

Some Insights into the Theory and Practice of Heritage Ecology: Grasping the Bio-physical and Socio-historical Dynamism of the Cultural Landscape of Hangzhou

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Abstract

This paper explores the theoretical and practical implications of characterizing heritage as an active and creative element of cultural landscape; specifically, as a spatial technique which plays a fundamental role in the bio-physical and socio-cultural process we call human ecology. We establish four analytical coordinates in order to better appreciate and handle the ecological dimension of heritage, among which are, besides the variable of material originality, the structural integrity of landscape, its functional continuity, and its value as representation and experience. We also suggest three levels for heritage aesthetics analysis, centered on the aesthetics of the technical-ecological process, the development of memory of urban ecology, and the experience of ecological space. The analysis of the restoration process of the Hangzhou hydrological heritage is used to illustrate the application of these concepts and methodology to communicate the active character of heritage in space, and the dynamism of landscape as an experience.

Keywords: heritage ecology; cultural landscape ecology; hydrological heritage; Hangzhou hydrology

Resum. *Aproximació a la teoria i pràctica de l'ecologia del patrimoni. Una proposta per comprendre el dinamisme biofísic i sociohistòric del paisatge cultural de Hangzhou*

En aquest article s'indaguen les implicacions teòriques i pràctiques de comprendre el patrimoni com un element actiu i creador del paisatge cultural; en concret, com a tècnica

espacial que té un paper fonamental en el procés biofísic i sociocultural que anomenem ecologia humana. S'estableixen quatre coordenades d'anàlisi per apreciar i gestionar la dimensió ecològica del patrimoni, entre les quals es troben, al costat de la variable de l'originalitat material, la integritat estructural del paisatge, la seva continuïtat funcional i el seu valor com a representació i experiència. Proposem, així mateix, tres nivells d'anàlisi en el tractament de l'estètica del patrimoni: l'estètica del procés tecnicoecològic com a tal, la memòria de l'ecologia urbana i l'experiència de l'espai ecològic. Es recorre a l'anàlisi del procés de restauració del patrimoni hidrològic de Hangzhou per il·lustrar l'ús d'aquesta metodologia per comunicar el caràcter actiu del patrimoni i la naturalesa dinàmica del paisatge.

Paraules clau: ecologia del patrimoni; ecologia del paisatge cultural; patrimoni hidrològic; hidrologia de Hangzhou

Resumen. *Aproximación a la teoría y práctica de la ecología del patrimonio. Una propuesta para comprender el dinamismo biofísico y sociohistórico del paisaje cultural de Hangzhou*

En este artículo se indaga sobre las implicaciones teóricas y prácticas de la comprensión del patrimonio como un elemento activo y creador del paisaje cultural; en concreto, como técnica espacial que desempeña un papel fundamental en el proceso biofísico y sociocultural que denominamos ecología humana. Se establecen cuatro coordenadas de análisis para apreciar y manejar la dimensión ecológica del patrimonio, entre las cuales se encuentran, junto a la variable de la originalidad material, la integridad estructural del paisaje, su continuidad funcional y su valor como representación y experiencia. Se sugieren, asimismo, tres niveles para el análisis de la estética del patrimonio: la estética del proceso técnicoecológico como tal, la memoria de la ecología urbana y la experiencia del espacio ecológico. Se recurre al análisis del proceso de restauración del patrimonio hidrológico de Hangzhou para ilustrar el uso de esta metodología para comunicar el carácter activo del patrimonio y la naturaleza dinámica del paisaje.

Palabras clave: ecología del patrimonio; ecología del paisaje cultural; patrimonio hidrológico; hidrología de Hangzhou

Résumé. *Approche de la théorie et de la pratique de l'écologie du patrimoine. Une proposition pour comprendre le dynamisme biophysique et sociohistorique du paysage culturel du Hangzhou*

Cet article explore les implications théoriques et pratiques de la compréhension du patrimoine en tant qu'élément actif et créatif du paysage culturel, en particulier en tant que technique spatiale jouant un rôle fondamental dans le processus biophysique et socioculturel que nous appelons l'écologie humaine. Quatre coordonnées d'analyse sont établies pour apprécier et gérer cette dimension écologique du patrimoine, parmi lesquelles, avec la variable d'originalité matérielle, l'intégrité structurelle du paysage, sa continuité fonctionnelle et sa valeur de représentation et d'expérience. Nous proposons également trois niveaux d'analyse dans le traitement de l'esthétique du patrimoine : l'esthétique du processus technico-écologique en tant que tel, la mémoire de l'écologie urbaine et l'expérience de l'espace écologique. L'analyse du processus de restauration du patrimoine hydrologique de Hangzhou est utilisée pour illustrer l'utilisation de cette méthodologie pour communiquer le caractère actif du patrimoine et le dynamisme du paysage.

Mots-clés: écologie du patrimoine; écologie du paysage culturel; patrimoine hydrologique; hydrologie du Hangzhou

Summary

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1. Introduction

Around the world, several representative urban landscapes have emerged as a product of the technical transformation of regional hydrology. The testimonies of these socio-natural processes (i.e., canals, dams, artificial reservoirs and islets, dikes, docks, and bridges) enshrine an important part of geographical memory and knowledge of the creation, transformation and preservation of the urban fabric. These elements are of great value for contemporary societies as clues for comprehending the bio-physical and socio-cultural formation of the territory, a process which is by no means exempted from social, cultural and political tensions. In this sense, the challenge that heritage conservation faces is how to express the value of technical heritage that, as a product and testimony of centuries of work and effort, has transformed the landscape and turned it into inhabitable territory and a livable, meaningful space, forging the character and identity of the community. Considered as a spatial technique, hydrological heritage acts and creates, it plays a fundamental role in the bio-physical and socio-cultural process we call human ecology, and is intertwined at the same time with the ordinary life of the communities that live around it. For this reason, the need to ensure its integral preservation promotes thought on the ecological dimension of heritage, on *heritage ecology*, as it stands.

