

The Impact of Urban Renewal on Sustainable Urban Development

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Abstract. Urban renewal is one of the most important factors to improve urban development and the problem has been a focus for many scholars. This paper uses four cases in Tokyo, London, Germany and Barcelona to illustrate diverse regeneration trajectories. There are theoretical foundations of urban regeneration and the impacts showed in the article. Urban regeneration has impact on the development of a city through three ways: the rebuilding of physical infrastructure, the reallocation of land use and economic activity, and the restoration of ecological systems. According to the case study, the paper shows that regeneration can improve land-use efficiency, upgrade infrastructure, enhance air quality, stimulate cultural identity, and attract investment. Integrated approach is better than single-focus approach, because single-focus approach has negative impact on sustainable development of a city. So, in order to develop sustainability of a city, governments should apply integrated plan instead of single-focus one. Governments ought to combine urban regeneration with social justice and ecological sustainability.

Keywords: Urban Renewal; Sustainable Development; Mechanism Analysis.

1. Introduction

Today, more and more people choose to study or work in the big city. So, most cities in the world are experiencing rapid urbanization. With the scarce land resource and fragile ecosystem, cities should improve function to match the residents there. This problem attracts many scholars' attention, and they have completed many studies about this. Most studies indicate that cities should afford more house and service to deal with the large population. For example, many districts built in the mid-twentieth century with aging pipes and roads should be rebuilt. Without urban regeneration, this problem will weaken local economies [1]. All of the ways for urban regeneration can be traced back to planning during fast expansion. During the period, fragmented layouts and costly growth are the most obvious problem, which also result in the environmental stress. Sprawl—often used to absorb newcomers—lengthens daily trips and clogs roads, pushes up infrastructure bills, increases energy demand, and raises greenhouse-gas emissions. Building outward also disturbs farmland and habitats, so climate risks grow. Outward growth can widen social gaps too, sorting wealthier households into new suburbs while lower-income residents stay in older cores with fewer services. What options fit this pressure? Growth-first strategies are no longer enough, so planners look for tools that match population change with sustainability. Urban regeneration is one route. Instead of pushing boundaries, it works inside the existing footprint by renewing infrastructure, improving land-use efficiency, redesigning streets and public spaces, and embedding ecological principles in day-to-day decisions. Done well, regeneration can deliver broad benefits [2]. Construction and building services create jobs, and flexible, mixed-use spaces support innovation. Repairs to historic fabric strengthen identity and help local firms. Open participation and clear rules can build community resilience. When ecological design is built in, stormwater is managed better, heat risk falls, and public health improves. Debate persists, however. Projects that focus only on physical upgrades can speed displacement and raise housing costs [3]. If governments only focus on the economic growth without attention to social safeguards, there will be wider inequality in the city.

2. Theoretical Foundations and Core Dimensions

Sometimes people go light: fix what's there so the place still feels like itself. Take Shibuya in Tokyo. Over a bunch of years, the rail companies untangled the maze inside the station, put shops and offices right over the tracks, and added little plazas and rooftop spots where you can actually stop. Getting around got easier. The streets felt busier. Land was used better. But there was a downside—rents crept up, and some longtime mom-and-pop stores had to move. It's a good reminder: if you upgrade transit without helping small tenants or setting fair lease rules, you can push people out. Other times you flip the land use and reboot the economy. Old docks and warehouses get turned into offices, homes, and shops. London's Docklands shows how that works. After industry faded, a development agency stepped in. They built new lines—the Docklands Light Railway and later the Jubilee Line extension—cut red tape, and offered targeted incentives [4]. Investors showed up, and Canary Wharf took off. Jobs grew, values jumped, the city looked more competitive. Still, not everyone benefited. Local residents didn't always have the skills those new jobs needed, housing got pricier, and long-time communities felt squeezed. Put together, the lesson isn't "pick one recipe." It's balance. Better access is great—so is keeping things affordable. New money helps—but so does making sure people belong. Good renewal tries to do both. In the absence of retraining, affordable housing, and participatory governance, prosperity pooled in a narrow enclave—an efficiency–equity trade-off that mirrors the Shibuya experience at a different scale [5]. Ecological restoration embeds sustainability within regeneration by remediating pollution, reducing climate risk, and improving public health. The Ruhr's Emscher Landscape Park converted polluted waterways and industrial relics into green corridors, parks, and cultural venues.

