Cadernos Cajuína

V. 9 N. 3 ANO 2024

e249334

Revista Interdisciplinar

# The Multiple Dimensions of Water in Regenerating Historic Urban Waterfronts for Sustainable Development

*As Múltiplas Dimensões da Água na Regeneração Urbana de Orlas Históricas para o Desenvolvimento Sustentável*

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**ABSTRACT**: Water, a vital element for human existence, takes prominence in the regeneration of post-industrial waterfront areas, emerging as a priority in contemporary research within urban studies focused on sustainable development. This article aims to explore the catalytic potential of water in the revitalization of historical riverine areas, promoting strategic redirection towards activities related to global capitalism, such as tourism, culture, and commerce, as integral components of urban interventions. The methodology is a comprehensive literature review of publications from scientific databases from the last five years. The article highlights examples of case studies to discuss advantages and drawbacks of waterfront revitalization projects from around the world. These projects demonstrate the potential of water as a powerful tool for urban transformation, providing numerous social, economic, and environmental benefits. The article examines the challenges and opportunities associated with water-based revitalization projects, including the need for stakeholders to understand community engagement and collaboration to address potential environmental and social impacts. Ultimately, the article argues that water can be a powerful tool for revitalizing historic waterfront areas seeking sustainable development.

**KEYWORDS**: Coastal development, Urban Regeneration, Waterfront revitalization, Sustainable Development.

**RESUMO**: A água, elemento vital para a existência humana, ganha destaque na regeneração de áreas fluviais pós-industriais, emergindo como prioridade nas pesquisas contemporâneas de estudos urbanos voltados ao desenvolvimento sustentável. Este artigo busca explorar o potencial catalisador da água na revitalização de áreas históricas fluviais, fomentando o redirecionamento estratégico para atividades relacionadas ao capitalismo global, como turismo, cultura e comércio,

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como parte de intervenções urbanas. A metodologia utilizada é uma revisão abrangente da literatura de publicações em bases científicas dos últimos cinco anos. O artigo destaca exemplos de estudos de caso para discutir as vantagens e desvantagens de projetos de revitalização dessas áreas ao redor do mundo. Esses projetos demonstram o potencial da água como uma ferramenta poderosa para a transformação urbana, proporcionando inúmeros benefícios sociais, econômicos e ambientais. O artigo analisa os desafios e oportunidades associadas aos projetos de revitalização baseados em água, incluindo a necessidade de os interessados compreenderem o envolvimento e a colaboração da comunidade para lidar com possíveis impactos ambientais e sociais. Em última análise, o artigo argumenta que a água pode ser uma ferramenta poderosa para revitalizar áreas históricas em busca de desenvolvimento sustentável.

**PALAVRAS-CHAVE**: Desenvolvimento costeiro. Regeneração Urbana. Orlas históricas. Desenvolvimento Sustentável.

## 1. INTRODUCTION

Water has played a fundamental role in the origin and development of cities, as settlements were established around sources of water for agriculture, transportation, and trade. Therefore, waterfront areas have long played a vital role in the economic and cultural development of cities around the world. However, over time, many of these areas have fallen into disrepair, and their potential as engines of development has been overlooked. As the world copes with the challenges of the 2030 Agenda for Sustainable Development, which includes a set of Sustainable Development Goals (SDGs) aimed at creating a more equitable and sustainable future for all, there is a growing recognition of the need to regenerate these areas to drive them towards new dimensions of change.

This article focuses on the relation of water as an element in the regeneration of historic waterfront areas seeking sustainable development. The central problem addressed is the need to tackle the unique qualities of water, including its cultural, environmental, and economic value, to promote sustainable urban development. The article argues that water can play a crucial role in regenerating these areas, providing social, economic, and environmental benefits that align with the SDGs. This article's justification is grounded in the urgent need to create more sustainable and resilient urban spaces that enhance quality of life. By leveraging the unique qualities of water, such as its ability to create a sense of place and community, the article proposes that revitalizing historic waterfront areas can contribute to the achievement of SDG 11: Sustainable Cities and Communities.

The objective is to analyze the role water plays in urban regeneration and to initiate a discussion on the probability of water bodies as agents in the process of finding sustainable solutions. It emphasizes the significance of integrating water as a unified natural element and essential landscape feature and, it will try to indicate the water bodies and the potential within using them for regeneration activities.

