



Bluespace: a typological matrix for port cities

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The sea covers more than 70% of the Earth's surface. Now for the first time in history more than half the world's people live in cities and many of the world's most populated conurbations are located on the ocean periphery. Climate change is making littoral zones a potentially productive location for the development of new forms of urban space in coastal cities. Increased urbanisation and the foregrounding of the coastal condition make the association between cities and the sea one of the most important environmental juxtapositions of the 21st century. The aim of this paper is to re-theorise the collision of the public realm and the sea edge, and provide a range of design precedents for this emerging urban space phenomenon. The paper will introduce the concept of 'bluespace' and define a matrix with nine instances of how urban space and sea space combine to produce distinct public space types in port cities. Case studies of each type will be presented and discussed in detail with reference to textual and representational descriptions of the space in question.

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Introduction

The sea covers more than 70% of the Earth's surface. Now for the first time in history more than half the world's people live in cities and many of the world's most populated conurbations are located on the ocean periphery. Climate change is making littoral zones a potentially productive location for the development of new forms of urban space in coastal cities. Increased urbanisation and the foregrounding of the coastal condition make the association between cities and the sea one of the most important environmental juxtapositions of the 21st century. The aim of this paper is to re-theorise the collision of the public realm and the sea edge, and provide a range of design precedents for this emerging urban space phenomenon. The paper will introduce the concept of 'bluespace' and define a matrix with nine instances of how urban space and sea space combine to produce distinct public space types in port cities. Case studies of each type will be

presented and discussed in detail with reference to textual and representational descriptions of the space in question.

Defining bluespace

Littoral refers to locations proximate to the seashore. The idea of a 'littoral society' broadens the concept to mean a community extending inward from the coast with porous frontiers acting as filters through which the salt of the sea is gradually replaced by the silt of the land society (Pearson, 1985). This is a western and continental view of the space under discussion with its privileging of the land mass. Polynesian culture, which locates itself in an ocean covering one-third of the Earth's surface, has for generations migrated across these vast spaces and views the seascape quite differently:

According to early Tahitian accounts these navigators saw the Pacific Ocean as a vast watery plain, joined around the edges of the horizon by the layered spheres of the sky, which encircled its clusters of known islands. It was also a marae, a sacred place where people

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went to cleanse themselves in times of spiritual trouble. (Salmond, 2003)

Literature dealing with port cities has typically defined the port in relation to its landed boundaries rather than a space in its own right. Hoyle (1967), Hoyle and Hilling (1970) and Rimmer's (1973) theoretical framework for port cities defines the foreland and hinterland as generators of port development. Both elements conceptually relate to the land at the extremities of the voyage. The sea space itself and in particular the space of the anchorage or harbour is incidental. In contrast Reeves, Broeze and McPherson endorse the importance of land-sea interface in their study of the Asian port city:

Such port city studies must take their start at the *places* [my emphasis] where goods and passengers are transferred between ship and shore—which is, after all, the ultimate rationale of the port—and in consecutive stages include all aspects of urban economic, social, cultural and spatial development that are generated, dominated, or significantly influenced by the port. (Reeves *et al.*, 1989)

Urban design literature dealing specifically with waterfronts has emerged in the last quarter century as cities internationally have rediscovered sea adjacencies in their post-industrial urban centres. Publications exploring the urban revitalisation of waterfronts and the remaking of the public realm in these locations have focused on the governance, planning and design challenges of the land-based development of the city and the urban quarter (Breen and Rigby, 1994, 1996; Berens, 2004) while other studies have documented the changes in port infrastructure (Meyer, 1999) to demonstrate a variety of generating conditions for port-city edge transformations that have resulted in successful urban waterfront projects around the world.

Typologically port waterscapes such as canals and docks have often been identified by urban theorists as elements of urban structure or enclosed public space in water-based cities (Bacon, 1975, pp. 100–105; Braunfels, 1988, pp. 78–109). Kostof (1992, pp. 218–219) describes the overlays of infrastructure, walkways, vegetation, buildings and streets that combine to energise urban waterways from Amsterdam to Delhi. Jacobs (1993, pp. 62–74) highlights on water light and movement as contributing to vibrant liquid streetscapes

such as the Grand Canal in Venice, and Blumenfeld (in Spreiregen 1967, pp. 246–269) interrogates civic design qualities resulting from the careful juxtaposition of an enclosed dock, an urban square and a town hall complex in Hamburg's Inner Alster. These latter studies in particular point to the importance of the water space itself as a public realm.

A definition of the public realm of the port city therefore needs to make reference to spaces, functions, technologies and activities from both urban and maritime traditions to properly encompass the complexity of this transitional zone. Bluespace can thus be defined as place where:

1. A physical space or social activity has an edge condition or adjacency that is coastal
2. The context is urban in character

These two fundamental characteristics of bluespace can be elaborated by four further criteria to create a matrix of nine space types that can be ranked in terms of:

1. Being analogous to a maritime space or technology
2. Being located along a land-sea continuum
3. Can be described in terms of a clearly defined spatial or formal configuration
4. Can be mapped on to a recognised urban space typology

The nine space types that emerge as a result of this analytical process are: maritime highways, fleets at anchor, harbour arenas, beaches, piers and jetties, containers, docks and canals, waterfront squares and beached vessels (Figure 1). In each category, three examples of the space type are identified in the matrix. An historical and geographical range is evident, with examples from Rio de Janeiro in the 18th century to Dubai in the 21st century.

A typological approach

A typological approach is useful as the basis for the bluespace matrix because of its emphasis on urban precedent and formal and spatial characteristics. The types serve as exemplars that facilitate translation into three-dimensional design thinking. The emergence of the notion of a type, based on actual architectural and urban examples,

MARITIME ANALOGY	SEA/LAND RELATIONSHIP	FORMAL / SPATIAL CONFIGURATION	URBAN SPACE TYPE
MARITIME HIGHWAYS Baltic Sea Mediterranean Sea Hauraki Gulf	SPACE + ACTIVITY ON WATER	SPACE CONTAINED BY LAND	INFRASTRUCTURE
FLEETS AT ANCHOR Sydney Cove C18 San Francisco C19 Aberdeen Harbour Hong Kong	SPACE + ACTIVITY ON WATER	SPACE CONTAINED BY LAND	QUARTER
HARBOUR ARENAS Rio de Janeiro Harbour C19 Hauraki Gulf Americas Cup [00, 03] Valencia Americas Cup [07]	SPACE + ACTIVITY ON WATER	SPACE CONTAINED BY LAND	ARENA
BEACHES Bondi Beach Sydney Copacabana Rio de Janeiro The Palms Dubai	SPACE + ACTIVITY ON LAND AND WATER	SPACE CONTAINED BY LAND	PARK
PIERS AND JETTIES Queens Wharf Auckland C19 Walsh Bay Sydney C19 Hanuabada Port Moresby	SPACE + ACTIVITY ON LAND AND WATER	LINEAR SPACE OVER WATER	STREET
CONTAINERS Borneo Amsterdam Ruoholahti Helsinki Amphibious houses Middelburg	SPACE + ACTIVITY ON LAND AND WATER	MUTIPLE UNITS GEOMETRICALLY CONFIGURED IN 3D SP	BLOCK
DOCKS/CANALS Grand Canal Docks Dublin Koop Van Zuid Rotterdam Puerto Madero Buenos Aires	SPACE + ACTIVITY ON LAND	BUILDINGS SURROUNDING FOCUSED WATER SPACE	SQUARE
WATERFRONT SQUARES Piazza San Marco Venice Praca do Comercio Lisbon C18 Largo do Paco Rio de Janeiro C18	SPACE + ACTIVITY ON LAND	OPEN SPACE ENCLOSED ON 2 SIDES BY BUILDINGS	SQUARE
BEACHED VESSELS Niantic San Francisco C19 Ark Wellington C19 Alang Gujarat	SPACE + ACTIVITY ON LAND	SHIPS ON LAND	BLOCK BUILDING