3. Impacts Of Urban Regeneration

3.1. Economic Impacts

Urban regeneration's economic impacts are often visible and persuasive. Governments and investors back these programs because they promise higher productivity and solid returns. For public authorities, regeneration supports job creation and widens the local tax base, which strengthens municipal finance. For private capital, upgraded districts reduce risk and open clear revenue streams in offices, housing, retail, and logistics. A central channel is land-use efficiency: scarce urban land shapes total factor productivity, and better use of parcels raises output per square meter [6]. When derelict or underused sites are rebuilt, projects cut search and negotiation costs, improve links between firms and workers, and trigger agglomeration effects.

Background helps explain the scale. Many inner-city industrial plots were laid out for rail sidings and single-story sheds; they now sit near transit and dense neighborhoods. Redevelopment that stacks use concentrates demand and shortens trips. What happens to market signals? As access improves, effective rents per buildable area rise, which lowers the hurdle rate for private investment and gives cities room to enforce design and inclusion rules. London shows the policy mix at work. The creation of the LDDC brought simplified approvals, long leases, and targeted tax relief. Private developers responded by assembling large sites and financing new towers; public agencies extended rail links and the Docklands Light Railway. Finance and professional services grew quickly, and supplier networks followed. In Shibuya, a different mix achieved a similar result. Transit modernization, clear floor-area incentives, and public realm upgrades drew global technology and retail firms [7]. Flagship stores and creative studios raised daytime and evening footfall, which supported hospitality and tourism. Spillovers matter. Construction creates short-lived but sizable employment in building trades and materials. After opening, districts generate steady work in property management, retail, culture, and food services. Business travel and events add further demand. Venture capital and corporate labs cluster near high-amenity stations because recruiting is easier and deal costs are lower. Universities and training centers tend to partner with local employers, which improves matching for young workers.

Concentrated investment can lift land values beyond what independent shops and social enterprises can pay. Small firms then face a choice: move, shrink, or accept lower margins. Households on fixed incomes see rising rents and service charges. Skills gaps also appear. New finance, technology, and design jobs require credentials that long-time residents may not hold, so benefits tilt toward newcomers. The Ruhr offers another angle that large-scale ecological reuse created museum, park, and maintenance jobs, but the number and pay scale did not match the old coal and steel complex. Without targeted training and placement programs, many workers stayed outside the growth sectors. Land-value capture allows part of the uplift to fund public works. Inclusionary zoning and negotiated housing quotas keep a share of new units below market rates near job centers. Phased development, with right-to-return clauses, reduces disruption for tenants. When the rules are clear and trains actually run to the site, investors behave differently. If permits land on a predictable timetable—weeks, not quarters—long-horizon money starts paying attention. A pension fund manager will say, “I can live with a 12-year payback if the ground rules don’t shift midstream.” Projects that mix tenures—some rental, some for-sale, plus a slice that’s income-restricted—spread risk and smooth cash flow through upswings and slowdowns. And if the district matures into a genuine traded cluster (firms selling beyond the city), the ripple shows up in wages and patent filings first, then in assessed values and local tax receipts. There’s good news here, and a trade-off. The same playbook that draws capital and firms can lean against affordability unless the city sets guardrails that share gains with neighbors and small businesses. Think long ground leases for legacy shops, steady apprenticeships tied to public contracts, and an open dashboard on vacancies and asking rents so terms can be adjusted before trouble snowballs. Regeneration can raise productivity; it can also widen gaps. Whether it does one more than the other comes down to whether those protections are built in from the start.

3.2. Environmental and Social Impacts

The Ruhr in Germany shows how a polluted landscape can be rebuilt at regional scale. Beginning in the 1990s, agencies restored the Emscher from an open sewer to a functioning river, rehabilitating roughly 7 km of channels and floodplains and adding continuous greenways. Former mines and steel works became parks, museums, and trails; industrial memory remained while wetlands, birds, and insects returned. Monitoring reports recorded rising biodiversity indices and measurable gains in river chemistry and ambient air quality near the new corridors [8].