The methodology involves a comprehensive literature review from international databases focusing on recent publications, starting from 2019. Example of cities as case studies of waterfront revitalization projects from around the world, focusing on the challenges and opportunities associated with water-based revitalization projects and the need for effective stakeholder and community engagement and collaboration to address potential environmental and social impacts. The main conclusion of the research here is the purposefulness of introduction of water bodies as regeneration agents in waterfront areas. Further case-based studies along with desk studies will play the main role in building sound knowledge for the analytic discussion on the subject.

## 2. BRIEF HISTORICAL CONTEXTUALIZATION AND THE NEED FOR URBAN REGENERATION

Urbanized areas generate problems ranging from the consumption of natural resources - generating waste and pollution - rapid uncontrolled development, demographic changes, economic pressures, change of land use and zoning and transportation, among others. (Jokilehto, 2007; Van Oers and Roders, 2012). These consequences require the development of schemes or approaches to managing them so that cities can function with the proper quality of life sought by their citizens. In addition, if unplanned, those pressures impact on the safeguarding of the historic environment, often compromising their integrity or authenticity (Roders, 2013).

The increasing interest in managing change in cities has heightened the need for urban conservation. As Elnokaly and Elseragy (2013, p.31) state, Urban conservation deals with a varied range of issues that "can be classified into three categories: socio-physical, sociocultural, and environmental concerns". They also mention that it is a process of progressive development concerning preservation, restoration, and adaptation of historic structures, combined with new

architecture. It considers the urban layers of history and traditions and its continuity, trying to meet the demands of their inhabitants.

The International Council on Monuments and Sites (ICOMOS) in the Charter on the Conservation of Historic Towns and Urban Areas, The Washington Charter (1987), states that urban conservation should be indispensable to socioeconomic development and urban and regional planning policies at all levels. It also stressed the significance of direct involvement of the community, due to their character of being primary stakeholders (ICOMOS, 1987).

Rodwell (2007) emphasizes that the Washington Charter goes further and reviews important aspects that should be conserved: connections involving buildings, green and public spaces, including natural landscapes and the multiplicity of roles cities gather over time.

An important aspect highlighted by The Getty Conservation Institute (2010) is that each city has a different story, scenario and set of conditions that result in specific approaches. However, common trends and questions are noticeable. The answers to those issues and tendencies are found in an analysis of each case study since it aids the formation of strategic direction and the capacity to meet unique needs of those areas. Lichfield (1988) apud Elnokaly and Elseragy (2013, p.33) explains two critical issues: "resource value and responsibility towards the others respectively". The first is related to conserving current resources because reusing historic structures is a simpler way of achieving sustainability. The second correlates with economic initiatives: projects in historic quarters attract people, as they are curious and want to remember or experience the stories of these areas. Therefore, the restoration of the built environment contributes towards increasing its economic influence and encouraging competition, while making these areas renewed places for public gathering.

The historic environment and its various layers of history have an evolved urban character and cultural heritage. It has been asserted that people value it because it adds meaning and uniqueness to these places.

## 3. REGENERATION OF URBAN WATERFRONTS

Throughout human history, water resources have played a vital role in the construction and development of several cities in the world, as around them were the built socioeconomic structures, such as transportation and commerce (Hein et al., 2020). Urban waterfronts had

different uses and types, from settlements to exploration sites, huge ports, trading and travel centers, recreation sites, as attractive places for cultural activities, among others. These areas were mainly used for travelling and trading, though, with rapid industrialization and advancement of transportation technology from the late nineteenth and early twentieth centuries, those areas suffered periods of misuse and neglect, "as the demands of industrial production and global trade have shifted sites of heavy manufacturing and maritime trade activity away from inner-city sites to more peripheral locations" (Evans et. al., 2022, p.1). In addition, Arjomand Kermani, van der Toorn Vrijthoff and Salek (2020, p. 346) analyses:

> The dissociation of the port from the city has made their respective fates less and less dependent on each other, which has had significant socio-economic and political consequences. The challenging problem of how to deal with the vacated space in the heart of port cities around the world resulted in waterfront redevelopment programs (…) The regeneration of urban waterfronts became a well-established phenomenon in North America in the 1970s and spread to Europe city ports in the 1980s.