This paper explores the pertinence and possible theoretical foundations for this concept, relying on different disciplines and schools of thought in heritage, geography and landscape research, as well as its applications for landscape heritage preservation. Next section begins with a theoretical challenge to the traditional definition of heritage merely as an object, and a revision of the growing criticism of the nature/culture dichotomy. It goes on to review the ecology and esthetics of heritage as concept and method. The third section looks into a methodological proposal for the application of this theoretical framework for the analysis and intervention of urban hydrological heritage, conceptualized as a basic element of human ecology. In first place, it establishes four analytical coordinates in order to better appreciate and handle the ecological value of heritage, among which we distinguish, besides the unavoidable variable of material originality, the structural integrity of the landscape, its functional continuity, and its value as representation and experience. This perspective suggests a reappraisal of the aesthetic intervention in the heritage landscape, transcending a merely formalist perspective, in order to envisage

it, instead, as the foundation for a multi-layered approach to the preservation of its ecological dimension, and the integration of heritage elements into the living urban landscape and the ordinary lifeworld experience, as well. The proposed method for the analysis of aesthetic properties of heritage is based on the coordinates defined above, and considers three possible levels of integration (which are referred to as “aesthetics of technique and hybrid landscape”, “memory of urban ecology”, and “experience of urban nature”) in order to undertake a complete aesthetic intervention in cultural landscape.

Last section of this paper illustrates the use of the theoretical and methodological framework envisaged in the first part of this work through the analysis of both the geo-historical process of the Hangzhou hydrological landscape formation, and the strategy of urban heritage landscape preservation implemented there during recent decades. Hangzhou’s hydrological heritage preservation and management has achieved international recognition, as it is apparent from the acceptance of both the West Lake Cultural Landscape and the Hangzhou-Beijing Grand Canal as UNESCO World Heritage Sites. Notwithstanding, the main elements in the city’s hydrology belong to a much broader landscape system and philosophy¹. Hangzhou’s experience of heritage management shares with the theoretical proposal presented here the concern for attending restoration at several levels, by focusing on achieving the integration of natural and historical heritage with a damaged urban ecology and a fragmented city landscape, and it is aimed at finding a difficult equilibrium between memory preservation and the satisfaction of people’s present material, social and cultural needs in a changing environment. By applying the theoretical framework envisaged here to the analysis of this particular case of study, it is also intended to show how it could be especially useful for developing countries with diverse cultural backgrounds, in their search for strategies for revitalizing urban ecology and ecological awareness.

2. Theoretical Approach

2.1. *On the Concept of Heritage Ecology*

The recent history of theoretical research on heritage preservation witnesses the gradual abandonment of a rigid notion of heritage as object in favor of increasingly emphasizing its spatial dimension and the inseparable links between the

1. We refer here to the set of projects which has shaped the restoration efforts of the architectural, natural and landscape heritage in the West Lake (including the modern hydraulic engineering needed for the preservation of the level and quality of water), the tea villages on the western shore and surrounding hills, the historical, immaterial and natural heritage of the ancient city (indeed, almost completely rebuilt and modernized today), including the archeological ruins of the Imperial City (Wang G, 2009a), the project for the integral restoration of the Grand Canal, Hangzhou section (Yu K, 2012), the project for water management and conservation named Five Integral Water Treatments (*Wushui Gongzhi* 五水共治), several updatings of the Hangzhou Greenbelts System Integral Planning, the program for developing a National Scale Ecology and Landscape Security Pattern (Yu K, 2009), as well as the projects from the Sponge City Research Institute of the city (Yu K, 2016), among others.

object and its territory, seen as its landscape in a broad sense, as human and bio-physical scenery (Castillo, 2009; Feria, 2013). Together with the growing awareness of the need to take into consideration fundamental cultural practices in order to understand the evolution of communities and their environments, which has led to the recognition and appreciation of immaterial heritage, landscape in its own right has begun to be conceived as heritage. Now it is common to perceive it as a determining factor of community identity and sense of belonging, as far as we accept that both emerged from the production and signifying of certain cultural geographies (Gómez, 2013; Wang G, 2014). In the context of the research on methods for the analysis of cultural landscape, the objects charged with historical, social and aesthetic heritage value have been thought of as heritage vectors, and their succession in space would create axes which endow the landscape with structure and meaning (Silva and Fernández, 2017).

From a different perspective, authors such as Swyngedow (2009), following Latour (1993), elaborate on the hybrid character of landscape, and have rejected the pertinence of the dichotomy between nature and culture as a way to dissect and comprehend its elements. Some have even asserted, with Zizek, that “nature does not exist!” (Swyngedow, 2011). In reality, every cultural landscape is formed by a framework of deeply interwoven bio-physic and socio-cultural processes that mutually enable and shape each other over time. It is valid to say that both create an authentic urban metabolism (Castán-Broto et al., 2014; Newell and Cousins, 2014). These processes, in fact, in the form of flows of elements, populations and energy, extend beyond the physical or imagined limits of the landscape (as happens with the supply chains of food or the transportation of waste from the city to countryside; Decker et al., 2000). Certainly, hydrology (the water and cultural arteries *wenmai* 文脉 of territory, to use the usual terminology in traditional and modern Chinese landscape and urban design) is a leading factor which, by binding, integrating or fragmenting landscapes and communities, exhibits the dynamic nature of this exchange flow (Gandy, 2004; Arboleda, 2015; Cabello et al., 2015).

