Journal of Engineering Sciences
Assiut University
Faculty of Engineering
Vol. 46
No. 5
September 2018
PP. 587 – 598

URBAN UPGRADING OF THE RIVERFRONT OF MANSOURA CITY IN EGYPT - USING LEED-ND CRITERIA

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Received 22 April 2018; Accepted 6 May 2018

ABSTRACT

Due to its geographical location, Egypt has long waterfronts of the Nile River and sea coasts. Though, these areas are marginalized despite the efforts and plans laid by stakeholders for the development of these areas; some of which have already been applied. This paper discusses the problems of riverfront locations in Mansoura City, Egypt; these include the deteriorated conditions of existing riverfronts; mainly neglecting the basic needs of residents and visitors to these areas. The study tackles the reasons behind deterioration from the function and place-shaping factors, along with the human aspect of how the user especially the pedestrians, commensurate with these places. This paper aims at introducing a sustainability-based proposal for the urban upgrading of riverfronts in Mansoura City, Egypt; adapted from and guided by LEED-ND criteria. To attain its aim, the study demonstrates and analyzes a number of world recognized successful case studies, empowered by LEED-ND as guiding criteria. A set of localized pedestrian friendly guidelines are concluded for the planning and design of integrated, sustainable solutions that promote environmental, visual and humanitarian planning and design potential for future riverfronts in Egypt.

***Keywords**:* Riverfront, Sustainable Urbanism, Mansoura Urban Paths, LEED-ND Criteria

1. Introduction

Different methodologies for the development of riverfronts have emerged in world cities, depending on the conditions and possibilities available in terms of location conditions, water body width and the history of the city. Globally, the design development of cities waterfronts has gone through many stages over the decades from the late 1950s until now. During this period, cities waterfronts have been typically viewed as strategic and important locations. There were important projects, including recreational ones, whereas the interest in the human aspect and the study of population needs were stressed. The most important examples of this period were the development of the Thames River, the Minar Darling in Sydney, and the development of the Chicago River. In the United States, the American Planning Association and other institutions set special standards and requirements for the development of riverfront destinations, and then showed interest in

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the humanitarian and social aspect from a sustainable perspective.

One of the most important tools that emerged in the modern era is the Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) rating system. Initiated by the U.S. Green Building Council (USGBC) in partnership with the Congress for the New Urbanism (CNU) and the Natural Resources Defense Council (NRDC), LEED-ND integrates the principles of smart growth, new urbanism and green building and infrastructure into a sustainability-based rating system for neighborhood design.

In Egypt, the natural sites and features of rural life, which still retain their originality and value, as well as the presence of many religious shrines and symbols are spread along the Nile River axis. The Nile River is distinguished with its geographical position and distinctive culture. Considered as the mainstay of development in Egypt, the Nile River has been the focal point of Egyptian civilization in ancient and modern times. This paper tackles the urban problems and upgrading challenges of urban riverfronts in Mansoura City; these include the deteriorated conditions of an existing example at Mansoura City in which the urban activities and amenities are examined and analyzed on LEED-ND basis.

1.1. Importance of the study

To attain a clear vision for future smart cities is crucial, especially when it comes to solve the nowadays problems of urban waterfronts. The case study of "Al-Mashaya" Path in Mansoura City is examined for its urban sustainability performance, using LEED-ND as a specific instrument and configuration criteria for revitalization purposes. Results and conclusion can be adapted to a wide range of applications locally and regionally for the different benefits and services that can be inherited.

1.2. Aims

The study aims at analyzing the comprehensive urban design requirements of local riverfronts on sustainability basis, and the resulting poor conditions of some urban development projects in Mansoura City in Egypt, with a focus on the strengths, weaknesses, and conflict of some current development interventions.

1.3. Research methodology

To reach its aims, the study analyzes a number of successful case studies, empowered by LEED-ND as guiding criteria. A set of localized pedestrian friendly guidelines for planning and design of integrated is then concluded, to provide sustainable solutions that promote the environmental, visual, and humanitarian riverfront potential for riverfront revitalization of the case study, and hence concluding the guidelines for planning the future Egyptian waterfronts in general.

2. Riverfront examples in Egypt

Urban waterfronts in Egypt are currently suffering from deteriorated conditions due to several environmental and socioeconomic factors. The lack of sustainable environmental measures has negative impacts on the overall urban situation in most of Egyptian riverfronts, Fig. 1.2, [7, 8].