Consequently, significant parts of urban fabric were both physically and socially deteriorated by the decline of urban waterfront areas in post-industrial cities. The process of rediscovering the significance and the strategic character of waterfront areas for redevelopment and regeneration of dilapidated areas emerged during the end of the 20th century. Many researchers have covered a comprehensive historical study and evolution of waterfront schemes. (Üzümcüo ğlu and Polay, 2022; Sang-ju, 2020; Keyvanfar et al., 2018). Some state that the ideas and concepts of those regeneration projects started in North America (Giovinazzi and Moretti, 2010; The Seattle Department of Planning and Design, 2012; Brownill, 2013; Timur, 2013; Sandholz, 2017; Arjomand Kermani, Van Der Toorn Vrijthoff and Salek, 2020).

Those researchers also highlight how interesting it is that cities instead of dealing with it as an urban problem, approached it in an interdisciplinary strategy and reclaimed their coastal and port areas seeing them as an opportunity for collaborating to global capitalism and profit. For most, economic - drawing investments and publicity - and physical redevelopment.

For the increased awareness of the strategic potential that urban waterfronts have and to acknowledge all the factors that are attached to it, several authors studied the definition of urban waterfront areas. Most of them explain it as the location where urban development and water converge, or even broadly, any urban area near water (Hou, 2009 apud Timur, 2013). Given that many cities are situated near waterbodies, waterfronts have emerged as a focal point of urban

sustainability. Some others, prefer to specify and use different nomenclatures according to the typology of water location, like port, harbourfront, water edge, riverfront, among others. Alternatively, according to the site of the urban area, such as coastal (bay) or inland (river) cities (Wrenn, Casazza and Smart, 1983). For this article, the water character can be a bay, river, ocean or canal, different scales or location will not interfere in the aim of this study. Figures 1 and 2 illustrate different types of urban waterfront areas within the same city, in Aracaju, Brazil.

**Figure 1**: In Aracaju, a beach surrounds this waterfront area, but also consists of artificial lakes (at the front); and it has a recreational area (kart circuit) in the middle diving in two lakes.

Source: Maynard (2016).

**Figure 2**: Sergipe River is delineating the historic urban centre of Aracaju waterfront area.

Source: Guimarães (2011).

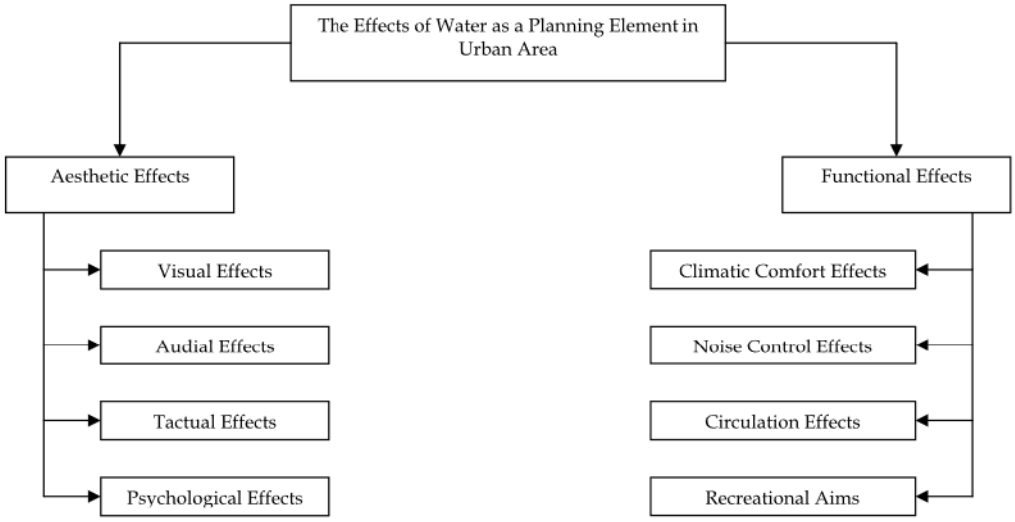
Figure 3 illustrates the World Heritage Site (WHS) of Stone town of Zanzibar, part of the United Republic of Tanzania. Stone Town's waterfront embraces a front line of a variety of coral stone and lime constructions which remote to its distinctive and multi-ethnic past, it represents a rich mixture of different cultures – such as African, Moorish, Arab, Persian, Indian and European elements - and the historical progression of Swahili trading towns. The city was listed as UNESCO's World Heritage Site in 2000 due to its reputation as an important Swahili coastal trading town of East Africa (UNESCO, 2000).

**Figure 3**: Stone Town's historic waterfront

Source: Seyyida Zanzibar (2016).