Based on the above, it is valid to assert that human beings, while producing a space for subsistence, produce their own nature, which encompasses both their humanized environment and their own identity (individual and collective, representational and empirical), as emerging at once from interaction (since we assume, along with Thrift, 2008, that all sorts of cognition, including the whole scope of thought and culture, arise from the concrete experience of lifeworld). This space comprises a field of bio-psychosocial links that could be defined as *human ecology*. Landscape is the place of the creative process of human habitat, and it is possible to think of it either as the static, observable *result* of the processes creating human ecology, or, and more accurately, *as the human ecology as such*, on its spatio-temporal development. In order to grasp this dimension, it is necessary to see landscape as a permanent dynamic, at the same time bio-physical and socio-cultural, as well as to acknowledge the dialectical character of the relationship between human beings and their environment (Thrift, 2005; Linton and Budds, 2014; Schmidt, 2014).

In this thought-provoking frame, which emphasizes the ecological foundation of cultural landscape, heritage vectors could be redefined as relevant, active, and creative elements and trajectories in the historical formation of landscape, and they hold, in consequence, plenty of ecological value. Heritage ecology research, in consequence, implies identifying the bio-physical and socio-cultural processes in which the elements, spatial settings and practices that comprise heritage play a decisive part, and which contribute to its dynamic function in the creation of both daily life, productive and ordinary space, and its symbolic, political and sacred order. As part of an ecological process, the function and effect of the technical object on the environment creates an indissoluble mixture of man-made and natural-born fluxes of energy and matter, and it forms a hybrid landscape. To preserve heritage ecology is to protect and restore the memory (and, as far as possible, the functionality) of its active character as a creative principle of landscape. It also encompasses the establishment of more suitable channels to express and share this value to the community².

2.2. On the Aesthetics of Heritage Ecology

Nigel Thrift (2007) dismisses the widespread conception of modernity as an age of frenetic change detached of a sense of time, the ability to appreciate the instant and the desire for contemplation. Against the proponents of this idea, he argues that a set of knowledge, disciplines and technologies related to the body and its sensorial and cognitive skills, not uncovered in the West nor spread massively throughout society until recent times, has in fact exceptionally increased our awareness of corporality. The discovering of this non-rationalist dimension of human being has been appropriated quite efficiently by the advertising industry and industrial design, for example. Therefore, contemplation cannot be considered as an archaic and alien experience for modernity, but as a contemporary necessity ever more demanding.

Although Thrift's argument specifically advocates the recognition of those non-representational aspects of lifeworld as fundamental topics for geographical study and ordinary space production, it is pertinent to rethink on the potential of representational landscape design as a tool for boosting the contemporary experience of nature. Following the tradition of Bachelard (1994 [1958]) and the phenomenology of space and architecture (Appleton, 1975; Lowenthal, 1979; Kaplan and Kaplan, 1989; Bell, 1999), we support the thought that aesthetics could be a vehicle to articulate the scientific and technical spheres with culture and everyday life.

2. In this sense, the concept of heritage ecology proposed here differs from (but by no means contradicts) other possible and very suggesting definitions, as for example, the study of the links of heritage with its surrounding and changing ecological environment in order to guarantee its material preservation (Brabec and Chilton, 2015), or the necessity of considering the complex symbolic dimension of ecological relationships implied in the sacred landscapes not only to preserve its integrity, but also to increase the ethical consciousness on cultural and biological environmental degradation (Singh, 1995).

Heritage aesthetics has the potential to transform space and abolish the traditional gaps both between the subject and object of heritage, and between them and their all-encompassing environment (their cultural landscape) as well. As suggested by classical phenomenology of space and recent cognitive sciences findings, emotion and reason spread out jointly from our body experience of the world. The former (highly praised by Chinese theory of landscape as is evident, for example, in the relevant work by Zhou and Wu (2009) on postmodern philosophy and aesthetics of urban ecology) even explores the evolutionary and physiological bases of our preferences on nature aesthetics and their translation into house, city and garden design (Laurie, 1975; Kellert, 1993). Bachelard (1994 [1958]) mentions, for instance, the persistence of the archetypal idea of the nest, a safe, enclosed place useful as physical and psychological shelter, and Yu K (1994) proposes the origin of the *Feng Shui* and its idealized landscape, formed by successive, concentric layers of rock and water, as the re-creation of the hunter-gatherer strategic environment. Independently of the limits of this approach, the incipient notion of a strong link between human beings and their environment points to the usually neglected ecological roots of mind and culture. As design guidelines, the above notions allow us to think of living places as emotional as well as eco-technical topologies (close to the rational/emotional geography advocated by Santos, 2000). The inclusion of the sensorial, emotional and symbolic aspects of experience, jointly with the mnemonic one (historical, communitarian as well as personal) is a possible path in order to create an integral sense of the place (in this case, a socio-ecological place), paraphrasing the words by Tuan (1974).

3. Methodological Proposal

3.1. *Four coordinates for comprehending the ecological value of heritage*

The challenge of capturing the ecological value of heritage and displaying it within the scope of community's everyday life is even harder than trying to define it conceptually. Paraphrasing Buttimer (1976), only from the dialogue between disciplines and schools of thought could emerge a more humanistic foundation for the space of a human ecology, which is, at the end, the lifeworld (an idea developed also by Obbehaar et al., 2009).

The rich eco-cultural value of hydrological heritage appears more evident when focusing on it as an active element of cultural landscape. This perspective exhibits the worth of technical heritage as surpassing the material limits of the object and flooding into all dimensions of landscape. Its widespread elements constitute a dynamic net in space, which enables new exchanges inside the ecological system. The technical net integrates, as well as modifies and reinforces, certain natural processes that produce landscape, and its accumulative effect creates new socio-natural realities. Heritage transforms not only the spatio-temporal nature of landscape, but also the pattern of human

action and experience, which includes every aspect of the relationship between humans and nature, including their biological, psychological, social and cultural-representational expressions.

In order to show the complex, strong and dynamic links of technical and hydrological heritage with surrounding ecological space and processes, we suggest recognizing and analyzing four coordinates for an understanding of the heritage ecological dimension:

1. material originality of the artificial or natural object of interaction,
2. integrity of the technical-spatial structure which the object belongs to,
3. functional continuity and its impact on the environment (or the memory of it, if it is not in use anymore),
4. the value of landscape as representation and place for experience.