Fig. 1, 2. Riverfronts in Egypt, depicting the city of Cairo. Source: Hussein, R. M, 2018 [7].

Inappropriate land use and negative aesthetic aspects of urban form govern the relationship between users and the built environment, shaping the principal dynamics of the local urban situation, Fig. 3.

Fig. 3. Riverfront examples in Egypt, depicting Luxor to illustrate the overall current riverfront situation in major Egyptian cities. Source: Source: Hussein, R. M, 2018 [7].

2.1. The case study of Mansoura city riverfronts: status quo, problems and countermeasures

Through the study and analysis of the current situation in Mansoura City, it was found that the natural, environmental, tourism and archaeological potential of the Nile riverfront is not employed properly, Fig. 4.

Fig. 4. Unplanned riverfront at the northern path along the city of Talkha. Source: https://goo.gl/images/9PorVj, accessed on Feb, 09 2018.

Other urban problems include the spread of several undeveloped spaces located on both sides of the river. For users, the width of the riverfront path is insufficient for pedestrian flow capacity, and the public shared places are rare. Tall buildings with uneven and inconsistent architectural patterns exist along the banks of the river, with lack of appropriate land use that can positively commensurate with the nature of the unique location of these paths. The river itself suffers from the concentration of old, dilapidated and polluted uses, e.g., from the berths of ships and sailboats. As a result of the high land prices on the river banks, many illegal drilling and reclamation activities along the city's water front were reported. Besides, the weak connection between the riverfront and the main areas of the city makes it difficult to access to the Nile from all parts of the city. Generally, it sounds evident that weak attention is given to wildlife, nature, and biodiversity which are crucial for sustainable development.

3. LEED-ND criteria as world recognized tool for riverfront revitalization

LEED for Neighborhood Development (LEED-ND), where "LEED" stands for

Leadership in Energy and Environmental Design, is a United States-based rating system that integrates the principles of smart growth, urbanism and green building into a national system for neighborhood design. LEED certification provides independent, third-party verification that a development's location and design meet accepted high levels of environmentally responsible, sustainable development, [1,2]

3.1. Objectives of new urbanism

New Urbanism is a terminology of an emerging concept in urban design and city planning, with specific objectives that can be summarized in the following:

1. Creating sustainable, sustainable communities.
2. To allow for a better future for all of us.
3. Reforming the design of the built environment.
4. Raising the quality of life by creating better places for living. [4,12]

3.2. Smart growth

Smart growth is an urban planning and transportation theory that concentrates growth in compact walkable urban centers to avoid sprawl. It also advocates compact, transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, and mixed-use development with a range of housing choices. Smart growth values long-range, regional considerations of sustainability over a short-term focus. Its sustainable development goals are to achieve a unique sense of community and place; expand the range of transportation, employment, and housing choices; equitably distribute the costs and benefits of development; preserve and enhance natural and cultural resources; and promote public health.

There are 10 accepted principles that define smart growth:

1. Create a range of employment opportunities.
2. Mix land uses.
3. Take advantage of compact building design.
4. Create walkable neighborhoods and a range of housing opportunities and choices
5. Foster distinctive, attractive communities with a strong sense of place.
6. Preserve open space, farmland, natural beauty, and critical environmental areas.
7. Strengthen and direct development towards existing communities.
8. Provide in advance a variety of transportation choices, urban and social infrastructure based on population projections.
9. Make development decisions sustainable, predictable, fair, and cost effective.
10. Encourage community and stakeholder collaboration in development decisions. [3.5.6.]

3.3. Green infrastructure

Green infrastructure is any practice that uses or replicates natural systems to achieve a desired outcome. This includes green roofs, rain gardens, and permeable surfaces. Green infrastructure looks to nature for advice, restoring and replicating ecological systems to create human benefits.[1.2]

3.4. Learned lessons from LEED-ND certified case studies

Two case studies are selected to examine some of the world best practice of riverfront development projects on sustainability bases. The cases are LEED certified projects from USA, with a number of urban and environmental constraints that can provide learned

lessons in using LEED-ND as guiding criteria to upgrade cities' waterfronts.

