Formosa Journal of Sustainable Research (FJSR)
Vol. 5, No. 4 2026: 271-282

Conservation and Revitalization of the Ciliwung Riverbank Area in Manggarai Village, Tebet District, South Jakarta

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A R T I C L E I N F O

Keywords: Riverbanks, Ciliwung River, Conservation, Slums, Revitalization

Received : 21, December
Revised : 23, February
Accepted: 25, April

A B S T R A C T

The Ciliwung riverbank area in Manggarai Village, Tebet District, South Jakarta is one of Jakarta's most critical informal settlement zones, characterized by high population density, inadequate sanitation, lack of green open space, and recurring flood disasters. This study aims to examine the physical and non-physical conditions of the area and propose a conservation and revitalization design concept that responds to community needs, spatial regulations, and future development of Manggarai Station as Jakarta's central railway hub. Using qualitative and quantitative methods including field observation, community interviews, site analysis, and architectural design, the study identifies the area's potential and constraints. The research covers three RW (neighborhood units): RW 01, RW 04, and RW 10, with a combined population of approximately 9,177 residents, of whom around 2,500 live directly on the riverbank.

DOI prefik: https://doi.org/10.55927/fjsr.v5i4.30
ISSN-E: 2830-6228
https://journalfjsr.my.id/index.php/fjsr

INTRODUCTION

Jakarta, as Indonesia's economic capital, concentrates approximately 65% of national monetary circulation and hosts 80% of economic activity in the country (Rahmatulloh, 2017). This rapid economic growth has attracted large waves of migration, resulting in an imbalance between population growth and available land particularly for residential use. As a consequence, many residents have settled along riverbanks, including the Ciliwung River corridor in Manggarai Village, Tebet District, South Jakarta.

The Ciliwung River, stretching 120 km from its headwaters in the Bogor highlands (Gunung Pangrango, Gunung Gede, and Cisarua) to the northern coast of Jakarta, has a watershed area of 387 km². The river is divided into three sub-watersheds: the upper Ciliwung (15,251 hectares in Bogor Regency and City), the middle Ciliwung (16,706 hectares in Depok, Bekasi, and Bogor), and the lower Ciliwung (6,295 hectares in DKI Jakarta). By 2020, forest cover in the watershed had declined to only 9.7% (3,693 hectares), well below the ideal 30% green open space threshold (Rahmad, 2020). Research by LIPI revealed that approximately 92.5% of fish species in the Ciliwung have gone extinct due to persistent water pollution (Hadiaty, 2017).

The informal settlements along the Ciliwung riverbank in Manggarai are characterized by dense, back-oriented housing structures that use the river as a waste disposal site. This pattern has caused severe water pollution, recurring floods, inadequate sanitation, and minimal public space for residents particularly children, who are forced to play on busy road shoulders in the absence of designated recreational areas (Saranta, 2017).

Government Regulation No. 38 of 2011 on Rivers mandates that tendencies harmful to rivers must be controlled to achieve a sustainable and harmonious balance between river functions and human life (PP No. 38/2011). Addressing these challenges requires long-term planning solutions including the establishment of clear riverside setback lines, green buffer strips, and functional Ruang Terbuka Hijau (RTH) along the riverbank corridor. Conservation—protecting and maintaining river function for present and future generations—must be complemented by revitalization, which enhances the quality and value of the riverbank area through improved social, cultural, and economic spaces (Setiawan, 2021).

This research focuses on the Ciliwung riverbank area in three RW neighborhoods (RW 01, RW 04, and RW 10) in Manggarai Village, as a student design studio project. It aims to provide a systematic description of existing field conditions physical (buildings, land, vegetation, river) and non-physical (social, economic, cultural dimensions) and to propose a conservation and revitalization design concept consistent with applicable spatial regulations.

LITERATUR REVIEW

The Conservation and Revitalization of Riverbanks

River conservation is the effort to utilize, protect, restore, and maintain river functions for present and future needs (Setyowati, Hardati & Arsal, 2018). Revitalization, by contrast, aims to enhance the quality and value of an area by repairing and creating spaces that are beneficial for social, cultural, and economic activities (Purwantiasning, 2015). The two approaches are complementary: conservation preserves ecological function while revitalization restores human-environment relationships that have been degraded over time. According to Wuisang, Sutrisno & Sondakh (2019), revitalization strategies must be grounded in the physical, social, and cultural context of the area. Mauliani, Nurhidayah & Masruroh (2012) highlight the importance of integrating riverbank conservation with urban design principles, citing Boat Quay in Singapore and the Ciliwung corridor as contrasting case studies: where Singapore has transformed its waterfront into a vibrant commercial and cultural destination, Jakarta's Ciliwung remains burdened by informal settlement pressures.