Even though these coordinates are deeply interrelated, it is also evident that they are often in conflict among themselves. They are intertwined in concrete space, and create systems of objects (Baudrillard, 1996 [1968]) as well as systems of memories, emotions and experiences (Santos, 2000). And the challenge of a preservation proposal targeting the ecological value of heritage and landscape would lie in *the search of balance* between these coordinates, and the finding of the most adequate form to display it, in order to help and encourage the community to appropriate and “patrimonialize” the environment. The research on the processes of regional historical geography, along with the historical conditions and necessities of the bio-physical support of the urban fabric, is the starting point for understanding how heritage acts on a material, relational, and symbolic level in each specific context. And it is also helpful in order to determine the most convenient form of arranging and harmonizing priorities, as much as the political formulation and strategy which could make possible the intervention.

3.2. Aesthetics of Heritage Ecology, its levels of analysis and possible applications

Below four determining factors are differentiated for the assessment of the *aesthetic value* of heritage, in line with the coordinates proposed above for analyzing the links of the heritage with the whole ecological landscape. So, the aesthetic value derived from the degree of material conservation of the object, practice or process of natural renovation (as in rice terraces or tea fields) is designated as *original* value. The value emerging from the object as belonging to a structural order spatially arranged is named here *relational* aesthetic value. The *ecological* aesthetic value comes out properly from being displayed as a pleasant experience of the heritage functionality in the ecosystem. The value of heritage as a representation could be defined as the *sense-emotional* value (table 1).

Through these coordinates it is possible to transit from the traditional and highly appreciated notion of heritage as object, towards an additional comprehension of heritage as an active part of the landscape, and the counterpart for

Table 1. Coordinates for analyzing the ecological value of heritage and the derivative determinants for the aesthetical appraisal of heritage landscape

Coordinates of the ecological dimension of heritage and landscape	Determining factors of aesthetics of heritage landscape	Source of value
Originality	<i>Original</i> aesthetic value	From the preserved materiality
Structural integrity	<i>Relational</i> aesthetic value	As a harmonic part of a living, livable and productive spatial setting
Functional continuity	<i>Ecological</i> aesthetic value	As functional structure (or testimony of its former activity)
Value as representation and experience	<i>Sense-emotional</i> aesthetic value	As psychologically and culturally valuable space of contemplation and experience

Source: author's own elaboration.

subjective perception and interaction as well. This broader scope of analysis allows thinking about heritage landscape as spatial process, and as an experience. In order to translate these analytical terms into strategies of aesthetic intervention in heritage, it is possible to establish three closely interrelated levels of *aesthetic integration*, narrowly related to those determining factors of aesthetics and ecological coordinates of heritage suggested before:

1. the aesthetics of technical-ecological process, that is, the aesthetic display of the technical operation of heritage and its effects transforming the spatial and temporal relations and dynamics on the territory,
2. the display of the memory of urban ecology, which embraces the use of immaterial heritage, museography, and other graphic, symbolic and narrative resources, focusing on evoking the old activity of the community and its historical symbiotic relationship with nature,
3. the displaying of ecological space as symbolic representation and subjective experience, the former defined as a pleasant image of natural elements with background on artistic and cultural references and usually even an implicit poetics or narrative, and the latter seen as stimulus for emotion, movement and all sorts of non-mediated sensorial perception (the field of the non-representative, as Thrift proposes).

These levels of integration of heritage landscape characteristics are suggested as potential patterns for its analysis, intervention and articulation with the urban landscape, at the ecological, scenic, historical, empirical and practical levels, in order to envisage an integrated, meaningful and abundant space for social life. From another perspective, the common features of these three levels of aesthetic intervention on heritage and landscape are, to some extent,

Table 2. Proposed levels for aesthetical intervention for heritage ecology preservation

Levels	Aesthetic factors stressed	Recommended methods	Examples
Aesthetics of technical-ecological process	<i>Relational and ecological value</i>	Restoration of functionality (or the memory of former functionality)	Restoration of the carrying capacity of the canals
Display of the memory of urban ecology	<i>Original and relational value</i>	Recovering of material and immaterial heritage as community links with natural processes	Reinforcing of the local identity
Display of ecological space as (1) representation, and (2) experience	<i>Sense-emotional value</i> as image and narrative stimulus for emotion, movement and non-sensorial perception	Landscape design According to the principles of local poetics of nature According to the psychological and kinetic requirements of human body	Parks, neighborhoods, museums, and other places that integrate nature into the city through encourage contemplation, interaction and discovering

Source: author's own elaboration.

“anti-aesthetic”, as far as through them it is sought to reduce to a minimum the imposition of external aesthetic forms on the environment, and rather to amplify the real characteristics of human ecology process in order to achieve a primary and spontaneous experience of nature (table 2)³.

4. Case Study: Analysis of the Hangzhou Heritage Ecology and Its Restoration Process

4.1. *The Material and Cultural Formation of Hangzhou Hydrological Landscape*

The city of Hangzhou emerged as a product of the development of hydraulic technologies throughout Chinese history. High dikes helped to contain the Qiantang River tidal bores, which in the past made the lowlands on the shore of the West Lake uninhabitable. The Grand Canal and its subsidiary waterways system consolidated the commercial, political and social integration of the city to the region known as Jiangnan (“at the South of the Yangtze River mouth”, the most prosperous in the country so far). The causeways which divided the Lake, built by famous intellectuals such as Bai Juyi (772-846)

