# THE TANGIBLE AND INTANGIBLE VALUES OF RIVER TOWARDS SUSTAINABLE URBAN LANDSCAPE DEVELOPMENT

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## ABSTRACT

This paper presents a review on the tangible and intangible values of river towards sustainable urban landscape development. The framework incorporated ecological knowledge related to river and sustainable planning and design process, rivers as an urban greenways corridor and green patches, river as urban heritage conservation, rivers and riverfront development and theory from the Islamic perspectives. The objective of the paper is to identify the functional and spatial structure of the existing river with respect to the requirements for harmonious development, protection and improvement of the sustainable urban landscape. It is also to provide important ecological and aesthetic benefits of river in urban setting. This study presents an understanding for facilitating protection, preservation, restoration, ecological enhancement of the river into a more comprehensive land-use planning process.

*Keywords*: tangible and intangible values; sustainable urban landscape development; comprehensive land-use planning process

## INTRODUCTION

River is the primary historical source for water, transportation artery, economic transaction and recreational amenity. Recreational activities occurred along the river which provides opportunities for activities such as eco-tourism, sport fishing and other outdoor activities. Rivers are longitudinally, laterally, vertically and temporarily connected with their environment (Rohde et al., 2006). However, with the rapid growth of urbanization, the river had lost its public consciousness, particularly after embankments were built on both its banks in a bid to protect the city from the flooding river (Nagpal and Sinha, 2009). According to Baschak and Brown (1995) urbanization involves large transformations of land, air, energy resources, water bodies and human populations. These transformations are

having major ecological consequences for urban habitats. More specifically they add that urban landscapes are progressively becoming deficient of areas with significant ecological values.

River would contribute to provide a sense of place, history, identity and community. Orientation towards rivers would bring people in contact with them more regularly, cultivating respect for local heritage as well as the precious water supply, ultimately the most effective way to nurture stewardship (Ellin, 2010). As stated by many authors, it is important to preserve and conserve the river as a heritage that belongs to the earliest evolution of cities and urban areas (Nagpal and Sinha, 2009; Baschak and Brown, 1995; Shannon et al., 1995; Rohde et al., 2006; Toccolini et al., 2006; Tzolova, 1995). Nearly all major cities in the world have been built around rivers. It would ultimately transform the 'problem' of unsafe and unsavory river banks into a solution for enhancing quality of life and quality of place in urban region. For example, the City of Kuala Lumpur which was located and developed between two main rivers, *Sungai Klang* and *Sungai Gombak.* These create 'a sense of place' to the City of Kuala Lumpur (Figure 1). Kevin Lynch defines that the "clarity with which it can be perceived and identified, and the ease with which its elements can be linked with other events and places in a coherent representation of time and space" (Lynch, 1987, p.131; see also Nagpal and Sinha, 2009, p 490). This expands the knowledge of sustainable urban landscape development efforts in order to restore, preserve and conserve the ecological establishment, visual quality and visual enhancement of the rivers in urban areas.

*Figure 1. The confluence of Sungai Kelang and Sungai Gombak formed the City of Kuala Lumpur, Malaysia (source from http://www.nst.com.my/nst/articles/06riv/Article)*

There has been increasing public concern for protection of urban river corridors. Numerous river commissions have been established in an effort to plan, use and protect (Baschak and Brown, 1995). So far, there are many programs that have taken place to preserve, and restore have occurred in these corridors as part of ongoing conservation programs (Nagpal and Sinha, 2009; Baschak and Brown, 1995; Shannon et al., 1995; Rohde et al., 2006; Toccolini et al., 2006; Tzolova, 1995). There is reason to be optimistic about combining human use and natural environments as many river cities are rediscovering their riverfronts and commissioning planning, design and management of urban rivers.

The main concern of this paper is to review the tangible and intangible values of river towards sustainable urban landscape development. The objective of the paper is to identify the functional and spatial structure of the existing river with respect to the requirements for harmonious development, protection and improvement of the sustainable urban landscape. It is also to provide important ecological and aesthetic benefits of rivers in urban setting. The framework incorporated ecological knowledge related to river and sustainable planning and design process, rivers as an urban greenways corridor and green patches, river as urban heritage conservation and rivers and riverfront development and theory from the Islamic perspectives.