3.4.1. Washington D.C. riverfront

For a city with two major rivers and long waterfronts, Washington residents have poor access to the water. Most of the land along the rivers, and the Washington Channel that parallels the Potomac for a stretch, has historically been dedicated to military uses or reserved as large federal parks (the land on which the Jefferson Memorial rests) far out of range of neighborhood walkability or the transit service, Fig. 5, 6. [10]

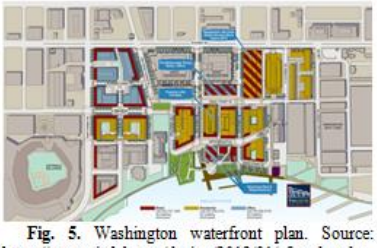

Fig. 5. Washington waterfront plan. Source: https://www.citylab.com/design/2012/01/after-decades-neglect-washington-finally-fixes-its-waterfront/996/

Fig. 6. Green infrastructure Source: https://www.citylab.com/design/2012/01/after-decades-neglect-washington-finally-fixes-its-waterfront/996/

A 42-acre redevelopment along the Anacostia River has been undertaken, As the site plan suggests, the project has a bit of everything (red is retail, gold is residential, blue is offices). The Yards earned LEED-ND gold on the strength of its smart growth, including the superb, centrally located and transit-rich location; a walkable mix of jobs, housing, shops and services; brownfield remediation; adaptation of older and historic buildings; water use efficiency; and excellent street design and connectivity, Fig 7, 8. [10]

Fig. 7. The urban waterfront. Source: https://www.citylab.com/design/2012/01/after-decades-neglect-washington-finally-fixes-its-waterfront/996/

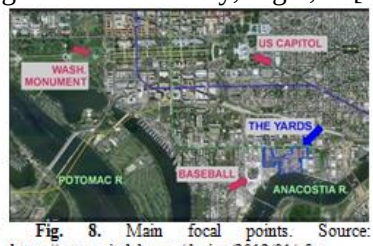

Fig. 8. Main focal points. Source: https://www.citylab.com/design/2012/01/after-decades-neglect-washington-finally-fixes-its-waterfront/996/

The project also includes a range of green infrastructure features to manage rainwater. According to the planning and engineering firm "Greening Urban," which worked on the yards, these include a tree trench infiltration system to absorb water slowly from storm events, vertical recharge shafts that deliver runoff directly to the natural underground water table, smart irrigation and gray water systems for water recycling, and flow-thru planter boxes that detain runoff before it enters the constructed storm water management system. [10]

3.4.2. The river waterfront of New York City

With input from waterfront communities, design experts, and government agencies, the "Waterfront Alliance" created "Waterfront Edge Design Guidelines," commonly known as WEDG. The goal of this incentive-based ratings system is to make our waterfronts more resilient, environmentally healthy, accessible, and equitable for all. WEDG is doing for the waterfront that LEED® has done for buildings, Fig. 9. [11]

Fig. 9. Green infrastructure Source: Vision 2020: New York City Comprehensive Waterfront Plan. Source: http://www1.nyc.gov/site/planning/plans/vision-2020-cwp/vision-2020-cwp

The Waterfront Alliance has advocated for better waterfront edge design through WEDG's precursor, our Design the Edge program. That program gave the Waterfront Alliance the opportunity to work on projects in Harlem River Park and Hallets Cove in collaboration with the New York City Department of Parks & Recreation and the New York City Economic Development Corporation. In 2010, in conjunction with the decennial update of the New York City Comprehensive Waterfront Plan, we recommended the creation of design guidelines for the water's edge. The result is a logical, easy-to-use tool for any urban or suburban riverfront, with scorecards, tailored for three types of uses: Residential/Commercial, Parks, and Industrial/Maritime. [11] Within these three types of uses, riverfront projects earn credits in seven categories:

- Site Selection & Planning
- Public Access & Interaction
- Edge Resiliency
- Ecology & Habitat
- Materials & Resources
- Operations & Maintenance
- Innovation, Fig. 10, 11.

4. The case study of Mansoura riverfront

Located about 120km to the north Cairo, Mansoura city is the capital of Dakahlia Governorate in Egypt. It lies on the east bank of Damietta Branch of the Nile Delta region, opposite to the City of Talkha on the west bank, Fig. 12. [9].

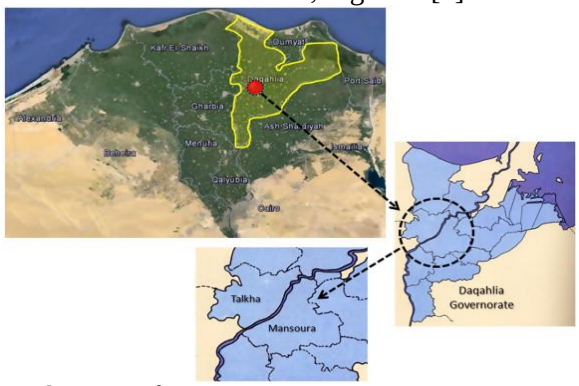

Fig. 12. Map location of Mansoura City, Egypt. Source: www.egypt-gbc.org

Figure 13 depicts Al-Mashaya path, which is the southern, lower walkway of the riverfront of Mansoura City.