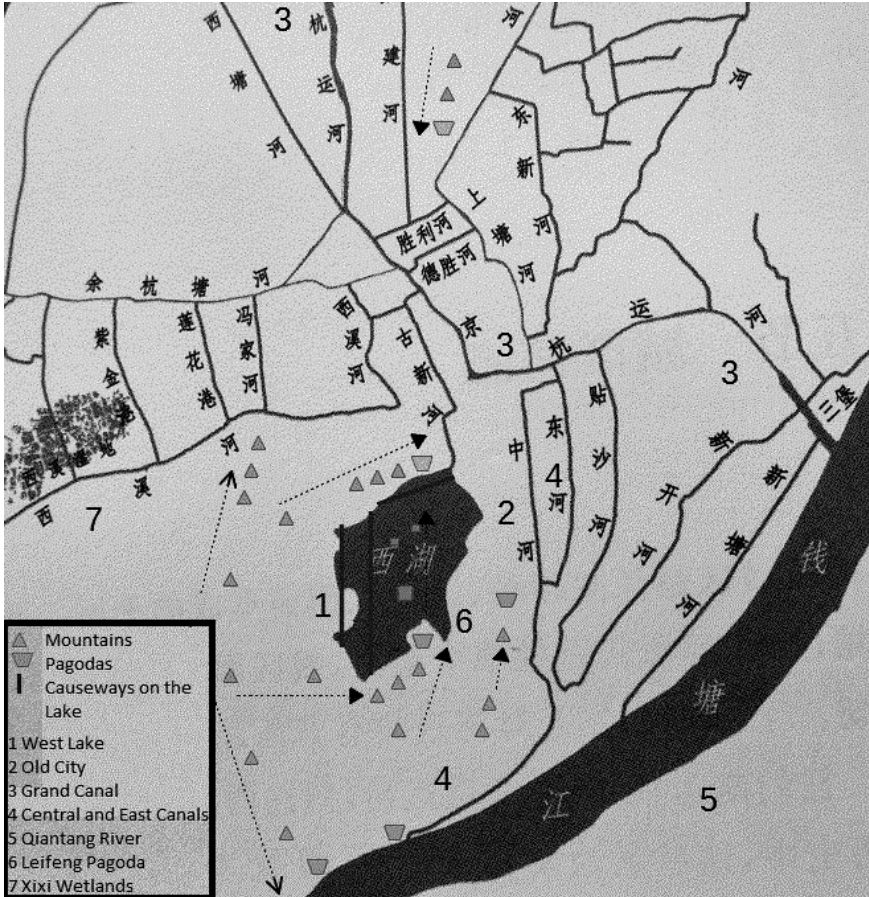
3. Yu K refers to the method of taking the ecological cycle flow as guide and principle for urban planning as *anti-planning* (*fanguihua*反规划; Li, 2004; Zhou, 2009), related both to the traditional Chinese practice of organic architecture which recommends “to adapt and create in function of local conditions” (*Yindizhiyi*因地制宜), as well as to modern theories like *Design with Nature*, by McHarg (1992).

and Su Dongpo (1037-1101), at once engineers, poets and philosophers of the landscape, helped both to control the water lever and improve the transit one side to the other. Furthermore, a system of wells and aqueducts supplied a city initially built on salty soils with fresh water. The material and symbolic impact of hydraulic technologies formed one of the more highly regarded cultural landscapes by the Chinese people until now (indeed, “Paradise on Earth” *Renjian Tiantang* 人间天堂 is one of its poetical names). It is not by chance that one of the most representative slogans related to the projects and policies on urban landscape regeneration reads: “Hangzhou for water lives, for water flourishes, for water is famous, for water is beautiful” (Wang G, 2009b: 317).

Traditional Chinese geographical thought conceives space as a relational system, where each element acquires a value because of its position and function as modifier or amplifier of the flows and structure of the spatial setting. *Feng Shui* (regarded here as geographical school; see Yu K, 1994; Xu, 2015) is, in broad strokes, a method by means of which it is intended to discover and understand the structural and dynamic principles of space, in order to find a guidance for the construction of human settlements (and especially non-human, like tombs and temples). It is aimed to make that material and dynamic outcomes of human action provoke as few dissonances on the rhythm and cadence of natural environment as possible. According to these principles, the ancient city of Lin’an (ancient name of current Hangzhou) was founded on the “cavity” (*xue* 穴) at the foot of a range of hills which extends around the lake (a place of concentration of vital energy, *qi* 气), and was itself surrounded by flowing water (the peaceful lake in the west, contrasting with the wide Qiantang river running in the east, and flowing canals crossing through the city from north to south), which formed a complete material and energy feeding system (impeding its dispersion but keeping it in movement at the same time), and supplied ventilation and drainage structure as well. In this geographical context, hydraulic engineering not only favored draining of the marsh, controlling inundations, supplying the inhabitants with drinking water, and facilitating transport and other material functions, but also fulfilled the metaphysical requirements of the habitat (Wang S, 2017). In this process of production of space, a set of pagodas, temples and islets on the lake strengthened the energetic structure of this physical and symbolic terrain (West Lake Tianxia, 2017a) (map 1).

In this case, the network and configuration of objects (including living bodies), flows and structures integrating human settlements respond to the specific properties of each location, and it is thus unique for every single cultural landscape. Even today, Chinese people consider that spatial setting directly influences the idiosyncrasy of a region. This covers its food, spirits and tea (because of the quality of soil and water), medicines and textiles, people’s temperament, the beauty of women, and the inspiration of poets. This spatio-cultural configuration is similar to the *genius loci* referred by Norberg-Schulz (2003). The desire for understanding and adapting to the