## RIVERS AND APPROACHES TO ECOLOGICAL KNOWLEDGE AND URBAN NATURAL RESOURCES MANAGEMENT

Urbanization caused the decreasing of natural ecosystems (Li et al., 2009). According to Li et al. (2009), urbanization promotes rapid social and economic development, but at the same time, leads to many problems, such as concentration of the population, traffic jams, housing shortages, biodiversity reductions, "heat island" effects noise, air and water pollution. People are increasingly realizing the importance of sustainable urban environment that will mitigate or eliminate these problems, and many countries have already developed and implemented strategies to promote urban sustainable development (Li et al., 2009). Therefore, understanding the ecological knowledge is important in order to maintain the species diversity and ecological processes of natural resources in urban areas.

The ecological knowledge began with an ecological planning process introduced by Ian McHarg (1969) in his book "*Design with Nature*" and built in ecological design process which was introduced by Hough (1984). The result was a framework (Table 1 and Figure 2) that included an assessment of natural and cultural resources, and the foundation of Greenway's spatial structure (Baschak and Brown, 1995). Baschak and Brown (1995; see also McHarg, 1969) state four main biophysical functions in maintaining the species diversity and ecological processes. They are biological diversity, sustaining hydrologic processes, climate improvement, and utilitarian.

Biological diversity is used to describe the variety of flora and fauna, the ecological functions and the contents of genetic diversity. In this aspect, the preservation and restoration of green and natural corridors and patches such as rivers become critical and it should be given high priority. Hydrologic processes have a significant influence in the development of landscape structure and landscape function. Water bodies such as rivers will act as a filter to catch possible contaminants from adjacent lands. Well-vegetated corridors will helps to reduce erosion by stabilizing banks.

A well planned and design of green corridors and patches in the urban context can contribute to significant urban micro-climate improvement. The 'urban heat island' can be partially mitigated through the proper planning and design of the green corridors and patches. The preservation of the existing vegetation and extensive new plantings will be one of the efforts in reducing the heat effects in urban areas. On the micro scale, vegetation cover provides shade, wind protection, and cooling through evaporation. These conditions provide better environments for flora and fauna habitats in urban areas. Many of

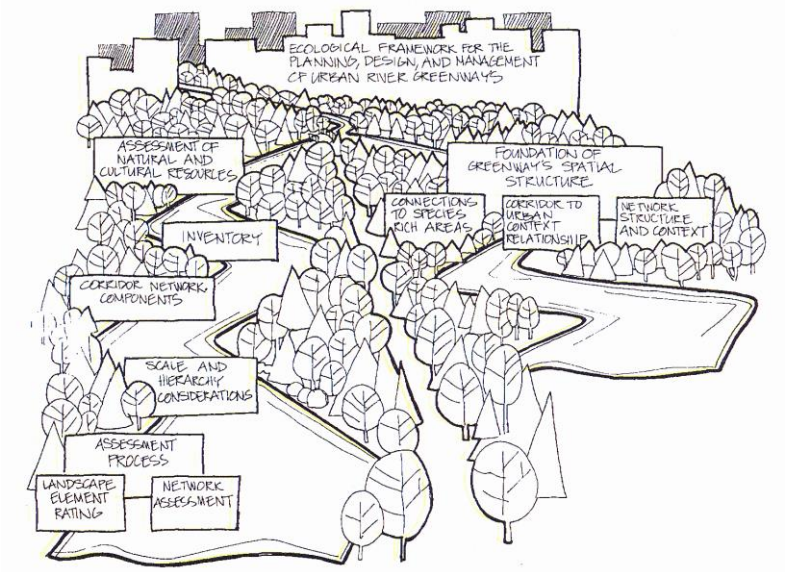


*Figure 2. An ecological framework for the design, planning and management of an urban river greenway (Source from Baschak and Brown, 1995,p.214)*

the biophysical functions for protecting natural habitats and ecological processes in urban areas are utilitarian. The usefulness of plants in erosion control, watershed protection, waste water management, noise abatement, and pollution control has many tangible economics benefits (Baschak and Brown, 1995) and aesthetic values.

