The sustainable design of Water's Edge Public Spaces in the Asia Pacific region: smaller scale Australian examples and case studies in Sydney, Hong Kong and Singapore.

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Abstract: The analysis of Water's Edge Public Spaces (WEPS) in the Asia-Pacific region is considered important, especially locally, because these spaces are a key to the identity and perceived image of place. Emerging water's edge public spaces in the Asia-Pacific region display environmental connections while also: i) encouraging mixed use functionality; ii) preserving heritage and promoting adaptive re-use; iii) applying green urbanism principles; iv) implementing technological connectivity, establishing and maintaining connections with and in urban networks; v) allowing avenues of incomplete urbanism; and vi) harnessing renewable energies in the public domain. The authors found that there is a link between global design language uptake (in both, the East and West) and local design upgrades; however, this global-local link has suffered in times of financial uncertainty and socio-economic transformation. For example, Australian cities are focussing more strongly on 'the local' during financial woes.

This paper is part of a larger study that uses a comparative urbanism framework to evaluate the sustainability of WEPS. The purpose of this paper is to discuss smaller scale Australian WEPS and connect these to the outcomes of a pilot study that compared three WEPS: in Sydney, Hong Kong and Singapore, at different stages of their lifecycle. The paper analyses and discusses factors in the sustainable design and renewal of Australian water's edge spaces. Results are presented within the context of changing relationship dynamics, understanding underlying subservient associations established both locally and globally, while continuing to keep in mind the valued and reliant social, architectural and cultural site-specific relationships, locally, and, between the East and the West.

Introduction

There is a growing recognition that spaces between buildings are important, and that cities and their public spaces require constant improvement to stay useful and competitive. Over the years of financial instability, there has been a shift from creating landmark buildings with distinct architectural form to recognising the importance of links, urban permeability and spaces between buildings. This may be a result of shortfall in funding major projects, or it may be because 'social business models' (Yunus et al, 2010), have been more successful during times of recession. The evidence for this has potential to be analysed in detail. Sydney, Hong Kong and Singapore have differing governance structures that ensure development of public spaces occurs uniquely. Water's Edge Public Spaces (WEPS) in global cities are featured due to landmark buildings that attract visitors e.g. The Gardens by the Bay in Singapore, but they hold their stance due to individual uniqueness and prominence.

Cities were never intended to be complete, as systems, frameworks, structures, habitats or organisms. Cities are inherently evolutionary in nature, always evolving and constantly transforming. Meanwhile, 'The East' and 'the West' are broad words used to define or demarcate boundaries that are diminishing. In mega-cities today there are indeed more 'global souls' than 'local heroes', with many groups defined using

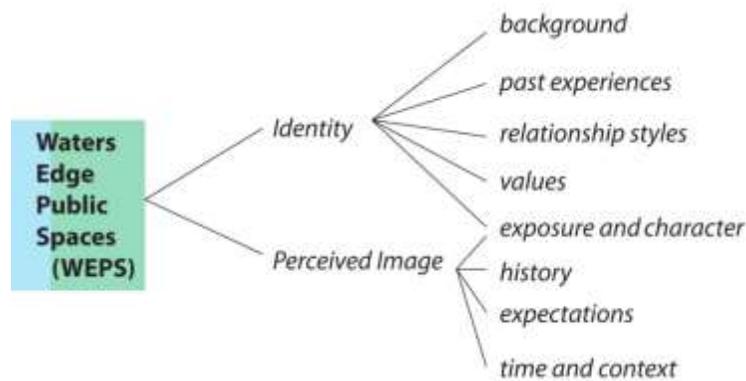**The importance of Water's Edge Public Spaces**

Figure 1. Aspects that contribute to the importance of Water's Edge Public Spaces, or are a key to the success of these spaces.

terms such as 'cosmopolitan', 'culturally diverse', or 'culturally well-versed.' In terms of needs, especially in theoretical music and food, the East and West have been constantly compared and focused upon (Cage, 1968 and Wen-chung, 1968). From 'exoticism' to 'internationalism' to 'the search for a global identity', in cities, much of the urban population continues to have a heritage encompassing many backgrounds and languages.

Due to its particular urban history, over the last 150 to 200 years, Australia is seen as a part of 'the West', despite its geographic location and intricate Aboriginal history. References to 'underlying subservient associations' in this paper, suggest this association with the liminal, linking past relationship styles to culture, and, postcolonial history and theory, and to current identity.

