Inclusive Renovation Strategies for Aging Residential Communities — A Case Study of Daguan Subdistrict in Hangzhou

Kaixuan Wu
Affiliation: Chongqing University
Email: calebwu0618@gmail.com

Abstract
With rapid urbanisation, many aging communities in China face deteriorating infrastructure and limited spatial functionality, impacting vulnerable groups such as the elderly, disabled, and children. This study argues that renewal efforts must go beyond physical upgrades to include multifunctional spaces, barrier-free design, and community cultural integration. Focusing on Daguan Subdistrict in Hangzhou, the paper analyses issues such as spatial deficiency, fragmented environments, and inadequate services. It proposes inclusive renovation strategies to enhance living quality, address diverse user needs, and support sustainable development. The study offers a systematic framework for inclusive community renewal, serving as a reference for similar urban regeneration projects. As urbanisation advances, continual refinement of design approaches is vital to building more inclusive, equitable, and resilient neighbourhoods.

Keywords: Aging Residential Communities, Inclusive Design, Urban Renewal; Sustainable Development, Hangzhou

1. Introduction

As China's reform and opening-up policy deepened in the late 20th century, the country entered an unprecedented phase of rapid urbanisation and socio-economic transformation. Particularly since the late 1980s, urban development has been driven by market-oriented reforms and an explosive expansion of the real estate sector. During this period, large numbers of residential communities were built to accommodate a growing urban population. However, many of these early developments, especially those constructed prior to the 2000s, now suffer from aging infrastructure, inefficient spatial layouts, and single-function designs that no longer align with contemporary urban lifestyles and demands. These aging residential communities, once considered vital assets during earlier stages of urban growth, are now becoming spatial and social liabilities. They often lack modern amenities, barrier-free accessibility, and adequate public services, creating significant challenges for vulnerable groups such as the elderly, persons with disabilities, and children (Gehl, 2011). According to national statistics, there are nearly 160,000 aging residential communities across China, affecting over 42 million households and covering an estimated total built area of approximately 4 billion square metres. These figures highlight not only the sheer scale of the issue but also its profound implications for urban governance, equity, and sustainability.

Improving the living standards and environmental quality of these communities has thus become a priority in China's urban agenda. In recent years, both central and local governments have issued a series of top-down policy initiatives to address this challenge. A major milestone occurred in December 2019, when the Central Economic Work Conference formally launched nationwide pilot programmes for the regeneration of aging residential communities. This move signified a strategic shift in urban policy—from growth-driven expansion to inward-looking regeneration. In 2020, the General Office of the State Council released the Guidelines on Advancing the Comprehensive Renovation of Aging Urban Communities, setting forth clear goals, tasks, and principles for such efforts. The guidelines emphasised the need for improving infrastructure, enhancing community functionality, and promoting resident participation. These directions were reaffirmed and expanded upon in the 14th Five-Year Plan (2021–2025), which explicitly calls for accelerating urban renewal as a means of improving quality of life, reducing inequality, and fostering resilient cities.

Within this policy and planning framework, inclusive design has emerged as a key conceptual and practical approach. Rooted in the values of social equity, human-centred development, and universal accessibility, inclusive design seeks to create environments that meet the needs of all population groups, regardless of age, ability, or socio-economic background (Imrie, 2012). In the context of aging residential communities, inclusive design implies more than technical retrofitting or cosmetic improvements—it calls for the transformation of public spaces, housing layouts, and community facilities to support interaction, dignity, and autonomy for diverse residents

(Carmona, 2019). Particularly important is the focus on populations that are often underserved in conventional urban development—elderly individuals navigating mobility decline, people with disabilities who face barriers in everyday life, and children who require safe, accessible play environments. Inclusive design provides a framework to not only accommodate these needs but also promote intergenerational interaction, mental wellbeing, and social cohesion (Dempsey, Brown & Bramley, 2012). It supports the vision of a more humane and democratic urbanism.