*Table 1. Ecological Framework for the Planning, Design and Management of Urban River Greenways*

| **Ecological Framework for the Planning, Design and Management of Urban River Greenways** | |
|---|---|
| Assessment of natural and cultural resources (Inventory and descriptions of the existing and potential resources) | Foundations of Greenway's Spatial Structure (Criterion that affect the spatial structure of a corridor network) |
| • Inventory (methods for mapping landscape elements);<br>• Corridor network components (river is one of the green patches and corridors components);<br>• Scale and hierarchy considerations (in terms of contextual criteria, species diversity, spatial relationships, and management units);<br>• Assessment process (indicator species, inventory, and system-based approaches). | • Connections to species-rich areas (network of species-rich areas to facilitate migration of species);<br>• Corridors to urban context relationship (impacts on the quality of corridors and patches, and spatial configuration);<br>• Network structure and content (connectivity and suitable conditions for habitat by appropriate development of structure and content relationships). |

Three approaches to landscape study that have been used to produce ecological 'fit' were: naturalistic, ecosystem science, and landscape ecology (Baschak and Brwon, 1995). All three have advantages and disadvantages as noted in Table 2. Firstly, the naturalistic approach is tended to be site-specific and design-oriented. It has attempted to reproduce nature by replicating and to a lesser extent plant associations. As McHarg (1969, p.120) noted "the environment is fit for life, for the forms which had preexisted, those which do now exist and those of the future". The focus of this approach has been on vegetation. In the urban context, vegetation plays major roles in sustaining and balancing

the ecosystem, it also contributes a greenway network and sustains the urban areas. It has involved the introduction of natural elements such as pocket parks, linear parks, wetlands, meadows and grassland through landscape design.

Secondly, the ecosystem science approach which has considered the processes as well as the structure of natural areas. In landscape planning, it consists of understanding of nature, describing planning constraints, the feeling for climate and environment and its design implication. It also involved natural processes such as succession, landform and development within the plan for the landscape or working with nature rather than against it.

Finally, the landscape ecology approach which deal with assemblages of ecosystems occurring in a geographically defined region. The subject of study in landscape ecology has been the landscape, its structure, function and change. In the urban context, landscape ecology deal with the management of individual patches and corridors as elements of the whole landscape.

The above three approaches have an important roles to play in considering the remnants of natural areas within an urban fabric. Naturalistic provides a basis for landscape design; ecosystem science provides a basis for landscape planning; and landscape ecology provides a basis for landscape management.

*Table 2. Comparison of the characteristics of three approaches to landscape study: naturalistic, ecosystem science and landscape ecology (Source from Baschak and Brown, 1995,p.213).*

| **Characteristic** | **Approach** | | |
|---|---|---|---|
| | **Naturalistic** | **Ecosystem Science** | **Landscape Ecology** |
| Scale | Site specific | Organism; population; community | Land unit: eco-region; eco-district etc. |
| Components | Wood lot; meadow; wetland | Natural systems; agro-ecosystems | All components |

| | | | |
|---|---|---|---|
| Focus | Vegetation | Biotic and abiotic | Biophysical and cultural |
| Operational Framework | Structure | Ecosystem structure and function; system analysis | Landscape and structure; function and change; Vertical and horizontal; heterogeneity: system analysis |
| Philosophical base | Habitats; plant communities | Systems integrity and expansion | Holism, Synthesis |
| Collective effort | Multi-disciplinary | Interdisciplinary | Transdisciplinary |
| Application | Design | Planning | Management |

## RIVERS AS AN URBAN GREENWAYS CORRIDOR AND GREEN PATCHES

A river might blend with its surroundings or stand out with natural resources. It could include pocket park, green lung, and urban gardens for local use. This engagement with local communities is essential to achieving the place-making and community benefits of riverfront. This approach of incorporating the place-making benefits has been called the trail-oriented development approach (Fields, 2009), whereby it involves utilizing greenways (including rivers) as community amenities that, when planned properly to mitigate environmental impact to sensitive areas, can be used as magnets for mixed-use development centers. Fields (2009) adds that linear open spaces or parks along rivers act as a buffer between 'nature' and urban areas, and it could be an effective tool for integrating hazard mitigation planning with community sustainability goals. Other than important as buffering systems within floodplains, rivers act to protect important ecological features, create areas of special recreational and aesthetic value, and at the same time reduce exposure of people and property to flooding.