For Timur (2013), water resources are an appreciated asset for urban planning, as it influences aesthetically, functionally, and psychologically on human quality of life. Therefore, it also plays a major role in achieving sustainable development. The author considered many researchers and depicted the results in Figure 04:

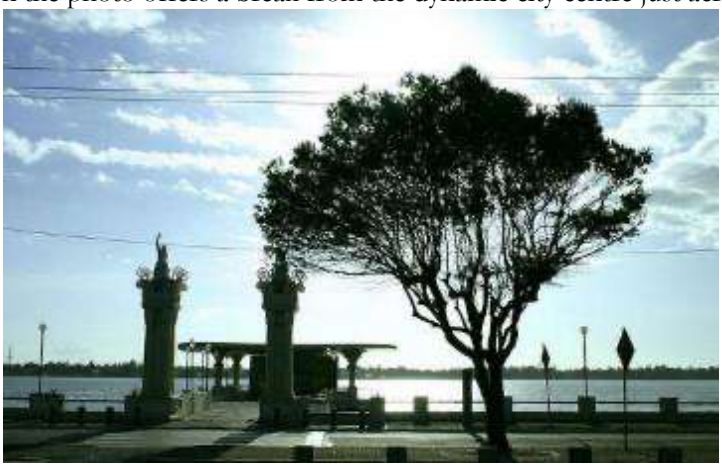
**Figure 4**: Water resources as an asset for Urban Planning, aesthetic, and functional effects.




Source: ÖNEN (2007), adapted by, TIMUR (2013).

"The balance is established between nature and social life for a sustainable development of cities. Urban natural water elements play an important role in the establishment of this balance" (Timur, 2013, p.170). In summary, concerning Aesthetic effects, it explores all methods of human perception, especially with visual and psychological effects. Waterfront areas are visually attractive on their own; they influence the way people feel. If it is moving water, it adds velocity, agitation, and dynamism to an urban area (Figure 5). However, if quiet, it produces a mirror effect, the vigour and tone of water brings mindfulness (Figure 6) (Önen, 2007 apud Timur, 2013).

**Figure 5**: View of Sergipe River in the historic downtown of Aracaju, in Brazil. The quietness of the river and the pier on the photo offers a break from the dynamic city centre just across the street.



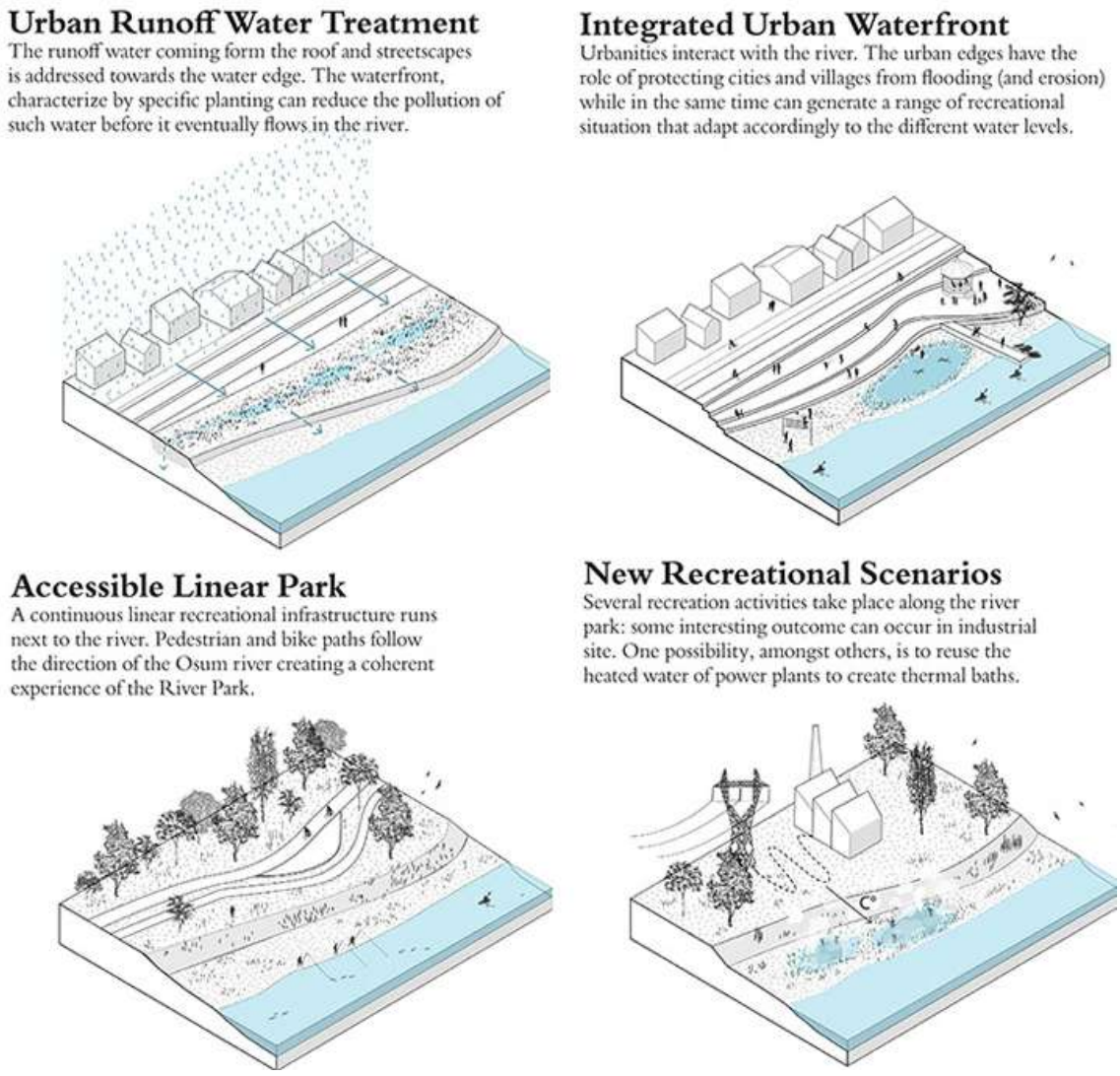
Source: Innholder, 2013.