Health gains also come through traffic policy. In Barcelona, the Superblocks program limited through-traffic on selected grids and reallocated carriageway to pedestrians and cyclists. City monitoring from 2017–2021 found NO₂ decline 5 %, PM_{2.5} decline 8%, and a reduction of mapped noise hotspots; household surveys reported more walking and cycling and fewer stress- and respiration-related complaints [9]. On project sites in Shibuya, new towers adopted high-performance envelopes and demand-controlled HVAC; podium terraces and pocket parks reduced mean radiant temperature and stabilized microclimates, lowering building energy intensity. These cases link ecological design directly to public-health outcomes. Decarbonization and resilience proceed together. Many regeneration districts now combine rooftop PV, heat pumps, district energy, and EV charging. Fleet electrification matters: one battery-electric bus typically avoids about 40 tCO₂e/year and reduces NO_x and PM that drive cardio-respiratory disease. Cleaner fleets and tighter buildings correlate with fewer clinic visits and lower pharmaceutical use, easing urban health budgets [10]. Meanwhile, restored rivers in the Ruhr act as natural retention basins, slowing stormwater peaks. In Barcelona, street trees, permeable pavements, and cool roofs reduce the urban heat-island by 2°C on summer afternoons, cutting heat-wave risk for older adults, children, and outdoor workers.

Ecological upgrades can also create new pressures. Green gentrification occurs when cleaner air, quiet streets, and new parks raise land values; rents climb and low-income renters or legacy shops are squeezed. Where projects chase environmental targets alone, maintenance finance may falter and local jobs may not materialize. The Ruhr illustrates both sides: landscapes recovered and cultural venues drew visitors, yet unemployment persisted in several towns because the new cultural economy

did not match the former industrial scale [2,9]. To dodge the usual pitfalls, don't just plant trees and pour concrete—pair the upgrades with people-first rules. That means inclusionary housing (set aside a slice of below-market homes), right-to-return plus moving help when projects are phased, and graduated rents or ground-floor space reserved so long-time shops aren't priced out. Turn care of the place into real jobs: hire crews from high-unemployment neighborhoods for corridor cleaning, street trees, and river operations, so “stewardship” becomes steady work. Keep parks and river edges open to everyone, and if you charge a fee, keep it low. Barcelona's Superblocks are a good example: the city ran neighborhood workshops, tried small pilots, asked for feedback, and let residents help pick crossings, benches, and play spots—then shared the after-action results. Co-design like that doesn't just look nice on paper; it makes the changes stick. By contrast, London's Docklands relied on a centralized development corporation that fast-tracked private schemes and paid limited attention to housing and local employment, prompting long-running criticism from councils and unions. The Ruhr added a different lever: cultural institutions and festivals in former plants preserved memory and broadened audiences, turning heritage into a civic asset rather than a barrier to change [9]. Today, most large programs pair environmental KPIs with equity metrics in project scorecards; agencies publish open data on air quality, park access, heat exposure, rents, and displacement risk. When indicators drift, plans adjust—adding affordable units, rebalancing land uses, or repricing parking and curb space [10]. Design guidelines protect landmark materials and sightlines while allowing adaptive reuse, and life-cycle cost (LCC) provisions dedicate funds for long-term operations and maintenance. The practical lesson is to deliver green upgrades with access rules, multi-year O&M budgets, and clear labor pathways—and to embed participation early and repeatedly, with public records that show how community input changed the design.

4. Conclusion

Urban regeneration is a multidimensional process that works through three linked dimensions—physical reconstruction, functional reorganization, and ecological restoration—to modernize space, redirect urban economies, and repair degraded environments. Evidence from Tokyo's Shibuya, London's Docklands, Germany's Ruhr, and Barcelona shows clear gains in efficiency, livability, and competitiveness when plans are well designed. What else does the record show? Single-track strategies leave blind spots and create new risks that later policy must address. On the economic side, regeneration improves land-use efficiency and connectivity, lowers transaction costs, and supports agglomeration. In Shibuya, station-centered vertical mixed use intensified activity on limited plots and drew global firms and visitors. In the Docklands, tax relief, faster approvals, and new transit unlocked private capital and built a major finance hub. But benefits are uneven: concentrated investment raises prices, squeezes small businesses, and excludes residents who lack the skills that new industries require. Construction creates short-term jobs; services and finance create longer-term ones; yet the gains often flow to newcomers and property owners, producing spatial inequality and volatility. On the environmental side, projects that embed green infrastructure—riparian corridors, street trees, cool roofs, and safe walking and cycling networks—deliver measurable health and climate co-benefits. Still, “green gentrification” can push up land values and displace vulnerable groups, and environmental works alone may not create enough employment unless they link to local industry formation. Who's in charge—and how they run the process—decides whether renewal closes gaps or makes them worse. If you set it up to be open and shared—let residents co-design streets, publish the data, and sign real community-benefit deals—people trust it. Barcelona shows what that looks like when participation is baked in, not bolted on. Do it top-down and you can still pull in big money (think Docklands), but you'll catch heat if affordable homes and local jobs aren't part of the plan. The Ruhr points to a third lesson: smart cultural reuse—museums in old plants, festivals on former rail yards—can keep identity alive and widen access, turning heritage into a public asset instead of a private amenity. In practice, treat renewal like a bundle, not a single project: Fix the place + protect people: pair street and building upgrades with anti-displacement tools—set aside affordable