This view of rivers as a buffer between urban and natural systems that can be used to mitigate natural hazard has a long lineage in contemporary environmental planning and it has become important aspects for urban sustainable land-use designs. Rivers could be seen as extensions of the natural environment within the city, which acting as a counterbalance to urbanization. The used of rivers in more urban landscape, however, encouraged discussion about the appropriate balance between growth management and urban landscape protection. It has been highlighted by Fields (2009) that the growth management principles vital for encouraging walkable urbanism. He adds that green infrastructure planning differs from conventional open space planning because it looks at conservation values in concert with land development, growth management and built infrastructure planning. This view on protecting and conserving the ecological resources in urban area provides and opening for the urban place-making approach as discussed above.

Apart of acting as urban green corridors and green patches, river also would act to improve water quality in canals up to a level that permits human contact, including swimming. According to Bosselmann et al (2010), as trunk sewer lines will serve the surrounding new urban development, it will be possible to collect sewage within the village by laying sewer pipes under the paved walkways, along the margins of the canals, and connect them to the sewer main. At the same time, grey water from homes, together with run-off after rains, can be locally treated under the pavement of the river margins and stored there to be fed into the river system as needed (Figure 3).

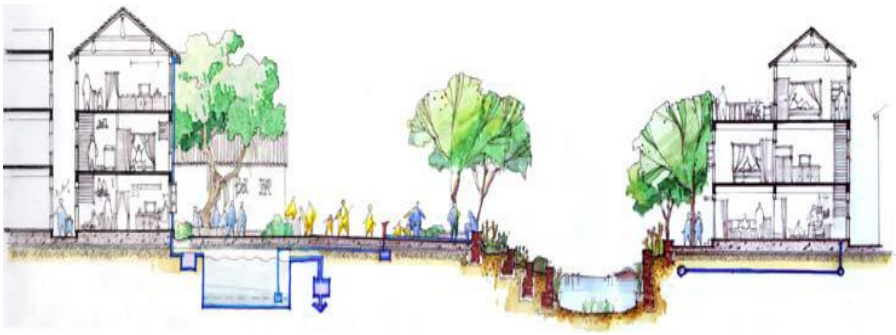

*Figure 3. Proposed improvements to canal cross-sections with provisions to treat and store grey water from homes and run-off after rains for release into canals. The section sewer pipes under the paved walkways along the margins of the canals collect household sewerage and connect them to the sewer main. (Source from Bosselmann et al.,2010,pp.260)*

## RIVERS AS AN URBAN HERITAGE CONSERVATION

It is interesting to note that the ecological knowledge mentioned above is an important aspect of restoring and conserving natural resources and biodiversity in urban areas. Urban ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (Rohde et al., 2006). As natural areas in urban environment become more fragmented and threatened, using approaches like the ecological framework in urban landscape planning, design and management might begin to reverse the trend. This section reviews the important aspect of rivers as urban heritage conservation in preserving the natural resources in the cities.

According to Nagpal and Sinha (2009), an urban conservation model that provide equal emphasis on the area around and between historic buildings as on the buildings themselves is necessary bearing in mind that medieval structure were always an ensemble with complex visual and physical relationships among the units. It is well noted that the natural landscape determined the location of forts, palace complexes and gardens, and the interaction between the built form and landscape occurred in multiple ways. Nagpal and Sinha add the most appropriate way to preserve the spirit of the past would be to conserve and/or recreate these relationships. As Childs (2010,p.1)

highlights "the design and shaping of parts of settlements such as the relationships between multiple built-forms, building typologies, public space, streets and other infrastructures, and the sitting and growth of town" are interrelated as the overall consideration in the urban place making. Kevin Lynch adds that historic conservation and a key performance dimension of the good city form should be thought of as a "problem of sensibility – as a way of enriching our image of time" (Lynch, 1987, p.260) (Figure 4).

