Ecotourism Based Revitalization of Urban Riverfront: Design Guideline Framework for the Cikapundung Riverbank, Bandung

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Urban rivers in rapidly growing Indonesian cities are frequently marginalized by uncontrolled development, resulting in degraded riparian zones that are ecologically dysfunctional and spatially disconnected from urban life. The study investigates the application of ecotourism principles as a framework for the revitalization of the Cikapundung Riverfront in downtown Bandung, focusing on the abandoned former Palaguna Mall site (±2.5 ha). Through a descriptive qualitative methodology, the research conducts a comparative precedent analysis of the Malacca River (Malaysia) and Cheonggyecheon Stream (South Korea) to derive design criteria across seven urban design dimensions: land use, attraction and character, access and connection, building form and massing, open space, support activities, and preservation. The results suggest that successful riverfront revitalization requires the simultaneous pursuit of sustainable tourism, creative tourism resource development, and dual track preservation, both ecological and historical. This evolved guideline framework encourages mixed use zoning with at least 40% blue green open space corridor, pedestrian priority networks with universal accessibility, building heights not exceeding 12 meters within the riverbank zone and adaptive reuse of colonial era heritage structures. The framework provides a replicable model for tropical urban waterfronts across Southeast Asian cities and offers concrete policy recommendations for the Bandung City Government's ongoing revitalization program.
Keywords: riverfront revitalization; ecotourism; sustainable tourism; design guidelines; Bandung

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1. Introduction

Urban rivers in developing world cities occupy a paradoxical position: they are among the most ecologically significant and historically rich assets a city possesses, yet they are routinely marginalized, collectors of waste, edges of informal settlement, and barriers rather than connectors of urban life. This contradiction is particularly acute in Indonesian cities, where rapid urbanization has outpaced regulatory capacity, leaving riverbanks in states of ecological degradation and physical neglect.

Bandung, as the capital of West Java Province with around 2.69 million inhabitants (Badan Pusat Statistik, 2023) has the Cikapundung River that flows across it. The river is a 28 kilometer tributary of the Citarum watershed, and the riverbank in the city center is plagued by uncontrolled residential encroachment, industrial effluent discharge, and a planning orientation that invariably relegates the river to the urban periphery (Kurniadie et al., 2016; Christiandy & Mussadun, 2014). Bandung's Regional Spatial Plan (RTRW 2022– 2042) designates the Cikapundung riparian zone as a protected area to be developed as green space, recreation, and new urban tourism.

Figure.1 Cikapundung River Riparian Zone
Sumber: Google Earth | Antara News | Detik.com | Urtrips

At the intersection of Jalan Asia Afrika Bandung's historically significant colonial boulevard and the Cikapundung River lies the former Palaguna Mall site, demolished in 2014 and since functioning only as a temporary parking area. This abandoned brownfield, classified within the PPK Alun-Alun strategic heritage zone, represents an opportunity to examine how ecotourism based revitalization can simultaneously address ecological restoration, heritage conservation, and economic activation (Martokusumo, 2008).

Although there is increasing scholarship on waterfront revitalization around the world (Breen & Rigby, 1994; Chang & Huang, 2011; Pramesti, 2017), there is limited research on the specific intersection of ecotourism planning, colonial heritage conservation, and riparian ecological restoration in Indonesian tropical urban contexts. This study addresses two research questions: (1) What criteria must be considered in ecotourism based revitalization of the Cikapundung Riverfront in central Bandung? (2) How can these criteria be operationalized as spatial design guidelines for the former Palaguna site?

2. Methods

This study adopts a descriptive qualitative research design appropriate for generating design criteria and guidelines from contextually embedded conditions (Creswell, 2014). The methodology consists of three sequential phases. Phase 1: Literature Synthesis. Based on the review of urban design theory (Gehl, 2010; Shirvani, 1986; Lynch, 1960), waterfront revitalization literature (Breen & Rigby, 1994, 1996; Martokusumo, 2006, 2008; Pramesti, 2017), riverfront open space characteristics (Aprilia et al., 2020; Sastrawati, 2003), ecotourism planning (Imam, 2023), and Indonesian regulatory frameworks (PUPR

Regulation No. 28/2015), an analytical framework of seven design dimensions was formulated and used throughout the study.

Phase 2: Comparative Precedent Analysis. Two international urban riverfront cases were selected: Malacca River (Malaysia) and Cheonggyecheon Stream (Seoul, South Korea). Selection criteria included: (a) comparability of river scale and tropical/subtropical urban context; (b) presence of both heritage conservation and ecological restoration objectives; (c) demonstrated tourism improvement outcomes; and (d) availability of documented design records.