Fig. 13. Al-Mmashya riverfront to the south of the Nile River in Mansoura City. Source: www.googlemap.com

There were several transformations on Al-Mashaya Path. Many operations occurred in 1990, as the open casinos were transferred directly to the Nile at high prices. In 2000, the gardens, parks and open spaces were upgraded. In 2010 was the bottom course and the transformation of the low level of the river into a pedestrian walkway which was a significant shift in the development of Al-Mashaya. Different services have been added to the infrastructure that enabled pedestrians to use River rafting and bus parking areas, but the footpath was again used to establish profitable projects such as cafes and restaurants, which again blocked the river from users' access, Fig. 14.

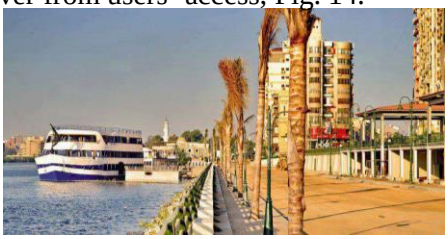

Fig. 14. Current riverfront state of Mansoura City: the walkable path. Source: the authors'

4.1. The methodology used in the applied study

This section confronts the case of Al-Mashaya riverfront with some complementary action toward sustainability for urban projects alongside its path. A pilot study is conducted to provide a framework for evaluating the community, and the prospected environmental and economic benefits of the propositions. The intent is to improve the performance, resilience and efficiency of the path by identifying the applicable sustainability approaches during the planning and design phases. The methodology used in the study of the applied area is summarized in two sequential steps as follows:

1. Implementation of SWOT analysis for the targeted area according to their available theoretical background and the influencing factors. The targeted locations of the study area are determined, analyzed, and quantitatively assessed in terms of urban efficiency: environmentally, visually and functionally, with reference to the above theoretical bases. Five locations are specified and studied in the way they connect to the river path, the available activities alongside the path and their ecological impact, pedestrian friendly considerations, quality of the urban character, and the general comfort and safety of the user.
2. The LEED-ND criteria are then applied to determine the most appropriate tools to attain the efficiency of urban quality for the area in environmentally friendly terms. LEED-ND is adopted by the authors as it offers available resourceful data and

experiments which are globally recognized and specialized in existing cities. These issues comprehensively identify the most urgent challenges which are finally tackled and examined for a variety of solutions to enhance the riverfront image for both residents and visitors of Mansoura city.

4.2. The SWOT analysis of the study area

The first step is implemented by conducting SWOT analysis of the study area. Objectives highlighted in Table 1, are based on several meetings and sessions with stakeholders. They indicate the targeted outcomes by data monitoring and analysis of the current situation, gathered and grouped in the following categories by the authors, who are lifelong residents of the case study area. [8].

Table. 1.
SWOT analysis of Al-Mashaya waterfront Source: The authors according to field visits and surveys.

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS	OBJECTIVE
The existence of the river as a strong visual determinant, which contributes to the city's development. An area located by the river is a potential distinctive visual sign of the city.	Buildings and clubs with high fences block visibility to the river in the majority of the path.	The possibility of visual permeability and the opening of visual areas on the river directly and restructuring the activities to improve the visual image of the riverfront.	Existing laws and legislation allow for the continuing process of construction near the river which will completely block the visibility to waterfront.	Supporting the user's right to access the river and encouraging the overall riverfront image.
Combined state and academic effort in dealing with informal areas and provision of sustainable urban solutions.	Weak environmental awareness of the residents in the high-populated riverfront area. Lack of the local NGOs contribution in environmental programs.	Spatial improvement services to existing informal localities. Implementation of improved sanitation project will ensure better healthy conditions for city residents.	Weak state environmental departments to deal with environmental threats in terms of monitoring, mitigating and rapid intervention.	Improving the environmental services related to riverfront activities.
The presence of the international coastal road and Talkha bridge expose the city's main entrances to riverfront offers good potential to connect to the heart of the city via a network.	Weak application of transport regulations.	The possibility of organizing separated paths for all urban circulation and transit systems: making a path for the pedestrians, a path to the stairways, and "arguably" a path for vehicles.	Lack of convenience and life safety due to improper traffic system provided by the authorities in charge.	Coordinating efficient traffic paths which are user-friendly compliant.
The Nile River represents a high humanitarian value for the Egyptians, which makes it socially important, necessitating the coordination of alongside sustainable activities.	The blocking of the river's appearance reduces the communication between the users and the Nile river and represents a largely negative point for the perceived image of the city.	The ability to restore human value, users' communication with the river and sense of beauty.	Lack of human sense for the beauty of the river, which decreases the value of human and social aspect of the river and negatively reflects on the city's quality of life.	Offering equal rights of all people to benefit from the riverfront.