*Figure 4. The conservation of cultural motives and heritage through the design of riverfront, Kuching Riverfront, Sarawak. (source from http://www.nadinhomestay.com/landmarksnearnadin.htm)*

An equally important aspect of the river conservation model is the emphasis on intangible values, which resides in cultural habits of perception, knowledge and technologies and its manifested in tangible forms –artifacts, building and cultural landscapes. Multiple forms of this model can be preserved through planning and programmatic efforts wherein natural and heritage river areas can be spaces for urban recreation and green space network. This means accommodating new structures, new ways of using spaces and changing cultural norms (Nagpal and Sinha, 2009). The riverbank edged the linear growth of the city (Rohde et al., 2006), consisting monumental buildings such as palaces, mansions, country retreats and gardens that were situated to take advantage of the river's expansive views, cooling breezes and ready availability of water Nagpal and Sinha, 2009). Childs (2010, p.6) states "the historic preservation movement is robust, supports a critical aspects of our national heritage, and has goals sympathetic

with environment sustainability". The river and its bank were a path of movement that not only afforded entries to the buildings and gardens but also served as places from where they could be viewed, thereby ensuring a memorable image of the city. The need to control the built environment's effects on the natural environment is a well made argument (Childs, 2010).

The river conservation would be an assemblage of elements of different periods, made coherent through landscape planning and design and also provides an opportunity for refining urban resources as a living theory aiming to enhance the health and well-being of cities and communities (Figure 5).