units, guarantee right-to-return during phased work, and backstop legacy shops with rent support or ground-floor set-asides. Change land use + open ladders: when new offices or labs arrive, line up skills programs, local-hire targets, and mixed-tenure housing near the jobs so neighbors can actually benefit. Go green + create work: tie parks, rivers, tree canopies, and energy retrofits to real jobs—green-industry anchors and long-term maintenance careers, not just ribbon cuttings. Then keep score. Use a simple dashboard to track air, heat, tree cover, housing affordability, vacancy and small-business turnover. Commit money for operations and upkeep, not just construction. And set clear “tripwires” so rules adjust—more affordability, tighter hiring goals—when the numbers drift. That’s how regeneration stays fair, not just shiny.

References

- [1] Saadallah, Maha Akram, Rana Mazin Mahdi, and Enas Salim Abdulahaad. Urban reconstruction in the historic urban fabric: Towards an integrated urban model. *International Journal of Sustainable Development & Planning*, 2025, 20(5): 2127–2138.
- [2] Cui, Jianqiang, Wout Broere, and Dong Lin. Underground space utilisation for urban renewal. *Tunnelling and Underground Space Technology*, 2021, 108: 103726.
- [3] Wang, Hao, Na Liu, Junhua Chen, and Shan Guo. The relationship between urban renewal and the built environment: A systematic review and bibliometric analysis. *Journal of Planning Literature*, 2022, 37(2): 293–308.
- [4] Chen, Yizhong, Qingye Han, Guiwen Liu, Yong Wu, Kaijian Li, and Jingke Hong. Determining critical success factors of urban renewal projects: Multiple integrated approach. *Journal of Urban Planning and Development*, 2022, 148(1): 04021058.
- [5] Wang, Yousong, Guolin Shi, and Yangbing Zhang. Microlevel evaluation of land use efficiency in an urban renewal context: The case of Shenzhen, China. *Journal of Urban Planning and Development*, 2024, 150(1): 05023043.
- [6] Qiao, Zhi, Luo Liu, Yuanwei Qin, Xinliang Xu, Binwu Wang, and Zhenjie Liu. The impact of urban renewal on land surface temperature changes: A case study in the main city of Guangzhou, China. *Remote Sensing*, 2020, 12(5): 794.
- [7] Xie, Hong, Lei Zhang, Peng Cui, Jingfeng Yuan, and Qiming Li. Exploring the evolution mechanisms of social risks associated with urban renewal from the perspective of stakeholders. *Buildings*, 2024, 14(5): 1470.
- [8] Bochenek, Anna Dominika, and Katarzyna Klemm. Effectiveness of tree pattern in street canyons on thermal conditions and human comfort: Assessment of an urban renewal project in historical district in Lodz (Poland). *Atmosphere*, 2021, 12(6): 751.
- [9] Liang, Chih-Min, Chun-Chang Lee, and Lian-Rong Yong. Impacts of urban renewal on neighborhood housing prices: Predicting response to psychological effects. *Journal of Housing and the Built Environment*, 2020, 35(1): 191–213.
- [10] Yıldız, Serkan, Serkan Kıvrak, Arzuhan Burcu Gültekin, and Gökhan Arslan. Built environment design–social sustainability relation in urban renewal. *Sustainable Cities and Society*, 2020, 60: 102173.