**Figure 6**: Artificial Lake in the coastal area of Aracaju, water as part of the attraction, its coloured effect and different movements appeal to many tourists.


Source: Aniszewski (2017).

Concerning practical waterfront effects for urban planning, water can cool air temperature through its interchange of moisture with the environment. Figure 7 displays some different examples of climatic benefits it offers to an urban area:

**Figure 7**: Different examples of effects on urban planning. Text of the figure is written below.

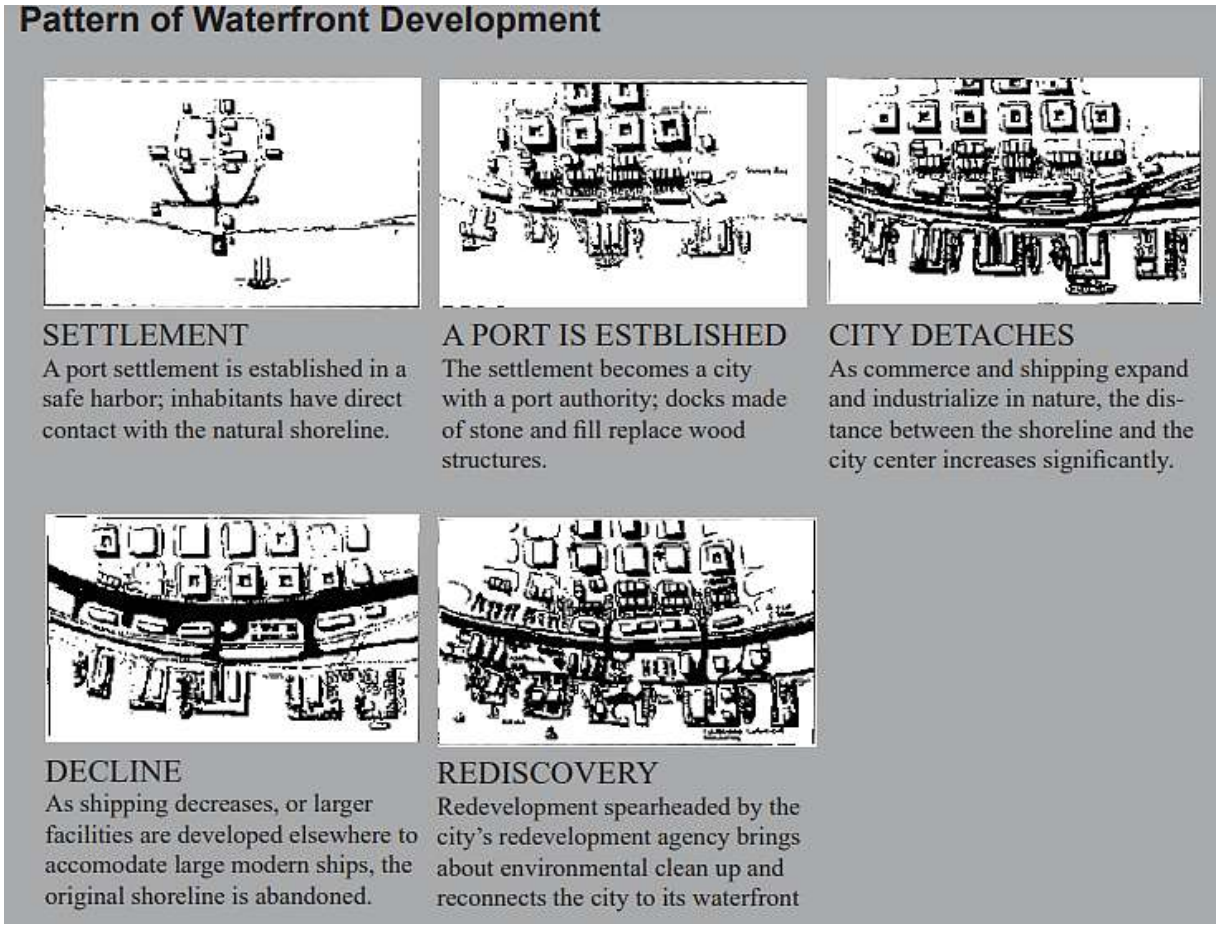



Source: Openfabric (2017), modified by the author.

**Urban Runoff Water Treatment** (The runoff water coming from the roof and streetscapes is addressed towards the water edge. The waterfront, characterize by specific planting can reduce the pollution of such water before it eventually flows in the river), **Integrated Urban Waterfront** (Urbanities interact with the river. The urban edges have the role of protecting cities and villages from flooding and erosion while at the same time can generate a range of recreational situation that adapt accordingly to the different water levels), **Accessible Linear Park** (A continuous linear recreational infrastructure runs next to the river. Pedestrian and bike paths follow the direction of the Osum river creating a coherent experience of the river Park) and **New Recreational Scenarios** (Several recreation activities take place along the river park: some interesting outcome can occur in industrial site. One possibility, amongst others, is to reuse the heated water of power plants to create thermal baths).

Not only because of its aesthetic and functional effects but also, mainly due to its location, waterfronts were the easiest living area to offer food, residence, settling and protection. Many researchers have summarised the historical progression of Urban waterfronts, from its emergence to its rediscovery, into a few phases (BROWNILL, 2013; THE SEATTLE DEPARTMENT OF PLANNING AND DESIGN, 2012; WRENN, CASAZZA and SMART, 1983). Wu and Liu (2023) and The Seattle Department of Planning and Design (2012) explain these phases:

**Figure 8**: The historical progression of urban waterfronts summarised.




Source: The Seattle Department of Planning and Design (2012).

Sandholz (2017) states that because of technological developments, from ship transportation to railways, and then to the trucking industry, dockland areas became impractical and obsolete. After several years of neglect, due to urban development and growth, lower classes occupied waterfront sites, so again, these places became central areas.

The aim to reconnect the city to its waterfront in principle had the purpose of rehabilitating its built heritage, conserving historic buildings, to attract further investments and entrepreneurship and to boost the area economically. According to Brownill (2013), those urban regeneration projects usually comprised of mixed uses – office, shopping, leisure, residential- all depending on partnerships between governments and private organisations. Similarly, cities were using their cultural heritage to improve their image and create an identity to explore their touristic potential, generating more income (Sandholz, 2017).

The interest of the waterfront regeneration phenomenon emerged from North America in the mid-1960's, with the rehabilitation of Baltimore's Inner Harbour, a project that transformed the run-down port area to an urban leisure centre. From the end of the 20th century, regeneration projects of urban waterfront areas have shown to be an effective tool for managing depict areas and bringing them back to life (emphasis added). With the increasingly successful economic results of initial regeneration programmes in North American countries diffused worldwide, waterfront regeneration became a global trend, extending from North America to Europe, and then, to developing countries in Latin America, Asia, and Africa (Brownill, 2013).