This paper takes the aging communities of Daguan Subdistrict in Hangzhou as a representative case for exploring how inclusive design principles can guide community renewal. Located in the city's urban core, Daguan comprises multiple residential compounds built in the late 20th century, many of which exhibit typical problems of spatial disconnection, infrastructure decay, and social fragmentation. Through a combination of field surveys, demographic analysis, and comparative case studies, this research identifies the core barriers to inclusivity in these neighborhoods and offers targeted design and policy strategies to enhance spatial functionality, community resilience, and urban equity. By rooting the analysis in real-world conditions and integrating international design principles with local socio-cultural contexts, the study aims to contribute both theoretically and practically to the broader discourse on inclusive urban regeneration. In doing so, it also responds to the national call for innovation in community governance, sustainable urban development, and people-oriented planning.

2. Core Concepts

2.1 Inclusive Design

Inclusive design is an evolving design philosophy and methodology that aims to create products, services, and environments accessible and usable by the widest possible range of users, regardless of age, ability, socioeconomic status, or cultural background (Mace, Hardie & Place, 1991). Its foundational premise is that exclusion often results not from personal limitations, but from environmental, institutional, and attitudinal barriers embedded within the built and social environments. Historically, inclusive design has been closely aligned with the needs of individuals with disabilities (Mitrović, 2024). This association has led to significant advancements in accessibility, such as barrier-free entrances, tactile wayfinding, and universal signage. However, the scope of inclusive design has significantly expanded over the years. Today, it addresses a much broader spectrum of human diversity—including cognitive differences, language proficiency, cultural practices, gender identities, and generational experiences. These factors profoundly influence how individuals perceive and interact with physical spaces and social systems.

Inclusive design is not a stylistic feature or a one-time technical fix; it is a holistic, life-cycle-oriented approach. It encompasses all stages of the design process—from user research and conceptual development to prototyping, implementation, and post-occupancy evaluation. The goal is not to design for the "average" user, but to embrace variability as a norm and embed flexibility, adaptability, and equity into the core of design solutions (Ma'rof, Noor & Xiang, 2023). In architectural and urban contexts, inclusive design manifests through a variety of spatial strategies: adaptable floor plans, step-free circulation paths, age-friendly landscapes, multilingual wayfinding, and participatory design processes. It encourages designers and policymakers to question default assumptions and to centre marginalised voices during planning and implementation.

Importantly, inclusive design also intersects with broader social values such as human rights, public health, and environmental justice. In the face of aging populations, climate change, and widening inequality, inclusive design offers a framework for creating resilient, dignified, and equitable living environments. In the context of aging residential communities, it enables the transformation of outdated, exclusionary urban spaces into welcoming, multi-generational places that foster wellbeing and belonging for all residents.

2.2 Renovation of Aging Residential Communities

The renovation of aging residential communities refers to a systematic and multidisciplinary process aimed at upgrading the physical, social, and environmental quality of residential areas that were built during earlier stages of urban development. These neighbourhoods, typically constructed in the 1980s and 1990s—or even earlier—now face growing issues of obsolescence, functional inadequacy, and social disintegration. As such, their renewal is not only an infrastructural concern, but a key urban policy imperative tied to broader goals of livability,

inclusiveness, and sustainability.

The core aims of such renovation efforts include: upgrading deteriorated infrastructure (e.g., water, electricity, waste systems), improving building safety and energy performance, enhancing the availability and quality of public services and amenities, and integrating smart technologies and digital governance tools to modernise community operations. Importantly, these interventions must be carefully tailored to preserve local identity, architectural heritage, and cultural memory. Blind demolition and reconstruction—common in earlier waves of urban renewal—are increasingly replaced by organic, incremental, and participatory models that value history and local context.

However, the renovation of aging communities presents substantial challenges. Many of these areas were built with minimal regulatory oversight, and suffer from outdated design standards, cramped spatial configurations, and poor environmental performance. Property ownership is often fragmented among residents, government units, and enterprises, leading to legal ambiguity and coordination difficulties. Moreover, many communities lack formal property management structures, and financial mechanisms for long-term maintenance are either weak or entirely absent (Obermuller, 2024). These institutional and governance gaps often result in neglect, where aging communities fall into states of disrepair, characterised by crumbling infrastructure, inadequate waste management, and a decline in social capital. Residents may experience not only physical discomfort but also social exclusion, particularly those who are economically disadvantaged or mobility-impaired.