Figure 1. Bluespace Matrix (2007) Brand.

is supported by Anthony Vidler’s notion of the third typology. Vidler (1976) argues that the first (biological/natural) typology and the second (mechanistic) typology are superseded by the third (architectural/urban) typology. In other words, architects and urban designers should look to a rich architectural and urban precedent for design inspiration, rather than referencing idioms that are more relevant to other disciplines. Such a process of reference has been systematised by Rob Krier (1979) in an extensive typological classification of public space, both real and imagined, demonstrating the spectrum of choice available to the designer.

Aldo Rossi (1982) distinguished the city’s composite parts as being made up of primary and secondary elements. Primary elements or persistences were things such as the plan, squares, parks and significant urban monuments, all able to be articulated as types, which contributed item

by item to an urban collective memory. The sum total of these memorable components created a city that in itself was an artefact of human culture and history.

Leon Krier (1985) takes the specific elements of the city (the spatial types of streets, squares, and blocks) and identifies both their relationships and the balance required between them to create the ‘right solution’. More recently on the other side of the Atlantic, American theorists Duany and Plater-Zyberk (1992) have reinvented the small American town in the suburbs, using typological componentry of structure, public space, building type, and architectural detail. Great nostalgic mileage is made from invoking the 19th century imagery and form. New urbanism or smart growth as it is sometimes known resurrects sound 19th century urban design principles: public transport, well-structured and ample provision for public space, gridded plans that evenly

filtered traffic, mixed-use commercial centres and multiple building typologies across industrial, commercial and residential uses. New urbanism in its theoretical manifestation was a formulation that could be applied to any social or cultural context, and talked about interpretation of local histories and cultural practices and architectures. It was also concerned with mixing communities with respect to age, ethnicity and socio-economic level. The first project built was a town called Seaside in Florida, which emerged as a full replica of a 19th century resort for the wealthy, and captured the imagination of the real estate industry that went on to adapt new urbanism for commercial purposes. With the exception of transit-based examples of new urbanism (Calthorpe, 1993; Katz, 1994), highly marketable but fundamentally unsustainable enclaves of privilege and facile historicism have dominated the movement's built projects from Australia's Gold Coast to South East Asia's exurban tracts. The point to be noted, however, is that all these ways of understanding urban design are typologically driven, are fundamentally structuralist in emphasis and log on effectively to the way designers dealing with the physical implications of the built environment think about urban design.

While several theorists are cited above, the most applicable body of urban theory is that of Leon Krier. This is because Krier's theory deals with formal physical space types derived from the European urban tradition and elucidates a set of physical components (metropolises (cities), quarters (neighbourhoods), streets (movement corridors), squares and parks (urban 'rooms') vernacular (repeating traditional urban fabric) and architecture (monuments)) that when combined in balance to create 'the city'. The 'vernacular' and 'architecture' align with Rossi's primary and secondary elements in the city.

Peter Rowe's (1991) concept of using large-scale infrastructure as a 'poetic' design operation that can give visual coherence to the macro urban environment is also relevant. Rowe argues that major elements of urban infrastructure such as expressways or parking lots have two characteristics that allow them the potential to unite and energise the wider visual field: scale and movement. If we conceptualise the water of a port or harbour as a substantial and visually compelling infrastructural element at the centre of a city, we have essentially a typological [re]invention in

Rowe's terms, or a rediscovery of a sustainable form of transportation that peaked in the 19th and early 20th centuries. The space is infrastructural (particularly as water-based mass transit begins to reassert itself at metropolitan, regional and national levels as a more ecologically responsible form of travel), and it involves continual movement. This approach is also pertinent to the conceptualisation of harbour space as a large outdoor arena where the larger landscape acts as a natural (Auckland) or constructed (Valencia) amphitheatre for water activities.

Maritime technology and colonial process

The nine types of bluespace cited are also derivative of technological and formal changes in port infrastructure, which reflect the history of maritime colonisation and the exploitation of distant resource-rich localities. Traditional sea-ports in Europe often consisted of natural bays enhanced by man-made features such as breakwaters to afford protected harbours. Colonial ports, however, were selected for their high degree of naturally convenient anchorage, shelter and defensibility. Deep harbours adjacent to elevated ground with protection from strong wind and tides were favoured with a view to minimising imperial expenditure on port infrastructure. As a result, many port cities in Southern Hemisphere colonies exhibit a high degree of enclosure and shelter, with multiple berthage areas. This made them perfect hub cities for maritime travel in the 18th and 19th centuries, and outstanding sailing and recreation spaces in the 20th and 21st centuries.

The dramatic technological changes in shipping infrastructure over this period are also relevant. The ever increasing size of vessels, the method of propulsion, the cargo densities and the loading arrangements all have an impact on the physical urban and architectural character of the port. Up until the 18th century, small sailing vessels with high value but compact cargoes (gold, silver, diamonds or spices) could be easily loaded and unloaded via barges or smaller craft. The larger vessels emerging after this date (sail, steam and motor), which carried lower density commodity cargoes (sugar, coffee, grain, wool, meat etc), were more efficiently loaded and unloaded from purpose-built warehouses on docks and piers. The invention of the container in 1950 eliminated

the warehousing requirement of port precincts and necessitated complete mechanisation of shipping operations, rendering 18th and 19th-century waterfronts from the London Docklands to the Sydney wharves redundant as sites of exchange.

Port cities have historically developed a second and equally complex urban realm because of their strategic, topographical, functional and spatial character: that of the harbour and the sea. The following discussion examines this space in terms of its relationship to traditional maritime and urban spaces, and their relationship to land and sea, with nine space types being identified. The argument is to be supported by textual and representational material including hydrographical charts, town surveys, sketches paintings, photographs and GPS-linked graphics.