Historically, WEPS have been places where trade, exchange and ship-building have prospered. While global WEPS are still thriving due to tourism, small scale, local or rural WEPS display moderate levels of tourism and often upgrades are necessary. These urban transformations are either state funded, or when still in a moderate condition, this is primarily enabled by specific aspects such as local involvement and value adding. The historical notion of 'a Waterfront as a gateway to the city' has changed, these spaces now focus on 'image and prominence', with a changing use, and the desires of planners and architects to make these spaces resource contributors, sustainable, connected to the environment, resilient, socially synergised, low-carbon and energy efficient. Increasingly, these formerly industrial waterfronts play a prominent role in the reinvention of the city. Technology has ensured that the waterfront is not essentially the only gateway to the city any more (e.g. the rise of the virtual/airport city), though the working port still holds its importance, currently, the recreational and functional port enables other valued pursuits like social connections, fitness, providing spaces of mixed use diversity, technology, small trade and outdoor dining.

Waterfronts can make cities more liveable and vibrant because they are powerful spaces of reflection, scenic integrity, recreation, functionality, diversity, history and local identity. To achieve a high-quality waterfront, the connections with the city, history and identity must be preserved. Links with day-to-day activities, enabling social connectedness, interaction and fitness should continue to be encouraged in these spaces. It is very difficult to change urban form retrospectively, and therefore, it is desirable to shape the next-generation of cities on the basis of a high-quality public space network, with appropriate density, mixed-use programs and walkability, and accept these as drivers in urban strategies.

Brownfield development, or the urban renewal of a waterfront is often a city's most significant urban development, as this has the potential to completely redefine the relationship of a city to the water. Bustling ports that are now quiet places, continue to remind us that change is part of growth, but growth

can have positive yet negative ramifications, including direct socio-economic effects on the operation and functioning of a place. e.g. Port Adelaide in South Australia and Wentworth in New South Wales. Today, waterfront renewal aims to play an important role in making a sustainable city, increasing climate resilience (e.g. rising sea-levels; improving the water quality; and, rethinking the working harbour, which frequently creates noise and pollution).

Smaller scale local WEPS have remained at a state of disrepair unless funding has supported upgrades. Larger scale local WEPS are under construction in some major Australian Cities (i.e. Perth, Brisbane and Sydney). Globally, emerging WEPS are exhibiting specific elements (John, Lehmann and Sivam, 2013) supported with the changing use and mixed use nature of these spaces. Locally, waterfronts have been used for trade, waste disposal, leisure and most recently for urban spectacle and lifestyle housing (Oakley and Johnson, 2013). Finally, where these spaces were previously working ports or shipping docks, they are now becoming recreational and tourism-oriented.

Firstly, this paper examines the global-local link and the effects of the financial instability on WEPS. Secondly, this paper discusses factors that could be considered in the sustainable design and renewal of local Australian WEPS. Thirdly, this paper leads towards sustainability and models of sustainability evaluation in a comparative urbanism framework for the chosen local WEPS. The parameters do not cover details about regional and local examples but draw out possible practices for these spaces that may be of help in future renovation, upgrade or redesign phases.

Historically, Waterfront regeneration is deemed a timeless activity, with the Greeks, Romans and Byzantines all engaged in harbour-building and waterfront renewal in response to changing political, economic and geological circumstances (Smith et al., 2012). The Metropolitan Waterfront Alliance for New York City notes that 'for recognizing great waterfront destinations, our waterfront should be as alive and diverse as the cities and towns that surround it.'

Waterside development should therefore:

> 'Provide public space, parks, and esplanades,
> Create access to the water,
> Connect neighborhoods to the water,
> Include waterside destinations (especially food!) that are fun and affordable'
> (Metropolitan Waterfront Alliance, 2013).

To this end, they have developed 'Design the Edge Principles' for waterfront renewal projects, to keep land from eroding into the water, using an approach that engages interdisciplinary and participatory design to achieve multiple goals, in water recreation, flood storage, access to the water, shoreline habitat and reducing stormwater pollution.

Methodology

In comparing local examples, like is compared with like, and hence differences, similarities and uniqueness becomes easier to observe. However, unique features that draw tourism (food, music, festivals and events, local specialities etc.) must also continue to encourage competitiveness. The large scale local areas compared within Australia are: 1) Perth 2) Brisbane and 3) Sydney, and, the smaller scale local areas compared are within 1) Mildura in Victoria, 2) Renmark in South Australia and 3) Wentworth in New South Wales.

This paper uses the comparative urbanism framework to analyse WEPS. The comparisons were undertaken by visiting and surveying each space. The authors collated this information and identified similarities and differences based on a detailed survey of the case studies. The pilot study results were analysed by comparing case studies in Sydney, Hong Kong and Singapore based on key factors. The key focus of this paper will be on the case studies in Sydney, Hong Kong and Singapore, yet Australian cities and regional examples also feature within the comparisons. This global comparison was undertaken through the gathering of information using a common questionnaire which was used to analyse all chosen

sites. The information gathered related to the categories of: density and use, built form displaying history and re-use, environment and life connections, networks, change and flexibility, and utilising cyclical processes proactively.

