

Considerations for Developing an Eco-friendly Riverfront

Background

Riverfronts are dynamic interfaces between urban life and natural ecosystems. Historically, rivers have supported cities by providing water, transport, livelihoods, and cultural identity. However, rapid urbanisation, encroachment, pollution, and infrastructure-heavy development have severely degraded many river ecosystems. In recent years, riverfront development has gained momentum across cities, often aiming to revitalise neglected water bodies and create vibrant public spaces. While these projects bring visibility and investment, they also pose risks of ecological damage if not planned with environmental sensitivity.

As the need for climate-resilient and inclusive urban development grows, it becomes imperative to approach riverfront planning through an eco-centric lens. This guideline on the Do's and Don'ts of Eco-Friendly Riverfront Development serves as a practical reference for urban planners, Urban Local Bodies (ULB) and other stakeholders. It highlights key principles and actions to ensure that riverfront projects not only enhance urban aesthetics but also restore ecological balance, support biodiversity, respect the river's natural hydrology, and safeguard the rights and roles of local communities.

Key Thematic Areas

The Do's and Don'ts for developing the river front has been categorised based on the following key thematic areas:



**Protection of
River's Natural
Features**



**Sustainable
Design and
Materials**



**Climate
Proofing**



**Biodiversity
Conservation**



**Integration of
Socio-economic
and cultural
aspects**



Protection of River's Natural Features

Do's

- ✓ Understand the type and characteristics of the river on which the riverfront is being planned, whether it is perennial or non-perennial, and whether its course is straight, meandering, braided, etc. This analysis is essential for assessing the river's flow patterns, floodplain and identifying areas suitable for riverfront development
- ✓ The natural floodplains, wetlands, marshlands, etc along the river should be preserved as much as possible to avoid hinderance in existing ecosystem functions
- ✓ The river edge should be kept natural wherever possible, and if soil stabilisation or bank protection is required then the natural material, like riparian buffer development, gabion walls, bioengineering materials for edge development, should be used
- ✓ Riverfront development should ensure that the natural connectivity between the river and the groundwater system is not disrupted. The linkage is important for the lateral flow of water between the river and groundwater aquifers.

Dont's

- ✗ Avoid hardscaping or concretising the river edge as much as possible to allow it to perform its natural ecosystem functions such as supporting local biodiversity, groundwater recharge, flood regulation etc.
- ✗ Don't reclaim land from the riverbed, whether for temporary or permanent structures, as it reduces space for the river to flow and increases the risk of flooding. Also, don't create permanent structures within the river that alter or stop the natural flow of the river.
- ✗ Avoid altering the river's natural course by introducing hard infrastructure such as embankments, retaining walls, or channelization within the river's flow path. Such interventions can disrupt the river's natural hydrology, reduce its ability to recharge groundwater



Example 1

The River edge of the MARIBYRNONG RIVER has been kept natural for it to perform its ecological function

Example 2
Restoration of the groundwater-fed natural springs/water bodies and wells in the floodplains under the Kham Riverfront Development



Example 3

Preservation of existing marsh lands and other natural features in Hunter's Point South Park Waterfront in New York



Sustainable Design and Materials

Do's

- ✓ Riverfront design should prioritize open and green spaces, along with continuous, safe, and inclusive access to the river, such as trails, promenades, and seating areas with unobstructed views
- ✓ The design should encourage the use of eco-friendly construction materials, including reclaimed wood, permeable pavements, locally sourced stone, and recycled metals, to reduce environmental impact and support sustainability
- ✓ Traditional water structures such as ghats, stepwells, temples, and cultural ritual spaces should be protected and thoughtfully integrated into the riverfront design to preserve the site's heritage and cultural identity
- ✓ A comprehensive and sustainable waste management system must be incorporated into the riverfront design. It should address all forms of waste, including solid, liquid, and organic, to prevent pollution and protect river health
- ✓ Use renewable energy sources like solar panels, organic waste to reduce carbon footprints and promote energy efficiency