The matrix

The bluespace matrix can be read from top to bottom and left to right and is structured to give a graduated overview of the range of space and environmental contexts possible. Left to right the columns rank and describe the four criteria from the definition above. The first column identifies and names the bluespace types (with three examples of each) and relates them to a specific maritime analogy. The second column lists the bluespace according to the degree of relationship it has to water or land, progressing from predominantly water at the top to predominantly land at the bottom. The third column defines the formal and spatial characteristics of the each type and the fourth column maps the bluespace type onto an urban type (listed in progressively diminishing scale). The discussion below explains the spaces in detail and gives examples of each.

Maritime highways

Maritime highways are bodies of sea water that are geographically contained, conceptualised as surfaces that facilitate transportation and have a substantial history of sustained maritime trade. The Mediterranean, the Baltic and at a smaller scale New Zealand's Hauraki Gulf all fit this description. The Baltic was named *Mare Balticum* (derived from the Latin *balteus* or girdle), recognising its encompassing form and visualising it as a medium of connection that facilitated

trade and plunder (Palmer, 2006). The Romans at the apogee of their imperial power declared the Mediterranean to be their 'lake' alluding to the spatial enclosure afforded by their land-based hegemony and the potential of the surface to expedite movement and linkage to their colonies (Langewiesche, 2004).

The Hauraki Gulf contains a series of sheltered harbours and islands off New Zealand's north-eastern shore facing the Pacific Ocean. It became the centre of Maori and European settlements in the region from the 1820s onwards and has always served as a recreation ground for Auckland. William Swainson wrote in 1853:

The Waitemata is well adapted for boat-sailing. Canoes from all parts of the Gulf are continually arriving and departing; and with nearly 100 vessels from distant ports, upwards of 600 coasters, and nearly 2000 canoes yearly entering the port, its sheltered waters present a lively, business-like appearance. But never, perhaps, is it seen to so great an advantage as when once or twice a year the native chief Taraia and his tribe [Tama-Te-Ra], from the eastern boundary of the Gulf, pay Auckland a visit in their fleet of forty sail of well-manned war canoes. (Stone, 2001)

The sea became the focus of life at the coastal edge and the unifying reality of politics, commerce and culture in New Zealand from the first moments of British colonisation. The documentation of the new colony focused on charting the seabed and coasts, and then on surveying the towns on the shores of the Hauraki Gulf. Captain James Cook's charts from 1768 to 1771 were widely used and augmented. Roads were a secondary and inconvenient means of passage, and were only fully developed after the arrival of the telegraph. Many islands in the Gulf became 19th century industrial depots for Kauri logging, milling, whaling and ship building (Great Barrier Island), nickel mining and copper smelting (Kawau Island), sand and scoria quarries (Waiheke Island), and more generally agriculture and grazing. By the 1860s a network of settlements ringed the Gulf. Sir George Grey, the second Governor of New Zealand, astutely located his *Mansion House* at Kawau Island. At that time, it was the centre of sailing passages between the Auckland Isthmus, the northern settlements and the resource-rich outer islands of the Hauraki Gulf, and was therefore the perfect place from which to control

both Maori and European constituencies. The body of water itself was the super highway of the era.

Fleets at anchor

Fleets at anchor are topographically contained water-based urban communities that prefigure a city (as in colonial settings such as early Sydney and gold-rush San Francisco) or are maintained as floating neighbourhoods on account of a water-based economic activity or condition, such as the sanpan fleets at Aberdeen Harbour in Hong Kong.

A well-documented example of a colonial fleet at anchor is Arthur Phillip's first fleet shortly after arrival in Australia. A plan of Sydney Cove in April 1788 by convict Francis Fowkes (Figure 2) shows the convict transports anchored in Port Jackson 3 months after their arrival. The map shows a convict camp on the edge of a vast continent. Isolated plots are marked out geometrically and labelled alphabetically within a strict camp hierarchy differentiating officers from soldiers from convict and, within the convict ranks, women from men. Most of the map is drawn in two dimensions. As if to emphasise

their status and importance in the frame only the Governor's House and the ships of the fleet in the harbour are drawn in three dimensions along with distant hills and islands in the channel. Some of the vessels display hoisted sails and oversized standards flying from their sterns. These were the only certainties in the new environment and they loom large in the artist's view of his new circumstances. A later plan drawn by Thomas Medland in July of the same year shows a proposal for the design of the new city. The Governor, Arthur Phillip, had served in the Portuguese Navy in Portugal and Brazil and favoured a waterfront square at the centre of Sydney. The plan was never actioned due to lack of resources but the drawing is interesting for its depiction of the land-sea balance of the early city. The cove is shown 6 months after landfall and the harbour is the most technically detailed aspect of the map. The bay has been charted, the coastal sandstone shelf contours have been traced and eight ships are shown with anchors fully delineated. In John Hunter's 1788 illustration names are even inscribed on the water next to the vessels. The landed community is still sparse with small dark tents and huts barely registering on the site. The proposed square and street