Thus, the renovation of aging communities must be understood as a complex socio-spatial process, involving not only physical upgrades but also legal reform, financial innovation, stakeholder collaboration, and capacity-building. It requires a shift from top-down, engineering-driven interventions to integrated and inclusive renewal strategies that centre the needs of residents, promote social equity, and align with broader urban development frameworks.

3. The Evolution of Aging Community Renewal in Hangzhou

3.1 Initial Exploration Phase (2000–2012)

Between 2000 and 2012, Hangzhou entered the initial phase of aging community renewal, characterised by government-led pilot projects aimed at improving basic infrastructure. At the time, the primary goal was to address the most visible and urgent physical problems faced by aging neighbourhoods (Gong et al., 2025). These included outdated roads, inadequate drainage systems, poor lighting, and unsafe building conditions. Renovation efforts focused on functional upgrades to restore basic services and improve residents' immediate living environments.

During this period, the Hangzhou municipal government launched a series of targeted interventions. Notably, 2,721 back alleys (urban lanes known for congestion and poor sanitation) were refurbished, and comprehensive infrastructure upgrades were carried out in 1,048 communities. These projects addressed critical urban utilities—such as water supply, sewage systems, electricity, and gas pipelines—and helped stabilise physical conditions in densely populated urban areas.

However, these efforts were primarily engineering-oriented and reactive in nature, focusing on technical fixes rather than long-term transformation. Funding was sourced mainly from municipal and district-level government budgets, with little involvement from residents or external stakeholders. Strategic urban planning integration was minimal, and interventions were often fragmented, conducted on a case-by-case basis without a unified vision. As a result, while physical conditions improved in many communities, issues of social fragmentation, spatial disconnection, and ageing governance systems remained largely unresolved.

3.2 Deepening Reform Phase (2013–2016)

After 2013, Hangzhou's approach to community renewal began to shift from isolated infrastructural fixes toward more holistic, resident-oriented renovation strategies. This transformation was largely influenced by national policy signals advocating for more inclusive and sustainable urban development. During this phase, renovation efforts started to incorporate not only physical improvements but also the wellbeing, cultural life, and participatory rights of residents (Irawati et al., 2025). A key development was the diversification of funding sources. The city began experimenting with public-private partnerships (PPPs), social capital investment, and resident

co-financing models to reduce dependency on government funds and increase financial sustainability. Property management services were reformed to promote standardisation and professionalisation, and new models of community governance were tested, emphasising shared responsibility among stakeholders.

Physically, the renovation scope expanded to include public space enhancement, community landscaping, and the construction of small-scale amenities such as senior activity rooms, fitness areas, and children's play zones. The integration of landscape architecture, community art, and cultural heritage protection emerged as new thematic pillars. The city also began to recognise the role of green infrastructure in improving microclimates and fostering public life. This phase marked the transition from technical repair to spatial and social regeneration. Community renewal initiatives began to align more closely with residents' lived experiences and aspirations. Projects were guided by the principle of "improving quality of life," with more emphasis placed on user feedback, community engagement, and local identity. Importantly, the renewal process began to be seen not just as a government task, but as a collaborative process requiring the co-creation of value by government, market, and society.

3.3 Systematic Renovation Phase (2017–2020)

Beginning in 2017, Hangzhou entered a new stage of systematic and comprehensive urban renewal. With the national implementation of the 13th and 14th Five-Year Plans, cities across China were called upon to accelerate the transformation of aging urban spaces, prioritising human-centred planning, environmental sustainability, and efficient governance. In this context, Hangzhou developed a series of strategic, measurable action plans to complete the transformation of all residential communities built before 2000 by the end of the planning cycle.

During this phase, renovation moved beyond surface-level fixes to embrace urban design, integrated infrastructure planning, and digital transformation. Upgrades included expanded public spaces and pocket parks, new underground utilities, fire safety improvements, universal accessibility features such as ramps and elevators, and traffic reconfiguration to separate pedestrian and vehicular flows.

Crucially, this stage saw a strong emphasis on cultural and historical preservation. Hangzhou, with its rich architectural and cultural heritage, began to take a more nuanced approach to balancing development with conservation. Where possible, historic buildings, architectural features, and vernacular styles were preserved or restored, transforming communities into living archives of the city's evolution. Additionally, the "Smart Community" concept gained traction (Camellato, 2024). Pilot programmes introduced digital platforms for community management, real-time monitoring of energy usage, intelligent lighting, and online resident feedback systems. These technologies aimed to modernise the governance and service delivery mechanisms, making them more responsive, efficient, and transparent.