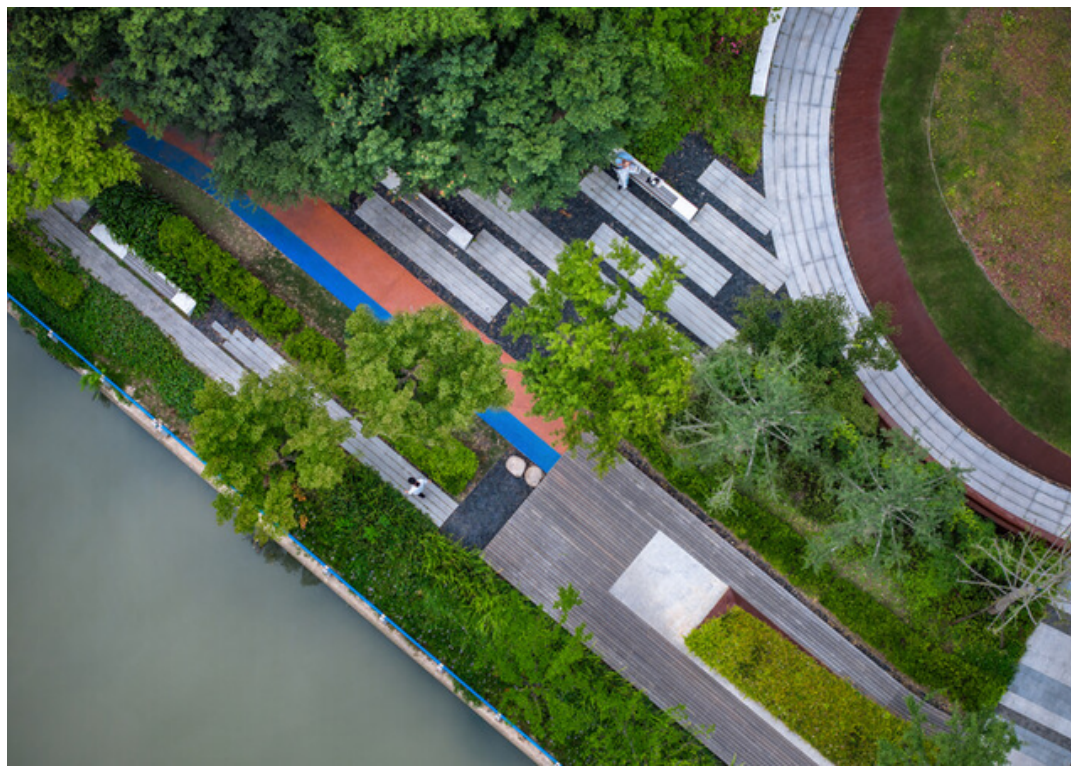
Dont's

- ✗ Do not allow the discharge of solid waste, sewage, or effluents from any infrastructure built along the riverfront. For example, toilets and sanitation facilities near the riverfront must be connected to proper treatment systems and should not release waste directly into the river
- ✗ Avoid the interruption to any of the existing traditional practices linked to the river and associated riparian communities
- ✗ Avoid the use of asphalt or other impermeable surfaces as much as possible, as they trap heat, increase surface runoff, and prevent natural groundwater recharge.



Example 1
Use of recycled material and integration of green space in Kham Riverfront in Aurangabad

Example 2
Provision of open and green spaces in the Jinqiao Caojiagou Riverfront, China



Example 3
Provision of clear views of river from promenades and green spaces in the Guawahati Riverfront



Biodiversity Conservation and Integration of Socio-economic Aspects

Do's

- ✓ Assess the existing biodiversity along the river to understand its ecological condition and evaluate the potential impacts, of the proposed riverfront design
- ✓ Protect and restore the existing green cover, and where new planting is required, use native vegetation that supports local aquatic and terrestrial biodiversity
- ✓ The riverfront should build upon existing socio-economic activities along the river and introduce new opportunities that strengthen the local economy, support livelihoods, and empower surrounding communities, while also minimizing the impact of these activities on the river.
- ✓ The design should ensure access to all sections of society, including informal workers, vendors, local communities, disable people etc. The planning process of the riverfront should also incorporate consultations with the riparian communities
- ✓ The design should incorporate information about the river's natural resources, diverse biodiversity and cultural history to connect people to the river and foster awareness. Art installations that reflect the community's heritage and culture should be provided

Dont's

- ✗ Do not remove natural habitats or existing tree cover during riverfront development, as this can disrupt local biodiversity and alter microclimate
- ✗ Avoid any kind of polluting activities along the riverfront. The pollution or waste being discharged from any existing activities must also be regulated in the design of the riverfront.
- ✗ Avoid planting invasive, non-native species and water intensive plantation in the riverfront landscape design, as they can outcompete native flora and negatively impact local ecosystems
- ✗ Avoid overuse of lighting that creates light pollution and affects birds and other species



Example 1
Restoration of
existing trees and
vegetation along
the Guwahati
Riverfront

Example 2
Community
awareness
campaign along
the Kham
Riverfront



Example 3
Provision of
different activities
like flower garden,
kite festival etc. to
connect people to
Sabarmati
Riverfront



Climate Proofing

Do's

- ✓ The riverfront should not alter the floodplain's capacity to hold water during monsoon season. If any modification is made, it should be able to perform its ecological function of managing the floods. Flood level markers such as high flood line must be taken into account while designing riverfronts.
- ✓ Incorporate flood-resilient design elements, such as elevated trails, adaptable seating areas, floodable landscapes and platforms using locally sourced materials that can withstand fluctuating water levels and seasonal inundation
- ✓ Design the riverfront to respond to urban climate challenges such as flooding, heatwaves, and water scarcity. Integrating green spaces, riparian buffers, and nature-based solutions like bioswales, rain gardens, and sponge parks can significantly enhance resilience and help manage stormwater more sustainably
- ✓ The riverfront design should maintain the local contours as much as possible. It should also include catchment analysis to understand the run-off generation, flow patterns etc. for sustainable stormwater management

Dont's

- ✗ Avoid constructing permanent structures in flood-prone zones, as rivers are dynamic systems and such development increases the risk of flooding and erosion
- ✗ Minimize the use of impermeable, heat-retaining surfaces like asphalt or concrete, as they contribute to urban heat islands and increase surface runoff



Example 1
Provision of floodplain park named Asita East park to absorb the monsoon water along Yamuna River

Example 2
Optimal green and open spaces in Perth Riverfront to manage the urban heat and high water level in Swan river



Example 3
Provision of flood resilient design in the Yanweizhou Park, China

References

- City of Mildura. (n.d.). A Guide to Riverfront Development: Connecting Communities to the Water. Mildura Rural City Council.
- City of Los Angeles. (2019). Los Angeles River Design Guidelines. Bureau of Engineering, City of Los Angeles.
- City of Maribyrnong. (n.d.). Maribyrnong Waterfront: A Way Forward. Maribyrnong City Council, Australia.
- City of Perth. (n.d.). Masterplan for Perth City Riverfront. City of Perth, Western Australia.
- City of Chicago. (2019). Chicago River Design Guidelines. Department of Planning and Development, City of Chicago.
- American Planning Association. (2006). Ecological Riverfront Design (Planning Advisory Service Report No. 578). Washington, DC: APA Planning Advisory Service. [Authors: Margie Ruddick, Anne Whiston Spirn, et al.]