Informal Riverbank Settlements and Spatial Regulations

Soemarno (2007) defines riverbank settlements as residential areas located within the protected zone of rivers, typically populated by lower-income households who occupy the land due to limited affordable alternatives in the city. Eni (2018) notes that the spatial character of these settlements reflects a strong dependency on the river as both a resource and a waste-disposal system, resulting in progressive ecological degradation. Based on Jakarta's City Planning Information (IRK 2022), the Manggarai riverbank site is designated for urban forest (hutan kota), city parks, billboards, and conditional strategic uses. Key spatial parameters include: KLB (Floor Area Ratio) = 2 floors maximum; GSB (Building Setback Line) = 3 metres; GSS (River Setback Line) = 10 metres. These regulations constrain the design parameters but also provide a clear framework for sustainable development.

Green Open Space and Recreational Infrastructure

RTH (Ruang Terbuka Hijau/Green Open Space) refers to outdoor areas with a natural or planted character, providing ecological, social, and aesthetic services to urban communities. RTH reduces surface runoff by absorbing rainfall, mitigates urban heat island effects, and provides recreational space for residents. Benchmark studies of Taman Indonesia Kaya and Taman Srigunting in Semarang demonstrate that well-designed urban parks with jogging tracks, play equipment, seating, and hawker zones significantly improve community quality of life (Anggreini, 2021).

Vertical Housing (Rumah Susun)

Rumah susun (vertical housing) is a multi-storey residential building divided into separate units that can be occupied individually, typically developed to address land scarcity in dense urban areas. For this study, the Rusunawa (rental flats) model is most appropriate, targeting lower-to-middle income households. The design incorporates ruko (shophouse) units on the ground floor to accommodate the large proportion of trading households in the study area. According to PP No. 38/2011 and standard architectural norms, residential unit sizes of 40 m² are considered the minimum adequate standard for a family of four (BPHN, 1992).

Sewage and Waste Management

The absence of adequate sewage infrastructure is a critical driver of river pollution in the Manggarai area. An Instalasi Pengolahan Air Limbah (IPAL/Wastewater Treatment Plant) processes domestic wastewater before it is discharged into the river, removing biological and chemical contaminants. The 3R principles (Reduce, Reuse, Recycle) guide solid waste management, aiming to minimize environmental impact and recover resources from waste streams.

METHODOLOGY

This study employs a combined qualitative and quantitative approach conducted over five months (November 2021–March 2022) in the Ciliwung riverbank area, specifically covering RW 01, RW 04, and RW 10 in Manggarai Village, Tebet District, South Jakarta. The research consisted of four stages:

1. Field survey:
   Direct observation of the riverbank settlement conditions, photographed and documented systematically. Interviews were conducted with local residents to gather demographic data, occupational profiles, and perceived community needs.
2. Literature and regulatory review:
   Collection of spatial regulation documents (IRK 2022, PP No. 38/2011), architectural standards for residential units and public spaces, and precedent studies of comparable riverbank revitalization projects.
3. Site analysis:
   Systematic analysis of land conditions covering climatology (sun direction), noise levels, access patterns (pencapaian), viewsheds, surrounding land uses, and utility systems. AutoCAD was used to produce accurate 2D plans and site diagrams.
4. Design concept development:
   Synthesis of analysis findings into a zoning scheme and architectural design concept that responds to community needs, spatial regulations, and future development scenarios for Manggarai Station as Jakarta's central railway hub.

The study site, located at Bantaran Sungai Ciliwung RT 01-03/RW 04, Kelurahan Manggarai, covers a total area of 38,351 m². Population data were obtained from Manggarai Village administration (June 2021). Building objects were selected purposively based on their representativeness of the three settlement typologies observed along the riverbank corridor.

RESEARCH RESULTH AND DISCUSSION

Existing Conditions and Community Profile

Field observation revealed that the Ciliwung riverbank in Manggarai presents a complex pattern of urban degradation. The front face of the settlement along the main road has incomplete pedestrian infrastructure, which terminates at the entrance to Manggarai Station. On the riverbank side, housing is densely packed with no setback from the river edge, and domestic sewage is discharged directly into the Ciliwung without any treatment. Electrical wiring is unregulated, and children are frequently observed playing on road shoulders due to the complete absence of recreational facilities.