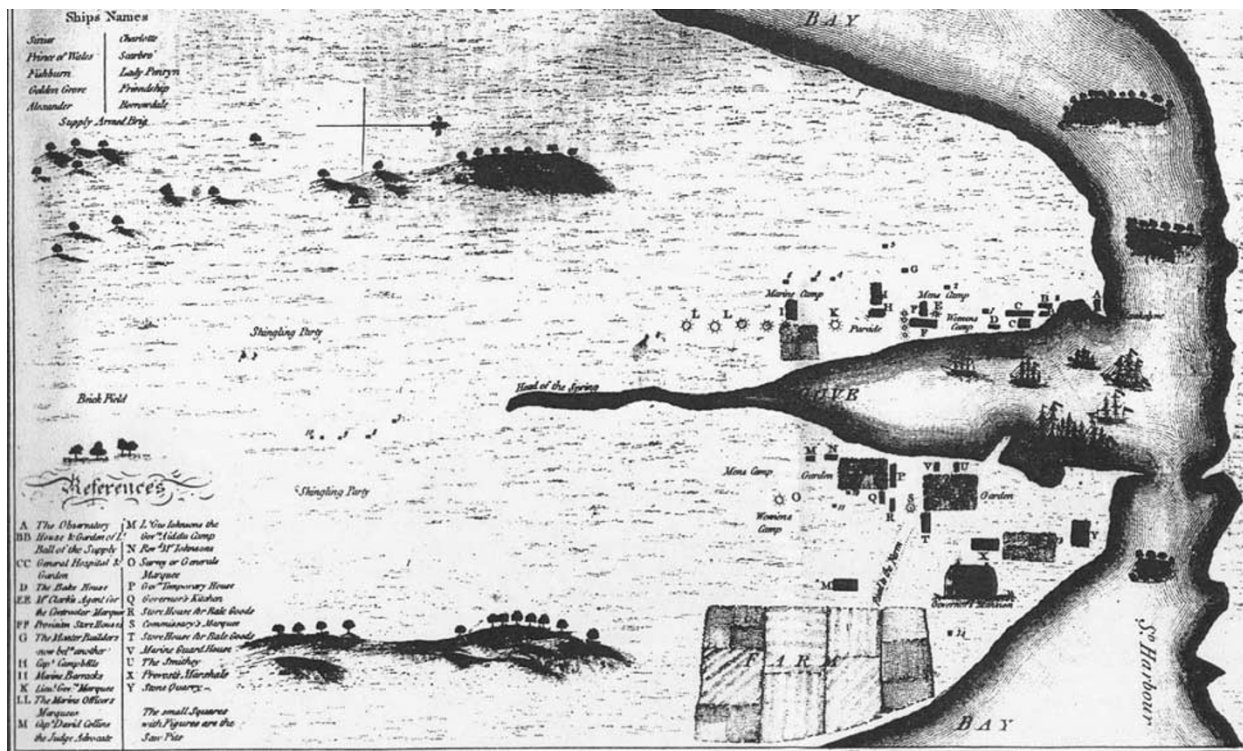


Figure 2. Sydney Cove April (1788) Francis Fowkes, National Library of Australia.

alignments fade off the edges of the map, because the harbour at this stage is the most important feature of the settlement.

Mid-19th century San Francisco was a city in which this pattern became accentuated due to the micro-economic distortions of the Californian gold rush. The discovery of gold in California bought ships full of hopeful prospectors from around the globe. Between the years 1849 and 1851 San Francisco grew from a settlement of a few hundred people to a city of 15,000. Topographically hemmed in on three sides by shifting sand dunes the city grew into the harbour with linear wharves extending into deep water. Once dubious 'water lots' became prestigious real estate. As arriving crews and passengers abandoned these vessels, speculators desperate for space, converted the ships into floating buildings, storehouses, hotels, offices and a church. In 1851, there were 148 such vessels on the waterfront, 'a Venice built of pine instead of marble' noted a Chilean visitor (Delgado, 2001).

Aberdeen Harbour in Hong Kong is an example of a water-based community that is specific to an ethnic group called the Tanka who have traditionally lived on junks in coastal China and Vietnam. Although many members of this group now live in onshore villages and markets some members of the older generation live on their narrow boats and pursue their traditional occupation of fishing. Originating from the Malay Peninsula the Tanka arrived in Hong Kong in the seventh century. Reclamation and pollution in Hong Kong have reduced the productive fishing grounds, and those with small craft who cannot fish offshore congregate in small floating villages close to land.

Harbour arenas

Harbour Arenas take the same formal and spatial arrangement as fleets at anchor as they predominantly occur within contained harbour spaces, but instead of encompassing a static community, the bowl of space becomes a natural amphitheatre for water-based recreational or cultural activities such



Figure 3. Disembarkation of the Princess Royal Leopoldina in Rio de Janeiro (1817) Jean Baptiste Debret, Museu da Chácara do Céu.

as the ceremonial arrivals of dignitaries, or sailing regattas. Maritime nations such as Portugal and Britain exploited their local and colonial harbours for ceremonial and recreational ends.

Portuguese monarchs enjoyed a long tradition of urban maritime ceremony related to the arrival and departure of monarchs and foreign dignitaries in Lisbon. In Rio de Janeiro between 1808 and 1821 during his court's forced exile in Brazil, Dom Joao VI maximised the juxtaposition of a grand landscape setting with regal pageantry, and extravagant maritime ceremony became an all important public relations exercise for a regime in decline (Brand, 2006). In 1817 in an arrangement designed to cement Portugal's ties with Austria's Hapsburg dynasty, the Archduchess Leopoldina arrived in Rio de Janeiro for her marriage to Prince Dom Pedro I (Figure 3). The highpoint of the royal household's residency in Brazil, this occasion was depicted by artist Jean Baptiste Debret, a founding member of the French Artistic Mission. The scene represents one of the most exuberant public waterfront celebrations that the house of Braganca indulged in during its time in Brazil.

In New Zealand, recreational sailing regattas have been a diversion from the foundation of the colony up until the two America's Cup regattas on the Waitemata Harbour in 2000 and 2003. An early description of an organised recreational event in colonial New Zealand is from the diary of Sarah Mathew the wife of the Acting Surveyor General Felton Mathew. She recounts the occasion of the founding of the city of Auckland on September 18 1840:

As it was wished to make this somewhat of a holiday the gentlemen got up a boat race amongst themselves, another for the sailors, and a canoe race for the natives, which all came off with great eclat. The amateurs pulled the Surveyor-General's gig against the Captain's gig; the sailors contested their whale boat against that of the Harbour master, for a purse of 5 pound; The Natives were each given half a pound of Tobacco, with which they seemed much delighted; and this closed the day's festivity. (Rutherford, 1940)

A similar race is depicted in a sketch by Charles Blomfield (Figure 4) showing a boat-level view of the action on the harbour. The race became an annual ritual, as did the waging of bets on the outcomes.

For the 2000 and 2003 America's Cup regattas, Animation Research Limited, a small Dunedin software company, developed a GPS-enhanced computer graphics package that allowed competing yachts to be tracked with extreme accuracy (Figure 5). Real-time on-board shots, helicopter images and sound, enhanced the commentary that followed the progress of the race. Detailed graphic enhancement and spontaneously drawn diagrams explaining the logic of match racing allowed a sedentary television audience to follow the race strategies and outcomes. America's Cup yachting, a hitherto removed and arcane enterprise became a media and broadcast phenomenon. This technology raised the profile of yachting as a spectator sport and redefined the harbour area and port as an urban arena in the minds of the international viewing public and the citizens of Auckland. The America's Cup facility built in



Figure 4. Auckland regatta (undated) Charles Blomfield, Alexander Turnbull Library.