The global cities, and water's edge public spaces chosen as case studies were selected because they display early, mid and emerging lifecycle components, which were selected for this analysis. In this context early is defined as of the 1850-1900s or prior, mid is defined as 1950s-2010 and emerging as 2012 onwards. The questionnaire had qualitative and quantitative aspects, including videoing and observational analysis of the spaces. The surveys were conducted following each other, in order to best simulate a comparative dissection through time.

The Pilot Study
The pilot study used a common questionnaire, for the global case studies in Sydney, Hong Kong and Singapore. The local sites were then analysed in relation to the global case studies. The scale is different, the context is different, but the language of architecture and design are the same. In local Australian examples, power differentials associated with indigenous heritage seems to cause issues, in a westernised waterfront voice and identity. Design mindset, as displayed in designs of Port Adelaide and the Melbourne Docklands (Oakley and Johnson, 2013) are increasingly westernised and unfortunately not locally attuned i.e. missing important things like Aboriginality and consideration of local power dynamics. In the overall global context, such differentials remain at play in terms of post-colonialism and a struggle to find individual identity.

The existing and current social, architectural and cultural relationships between the East and the West are worthwhile, but seen as values-based by many. Earley and Mosakowski (2002) also urged that "now is an opportune time for researchers to move away from the tried and true friends of cultural values as the sole indicators of cultural differences" (p. 316). Instead, it is important to focus on synergies that obtain positive design outcomes within WEPS. These synergies are irrespective of culture, but hold universal values such as integrity, genuine concern and good faith as keystones. In her book, 'Ordinary cities', Robinson advances the removal of entrenched ways of thinking, ones that state that the East and West have little relevance with each other, with one being modern and the other not. She argues for a more cosmopolitan form of theorizing, "one that tracks across different kinds of cities and contexts". Noting this, there is also a view that, "cities in the developing world cannot have the same strategies and debates as cities in the developed world" (Lehmann, 2012). In line with these points, this overall work aims to analyse, compare and test an evaluation tool and provide city specific strategies.

Before renewal, these waterfronts have often been underutilised areas in the heart of the city, where industry has been in decline, but the connection of the city core with the water's edge has been blocked.

In Australia, much has been done to keep water's edges public, including providing direct access to the city and to keep the relationship between the city core and the waterfront/river or harbour active. This is also the case in Hong Kong and Singapore.
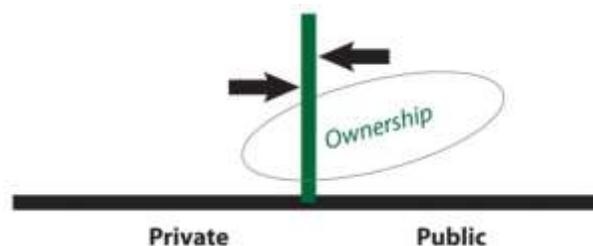
Expanding public access

Figure 2. The constant struggle between public and private ownership at the Water's Edge.

Sydney, Hong Kong and Singapore Case Studies

Sydney - Circular Quay, Walsh Bay and Barangaroo

Hong Kong - Star Ferry Pier, Queen's Pier (Avenue of Stars) and Victoria Harbour developments.

Singapore - Boat Quay, Marina Bay and, the vicinities of the Raffles and Fullerton Hotels including 'Gardens by the Bay'

Figure 3. Sydney, Hong Kong and Singapore Case Studies

Public spaces are continuously the same in terms of the basic levels (incorporating paths and plantings), but variations of diverse spaces along the edge make experiences better. A diverse and locally attuned public realm usually mixes large open spaces with more intimate pocket spaces. Land-uses vary along the water's edge, there has been a shift to recreational, entertainment, sports, cultural, tourism oriented spaces; or, preferably other functions/usages. An 'active edge' can be achieved through the creation of natural, interactive, interesting and meaningful spaces.

At Port Adelaide, where waterfront sites remain vacant, the disconnection from history and identity has caused issues, the 'rough wharfie' and 'working class' should have been featured and incorporated in an architectural style celebrating 'coarse yet longstanding bare walls' and 'visible structural integrity' through the renovation of historic buildings and connected public sphere. The usage of industrial harbour is still active in many similar scenarios, and tensions continue in working harbours, where residents encounter issues that affect their quality of life.