Figure 1. Field Observation
(Sumber : google maps)

Community demographic data for the three RW units are summarised in Table 1. The total population within the study area is 9,177 residents (4,567 male, 4,610 female). Of these, approximately 2,500 people live directly on the riverbank after excluding TNI residential compound residents and those not in the riparian zone.

Table 1. Population Distribution by RW in Research Area

RW	Male (WNI)	Female (WNI)	Total
RW 01	1,193	1,274	2,467
RW 04	2,313	2,311	4,624
RW 10	1,061	1,025	2,086
Total	4,567	4,610	9,177

Source: Manggarai Village Office, 2021

Occupational data indicate that the majority of residents are traders (5,556 persons), private sector employees (4,351), and daily labourers (2,181). This occupational profile is critical to the design approach: a significant portion of households depend on informal street-based commerce, meaning any relocation scheme must integrate commercial functions within the proposed building typology. Educational data show that the largest group currently in the school system is at the primary school level (2,771 children), highlighting the urgent need for children's play areas and recreational infrastructure.

Site Analysis

The site of 38,351 m² was assessed against the applicable spatial parameters. Given a KDB (site coverage) of 30%, the maximum buildable footprint is 11,505 m². The KLB of 0.6 yields a maximum total floor area of 23,010 m², with a maximum of two floors. Green open space requirement (KDH) is 45%, equivalent to 17,258 m². The site was subdivided into four functional zones as shown in Table 2.

Table 2. Site Zone Distribution

Zone	Function	Area (m²)
A	Commercial Flats (Rusun Komersil)	8,915
B	Commercial & Accommodation	8,708
C	TNI Residential Compound (not redesigned)	7,308
D	Community Park (RPTRA)	13,420
	Total Site	38,351

Climatological analysis showed that maximum solar exposure affects Zone B (commercial/accommodation) and Zone D (park) during midday hours, due to their southerly-exposed positions. Zone A (rusun) receives partial shading from adjacent structures. Noise analysis identified Manggarai Station as the primary noise source, influencing orientation and facade treatment for Zone B. Two main vehicular access points were identified: the primary entrance from the main road, and a service road along the northern riverbank edge designated for waste collection and utility trucks.

Design Concept: Commercial Flats (Zone A)

Zone A accommodates the resident population of approximately 2,500 persons (estimated 625 households at 4 persons/household). The proposed rusun comprises 12 buildings, each two storeys. Two unit typologies are provided: (1) standard residential units (5 m × 8 m = 40 m²), containing 2 bedrooms, living room, dining room, kitchen, and bathroom; and (2) ruko units (shophouse flats) where the ground floor serves as a commercial space and the first floor provides a 1-bedroom residential unit. The ruko typology directly addresses the needs of the 5,556 traders identified in the community survey.

Supporting infrastructure in Zone A includes a sewage treatment system (IPAL) on the northern edge, ensuring that all domestic wastewater is processed before discharge into the Ciliwung. A clean water distribution system using underground storage tanks (GWT) and pumps serves each building block. A green courtyard at the centre of the zone provides communal outdoor space, preserving the social character of the original settlement. The rusun layout maintains a 10-metre GSS from the river edge and a 3-metre GSB from the internal road.

Figure 2. Design of Commercial & Accommodation Area

Design Concept: Commercial & Accommodation Area (Zone B)

Zone B capitalises on the strategic location opposite Manggarai Station, which is planned to become Jakarta's central railway hub. The accommodation concept adopts a capsule hotel typology: each capsule unit measures 1.3 m × 2.3 m, stacked in pairs (2 tiers, 10 units per room, 20 capsules per room), minimising cost while maximising occupancy. Zone B contains 12 capsule hotel buildings, 18 commercial tenant units, 3 outdoor dining areas, 4 service buildings, and a dedicated pedestrian overhead bridge (JPO) connecting the commercial zone directly to the station. A central service management building is positioned at the midpoint of Zone B to facilitate operation of all facilities. This commercial-accommodation cluster serves dual purposes: providing a revenue-generating asset that can support maintenance of the entire revitalized area, and creating formal employment opportunities for displaced residents who previously operated informal street stalls.

Figure 3. Design of Commercial & Accommodation Area

Design Concept: Community Park / RPTRA (Zone D)

Zone D (13,420 m²) responds directly to the most acute social deficiency identified in the field: the total absence of safe recreational space for children and community interaction. The park design adopts a curvilinear landscape pattern, combining curved path forms with circular spatial nodes, integrating the following elements: a central green field serving as both a children's outdoor play area and a jogging track perimeter; a water feature (decorative pond) improving micro-climatic cooling in this high-temperature zone; dedicated vendor areas providing formal space for itinerant traders; parking zones to eliminate illegal on-street parking; and planted buffer strips along the road edge to improve pedestrian safety and reduce heat exposure.

