way with different forms and updating activities potentially help maximize the values of the area, serving not only local but also tourism development.

Figure 5. Public buildings and public spaces as attractors of the areas; however, seem not very relevant to (Xuyen Tam) canal close by [8].

4.2.1. The Current Situation. Due to uncontrolled urbanization and insufficient provisions of urban infrastructure, housing and architecture, issues of flood, pollution, degrade of waterways, small disconnected insecure alleys are common seen in the canal section (Figure 6) and yet potentials of the water elements to sold problems and enrich social cultural characters
Figure 6. Current issues of flood, pollution, degrade of waterways, small disconnected insecure alleys of Xuyen Tam canal [8]

By overlaying the framework developed in the previous section (Figure 3), the research is able to analyze the three different dimensional values of the research area as see in Figure 7.

Figure 7. Morphological values of a canal section of Xuyen Tam, Ward 1-2, Binh Thanh District [8].

4.2.2. Project’s Objectives. The research set out are three objectives accordingly with programming and actions as shown in the diagram below:

Re-structuring residential areas, allowing Low and middle rise apartments
- Urban voids for public uses
- Green spaces network connected with waterfront and significant attractors
- Improve living environment

Revitalizing water ways and green spaces along sides
- Improve environmental qualities
- Attractions for local uses and visitors
- Increase life’s qualities

Reactivating the historic tramway/alike bus lane
- Maximize Public transport
- Revitalize historic values: local attractiveness

The following figures 8, 9, 10 and 11 illustrate how the area is transformed according to the research aims. The proposal ranges from landuse plan, Street network and section, master plan and detailed plans of different specific areas and significant public spaces.
Figure 8. Proposed Landuse Plan for the research area [8].

Figure 9. Proposed Street Sections with water (alike) element for the research area [8].
Figure 10. Proposed Master Plan for the research area [8].
5. Conclusions
Solutions on upgrading and development of the waterfront and water-based settlements in Saigon HCMC need to have more comprehensive approach to ensure the protection of distinctive values and benefits to all, according to case-to-case basis. In order to enable those values to be identified and maximized, in-depth analytical understandings and the program to balance different demands for living, public good and environmental protection are critical from different stakeholders. While the overall water network needs strategic and holistic approach, to the small and less historically significant channels like Xuyen Tam, local/community-based solutions might be more useful, starting from increasing public awareness and their behavior toward waterways.

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