Depending on the nature and size of the water body, boats, ships and houseboats are allowed to visit the water's edge at different areas - city, regional or local. Development should continue to support the working waterfront, recreational sailing and also have sections where the natural waterfront is restored to maintain water quality, biodiversity and health standards. Connectedly, the flow of ideas, throughout history has been enabled by trade and commerce, and this remains till date the way design and architectural innovation progresses. Public spaces are a reflection of our current minds, the power dynamics, past relationship styles and emerging thoughts. A global concept of mind, in the context of sustainability, green urbanism, resource efficiency, environmental connection and low carbon cities, grounds this paper and provides the basis of the study. This paper focuses on the Sydney case studies, and draws out lessons from Hong Kong and Singapore. These global cities have unique elements that provide good and bad lessons that will aid designs locally.

Outcomes of the Pilot Study
In analysing the abovementioned case studies (Fig 3), it was observed that emerging WEPS:

1. display elements of heritage preservation and adaptive re-use,
2. are distinctly green, allow urban and roof-top farming,
3. value functionality and connectivity, including shelter from weather,
4. display recycling and waste disposal is a priority,
5. display health and fitness as a priority,
6. allow avenues of incomplete urbanism, fluidity and change, and,
7. are self-sufficient and energy efficient.

Photographs, Set 1: Emerging WEPS display elements of Heritage preservation and adaptive re-use (Walsh Bay, Sydney)

Photographs, Set 2: Emerging WEPS are distinctly green (Victoria Harbor, Hong Kong)

Photographs, Set 3: Emerging WEPS allow urban and roof-top farming (Tram to the top, Hong Kong and Punggol, Singapore).

Photographs, Set 4: Emerging WEPS value functionality and connectivity, including shelter from weather (Star Ferry Pier upgrade, Hong Kong, and Victoria Harbor, Hong Kong).

Photograph, Set 5: Emerging WEPS display recycling and waste disposal is a priority (Avenue of Stars, Hong Kong).

Photographs, Set 6: Emerging WEPS display Health and fitness as a priority (Avenue of Stars, Hong Kong).

Photographs, Set 7: Emerging WEPS allow avenues of incomplete urbanism, fluidity and change (Makansutra, Gluttons Bay, Singapore).

Photographs, Set 8: Emerging WEPS are self-sufficient and energy efficient (Victoria Harbour, Hong Kong and Marina Bay Boulevard, Singapore).

The population in the majority of the western world is ageing, with global financial instability continuing to affect the world economy. Meanwhile, rapidly urbanising Asian cities are encountering problems associated with increasing population, and higher densities, with public spaces in Asia becoming more heavily used (Miao, 2001). During 2011–12, the larger cities in Australia grew almost 50 per cent faster than the rest of the country (DIT, 2013). And, in the past decade, Australia's major cities have all been affected by extreme weather events such as long droughts, heatwaves, severe storms, bushfires, and extensive flooding. As these events are forecast to rise in frequency and intensity, Australian cities need to become more resilient by mitigating and adapting to the effects of climate change and other natural hazards and events (DIT, 2011).

Local Australian Examples
The city and regional/rural Australian examples are from Perth, Brisbane and Sydney, and, Mildura, Renmark and Wentworth respectively. Globally, WEPS in Singapore and Hong Kong are unique, with Singaporean spaces being a part of a comprehensive scheme. The design of the spaces in Hong Kong are still focused upon individual development proposals, as in Sydney. The rate of change is higher in Hong Kong in terms of the progress of proposals, than when compared to Sydney. The WEPS are different based on history, nature and type. The traditional Chinese city did not offer many spaces for gathering; the idea of public space as a political and civic sphere has not intentionally been part of the traditional Chinese city (e.g. Tiananmen Square as a creation for meeting with military presence). But, the spaces adjoining waters were trade focused, and hence the movement and networks associated with these spaces have always been crucial. Urban theorists perceive this shift of rapid transformation of urban public space as a necessary move. With online domains finally securing attention, the current state of discourse in this matter is adapting and allowing for this change, e.g. theorists and sociologists from China or Europe support a movement into online trade and supply (e.g. in the 1970s there was a vigorous debate on questions of 'public vs. private', reflected in societal transformation, for instance by Umberto Eco or Richard Sennett), but now, these debates are superseded by online shoppers securing the best deals for perceived free shipping. Local examples display need for care, upgrade and financial assistance. The community supports these upgrades but funding is often the most crucial issue when development is planned.

Photographs, Set 9: Emerging WEPS in Murray Bridge Council, Hume Reserve, and the vicinity of the Swamp Road DPA, including the ARTC owned Railway precinct and historic riverfront (Rural City of Murray Bridge, 2013).

Photographs, Set 10: WEPS in Wentworth, where the Murray River and Darling River meet.

Photographs, Set 11: Emerging WEPS in Mildura, where residential development fronts a cafe and house boats.