Phase 3: Site Analysis The analysis of the former Palaguna site and the Cikapundung riverfront were conducted based on the official spatial planning documents (RTRW 2022–2042, RDTR Bandung), climatology data (WeatherSpark, 2023), and existing research on Cikapundung watershed (Darul et al., 2016; Suriansyah & Pangarso, 2006). Dimensions analyzed include land use pattern, activity distribution, circulation and accessibility, building orientation and massing, open space quality, climatic conditions, topography, and riparian vegetation condition. Structured assessment rubrics were developed from the synthesis of the literature and each case was assessed on all seven design dimensions.

3. Results and Discussion

Precedent Analysis: Malacca River, Malaysia

The Malacca River revitalization transformed a degraded colonial harbor into a UNESCO World Heritage tourism corridor. Engineering interventions dredging, interceptor sewer systems, tidal gates, and riverbank retaining walls, addressed acute environmental conditions including severe silting, direct sewage discharge, and bank erosion. The parallel spatial approach established a heritage tourism corridor anchored by preserved shophouses, reappropriated colonial warehouses, and a riverside boardwalk on the remnants of jetty foundations from the VOC era.

Figure.2 Malacca River, Malaysia
Sumber: Airbnb | Trip.com | Shutterstock

Key findings for performance across the seven dimensions are: (1) Land Use: mixed use zoning with a bluegreen buffer of more than 40% of the site area, integrating heritage tourism with residential and commercial functions; (2) Attraction & Character: UNESCO shophouse conservation, innovative craft workshops, and heritage trail connections that foster an authentic sense of place; (3) Access & Connection: boardwalk promenades with accessible design for elderly and disabled users, river cruise

services, and heritage trail networks; (4) Building Form: compact two story massing that maintains historical continuity without new high rise construction, with a minimum 3 meter setback; (5) Open Space: linear riverside park with a jogging track, and mangrove preservation zones that provide ecological habitat; (6) Support Activities: a maritime museum, craft workshops, and an ecotourism center that sustain visitor dwell time; (7) Preservation: the Mallaca Historic City Council Heritage Enactment (2005) requires biennial building inspections, material conservation standards, and riparian setback enforcement.

Precedent Analysis: Cheonggyecheon Stream, Seoul

The Cheonggyecheon restoration (2003–2005) involved demolition of a 5.84 kilometer elevated highway and the restoration of the historic urban stream beneath it. The project employed thematic linear zoning: an upstream History zone (0–2 km) with reconstructed historic canal infrastructure and archaeological displays; a middle Culture zone featuring contemporary art installations; and a downstream Nature zone that emphasizes riparian habitat and ecological continuity.

Figure.3 Cheonggyecheon Stream, Seoul
Sumber: Archdaily

Performance findings include: (1) Land Use: 5.84 km linear bluegreen corridor with riparian buffer zones (10 m ecological, 15 m transition, urban integration beyond), reducing stormwater runoff by approximately 30%; (2) Attraction & Character: historic Gwangtonggyo Bridge restoration as landmark, rotating public art exhibitions, and digital light projections generating strong night branding; (3) Access & Connection: 10.9 km pedestrian only corridor, 22 bridges, buspriority traffic policy reducing downtown vehicle emissions; (4) Building Form: maximum 3 story height with 5–10 m setbacks replicating Joseon era settlement patterns; (5) Open Space: riparian planting of native species reduced local temperatures by 5.9°C relative to surrounding areas; (6) Support Activities: digital information kiosks, maker spaces, AR cultural interpretation, and popup creative markets; (7) Preservation: traditional stone without mortar bridge reconstruction, IoT water quality monitoring, and 5 year ecological restoration cycles. Economic cobenefits included land value increases of 35–80% within one year of completion.