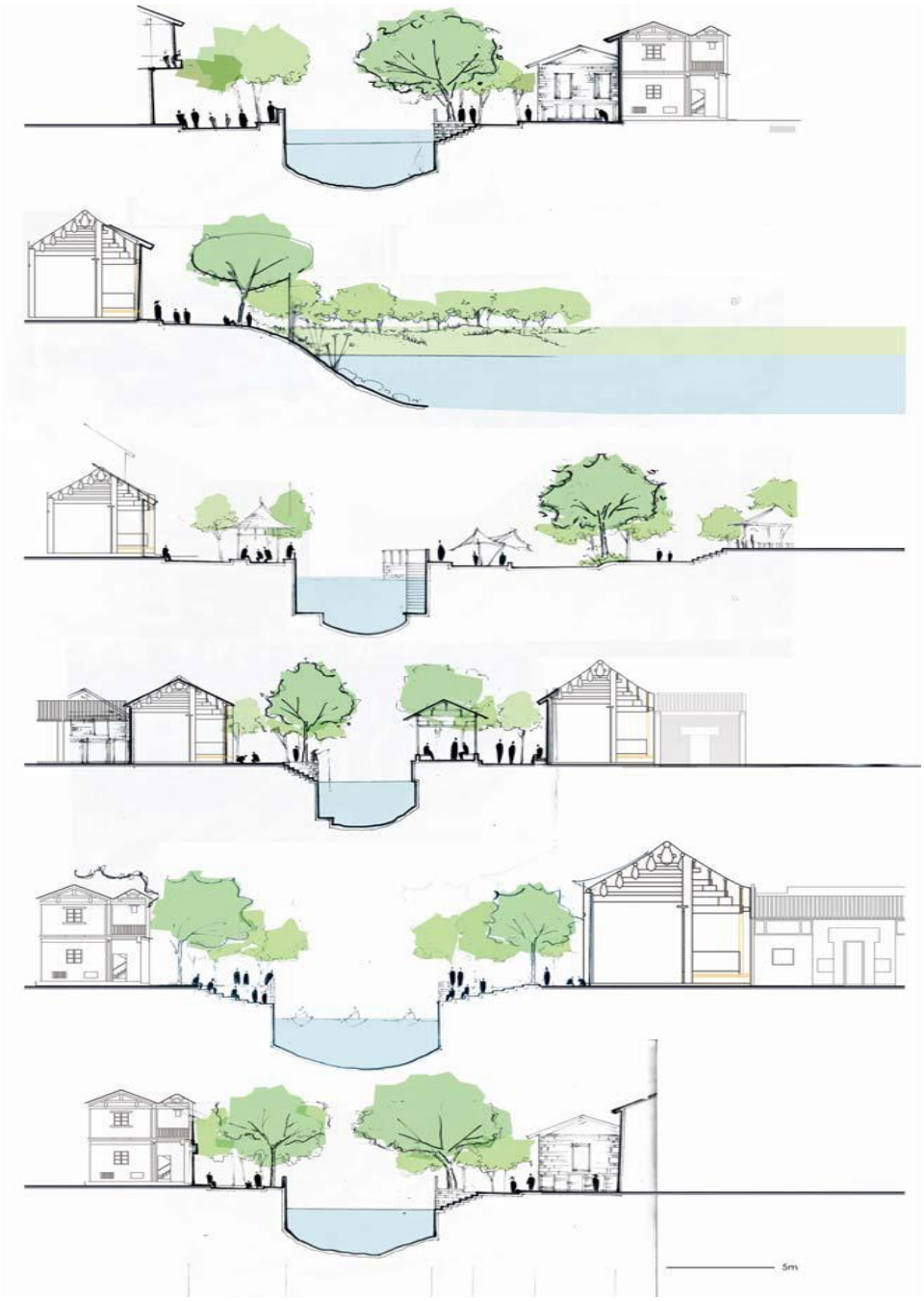


*Figure 5. New construction along canals should be built up to a building frontage line established by neighbouring buildings. (Source from Bosselmann et al.,2010,pp.262)*

## RIVERS AND RIVERFRONT DEVELOPMENT

Much of the historic riverfront landscape has disappeared (although many historic buildings remain) and new types of landscapes have emerged, yet this is not much of an obstacle as it may first appear (Nagpal and Sinha, 2009). They add a close 'reading' of the historic and contemporary landscapes, the patterns of forms and meaning reveals that through selective design interventions and urban linkages, it is possible to enhance that elusive urban quality that Kevin Lynch (1987) calls 'sense of the city'. Based on this, the redesign of the riverfront reconciles the past and present by restoring the historic connection between the heritage town settlement, heritage buildings and the river and serving as a catalyst for economic and cultural revitalization. According to Sinha and Sharma (2009), imaginable and legible landscape design, could be applied towards heritage sites in creating a temporal collage and enunciate a sense of the past existing in the present. Within this context, the riverfront development must consider the past whose authenticity is derived from engagement with the ongoing trajectory of change, in the process reversing decline and ushering in a renewed engagement of the city with the river.

Heritage revitalization on riverfront would apply not the recreation of non-existent historic settings but a strengthening of the relationship between the extant historic architecture and the river, achieved through creative reinterpretation of the past landscapes (Figure 5). This approach does not aim at the physical re-creation of the historic landscape, but attempts to recreate its ambience and vitality. 'Heritage' encompasses both material structures –historic landmarks and landscape remnants –and its intangible aspects –practices, living traditions and memories associated with river (Nagpal and Sinha, 2009; Sinha and Sharma, 2009), particularly where they meet major streets (Ellin, 2010). Thus, sustainability of riverfront development must address core concerns of the past heritage to help recreate a sense of place that attract visitors to the area and encourage more historically sound patterns. This is one reason why 'landscape', and especially urban landscape, is understood as a 'terrain' where national identities can be created, developed and enhanced (Gospodini, 2004).

Visualized as a 'heritagescape', the riverfront can be developed as a truly public realm accessible to all (Nagpal and Sinha, 2009). While the recreational and cultural attributes of the historic space are recognized (Fields, 2009), rivers can be a place where visitors/users orient themselves in time and space and make sense of how the urban past continues into the present through an introduction to its intangible (crafts traditions) and monumental architectural heritage (Nagpal and Sinha, 2009). The potential for recreational activities depends on the distance between the riverfront and the next closest densely populated area (village, town) (Rohde et al., 2006). The riverfront spaces, designed for exhibiting and selling traditional crafts, can be a catalyst in preserving intangible aspects of the city's heritage. The riverfront can provide a public corridor of access to the historic precincts, heritage buildings and to be more recently built parks and public monuments. These memorial spaces would introduce the resident and visitor to the city's historical narrative, its events and figures. Hence, improving recreational opportunities of the riverfront in urban areas can be an important objective in the overall urban conservation and sustainable development (Figure 6).