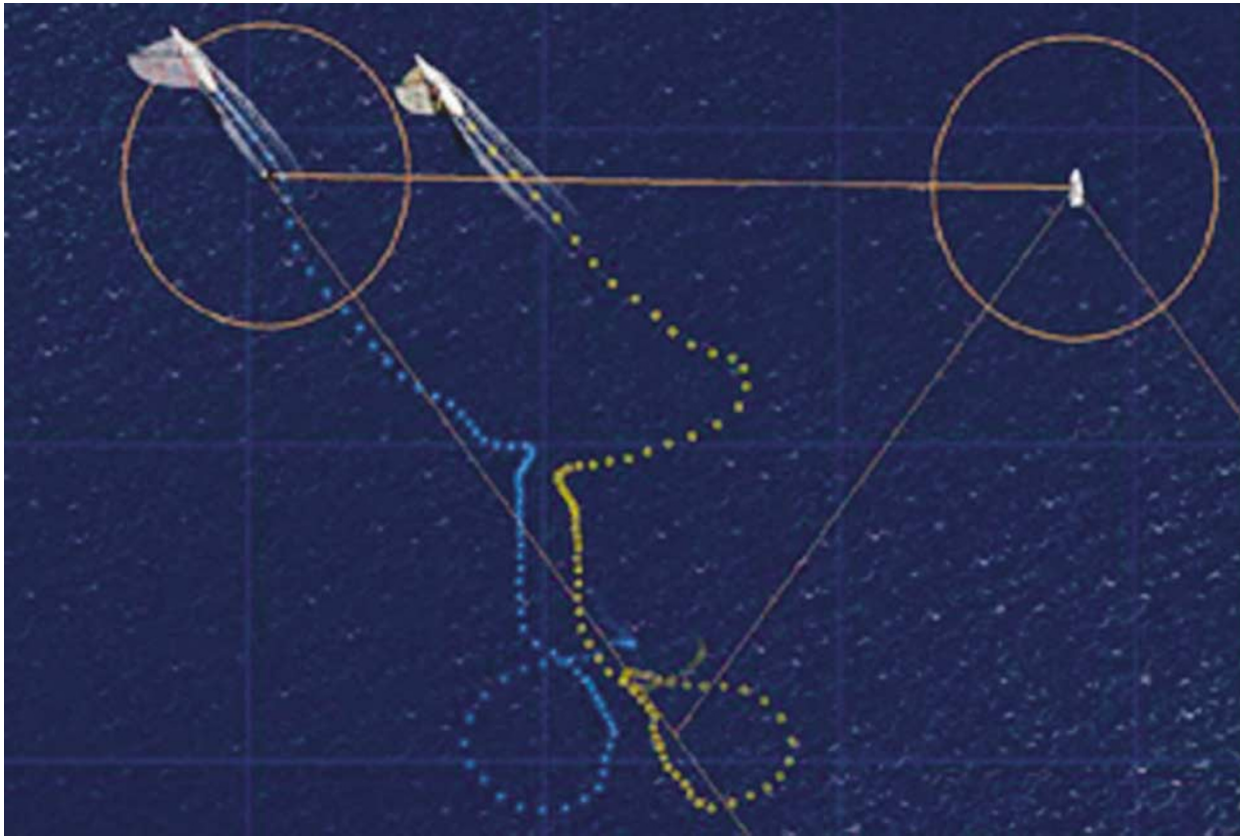


Figure 5. America's cup race start (2003) Animation Research Limited <http://arl.co.nz>.

Valencia for the 2007 challenge took this idea further. Favourable wind and wave conditions in Valencia will allow racing close to the shore and an extensive spectator park with a beach and a breakwater overlooking the course accommodates up to 1,000,000 spectators.

Beaches and parks

Beaches were the first landing places in new territories before cities were constructed and constitute the land edges of the harbour arenas. Now largely existing only outside historic urban centres they are nonetheless a significant type of bluespace that combine shore adjacency with parks or an expanse of sand, rocks and shallow water.

Urban gardens and beaches were often aligned in coastal colonial cities of the Southern Hemisphere. Urban gardens such as the Passeo Publico in Rio de Janeiro and the Royal Botanic Gardens in Sydney combined scientific knowledge and genteel promenading at the waters edge. By

extension, the water space became a domain of pleasure, both passive and active. The harbour and its activities became the focus of these green spaces with their long vistas reaching out to the seascape beyond.

With the expansion of cities around these harbours, the beach became a coastal form of the urban park. Famous urban beaches include Bondi in Sydney, Copacabana in Rio de Janeiro and Miami Beach in Florida. Bondi (Figure 6) combines a major green park and an expansive beach with public facilities scattered along it, including a pavilion, an open air tidal swimming pool and parking areas. This is backed by an esplanade replete with hotels, restaurants and shops. Bondi Beach as depicted in contemporary Australian art is a 20th-century leisure playground populated by scantily clad hedonists. Bondi is the natural habitat of photographer Max Dupain's oiled 'Sunbaker' or the bronzed 'Surf lifesavers'. Mostly the beach is represented as a natural setting. Artist Brett Whiteley's unfinished 'Bondi beach scene' is one of the few images alluding



Figure 6. Bondi beach (1993) Diane Brand.

to an urban backdrop with its railed concrete promenade and artist's paraphernalia in the foreground.

Copacabana Beach in Rio de Janeiro follows a similar pattern. The beach is framed along its length by tall apartments with restaurants and bars at the base. The 'park' (designed by Burle Marx) is a dynamically paved strip dotted with petrol stations, police booths and renters of beach accessories, trisected by two major roadways forming Avenida Atlantica. The paving on the beachfront repeats the black and white cobbled wave motif used in the Rossio square in Lisbon and is edged with a stand of tall palms. On the edge of the sand regularly spaced tower structures combine lifesaving surveillance posts and informal stalls selling coconut juice and sunglasses. Unlike in Europe and the US where many beaches are fenced and privatised, Copacabana and Bondi are both truly democratic 'public' spaces for the pleasure of all demographic groups.

The beach has taken on a new and superlative form in the development of gargantuan figures of 'oasis' off the coast of Dubai with projects such as 'The Palms' or 'The World' creating endless beachfront real estate for the wealthy investor. The leaves of the palms bend the beach into an ultra-elongated bay creating in effect a canal to maximise mansions per beach frontage over a small expanse of contained water, thereby subverting the actual spatial curve and view of the horizon that a beach space embodies. In Dubai, the iconography of the beach as a piece of tropical (palm or island) imagery has overtaken the character and disposition of the space as part of the public realm of the city. The emphasis is on

the beach as a lifestyle branding strategy rather than as an urban space that enhances the city.

Piers and jetties

A pier or jetty is a linear projection over water that extends the architecturally contained space of earthbound public street into the outwardly directed open space of the sea. Vessels are berthed parallel or perpendicular to these linear platforms.