Among various, notorious examples in the United Kingdom are Liverpool's Albert Dock, Cardiff Bay, Bristol Docks, Newcastle's Quayside and London's South Bank. One of the most well-known projects is the regeneration of London Docklands. In 1981, the London Docklands Development Corporation (LDDC) was set up to revitalise depict dock areas near the River Thames (east London). The project consisted of encouraging the private sector investment, therefore, integrating mixed functions in the area and contemporary architecture with historic buildings – office use for economic services and waterside residential areas. Thereupon, the LDDC regeneration scheme evolved into a model for urban waterfront regeneration programmes influencing many countries in the world (Sandholz, 2017).

In European capitals such as Barcelona, Hamburg, Amsterdam, among others, regeneration projects had a different approach – a more participatory and practical planning strategy, but still, with the intention of integrating the waterfront back to the contemporary city (Brownill, 2013). The process of regeneration of urban waterfront became a global phenomenon, it went beyond large post-industrial Docklands, to different towns and types of waterfronts - rivers, canals, to an expression of cosmopolitan city paradigm.

A relevant case study to mention is the ongoing Rio de Janeiro's Porto Maravilha project (Figure 9), which started in 2011 for the 2016 Olympic Games. The local government created the Urban Development Company of Rio de Janeiro's Port Region (CDURP) to manage and supervise the project, integrate areas to increase the economic dynamics of the city through the modernization and repurposing of the location, based on a set of initiatives originating from a public-private partnership. In addition, the redevelopment consisted of improving housing conditions to attract new residents to an area of 5 million m². According to CDURP, demographic density projections indicate an increase - from 32.000 to 100.000 inhabitants in 10 years in the region (CDURP, 2017).

This regeneration project has been largely covered by Almeida (2019), Araújo (2019), De la Barre and Lima (2019), Ferrarini, Abiko and Santovito (2014), Junior, Werneck and Novaes (2020), Mello and Pessôa (2019), Oliveira, Amaral and Silva (2019) and Silva (2018). These authors have used different methodologies and theoretical frameworks to analyse the discourse, practices, and outcomes of the project, and they offer critical perspectives on its promises and challenges. For instance, De la Barre e Lima (2019) described how the meaning of African heritage in the region has been reinterpreted in various ways. It also highlights the negotiations between public authorities and social movements, which have resulted in conflicting discourses around places of memory. Furthermore, debates on heritage, memory, and places have taken place at the Museum of Art of Rio and the Museum of Tomorrow, both of which are relatively new institutional actors in the region. Overall, the waterfront was regenerated through urban planning, leading to groups of actors having to adapt to new spaces and develop collaborative mechanisms between residents and institutions. In contrast, Junior, Werneck and Novaes (2020, p.1) criticizes the project concerning social impacts:

> The first thesis argues that the understanding of urban transformations in Porto Maravilha should take into account the specific characteristics of the city's urban configuration - a hybrid, unequal, and combined urban order - and the role of black culture and the African diaspora in its formation. The second thesis argues that Porto Maravilha constitutes a neoliberal experiment triggered by a coalition of interests, but its implementation is constrained by the hybrid, unequal, and combined urban order and, at the same time, modifies it in a multiscale process of creative destruction that produces a local version of a global phenomenon. The third thesis argues that urban renewal projects in Rio de Janeiro promote a particular type of gentrification, characterized by processes of "whitening" and attempts to annihilate black culture, known as peripheral gentrification, but social resistance results in the reproduction of the hybrid, unequal, and combined urban order (translated by the author).

Overall, those authors contribute to the ongoing debate about the role of mega-events, neoliberalism, and historical memory in shaping urban spaces and societies.

**Figure 9**: Area of Special Urban Interest of Rio de Janeiro's waterfront and port area.


Source: Oliveira, Amaral and Silva (2019, p.05).

Many researchers realized a repetitive pattern in waterfront projects: London Docklands in the UK, and Baltimore and Boston, in the United States, are considered as models that globally influenced others with the formula of attracting private investments into the area and reusing historic buildings for mixed uses (Brownill, 2013).

Waterfront regenerations are well diffused and multiplied internationally; having covered the developed and developing world, from the major cities to small towns, it has reached to the level that, it is the first step and a strategy to revitalize and shift back any city itself to the international context. In this regard, Giovinazzi and Moretti (2010) summarized their 20-year-research carried out by the Centre for Cities on Water in Venice into ten basic ideas that contribute to a sustainable development of Urban Waterfront Areas. The study is a comparative analysis about the key to successful waterfront redevelopments, with the aim of making a **state of the art** (emphasis added) at the international level of the phenomenon of waterfront regenerations.