It is essential that economic development activities on the waterfront bring resources to regional areas, even though the down-side is the potential to reduce quality in the public realm for everybody. This is noticeable in some designs, where surely unanticipated by the developer, for example, some sections of Mildura's public water's edges (along the river) are difficult to walk because of bird/duck faeces covering the public walking path. This however, is counteracted in developed scenarios where the birds pick up dropped food in cafes.

The Barangaroo Harbor area of Sydney, New South Wales, Australia, was once a busy harbor, with warehouses and ships crowding the waterfront. Barangaroo (with its developer Lend Lease and the new Crown Casino) sit in this overall debate as basis, aware of the changing uses of these waterfront spaces, and aware of the high profile nature and prominence of these areas.

Photographs with conceptual visualisations (three above), Set 12: The new urban district at Barangaroo South in Sydney, part of Darling Harbour. Supporting possible new standards for decentralized energy and cooling of buildings (Lend Lease, Sydney).

Sustainability is a possible common thread through all aspects of the Barangaroo redevelopment. The designs aim to support sustainability principles, and eventually behaviour change over time (Lehmann and Crocker, 2013).

Barangaroo consists of three major developments, each slated for completion at different times:

1. ***Headland Park:*** *More than 50 percent of Barangaroo is dedicated to public space, and most of that will be in the Headland Park area, which is currently under construction and slated to open in 2015. It will feature restored headlands and a 2.2-kilometer (1.4-mile) public foreshore walk. The project calls for building up the headlands' height while emphasizing their natural shape.*
2. ***Barangaroo Central:*** *The creative heart of the region, the central area will feature a civic arts space managed by the Barangaroo Delivery Authority. It is currently in the design phase.*
3. ***Barangaroo South:*** *The area's commercial center will include premier real estate in hopes of attracting financial organizations, as well as residential development. (Fretty, 2013).*

The Global city-Australian city link: enlivening and enhancing the waterfront
Innovation spreads through communication, and communication is easier in a climate of excess and comfort. The financial instability has affected innovative movements in design, even though technology continues to allow communication. The global and local have continually grown apart in some aspects and closer in other aspects. The elements of emerging public spaces in global cities (John, Lehmann and Sivam, 2013) correspond with local solutions for upgrades, but local uniqueness, environment should be well understood and preserved. It is important for cities to have better waterfronts because these areas are increasingly becoming economic magnets, pulling tourism and shaping the image, functioning and popularity of the city.
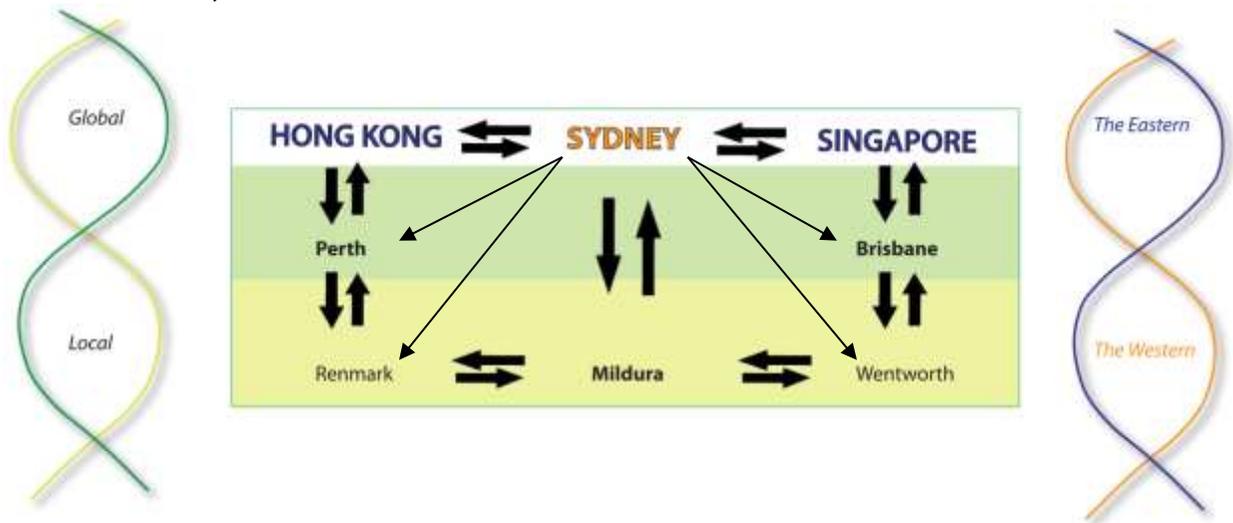
Renmark, Mildura and Wentworth Case Studies