In 1840 a pier that captured the essential connection between the main street and the anchorage was constructed at the base of the Queen Street valley in Auckland, New Zealand. Queen's Wharf extended Queen Street by a quarter of its one mile length into the Waitemata Harbour. An image from 1852 by Patrick Hogan (Figure 7) shows the land-sea junction and the seamless continuity from one to the other. After 11 years of settlement, ships in the harbour occupy as much sea space as buildings do land space, and the scale of the vessels overshadows the small timber cottages on the horizon. Waka (Maori canoes) lie beached among European craft. A photograph of Queen's Wharf in the late 19th century shows a larger and more complex facility, and confirms the ongoing importance of the supply line from ocean to colony. A structure over water with a 'main street' and 'side streets' has sprouted pavilions and warehouses among the huge vessels berthed alongside the pier. The 'real' city provides a similarly scaled backdrop to the frenetic activity of the docks. Similar images can be found for other New Zealand ports of the time, although the pier configurations differ relative to tides and prevailing winds. In Wellington, wharves that initially were constructed perpendicular to the coast were eventually grouped in grid formations

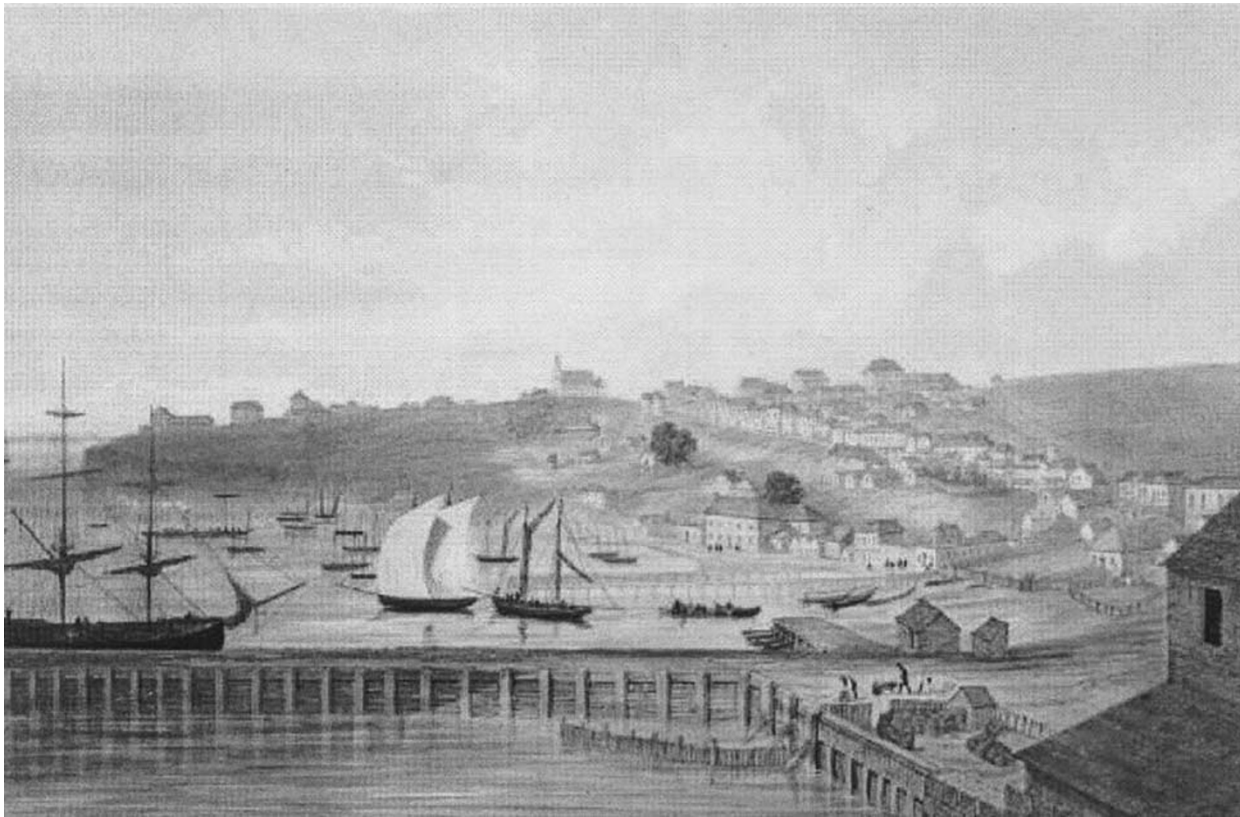


Figure 7. Auckland New Zealand (From Smales Point) (1852) Patrick Hogan Alexander Turnbull Library.

oriented north–south to take advantage of the decelerating effect of prevailing wind directions while ships were docking.

This linkage of street and sea was maximised in the late 19th century construction of five-finger wharves at Walsh Bay in Sydney. The piers are two-storeyed timber structures, backed by brick shore-sheds on terra firma. A level difference between the pier, the escarpment and the dock allowed horse-drawn carts and later lorries loaded with wool and grain to be driven directly onto the upper level of the pier. The wool was baled, labelled and chuted down to the docks for loading onto waiting ships. This efficient berthage configuration served the wool export industry in Sydney well into the mid-20th century.

In Papua New Guinea, a residential version of a pier development is located northwest of the nation's capital Port Moresby. Hanuabada (literally big village) is home to 15,000 mainly indigenous people. A traditional form of settlement built over the sea by the coastal dwelling Motu tribe, the village consists of small timber dwellings on tall

stilts, linked to land by narrow elevated walkways. This way of constructing a community accorded with the tribe's traditional occupation of fishing, and afforded security and protection from the land-based hostilities of rival tribes. Boats can be navigated into the spaces between the piers and moored adjacent to the dwellings.

Containers

In 1950, the first containers were used to ship cargoes between the United States and Puerto Rico. Since then docks around the world have been progressively mechanised and relocated to sites with deep water berthage and large expanses of flat land, leaving behind traditional inner city port land for redevelopment. Modern container terminals on large peripheral sites bristle with super-scaled cranes that oversee acres of stacked metal boxes or vast parking lots full of newly imported vehicles. The steel container is the storage module that gets delivered by articulated truck directly to a distribution centre or manufacturer, making traditional port warehouse zones redundant.

Many of these warehouses and bond stores have been retro-fitted as offices and apartments but increasingly dockside land is redeveloped, with entire city quarters overtaking previously industrial uses. Two examples of the redevelopment of inner city port land are the Borneo district in Amsterdam and the Ruoholahti precinct in Helsinki. These cases are relevant not only because they have displaced traditional port functions but also because their designers have consciously used the robust aesthetic of the container and container vessels to conceptualise and configure three-dimensional space.

The Borneo-Sporeburg Peninsula development by landscape architects West 8 concentrates the public realm in the street and on the water. The urban blocks are built up of back-to-back three- or four-level 'containers' of integrated private indoor and outdoor space (gardens and patios). Designer Adrian Geuze compares this form of residential development to a Swiss cheese where between 30 and 50% of each housing module consists of voids or open spaces that would normally be found in the front and rear yards of the property. The residential modules were given to 60 different architects to design in detail. This resulted in urban blocks that have a consistent modulation, but are varied in their internal spatial configuration and external architectural expression. The space of each individual legal lot is geometrically stacked on the site in a comparable way to containers on a wharf.

Ruoholahti (Figure 8) is a mixture of public and private sector housing and commercial developments centred on a public square, a community centre and a canal incorporating a marina. The High Technology Centre by Warttinen Architects and Evata Finland consists of five similar buildings sitting at the entrance to the canal. The centre is described as a 'business refinery' but is essentially a technology park following the Silicon Valley model where clusters of high-tech researchers and businesses congregate to produce value-added information technology products. The buildings take their iconography from the existing cranes on the adjacent Jätkäsaari cargo and passenger terminal, with a ship-scaled, highly articulated and muscular structure supporting offices above the waterside promenade. The five buildings resemble the bridge structures of container vessels in form, scale and materiality, and to further reinforce the



Figure 8. High Technology Centre Ruoholahti (2000)
Diane Brand.

maritime analogy each building is named after an exploration ship.