4.3. LEED-ND based criteria of riverfront revitalization

The following confronts the LEED application to assess the environmental aspects of the proposed integrated sustainable solutions provided for the development and rehabilitation of

Al-Mashaya Waterfront. A part of the research methodology is to review the Academy of Scientific Research's initiative that provides both the technical and economic solutions with scientific research to meet the challenges and national aspirations in all areas. On this basis, the study examines the efficiency of the environmental design aspects as well as the social one in terms of human accessibility to the Nile River. In urban terms, these criteria are interpreted into the efficiency of ecological component around the river and water surface which is evaluated along with human activities and land uses, Table 2.

Table 2.

The authors' proposal of Al-Mashaya riverfront revitalization and development plan, adapted from the LEED-ND-based criteria. [1, 2, 3, 4, 5.8, 14, 13]

<table>
<tr>
<td>Intelligent drainage
- The City's system depends on the traditional drainages system and the city flooded in the winter and some deranges system to recycle water
  </td>
<td>Mix land uses
- All building mixed uses the ground floor its used shops and the buildings are used housing and learning
 
  </td>
<td>Walkability
- It is necessary to remove the roadway and to divide the pathway appropriately to enjoy the river.
 
Easy design paths
  </td>
</tr>
<tr>
<td>Crisis Management
- Mansoura waterfront it has no crisis management
- Some water front around the ward use like Amsterdam water front it can uses in manouri water front it contain smart system whether, traffic alarm .
 
www.filckr.com</td>
<td>Create walkable neighborhoods
- Mansoura city water front it has walk path parallel the river it can redesign it fit the e user in the city
- We can have dived the path to three sector cars and bikes and walkable .
  </td>
<td>Connectivity
- Connectivity is the most features of the urban fabric connected waterfront by streets and the down town of the city by sub link.
  </td>
</tr>
<tr>
<td>Application of the complete system of green buildings
- Encouraging more people to experience the beauty of the town which will result in improved quality of life experienced by human capital.
 
  </td>
<td><u>Preserve open space</u>
- Mansoura waterfront its many open area but not able to all users likes social clubs int proposal we should make 50% of the land uses to all user by hubs and open space according to Egyptian buildings law
 
- Provide a variety of transportation choices, urban and social infrastructure
  </td>
<td>Quality of life
- Creating sustainable, sustainable communities.
- Creating a better future for all of us.
- Reforming the design of the built environment.
Quality of architure
- The presence of tall buildings with an uneven and inconsistent architectural pattern along the banks of the river
- Front balconies and windows overlooking the street
- Mixed used and design paths for continuous, efficient sightseeing.
  </td>
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</table>

Such evaluation helps determine the capacity of these activities to yield vibrant, attractive environments, while keeping standard conditions of safety and health for all users. For example, several proposals have been suggested for the development of smart city mobility system, including tram and river transport. This level of urban intervention will result in considerable improvement of Al-Mashaya path alongside the Nile River as well as on the northern bank at the City of Talkha. The benefits include, but not limited to, the following:

1. Decreasing traffic pressure on the city's internal roads, by providing a refreshing addition to public transportation in Mansoura City (and breathtaking skyline views), with regular public transport service to several locations across the Nile river banks.
2. Encouraging people to incorporate walking, biking, and efficient public transport into their daily routine.
3. Urging more people to experience the beauty of the town which will result in improved quality of life experienced by human capital.
4. Allowing more residents to become educated about sustainable development goals in a way that is accessible to a larger percentage of the population.