Figure 4. Renmark, Mildura and Wentworth Case Studies

The Global-local link: drawing lessons for the local from overseas examples
In making the comparisons, the following points are apparent: 1) Design flow is based on fund availability, 2) Travel and communication of global elements to the local is slower in times of financial difficulty, and, 3) Designs that incorporate all elements of emerging public spaces have not yet been successful in the Australian context. Locally, waterfront housing, and mixed use areas are popular in the Australian context but aboriginal sites are increasingly not receiving enough care during development.
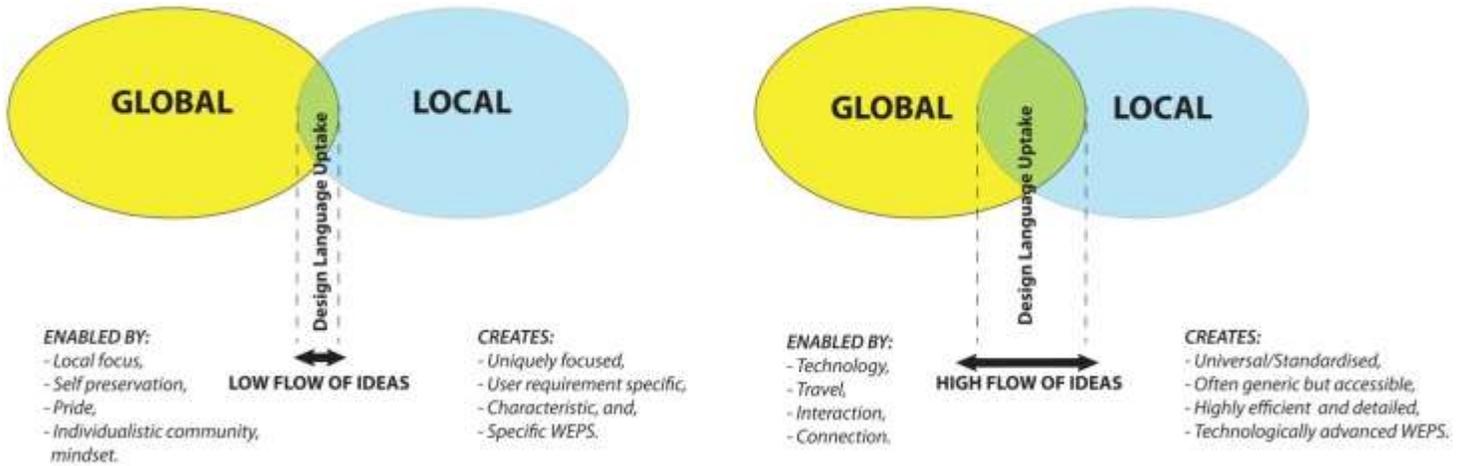
Linking global and local WEPS

Figure 5. The relationship between global and local WEPS

In the future, WEPS will be more than energy efficient and self-sufficient, they will be capable of being hubs that are a source of environmentally harnessed energies. A successful model that will enable this transition is yet to be found. The authors believe, and many texts corroborate, about eco-cities and 'low carbon cities' (Lehmann, forthcoming), that public spaces in these places will need to begin delivering like never before.

Similarities and differences
The local case studies exhibit that, similarities exist between WEPS in terms of 1) prominence and importance of site, 2) histories and stories associated, especially in understanding of local aboriginal stories, 3) scenic beauty and biodiversity, 4) need for funds to ensure upgrades, 5) tourism, trade and commerce, and, 6) areas of interaction and exchange.
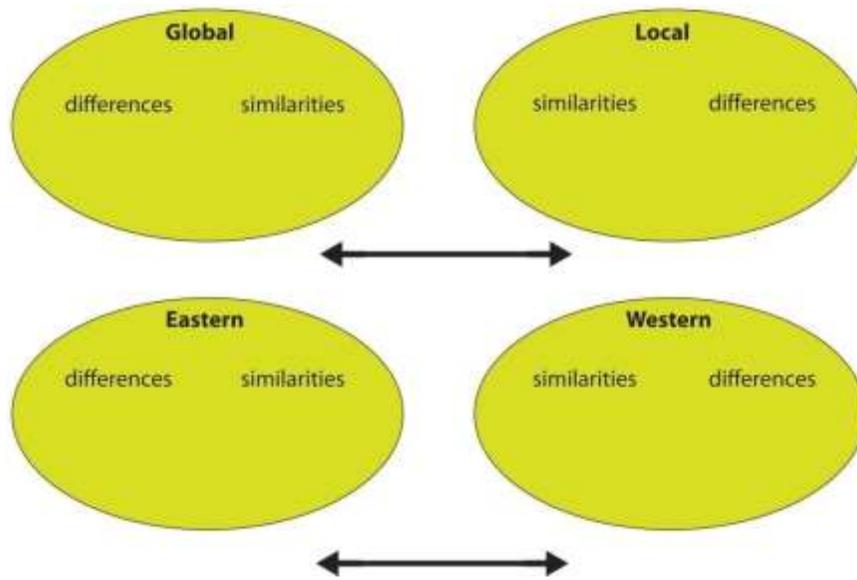
Understanding similarities and differences