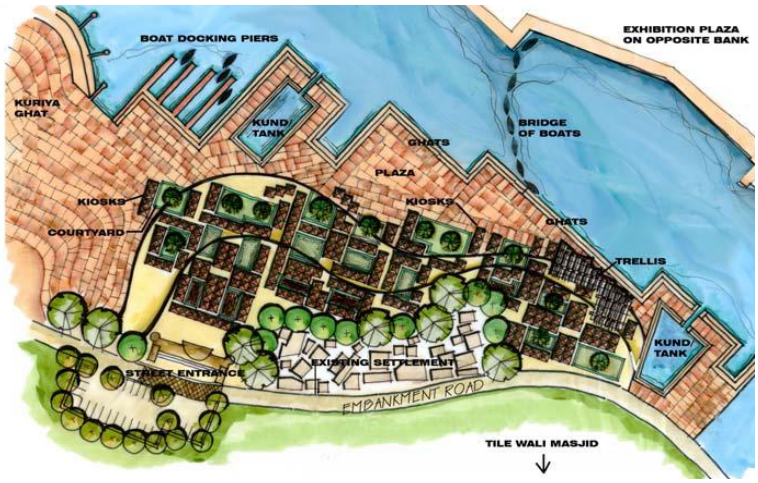


*Figure 6(a). The Residency Memorial Park commemorates the Mutiny from the British point of view in its numerous building ruins, obelisks, plaques and graves, testimony to the siege, lives lost, and eventual victory*

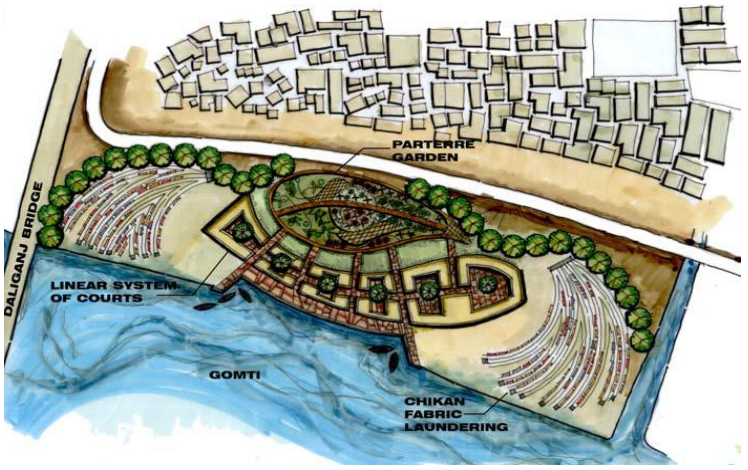


*Figure 6(b). The Indian version of the Mutiny events can be narrated in a riverfront plaza next to Shaheed Smarak, the two together commemorating the First War of Independence.*

Figure 6 (a & b). The two memorial plazas will be possible to walk to the grounds of Chattar Manzil that would be publicly accessible as a riverfront garden. (Source from Nagpal and Sinha, 2009, pp.500-501).

## ISLAMIC PERSPECTIVES ON SUSTAINABLE RIVER DEVELOPMENT

Generally, sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for generations to come. Urban sustainable development does not mean the sustainable development of any single economic, social, or environmental subsystem, nor simply adding to the use of these subsystems (Li et al., 2009). Instead, it attempts to balance economic growth, ecological construction, environmental protection and social progress, and the difficulty of this challenge has made it a major focus of current research. From an Islamic standpoint, sustainable river development is based on the precepts of relationship between man and environment. The concern for the environment is very vital since man and the environment have a strong relationship, by which human beings have survived for generations (Zainora Asmawi, 2008).