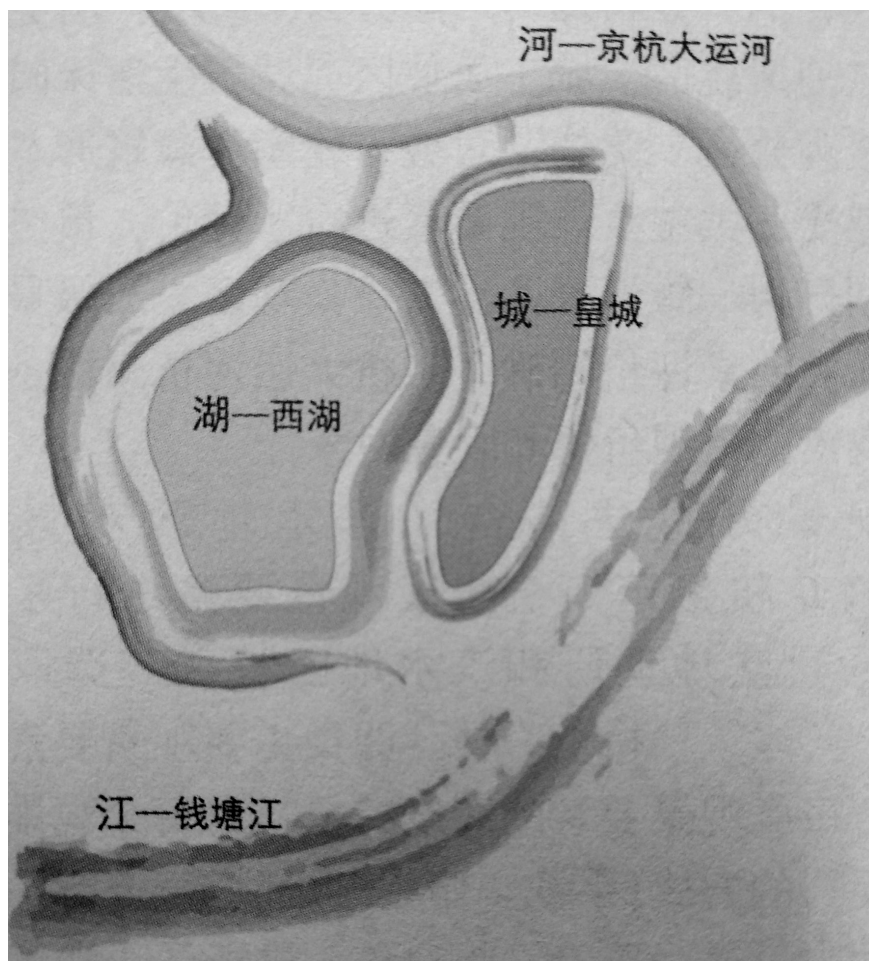
Map 1. Hydrology of Hangzhou



Source: Du (2016: 102). Modified version by the author.

qualities of the territory follows on from the embraced ideal of achieving harmony with nature. It expresses the aspiration of integrating urban habitat into the preceding, encompassing, and immanent life-sustaining process of nature. Landscape beauty is not a solely formalist attribute, but it distillates from the equilibrium, continuity and merger between elements and flows, nature and built environment, and it involves the totality of human life. It is not surprising that one of the main principles of Chinese aesthetics of nature, i.e. to achieve “the marriage of Heaven and Human Being” (*Tianren Heyi* 天人合一), is still the inspiration of many contemporary Chinese landscape and urban designers and theoreticians (Zhou and Wu, 2010) (map 2).

Map 1. Historical design concept of Hangzhou: one canal (up), one river (down), one lake (left), one city (right); the line around the West Lake represents the surrounding mountains



Source: Wang and Yang (2017: 69).

4.2. Heritage Analysis Coordinates Applied to Hangzhou Hydrology Restoration

The restoration process of Hangzhou's cultural landscape, here taken as an example, offers us a glimpse of how the change in emphasis given to each coordinate of heritage ecology analysis and intervention directly affects the handling of the rest. In the restoration of the West Lake scenic landscape, for example, representational and structural aspects (both perceived as highly interrelated, as seen above) were stressed. For this reason, the reconstruction of the Leifeng Pagoda, which collapsed at the beginning of the twentieth century,

Image 1. Bazi lock in West Canal



Source: photo by the author.

was carried out almost eighty years later, even by using different materials and styles than the original. It was focused on the necessity of “completing” and re-balancing the symbolic and relational landscape, and the main pragmatic criterion to follow was to create an aesthetically attractive architectural form which, in addition, could amplify the experience and meaning of the place for the modern inhabitants and visitors (by providing the new building with amazing views and making it completely accessible to the public), instead of merely on preserving its resemblance to the original.

In the case of the preservation of the city canals, on the other hand, functionality was stressed. The replacement and modernization of the structural engineering of the old floodgates, locks and bridges (many of them maintaining some traces of traditional style, however; see image 1), as much as the displacement of most of the population settled on the bank of the waterways, going back to the 1980s, besides the current prohibition of carrying out activities that could pollute or obstruct their margins (including fishing in some parts), certainly represents a radical rupture with the customary and intimate link of people with the urban water, but it is justified as long as it preserves the hydrological function they were devised for, and it is still judged as indispensable.

In all probability, the debate on material originality is one of the most controversial topics that arise when contrasting heritage and conservation practices between East and West. Oakes (2006) emphasizes the culturally-determined

background of the special esteem of western culture towards the “original” and suggests instead making an effort to understand the eastern cultures experience on heritage and cultural landscape. Wang N (1999) and Chung (2005) strongly advocated for a broader, more flexible and dynamic concept of heritage, that revolves around the notions of spirit and culture as a process⁴.

4.3. Levels of Aesthetic Integration in the Process of Restoration of Hangzhou's Heritage Ecology

4.3.1. Aesthetics of technical-ecological process

In the case of the renovation of the urban fabric of Hangzhou, landscape design tried to show water as the bio-physical substratum of the city and its evolution, together with the exhibition of the action of hydraulic engineering. The design pattern followed in the canals is named “one bridge, one scenery”, and it was used also when assembling the greenways around the locks, flood-gates and docks. The environment surrounding historical technique heritage (conserved or newly rebuilt) was conceived in order to explore several possible observation angles, movement and interaction sequences, and different channels for acquiring historical information (Wang and Yang, 2017; Xiang and Qian, 2013). The technical heritage corridor which surged along the canals extends through the hybrid space of the city.