Figure 6. Relationships between similarities and differences in WEPS

Differences exist in terms of 1) scale and population using the site, 2) diversity of users, 3) average stay and use of space, 4) options for securing funds, 5) options for maintenance and upgrade, 6) governance structures, legislation and politics associated with change, and, 7) unique histories.

Additional Elements
"If there is magic on this planet, it is contained in water"
~LOREN EISELEY, The Immense Journey.

"For what sustains, cleanses, purifies, refreshes and can be looked upon, for/with reflections, like water".
~MABEL JOHN.

Each local environment has unique flora and fauna, associated with the geology of the area, for e.g. the biodiversity of a section of the Murray. Additional features depend upon the water body and specific water's edge. This connection between the water's edge to natural environment (parklands, gardens) is achieved by keeping newly introduced materials consistent with existing ones, and minimising impact on natural systems. There are strategies that have been successful in achieving this close connection, and these employ bio-mimicry or an architectural science consideration of variables and parameters (seasonal and cyclic changes over time) for e.g. the Domain in Sydney overlooks the Harbour; while Gardens by the Bay in Singapore unfortunately turns its back to the water.

A high level of pedestrian permeability can be achieved (along, as well as perpendicular to the water edge) by using various interesting methods, but large scale podium architecture may not be supportive of active water edges, impacting negatively on views and access, compromising good urban design outcomes. Instead, small scale yet detailed, basic, simple and easy to use steps or floating platforms allow required pedestrian permeability.

Context, Culture and Change: expanding public access
The context in Sydney, is one supporting a mid-grained patch-work kind of approach. This follows a diversified and cosmopolitan Australian culture. The waterfront case studies chosen are busy with tourists and a large number of commuters.

The context in Hong Kong, is one supported by a fine-grained patch-work approach, one that is driven predominantly by developers. The waterfront case studies chosen are busy with office workers, tourists and a large number of commuters.

The context in Singapore is predominantly the same but focuses on connected green spaces.

Perth and Brisbane, are mid-sized Australian cities, and prominent developments are rejuvenating the city's image. Mildura, Renmark and Wentworth are regional, where State funding and local value-adding are working towards waterfront regeneration. The cultural similarities, are mainly in the Australian context, in search for the protection and preservation of aboriginal sacred sites and culture.

The cultural difference, is mainly in the diverse nature of global cities. Interestingly, Gelfand et al. (2006) argue that there are societies or groups that are generally collectivistic and loose (e.g., Brazil), collectivistic and tight (e.g., Japan, Singapore), individualistic and loose (e.g., the United States, New Zealand), and individualistic and tight (e.g., Germany; cf. Chan et al., 1996; Triandis, 1989).

The authors believe that though history is a good indicator of past behaviour, individual identities should not be limited by cultural or social perceptions, the growing diversity of cities, and study of culture in WEPS supports this. Where history links to present, these ties must not be broken in the design of space.

Factors to be considered in the sustainable design and renewal of WEPS
The factors that lead to change according to Anne Breen and Dick Rigby (1994) are:
      1. Environmental cleanup,

2. preservation, ethnic and downtown comeback,
3. federal (or State) assistance,
4. recreation/fitness,
5. tourism,
6. pioneering citizens,
7. leadership, and/or,
8. history.

To ensure sustainable design and renewal, these factors are all to be considered in association with an understanding of variables (catalysts) that cause change, and parameters that cause change (cycles and seasons), in the lifetime of these space, this work is better considered in an inter-disciplinary and broad design context.

Additionally, it is important to design self-sustaining systems, plantations that reinstate themselves inter-generationally without constant requirement of care and maintenance, with buildings that harness the changing seasons and cycles around them proactively.

Sustainability and models of sustainability evaluation

Models of sustainability evaluation do not currently address WEPS specifically, and in this search it is important to consider that most evaluations are subjective. However, to understand this better, further research is being undertaken at the study sites in Sydney, Hong Kong and Singapore. This data collection and analysis will be used in further papers associated with this study. It is considered that the design of WEPS and urban waterfronts will be crucial for cities, to create advanced spaces for users, address issues related to climate change, and to become more risk averse and disaster resilient.