With predictions that hundreds of millions people could become refugees of global warming, Dutch architects are investigating amphibious housing. Borrowing from shipbuilding, offshore oil rig and pontoon technology, floating residential 'containers' are proliferating in watery localities around the Netherlands. These projects resemble villages on water, where identical amphibious houses cluster around piers, or are designed to be towed to new locations as with Herman Hertzberger's Water Dwellings in Middelburg. The identical nature of these floating modules, their mass fabrication, their transportability, their extensive use of marine technology and their clustering at the water's edge make these projects an excellent example of an innovative container typology.

Docks and canals

In the late 18th century, the wealth resulting from the industrial revolution in Britain fuelled invest-

ment in the expansion of port and canal infrastructure to connect mills to local and overseas markets. The decades around 1800 saw the emergence of grand projects in bold classical geometries that were needed to separate local from international shipping in the increasingly congested waterways of the British Isles. For example, in London the West India Docks of 1800–1802, the East India Docks of 1804–1808 and St Katherine’s Docks of 1825–1828 were all instances of extensive formal warehouse precincts arranged in grids. The installations were so vast that some paintings of the era show them in birds-eye view perspective, as a vast network of ponds dotted with vessels and surrounded by formal building arrangements that dwarfed the modest communities in their lee. These precincts were the nexus of British trade until well into the 12th century when containerisation changed the landscape of port operations. From the 1980s onwards these precincts were progressively converted into office and residential zones to support a burgeoning service sector driven by the information economy and globalisation of markets. These dock spaces and canals that were once filled with ships plying global trade routes are now empty water squares overlooked by luxury accommodation or privatised marina berths.

The spatial configuration of a dock is generally an elongated rectangle of water with enough depth to allow ships to manoeuvre into the space and dock parallel to the quays. In the 19th century, the space type would have resembled a marine parking lot with a continual throughput of vessels. When the vessels disappear, the space is reduced to a water ‘square’ in that the space is a focus for the development around it rather than a busy movement corridor. Many contemporary dockside redevelopments are disappointingly minimal in their use of the water space itself with the body of water serving as a view rather than an engaging activity space. Developments that fall into this category include the Grand Canal Docks in Dublin (Figure 9), Koop Van Zuid in Rotterdam and Puerto Madero in Buenos Aires. While grand 19th century warehouses converted to lofts, or new developments referencing a maritime past remain physically seductive, it was the commerce and industry of the old dock sectors that made them urbane.



Figure 9. Grand Canal Dock, Dublin (2006) Diane Brand.

Waterfront squares

The urban square is a well-established waterfront space from the ancient world. Vitruvius’s *Ten Books of Architecture* identified the location and distribution of public squares and civic buildings within a city. Alberti’s Renaissance treatise *On the Art of Building in Ten Books* enlarged on the earlier work and specifically advocated a gridiron plan. Spanish planning tradition in South America, articulated in Phillip II’s *The Laws of the Indies* (1573), embodied these principles and clearly identifies the location of the principal public space in the case of a port:

112 The main plaza is to be the starting point for the town; if the town is situated on the sea coast, it should be placed at the landing place of the port, but inland it should be at the centre of the town. The plaza should be square or rectangular, in which case it should have at least one and a half its width for length inasmuch as this shape is best for fiestas in which horses are used and for any other fiestas that should be held. (Gasparini, 1991)

Canaletto's paintings of Piazza San Marco in Venice are memorable because they highlight the relationship between the square and the adjacent water, and give a fulsome portrayal of everyday life and civic ceremony in the 16th century city. In painting urban Venice Canaletto recognized both the commodity value of the city (Boyer, 1994) and the capacity of pageantry to enhance the impact of the image. Two paintings in particular capture the movement, the display and the architecture of the place and time: *Reception of the Imperial Ambassador, Count Giuseppe di Bolagno, at the Doge's Palace* and *The Bucintoro preparing to leave the Molo on Ascension Day*. The first painting focuses on the dignitary in question while the second shows the wider water context of the event. Both images, however, illustrate water and land as equally important to the ceremony depicted.

The Portuguese built two outstanding examples of waterfront squares: the Praca do Commercio (Commercial Square) in Lisbon, and the Largo do Paco (Palace Square) in Rio. Rio de Janeiro grew around the Largo do Paco at the water's edge and the space was modelled on the Praca do Commercio. The Praca do Commercio had been reconstructed by the Marquis of Pombal in the wake of the 1755 earthquake that devastated the centre of Lisbon. The square was enlarged and surrounded by an elegantly symmetrical arrangement of concrete framed buildings accommodating commercial and government functions. Connection to the river was achieved directly by a curvilinear stone-landing place projecting axially from the paved square, with a fountain and broad steps down to the water on three sides. Eighteenth-century images show a plethora of maritime craft in the vicinity of the landing place. Artists routinely overstated this aspect of port cities as a matter of imperial pride and propaganda, for there is a consistency of fantastic maritime volume in many historic images of Lisbon, Rio and Salvador. A painting by A.J. Noel from 1789 shows the launching of a frigate from the Royal Dockyard in Lisbon. The enclosed 'square' of the boatyard is completed and effectively doubled by a flotilla of vessels. The boats complete and enclose the extended space on the surface of the Tagus, and provide an additional vantage point from which to view the spectacle. A similar on-water configuration was adopted at the adjacent Praca do Commercio for the welcoming of foreign monarchs when they arrived by sea. The Largo do Paco was also an

important site for royal ceremonial events. Outside of these occasions the space was the nexus of trade and commerce in the city with foreign ships drawing up to replenish water supplies from the huge fountain at the water's edge. It was also the principal landing point for Portuguese naval and government vessels. For slaves it was the place where water was collected for the master's household and the location of the *pelourinho* or whipping post, where harsh punishments were administered. The waterfront square thus represented a form of urban space that allowed the city proper to engage with the bluespace of the harbour. As a focused space type it allowed for the expression of communal activity, and related to citizenship, commerce and government (Figure 10).