The reforested margins of the canals, cleared of most of their former houses and warehouses, as well as the harmonic flow of water, become an open-air museum displaying the hydraulic support of the city, as much as the technical heritage which represents the material realization of the ideal of harmonic integration between human settlement and nature (image 2). It is similar to the observation of the circulatory system of a living organism, both diverging and expelling rain water out of the city, enabling people and merchant transportation, and irrigating the greenbelts and surviving crop fields in the outskirts. Furthermore, the experience of boat trips on lakes, canals and rivers, a favorite theme of the traditional Chinese poetic imagination, not only prompts the travelers to merge with the water flow, and the changing natural landscape along its path, but also with the variety of human settlements, traditional and modern, it crosses by (Chen and Chen, 2006).

4. The emphasis made in this paper on some aspects of Hangzhou's experience of heritage intervention aims to explore the broader implications of the proposed theory. Nevertheless, it is important to stress the outstanding work on architectural and material heritage in general, not to mention on immaterial heritage, supporting the projects (Zhou, 2010). It is based on an extensive documental research, exemplified by the collection coordinated by Wang Guoping, comprising more than 300 volumes classified according to the different aspects of the historical geography of the main water bodies in the region – lakes, river, wetlands and canals – or by the detailed catalog of heritage on the banks of the Grand Canal, with its 1700 km extension, coordinated by Yu K (2009). Its methods and theory have been systematized according to the criteria for the recognition and preservation of heritage issued by UNESCO (2006) and the principles for its restoration and reconstruction contained in the Burra Charte (2013), and its normative application to the Chinese experience, also made by ICOMOS (2015).

Image 2. West Canal seen from Taiping Bridge



Source: photo by the author.

It is also subtly depicted as a museum of natural sciences of the urban ecosystem. Parks mainly introduce local species of flora and fauna, but vegetation is frequently arranged in small spaces according to their biological characteristics (density, blossoming season or loss of leaves), in order to allow people to perceive at a glance changes, contrast and diversity. This intention, aesthetical and pedagogic at the same time, takes advantage of the spontaneity of nature for communicating and fascinating. The display of scientific information about basic biology, hydrology and history around the engineering structures, but also in thematic parks and indoor museums along the waterways devoted to the different elements of urban hydrology, provides the people with knowledge that is useful to appreciate the ecological dimension of urban landscape. It is also the spot for promoting an active campaign in support of several projects for water and environmental care such as the Five Integral Water Treatments, focused on raising awareness about the complexity and importance of the water system and its responsible management for the basic functions of the city (Huang et al., 2016), and the Sponge City project, which seeks to make the people to realize the importance of preserving the urban aquifers and subsoil stability (Yu K, 2016).

Finally, by keeping open the north-south city axis formed by the south section of the Grand Canal and the Central and East Canals (the original continuation of the main waterway), the symbolic and metaphysic landscape referred to before is also preserved. Indeed, these waterways link emblematic water spots (West Lake, Wulin Dock and Xixi Wetlands) and historical mountains (Wu and Phoenix Mountains, the settlement of the disappeared

South Song Imperial Palace) with others considered historically as part of an outer ring of city greenbelts (Banshan, Liangzhu and Xianghu), reinforcing and extending in this way the physical and symbolic city landscape. Part of this concern for harmony and equilibrium in visual and symbolic landscape is expressed, for example, by the efforts aimed at protecting the skyline of the West Lake waterfront, by regulating the height and style of buildings in the important area between the lake and the river (Yang, 2017).

4.3.2. *Memory of urban ecology*

Whereas the restoration works of the West Lake cultural landscape and its urban waterfront rely on a large amount of well-known and documented literary and pictorial information (with the “Ten Scenes of the West Lake” as the main guideline), the high degree of damage and fragmentation suffered by the heritage of the downtown historical neighborhoods prompted many researchers to devise a heritage corridor assembled along the waterways (Li, 2004; Wang and Yang, 2017), which includes not only the redesigning of landscape and restoring of architectural heritage, but also making use of local immaterial heritage and oral tradition (formed by old stories and curiosities, which are both entertaining and full of historical value) in order to reinforce the historical links of the community with its water urban environment (Yu W, 2016). Through an extensive and dynamic landscape heritage concept based on the memory of everyday life and the ordinary activity of the neighborhood (especially the economic activity which made the city famous for centuries) it is expected to recreate a geography of memory, meaningful for the modern inhabitants and visitors. As can be inferred from above, urban hydrology is conceived as the nexus binding city neighborhoods (old, but also new ones), not only as a spatial link, but also as a memory device which helps people remember past life in a region and a country closely interconnected through water. Each area is depicted as an active pole at the same time highly dependent on the rest by means of commerce, but also extraordinarily creative, constantly redefining its community identity, environment and history.

One main approach to local heritage for this purpose is thematization, i.e. the selection of notable features of each neighborhood in order to redesign its whole image around them. Controversial as it is, in this case the strategy was envisaged taking account of the local dynamics and social and urban necessities of the community. The renovations of heritage in the communities around Fengqi, for instance, focused on the streets of the silk market and some scattered buildings, dubbed collectively as a National Silk Neighborhood with historical relevance. Several old buildings along the few surviving *nongtang* 弄堂 (alleys with well-preserved architecture and zigzagging traditional pattern) in neighborhoods such as Hefang Street or Wuliu Lane have been renovated as traditional drugstores and together trace out a corridor of Chinese medicine. In the areas surrounding the old docks of Gongshu and Qitang, on the banks of the Grand Canal, the industrial heritage has been restored, and subsidiary canals as Desheng and Xinyi Lane, close to the remains of Fuyi Granary, have

Image 3. Xiaohe Canal



Source: photo by the author.

become gastronomic corridors. Xiaoying Lane, in the middle course of the East Canal, was location of the first headquarters of the Zhejiang branch of the Communist Party and place of residence of several revolutionary heroes and thinkers (and Mao Zedong himself during a brief stay), and has therefore become a discreet destination for the so called “red tourism” (the visiting of patriotic places), with some of the old residences turned into commemorative halls and community centers. Rich archeological and architectural spots as the surroundings of Wushan Hill, Zhongshan Street, Wuliu Lane and the Xiaohe Canal have been preserved as far as possible, with special emphasis on respecting the original inhabitants in order to maintain a glimpse of the city’s ancient scenery (image 3). Almost completely rebuilt neighborhoods which have taken over most of the modern downtown are also striving to recover an image of their own past, such as the old university quarter or the Gengshan Gate area, both storing an abundant but mostly unknown urban memory (Gu, 2013; Xia, 2015; West Lake Tianxia, 2015b).