Comparative Summary

Table 1. Comparative precedent analysis and derived design principles for the Cikapundung Riverfront, Bandung

Dimension	Malacca River	Cheonggyecheon	Principle for Bandung
Land Use	Mixed use; bluegreen	Thematic linear zones;	Mixed use; thematic

Dimension	Malacca River	Cheonggyecheon	Principle for Bandung
	≥40%; heritage tourism corridor	bluegreen ≥40%; water sensitive design	zoning; bluegreen ≥40%
Attraction & Character	Heritage shophouses; UNESCO walking trail; craft workshops	Historic bridges as landmarks; contemporary art; night projections	Jalan Asia Afrika heritage + river as dual attraction; night activation
Access & Connection	Boardwalk; river cruise; universal design	10.9 km pedestrian corridor; 22 bridges; bus priority	Car free riverbank path; access every 100 m; water taxi
Building Form & Massing	≤2 floors; 3 m setback; heritage façade retention	≤3 floors; 5–10 m setback; view corridor protected	≤3 floors (≤12 m); 5–10 m setback; river orientation
Open Space	Linear park; mangrove buffer; jogging track	40% bluegreen; 15 m+ riparian buffer; −5.9°C effect	Riparian corridor ≥15 m; amphitheater; pocket parks
Support Activities	Maritime museum; craft workshops; ecotourism center	Digital kiosks; AR tours; maker spaces; pop up markets	UMKM kiosks; ecolab station; smart signage every 400 m
Preservation	MBMB Heritage Enactment; 20 m riparian setback; biennial inspection	Traditional bridge methods; IoT water monitoring; 5 year cycles	Adaptive reuse; heritage class A/B protection; IoT monitoring

Site Analysis: Former Palaguna Site

The former Palaguna site (±2.5 ha) occupies a position of exceptional urban significance: it fronts Jalan Asia Afrika, Bandung's colonial heritage boulevard; it borders the Alun-Alun (city square) and Grand Mosque; and it is traversed by the Cikapundung River on its western boundary. The City/Regency Spatial Plan (RTRW) 2022–2042 classifies the site within the PPK Alun-Alun strategic heritage zone, permitting mixed commercial, cultural, recreational, and transit oriented uses, with minimum building coverage (KDB) of 70%, floor area ratio (KLB) of 2.8, and mandatory green space (KDH) of 20%.

Land use analysis reveals a fragmented brownfield surrounded by active colonial era commercial buildings and government offices, with no organized pedestrian connectivity to the riverbank. Building typologies are Dutch colonial (1-2 storeys, pitched tile roofs) to modern multi storey commercial buildings with a heterogeneous typology and no orientation to the river. Analysis of circulation shows good access to public transit (Trans Metro Bandung) within 200m, but lack of pedestrian infrastructure along the riverbank and disjointed bicycle infrastructure. Climatological data (WeatherSpark, 2023) shows mean annual temperature is 22-27C, peak rainfall is January (266mm/month), dominant winds are easterly (prevailing 7.9 months a year), and outdoor tourism conditions are good from June to September. This data informs design responses including shaded pedestrian corridors (≥60% canopy cover), courtyard building typology with easterly wind axis for passive ventilation, and permeable open space infrastructure for stormwater management. Topographic conditions are relatively flat (1–2% slope, 3–6 m elevation differential), with existing riparian vegetation sparse and ecologically fragmented offering significant opportunity for native species restoration.

Design Guideline Framework

Synthesizing the literature review, comparative analysis, and site findings, the following seven dimension guideline framework is proposed for the ecotourism based revitalization of the former Palaguna site.

a. Land Use and Zoning
The site should be organized into four integrated zones: (1) Riverside Heritage Zone: a minimum 15 meter green buffer along the Cikapundung bank with river fronting cultural and light commercial programming; (2) Cultural and Creative Industry Zone: adaptive reuse of heritage structures for galleries, workshops, and food and beverage; (3) Civic and Public Space Zone: plaza and amphitheater aligned with the existing Alun-Alun axis; and (4) Mobility and Service Zone: integrated parking on the outer ring with public transit connections. A minimum of 40% of total site area must be designated as bluegreen open space. Flexible space design must accommodate pop up markets, seasonal festivals, and temporary installations to sustain activity throughout the day (minimum 12 operating hours).

b. Attraction and Character
Attractions should span three categories. Natural attractions must optimize the river edge as the primary experiential destination through promenades, observation platforms, and wateredge seating. Cultural attractions should pursue adaptive reuse of surviving colonial era structures (Heritage Class A and B) for museum, gallery, and creative workshop functions, connected by a heritage interpretation trail linking to the Museum Asia-Afrika. Built and programmed attractions should include a landmark art installation, digital light projection programming on heritage façades for nighttime activation, and a seasonal event calendar cocurated with local communities. Site character should be expressed through a coherent material palette drawing on local stone, reclaimed timber, and water motifs referencing the Cikapundung's urban history.