Theoretical recommendations: designing the edge

In analysing WEPS both globally and locally, one aspect is clearly apparent, i.e. the differences and unique elements of these spaces, can and should be the focus of these sites, and the success of the design depends on this focus. Unique features can make a place, so stories and histories should be continued in the design language of these spaces. The design process should be collaborative, including architectural science, history and consideration of ecological connections.

To ensure this process is successful, community Involvement and stakeholder consultation is crucial.

Part of a waterfront plan recommended by the authors, focuses on fine design outcomes identifying and pursuing strategies to increase the city's resilience to possible climate change, sea level rise and other hazards, i.e. adapting to and being prepared for possible environmental risks.

A list of principles/objectives for the design of water edges and their activation is provided below:

1. Clean up and remediate (if environmental issues exist),
2. style to reinforce the history and culture of the locality,
3. continue stories and threads that display cultural/landscape/technological messages,
4. use a variety of textures and materials to create intimate well designed areas incorporating green urbanism principles,
5. incorporate biodiversity, plantation and living water filtration and use systems,
6. use methods to reduce erosion and water impact on banks,
7. incorporate avenues of incomplete urbanism (places that will change and grow in time), health and fitness,
8. build with natural materials, so that the effect has low environmental impact and best outcomes,
9. install Gabions (where required),
10. use bio-remediation and bio-retention pits to ensure plants and trees are adequately cared for,
11. accommodate visiting boats,
12. allow places where all senses are used in play, e.g. to touch the water,
13. create an energy efficient water's edge,
14. recycle and reuse all wastes generated,

15. create lifelong generational environmental, social, cultural and economic relationships and connections.

Photograph, Set 13: Safe direct access to water is frequently mentioned by communities as very desirable for urban waterfront renewal; steps to touch the water should be accommodated (Metropolitan Waterfront Alliance, 2013).

The level of access to water, e.g. if users (the young, old and children) can get down to the water level (tidal) and touch the water, depends on historic data and flood levels. This enables a more experienced and profound experience. In line with this, boardwalk widths should be given careful consideration based on use and numbers of population estimated to use the area at any one time.

The transition between the water's edge and the existing urban fabric (city grid) is important and requires careful consideration; the authors believe that connections and aspects improving communication holds the key to effective water's edge designing. In both Eastern and Western contexts, buildings facing the water have differing distances from water and setback, including height restrictions, these are constantly being challenged as new and improved concepts cantilever and use advanced materials and engineering technologies. Mixed use developments, as historically present, and still present in eastern contexts, are making a comeback, as community led incentives along waterfronts return e.g. street markets, art sales, etc.

The 'publicness' of public spaces has been discussed and studied, with contemporary models, including the "star model" being introduced in 2010, but a gap has been identified in terms of existing models being tested limitedly, being unable to capture climatic design variations and encapsulate user preference (Varna 2010 and 2011). In addition to public space evaluation tools, it is understood that the city visioning processes do offer some opportunities to frame development priorities, and can be used as a tool for urban development planning (Robinson 2007).

Practical outcomes
The design of water's edges, must consider along with the elements of emerging public spaces, public and practitioner opinion, quality of design, flooding risk, sea-level rise and disaster resilience. Locally, natural water bodies when protected by man-made dams, should be controlled effectively and efficiently. Regionally, natural water's edges should be maintained and enhanced as features, with protective elements to stop subsidence, sinking and slippage of banks. Globally, these water's edges are most developed and complex, but should withstand the tests of time.

Conclusion
Overall, the strengths of a sustainable Water's Edge Public Space (WEPS) are built on uniqueness, connection with site and history, and collaboration with community and stakeholders. These elements when appropriately considered will ensure that design locally, regionally and globally are considered and considerate. While spaces like Mildura and Port Adelaide display issues in terms of finding their identity through design, Singapore uses a comprehensive scheme, and creates a bold architectural statement. Hong Kong and Sydney incorporate a patchwork model in terms of developing an overall scheme. To

conclude, emerging water's edge public spaces in the Asia-Pacific region display environmental connections while: i) encouraging mixed use functionality; ii) preserving heritage and promoting adaptive re-use; iii) applying green urbanism principles; iv) implementing technological connectivity, establishing and maintaining connections with urban networks; v) allowing avenues of incomplete urbanism; and vi) harnessing renewable energies in the public domain. These elements, when taken to regional and local levels still hold strong in a unique way, as site-specific considerations, local context, history and culture become key in terms of local deliberation. The authors provide various additional recommendations in terms of the design of WEPS, but ultimately believe that there is a strong global-local and eastern-western link between water's edges, this relationship converges and diverges over time based on the flow of ideas.

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Acknowledgements