Beached vessels

Proudfoot (1996) makes the important linkage between the port and the inevitable exponential growth of the city and region behind it. Part of this process involved the establishment of port facilities that in the 19th century consisted of shipyards, warehouses, bond stores, shipping offices, insurance companies and other maritime industry affiliates. Solomon makes this observation with respect to Hobart, Australia:

Throughout the nineteenth and into the twentieth century the port continued to be a major section of inner Hobart, both of its fabric and its function. Its function of exchange was absolutely basic to the capital's increasingly normal role as a 'trading town', and the warehousing backing the wharves formed the link between production of the land and commerce of the sea. The population drove and promenaded along its margins with keen delight and the port zone was by its nature distinctive. (Solomon, 1976)

The front 'row' of the harbour amphitheatre was functionally bulk-storage where goods moved from ship's hold to warehouse or bond store and vice versa. Conceptually one could view the evolution of port warehousing or bond stores as the beaching and permanent location of the sea going vessel, as these building types resemble dismasted hulks in their scale massing and arrangement on the shore. The British Admiralty had used dis-masted decrepit men-o-war during the Napoleonic Wars to house prisoners, and more

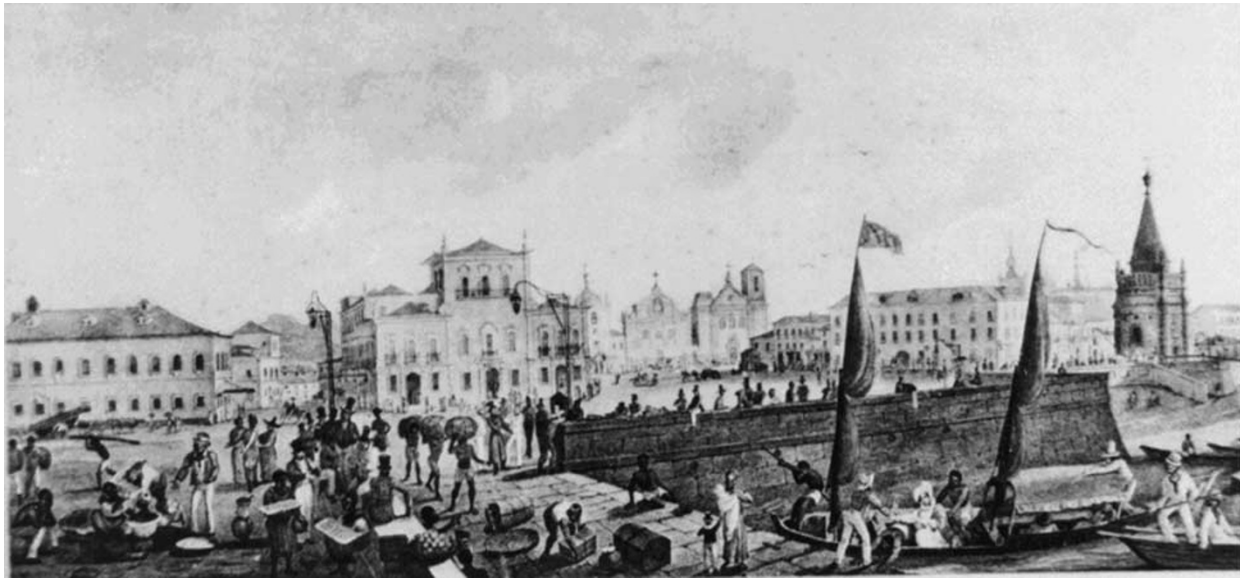


Figure 10. Largo do Paco, Rio de Janeiro (1824) Augustus Earle Mitchell Library, State Library of NSW.

famously had stored convicts on the Thames in the years preceding the colonisation of Australia when England's prisons were overwhelmed.

The metamorphosis of ships into buildings occurred in San Francisco during the gold rush years. Although not the first instance of maritime–urban conversions, it was certainly the most extensive and commercially driven. For example, the former China trader *Niantic* was beached and laterally supported on pilings made of her own masts. A barn-like superstructure was built over her decks, doors were cut in her hull, stages were built on stern and port side and she was rented as storage, office space and accommodation. Artist Frank Marryat drew *Niantic* a full three blocks from open water in 1851, penned in by buildings on piles and sand fill, with a muddy street in the foreground. The *Apollo* drawn one building away was in fact at least a block distant. He muses:

This has left many old ships, which were a year ago beached as storehouses, in a curious position; for the filled-up space that surrounds them has been built upon for some distance, and new streets run between them and the sea, so that a stranger puzzles himself for some time to ascertain how the *Apollo* and *Niantic* became perched in the middle of the street. (Delgado, 2001)

The *Niantic's* embedded position in the urban realm ultimately led to her destruction. A fire in

1851 destroyed the hulk along with approximately 2000 other buildings in the harbour precinct. The new city was simply reconstructed over the remains. Excavations for foundations to a new building in 1977 unearthed the bottom portion of the hull. In Wellington, New Zealand, on a smaller scale the *Inconstant* was beached at Lambton Harbour in 1850 and used variously as a bondstore, shop and counting house for local businessman James Smith (Figure 11). Her remains can be seen in the Museum of Wellington City and Sea, and below the Bank of New Zealand Arcade on Lambton Quay.

In Alang, Gujarat State, India, the combination of an expansive sandy coast and an extreme tidal range have produced a ship breaking industry that has attracted the scrutiny of first-world environmental agencies. Here, around 300 large vessels per year are driven full throttle onto the beach at high tide. Each ship is then manually dismantled by 1000 or so barefoot workers in the space of 6 months, in a dangerous and environmentally toxic salvage operation. Brazilian photographer Sebastiao Salgado first captured stark impressions of gaunt and filthy migrant shipbreakers in Bangladesh in 1989 and published them in a book called *Workers*. As apocalyptic images of the industrial revolution revisited in contemporary times, these operations represent sites of deconstruction created by the beached vessel typology.



Figure 11. Plimmer's Ark, Wellington (1854) William Holmes Alexander Turnbull Library.

Conclusion

This paper demonstrates that by mapping maritime functions onto urban space typologies, a new category of urban space called bluespace can be defined. A typological approach is useful because it takes what are essentially formal types related to maritime infrastructure and indexes them to a recognised set of urban spaces. Maritime spaces themselves have been subject to dramatic changes in form and scale over the last 500 years making a range of analogies possible. This is a direct result of the development of marine technologies and imperial projects of global colonisation and trade. While the nine forms of bluespace identified are discussed as single types they can also overlap and combine. Maritime Highways can incorporate whole port cities. Harbour arenas can be edged with beaches. Piers can extend the space of the beach and containers can be located on docks canals or waterfront squares. The importance of the matrix is that it develops a space vocabulary specific to a port city.

The paper serves to highlight how harbour space is an integral part of the urban public space of the seaport. In spite of being historically overlooked, bluespace has traditionally been part of the harbour city, particularly in the settlements of maritime colonisers such as the British and Portuguese. Urban ceremonial space in Portugal and Brazil, and dockside commercial space in Europe, Australia and New Zealand have em-

braced this realm, activated the land–sea margins, and expanded the conceptual space of the city into the harbour itself. In the 21st century and beyond rising sea levels will reshape port cities and present challenges and opportunities to further articulate this space. This study provides an initial theoretical position from which to proceed.

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