c. Access and Connection
A car free pedestrian and bicycle corridor minimum 6 meters wide, with shade canopy exceeding 60%, should be established along the entire riverbank length. Universal access points, ramps, boardwalks, and pedestrian bridges, must be provided at maximum 100 meter intervals. Route gradients must not exceed 5%, with non slip surfaces and tactile paving. Integration with the Trans Metro Bandung network and existing Jalan Asia Afrika bicycle lane is mandatory. Water transport (river cruise, water taxi) should be developed as a recreational transit option connecting the site to upstream and downstream riverfront nodes, consistent with the Bandung City Government's Cikapundung tourism masterplan.

d. Building Form and Massing
New or infill structures within the riverside zone must not exceed 3 stories (approximately 12 meters) to preserve the river view corridor and maintain human scale streetscape. Setbacks of 5–10 meters from the regulatory riverbank line must function as communal open space and flood retention buffer. Building orientation should align primary axes with the dominant easterly wind direction using courtyard typologies to promote natural ventilation. Material selection should prioritize local stone, bamboo, reclaimed timber, and recycled brick. Lightweight contemporary infill (canopies, pavilions) is appropriate where it does not obscure heritage façades. Amphibious architecture principles (flood resilient ground floor design) are recommended within the 100 year flood zone.

e. Open Space
A riparian green corridor minimum 15 meters wide must be established along the Cikapundung bank, planted with native riparian species to restore ecological function, reduce bank erosion, and lower ambient temperature. The corridor must include rain gardens, constructed wetlands, and permeable paving to improve stormwater infiltration and water quality. Public open space programming must provide: a riverside amphitheater (capacity approximately 500 persons); flexible multipurpose lawns for sports and community activities; pocket parks at 50 meter intervals; and a

children's inclusive play area. Cool pavement and shade tree coverage exceeding 60% of open space area are essential for thermal comfort.

f. Support Activities and Amenities
Public amenities must include accessible toilets (one per 600 m of riverbank path, solar powered), prayer room and nursing room, and digital information kiosks with real time displays of maps, event schedules, and river water quality data (placed every 400 meters). An ecolab river monitoring station open to educational visits should be integrated into the riverside heritage zone. Commercial amenities should prioritize local UMKM enterprises through zero plastic food and beverage kiosks, artisan market spaces, and creative industry incubator units within adaptively reused heritage buildings. Smart city infrastructure (Wi-Fi, motion activated LED lighting, IoT water quality sensors) is recommended to reduce operational energy consumption and enhance visitor safety.

g. Preservation
Historical preservation must protect all Heritage Class A and B structures through façade retention, prohibition of demolition, adaptive reuse as the preferred intervention strategy, community artisan involvement in conservation works, and biennial conservation inspections. Ecological preservation must include Cikapundung riparian ecosystem restoration through elimination of direct sewage discharge (interceptor sewer infrastructure), continuous IoT linked water quality monitoring, prohibition of waste dumping and unauthorized construction within the riparian setback, and community led 'adopt a riverbank' stewardship programs. The dual track preservation approach simultaneously protecting built heritage and natural ecosystem is identified as the framework's most critical strategic distinction from conventional urban commercial redevelopment.

4. Conclusion

This study developed an evidence based, seven dimension design guideline framework for ecotourism based revitalization of the former Palaguna site on the Cikapundung Riverfront in central Bandung. Derived from comparative analysis of Malacca River (Malaysia) and Cheonggyecheon Stream (South Korea), supported by comprehensive site analysis, the framework addresses land use, attraction and character, access and connection, building form and massing, open space, support activities, and preservation.

Three overarching principles emerge. First, sustainable tourism in an urban riverfront context requires ecological health and cultural authenticity as coequal design priorities. Second, creative tourism resource development transforming the Cikapundung's natural and colonial heritage into authentic experiential visitor offerings is the most viable economic activation strategy, provided it is grounded in genuine community participation. Third, dual track preservation simultaneously protecting the riparian ecosystem and the Jalan Asia Afrika heritage corridor is not only ethically necessary but constitutes the site's most durable competitive advantage over generic urban commercial redevelopment.

The framework offers the Bandung City Government a directly applicable planning instrument for the Palaguna revitalization initiative under City/Regency Spatial Plan (RTRW) 2022–2042 and the Urban Subregion (SWK) Karees Creative District (Karyapolis) development agenda. Beyond Bandung, the framework provides a replicable methodology for tropical Southeast Asian cities facing analogous brownfield riverfront revitalization challenges. Future research should pursue participatory design processes with Cikapundung riverbank communities, quantitative post occupancy evaluation once revitalization is implemented, and hydrological modeling to validate the bluegreen infrastructure performance under projected climate scenarios.

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