Among those ten principles are:

1. The quality of water as a requirement to be accomplished by the municipalities, which oversee sustainably recovering ruined banks of river, bays, among others.
2. Newly built structures in waterfront areas should integrate into the existing urban fabric of the city adding vitality to its former part.
3. Respecting the historical identity and built heritage is part of the sustainable development process.
4. Mixed uses offer diverse functions including housing, cultural and commercial activities.
5. Inclusive and accessible public spaces in waterfront urban areas for both tourists and inhabitants.
6. Partnerships between public and private investments: governments should guarantee infrastructure and be socially proactive, whereas private entities deal with competition into the global market.
7. Participatory planning, since those places, are planned not only for tourists but also inhabitants, so place-making approach benefits towards sustainability.

Waterfront regenerations are for long-term plans; it goes beyond short-term interests, they argue that these projects need to be flexible and adaptive to involve different disciplines and professionals (Giovinazzi and Moretti, 2010). Regarding the idea that waterfront regenerations are for long-term plans, the revitalization of the river Thames in London exemplifies it, as it took 150 years for it to be cleaned. The process of regeneration started from a shipwreck disaster in 1878 when 640 people died intoxicated from the pollution of the river. Today, after its revitalization, researchers declared that there are about 125 species of fishes in the river (Globo Notícias, 2017).

Additionally, to exemplify those principles above, the city of Liverpool, in the United Kingdom, has been undergoing the last decades through different process of regeneration of its waterfront conducted by public-private partnerships. The outcomes so far have been in 2004, the city was listed as UNESCO World Heritage Site, attracting international interests; in 2008, Liverpool was designated as the European Capital of Culture, being able to reinforce its industrial heritage, building shopping centers, improving the economy and strengthening its local identity. Therefore, so far, waterfront regeneration has shown great results, the next step for Liverpool is a

master plan, scheduled for 2020 to continue the regeneration of its maritime-port legacy (Giovinazzi and Moretti, 2010).

Concisely, Timur (2013) lists the benefits and uncertainties of urban waterfront regeneration. The advantages are numerous, such as the rise of prices of real estate properties, conservation of local urban heritage and adaptive reuse of historic buildings. Also, the improvement of the city's infrastructure, the quality of water and transportation and economic regeneration, offering new opportunities, jobs and activities, tourism, and marketing to the city's image.

Regarding the disadvantages, the most prejudicial relate to the standardization of the projects, although cities share common problems, models can be perceived. However, each regeneration project should take into consideration each case has specific scenario and demands. If overlooked, Morena (2011 apud Timur, 2013) argues that it usually leads to perplexity and even loss of the identity of the place. Another risk is when the project focuses more on tourist functions rather than providing residential or meeting specific needs of the community. Tourism is a short commercial use in few hours per day, while residents will use the area for a long-term period.

## 4. CONCLUSION

Overall, this research has highlighted the potential of water-based revitalization projects as catalysts for regenerating historic waterfront areas and promoting sustainable development. In particular, SDG 11, which aims to make cities and human settlements inclusive, safe, resilient, and sustainable, is highly relevant to the revitalization of waterfront areas.

Through a comprehensive literature review and case studies of cities from around the world, the challenges and opportunities associated with these projects have been identified, along with the need for effective stakeholder and community engagement and collaboration to address potential environmental and social impacts.

The article's theoretical and methodological framework drew on interdisciplinary research in urban planning, architecture, environmental science, and cultural studies. The research approach involved desk research and a comprehensive literature review to explore the potential of water as a catalyst for regeneration, and many examples were used to illustrate the findings.

The regeneration of urban waterfronts has become a global phenomenon, going beyond large post-industrial Docklands to different types of waterfronts and becoming an expression of cosmopolitan city paradigms. However, researchers have also identified some potential negative impacts of these projects, such as gentrification and attempts to erase local culture. There are also risks associated with standardization of projects and prioritizing tourist functions over the needs of the community. It is important to balance the economic value of waterfronts with conservation issues and governance analysis to ensure the retention of authenticity and integrity. Therefore, it is crucial to ensure effective stakeholder engagement and community participation in these projects to ensure they benefit everyone and promote sustainable development.

Finally, this research provides valuable insights for policymakers, urban planners, and researchers interested in waterfront revitalization and sustainable development. This article might be fundamental for aiding future research. While existing waterfront regeneration projects can provide valuable lessons, the literature suggests that the scale and character of each city must be considered when planning a new project.

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