Several visual and informative elements spread along the greenbelts and neighborhoods, as eye-catching reliefs with historical scenes carved under the bridges, vivid bronze sculptures portraying ordinary inhabitants of the old city working or resting (image 4), ancient maps engraved in stone showing the evolution of urban morphology, and monuments, together with the common plaques displaying relevant facts about buildings, historical events and old traditions outline the route for the visitors and help them to perceive the landscape as the evolution of a living space. Additionally, a proliferation of all sorts of museums devoted to traditional handcrafts and local production (from

Image 4. Bronze sculptures in the Food Market Bridge



Source: photo by the author.

tea, silk and porcelain to scissors, umbrellas and regional food), besides the indispensable socio-historical section in every museum focused on hydrological heritage, always highlighting the strong link between human material and cultural process and its integral ecology, strengthens as a whole the appreciation of the city as a hybrid process. Technical heritage therefore acquires historical

depth and is integrated through the evocation and memory into the imaginary of the community identity process.

4.3.3. Displaying ecological space as representation and experience

We find several theoretical influences giving shape to the landscape design of Hangzhou's canals. On the one hand, greenways are conceived as places for leisure and recreation with nature. Both are essential activities for physical and mental revitalization (or restoration, using the words of Hartig et al., 2003, an idea already present in Olmsted, 2003[1870], one of the founders of modern landscape design), and the result of a process that is both bio-psychological and cultural (Pan, 2017). Even though the seemingly uncomplicated act of contemplation of nature does not have any ulterior goal other than to perceive the environment, a well-developed experience of nature involves the reaction of the entire body to the surrounding stimuli, including the fanciful shapes of the trees along the waterway, the reflection of sunlight under the arch of a bridge, and the subtle waves of flowing water, the singing of the birds or the unexpected jumping of a fish. And together with sight (Ulrich, 1979) and hearing (Gallagher et al., 2017, who even advocates for a listening geography), the path design and organization of space along it could specially arouse the releasing of body's kinetic potential (as is apparent when watching an old woman practicing Taijiquan on a stone platform besides the waterway, or a group dancing and singing inside a pavilion; image 5).

Image 5. Guang'an Bridge in West Canal



Source: Xiang (2013: 125), version downloaded from Baidu Baike.

Image 6. Hidden Spring Pavilion in West Canal seen from the Wan'an Bridge



Source: photo by the author.

East Canal landscape design applies several of these insights by producing an enclosed line of gardens where people have the sensation of isolation from outer world. The abundant greenery bursting abruptly in the middle of an urban trace dominated by asphalt and iron, like a suture made by nature on the rational but ecological and culturally fragmented modern geometry of wide streets and high skyscrapers, draws the pedestrians' attention towards its fecundity and prompts them to pause and enjoy the scenery. The view while crossing a bridge (in itself a highly appreciated experience in Chinese aesthetics) through some of the more carefully sketched scenes could transmit the impression of finding the Peach Blossom Valley, the Paradise Lost of the Chinese literary tradition, considered as a place of harmony, peace and retirement (image 6). The flow of water, the imitation of some kind of natural relief, with hills and rocky shores, the protection of the dense treetops, but also the architectonic elements, including the high buildings that form the background, like crystal mountains lining a valley, creates a sort of microcosm full of symbolic as much as physical links with urban ecology, where city and nature merge unexpectedly. The interconnectedness of the different sections of the greenbelt, seeking to reduce to the minimum the disturbances due to vehicle traffic, as well as the great diversity between sceneries (alternating variable vegetation density and distribution, and different ways of integration with the characteristic neighborhoods it crosses by) aims to increase the degree of immersion, and arouse pedestrians' curiosity. The aesthetics of nature aim to create in this manner an intimate and living nexus with urban ecology.

5. Final remarks

Throughout this article, it has been discussed the pertinence of envisaging hydrological heritage as an active and creative process, which configures natural and cultural landscape; it has been at the same time product and producer of human ecosystem along history as well as in present times. This approach suggests that, by surpassing the strict limits of the heritage as an object and considering it as an integral element of the human ecology, it is possible to build more meaningful links between it and the community through the preservation process. The reasoning has been that ecology is not an external category, as it is usually referred to in the patronizing discourse which idealizes nature as a submissive and passive dimension of reality; heritage, in the other hand, should no longer be understood as a rigid corset imposed on people and communities, instead of part of their living and evolving environment. Both, heritage and ecology, result from the synthesis of bio-physical and socio-cultural processes which shape our material and mental existence, as long as the encompassing ecological cycle we belong to is also the foundation of human cognition and identity. Only by realizing the dynamic nature of heritage ecology will it be possible to incorporate heritage itself into our current forms of sociability, sensibility and production.

The four coordinates suggested in this work for heritage landscape analysis, as well as the three levels of integration recommended as a methodological framework for heritage landscape aesthetic intervention, as seems clear from its application to the case of the Hangzhou hydrological and technical heritage, articulate a strategy for redesigning heritage landscape as a space of life, well integrated into the ecology, culture, experience and memory of the community.

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