In Islam, all things have been created with purpose and in proportion and measure (Al-Qamar, 49) (as quoted by Spahic Omer, 2008). As the vicegerent on earth, we are Allah's stewards and agents who will manage the environment. Prophet Muhammad S.A.W said:

> *"This world is a green and pleasant thing. Allah has left you in charge of it (mustakhlifukum fi-ha) and looks at how you behave". (Hadith: Muslim)*

The relationship between man and the environment has been recognized as the trust for man to carry out his duty as a 'caliph' on earth. Man should conserve and preserve the resources for the use of present and future generations, which is conformity with the concept of sustainable development. In the Quran, nature is an estate belonging to Allah which constitutes a testing ground for man's morality and behaviors and whatever right man possesses to have dominion over nature. This was formed from the three central concepts of Islam: *Tawhid* (unity), *Khilafa* (stewardship) and *amana* (trust).

*Tawhid*, the oneness of God, is a cornerstone of the Islamic faith. It recognizes the fact that there is one absolute Creator and that man is responsible to *Him* for all his actions. Quran says:

> *"And to Allah belong whatever is in the Heavens and whatever is on earth.And ever is Allah, of all things, encompassing". (An-Nisa, 126).*

The above *ayyah* stresses that, abusing one of Allah creations, whether it is a living being or natural resources, is a sin. The Prophet Muhammad S.A.W. considered all of God's creations to be equal before God and he believed animals, but also land, forests and watercourses should have rights.

The concept of *khilafa* (stewardship) and amana (trust) emerge from the principle of tawhid. The Quran explains that mankind holds a privilege position among God's creation on earth as stewardship and carries the responsibility of caring for God's earthly creation. Each individual on earth is given this task and

privilege in the form of God's trust. Environmental crisis is, in effect a failure of the trusteeship, thus nature becomes an index of how well a particular society has performed its responsibility towards Allah s.w.t. However, the human being was the only in Allah's creation (i.e.nature) that was prepared to undertake this tasks of trusteeship (*amanah*) willingly, according to the verse:

> *"We did intend offer the trust (amana) to the heaven and the earth and the mountains: but they refused to undertake it, being afraid therof: but man undertook it, he was indeed unjust and foolish". (Al-Ahzab, 72)*

But the Quran repeatedly warns believers against arrogance: they are no better than other creatures. The Quran says:

> *"No creature is there on earth nor a bird flying with its wings but they are nations like you". (Al-An'am, 38)*

Islam has long stresses on the importance of sustainability and how corruption on earth will bring all human kind sufferings. In the Quran, Allah says:

> *"...so eat and drink of the sustenance provided by Allah, and do not evil nor mischief on the (face of the) earth". (Al-Baqarah, 60)*

Based on the above *ayyah,* human kind has been warned about not to do any misconducts on earth. As a Muslim, we have been thought to conserve and preserve our natural resources. Quran says:

> *"It is He who produces gardens, with trellises and without, and dates and tilth with produce of all kinds, and olives and pomegranates, similar (in kind) and different (in variety): eat of their fruit in their season, but render the dues that are proper on the day that the harvest is gathered. But waste not by excess: for Allah loves not the wasters". (Al-An'am, 141)*

Man is therefore in charge of managing earth and its resources. Doing so is a trust from Allah to man. Failing to properly manage the earth and its environment means that man did not fulfill the trust (*amanah*). Though we know the importance of trust in Islam, our *amanah* towards nature is perhaps the most important for us. In the context of sustainable river development, we as vicegerent on earth are required to plan in such a way that the river resources are not wasted. Islam abhors wastage and encourages sustainability in terms of we leave the earth in a state similar or better for the future generations.

## CONCLUSION

This review has introduced an understanding to facilitate the protection and enhancement of rivers and natural areas in cities. An ecological knowledge was developed related to planning, design and management of the urban natural resources. The Islamic perspectives towards sustainable river development highlight the importance roles play by human in order to sustain the ecological and natural resources of the urban areas. These facilitated the systematic review to identify areas that need protection and/or enhancement to maintain ecologically functioning rivers in the cities. This understanding is important in order to conserve the river biodiversity and ecological processes. It is not too late, in many cases, to begin the healing process and allow nature to begin to play a more important role in the health of cities through ecologically functioning of urban rivers.

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