5. Conclusion and recommendations

The riverfront of the city of Mansoura underwent several transformations affecting the city as a whole, where construction has increased significantly in recent decades. The waterfront proximity to the vital landmarks within the city such as several governmental and administrative buildings, and Mansoura University encouraged the land value of the area to enormously increase... The study stresses the importance of providing a comprehensive strategy for the current and future needs of the inherent riverfront community. Without such strategies, improper construction activities, inappropriate urban character, and dramatic loss of identity will continue; causing increased deformation of the image of the city. In future city plans, Al-Mashaya riverfront should demonstrate a richly designed path along the cornice, to serve both pedestrians and vehicles as well as satisfy the other vital needs of the population and visitors.

An interest should be given to distinctive buildings that can possibly add value of the riverfront, such as the University Hotel (previously, Ramada Hotel), and a number of valuable buildings and places that feature distinctive design style, and can serve as attraction poles for the entire population instead of being restricted to club members. The study concludes that Al-Mashaya path can be accessed mainly from two major approaches and secondarily from six minor streets connecting from the heart of the city. The study analysis showed that these access routes lack adequate confirmation and clarity. In ecological terms, Nile River in the study area is highly polluted due garbage disposal and industrial activities around the river. Purification plants and rigorous studies on the environmental impact of projects should be conducted for the riverfront and how they would affect the ecological life in the river and resulting in adversely environmental changes. The application of sustainability measures along the waterfront paths showed a good potential to overcome their major urban problems discussed above.

Yet, the re-planning will be a major challenge to designers and planners in how to restructure the city and deal with the existing situation without compromising the private ownership of individuals, activities and uses, adjust the imbalance between public and private uses, and allow for the needed activities that serve the community as a whole. It is well noted that the clubs located extensively along Al-Mashaya Waterfront are not made

available to all classes of people to join. Opposite to the successful waterfront lessons that showed maximum public beneficiary of such areas for hiking, exercising and all possible activities that can be practiced in safe and secured manner. Based on all of the above, future city development proposals should be carried out, and then evaluated for sustainability, efficiency, and user-friendly, and ultimately their ability to revive the urban riverfront of the city. It is therefore recommended to consider the LEED-ND criteria for developing sustainable solutions and integrated plans to revive the waterfront and address the system of transport on the riverfront that can contribute collectively to better quality of life.

Cities generally located along a major riverfront should figure out how to best benefit from such paths collectively for the public without harming the environment. Many of the most popular activities, such as boating, can be highly polluting, and overdevelopment near the shore can cause problems with erosion, runoff, and contamination. If planned correctly, riverfront property can be a key part of urban recreation space without contributing to these problems.

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JES, Assiut University, Faculty of Engineering, Vol. 46, No. 5, September 2018, pp.587–598

الارتقاء الحضرى للمطلات النهرية لمدينة المنصورة في مصر باستخدام "معيار ليد" لتطوير المجاورات السكنية

الملخص العربى

اختلفت منهجيات الارتقاء الحضرى للمطلات النهرية فى مدن العالم تبعاً للإمكانات المتاحة من حيث ظروف الموقع وعرض النهر وأيضاً من حيث تاريخ المدينة. وفي مصر تنتشر المواقع الطبيعية والمعالم البيئية وخصائص تريف المدن حول نهر النيل، والذي يتمتع بتميزات جغرافية وثقافية وحضارية، ونتيجة لتلك الخصوصية التي يتمتع بها نهر النيل فقد نما حوله النسق العمراني المصري فى نسيج تطور وتفاعل فيه الإنسان مع المكان، مما تطلب ضرورة اختبار وتطبيق منهجيات التطوير الحضرى لمساراته وخاصة فى المناطق الواقعة داخل المدن والتي تطل علي النهر بما يمثل إسهاماً في منظومة التنمية الشاملة المرتكزة على معايير الاستدامة.

ويهدف البحث إلى تحليل المسار العمراني للمطلات النهرية (المشاية) بمدينة المنصورة بمصر، والسعي نحو تطبيق نظام التقييم المسمى (ليد للمجاورات السكنية LEED-ND) بغرض الوصول إلى حلول متكاملة ومستدامة للارتقاء العمراني للمسار، وللوصول إلى الهدف المرجو له، ويحلل البحث أمثلة عالمية ناجحة في مجال تطوير المسارات المطله على الأنهار، واستخلاص الدروس المستفادة فى تطبيقها محلياً، مع إجراء "التحليل الرباعي" لحالة الدراسة وتحديد أولويات التدخل في إطار الارتقاء ليد التي تضم كلاً من التوصيات بالنمو الذكي والعمران الجيد والعمارة الخضراء والبنية التحتية المستدامة.