The park layout ensures visual connectivity to the Ciliwung River through strategic clearances in the building mass, allowing residents to develop a positive relationship with the waterway rather than treating it as a back-of-house waste channel. RTH within Zone D exceeds the 45% KDH requirement, contributing to the overall ecological performance of the site.

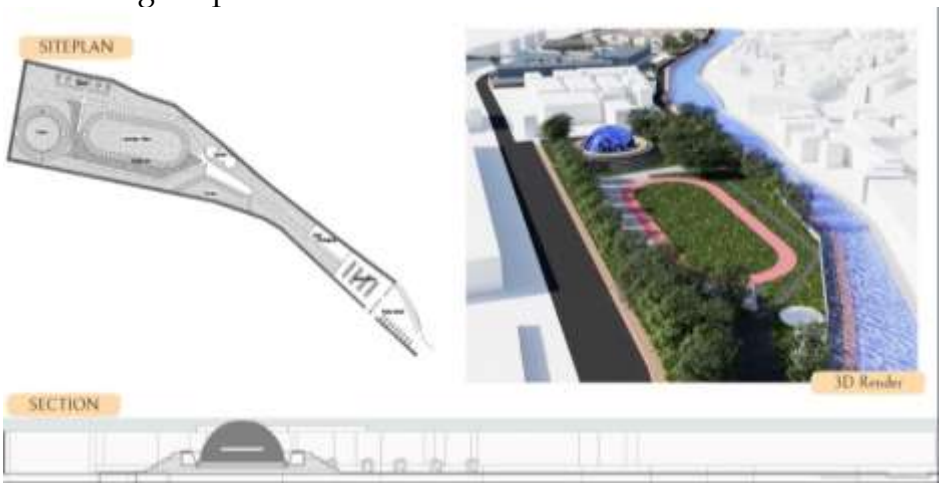

Figure 4. Design of Community Park/RPTRA

Integrated Spatial Summary

Table 3 provides a consolidated summary of the proposed design interventions across the three designed zones. Together, they address the full spectrum of community needs identified during fieldwork: housing security, livelihood continuity, sanitation, recreation, and ecological sustainability.

Table 3. Summary of Design Interventions by Zone

Zone	Key Design Elements	Primary Beneficiaries
A – Rusun	12 rusun blocks; residential & ruko units; IPAL; GWT; communal courtyard	Existing 2,500 riverbank residents
B – Commercial	12 capsule hotel buildings; 18 tenant units; 3 outdoor dining areas; JPO to station	Station users; employed community members
D – Park	Green field; jogging track; water feature; vendor area; parking; buffer planting	Children; all community members

CONCLUSION AND RECOMENDATIONS

This study has documented the severe physical and social degradation of the Ciliwung riverbank settlement in Manggarai Village and proposed an integrated conservation and revitalization design that responds to community profiles, applicable spatial regulations, and the forthcoming transformation of Manggarai Station into Jakarta's central railway hub. Four key conclusions are drawn:

1. The dominant occupation of residents as traders (5,556 persons) necessitates a building typology that integrates residential and commercial functions (ruko). A purely residential relocation scheme would destroy community livelihoods and lead to rapid re-informalization.
2. The absence of sewage treatment infrastructure is the primary driver of Ciliwung River pollution from this settlement. Installation of an IPAL within the rusun complex is a non-negotiable ecological prerequisite for any revitalization intervention.
3. The proximity to Manggarai Station planned as Jakarta's central hub creates a unique economic opportunity. The commercial-accommodation zone (Zone B) can generate passive income through capsule hotel operations and tenant rentals, providing a sustainable funding model for ongoing site management.
4. The community park (RPTRA, Zone D) directly addresses the most visible social deficit: children playing on busy road shoulders. By providing safe, designed recreational space, the park also contributes ecological services (urban cooling, stormwater management) and creates a platform for positive community interaction.

Policy recommendations include: immediate establishment of clear riverside setback zones (GSS 10 m) with enforcement; phased relocation of riverbank households to the proposed rusun during construction; integration of the IPAL operation into the formal utility management system of DKI Jakarta; and inclusion of the Zone B commercial cluster in the Manggarai Station Master Plan as a transit-oriented development component.

ADVANCED RESEARCH

Further research is still being conducted to learn more about the conservation and revitalization of the Ciliwung riverbank area in Manggarai Village, Tebet District, South Jakarta.

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