This phase also featured cross-departmental collaboration between planning bureaus, transportation agencies, environmental departments, and community associations, signalling the maturation of inter-agency coordination and urban governance in Hangzhou.

3.4 Future Community and Organic Renewal Phase (2021–Present)

Since 2021, Hangzhou has embraced a new frontier in urban renewal, defined by the concept of the "Future Community" (Weilai Shequ). This model promotes organic, context-sensitive regeneration over wholesale demolition and reconstruction. It calls for "micro-renewal", whereby each community is assessed based on its unique history, demographics, and spatial potential, and then renovated using flexible, tailored interventions.

This phase reflects a significant philosophical shift: from top-down planning to bottom-up participation, from infrastructure-led growth to people-oriented design, and from hardware improvements to emotional belonging and lifestyle enhancement (Zhou, 2024). The Future Community model incorporates nine core elements—health, education, employment, elderly care, childcare, mobility, architecture, community governance, and smart services—aiming to construct a comprehensive and adaptive ecosystem for urban life. In the wake of the COVID-19 pandemic, this model was further reinforced by the notion of "community as the basic unit of life." Hangzhou invested heavily in improving public health infrastructure, epidemic response systems, and digital integration. Communities became more self-sufficient, data-driven, and resilient.

Sustainability and inclusivity are also key themes (Triggiano, 2024). Green building standards, low-carbon design strategies, shared mobility systems, and intergenerational public spaces have been integrated into new renovation projects. Moreover, the city is emphasising spatial continuity and ecological connectivity, ensuring that revitalised communities are not isolated nodes but part of a larger, cohesive urban ecosystem.

This latest phase has also pioneered new financial and legal frameworks. Incentives were created to attract private capital, banks were encouraged to offer low-interest community redevelopment loans, and regulatory tools were adapted to allow incremental land use changes (Leite, Reis & Correia, 2024). Meanwhile, community participation was institutionalised through resident councils, participatory budgeting, and digital consultation platforms.

In summary, Hangzhou's evolution in aging community renewal reflects a progressive, multi-dimensional, and adaptive transformation. What began as simple infrastructure repairs has evolved into an integrated urban regeneration strategy grounded in inclusivity, sustainability, and innovation. Through diversified funding, policy experimentation, and the application of inclusive design principles, the city has created a model that balances heritage and modernity, growth and equity, government leadership and civic participation. Hangzhou's experience demonstrates how aging community renewal can serve as a strategic entry point for broader urban transformation—not only revitalising neighbourhoods physically, but also reimagining urban governance, strengthening community identity, and enhancing the quality of life for diverse populations.

4. Current Conditions of Daguan Subdistrict

4.1 Location and Historical Context

Daguan Subdistrict, located in the northern part of Hangzhou, represents one of the city's most concentrated clusters of aging residential communities. It occupies a strategically significant urban zone, bounded by Daguan Road to the north, the historic Shangtang River to the east, Shangtang Road to the west, and Shihuiba to the south. The area's name—"Daguan"—derives from the ancient Beixin Customs Gate ("Beixin Guan"), reflecting the district's longstanding role as a key point of commerce and trade during imperial times.

Covering approximately 1.6 square kilometres, Daguan Subdistrict encompasses eight administrative communities—Dongyi, Dong'er, Xiyi, Xi'er, Desheng, Cuiyu, Nanyuan, and Xiangji—and consists of 30 residential neighbourhoods, 29 of which are classified as aging or under-serviced communities, with only one built as modern commodity housing. The concentration of older developments makes Daguan an archetypal case for studying community decline and regeneration in the context of rapid urbanisation in China.

With the progression of urban modernisation in the 21st century, Hangzhou has experienced extensive transformations in land use, transportation systems, and urban design. Daguan Subdistrict, once peripheral, has now become a semi-central area integrating residential, commercial, and service functions. Yet this evolution has exposed the limits of its outdated residential infrastructure. Many buildings constructed during the 1980s and 1990s lack the spatial and technical capacity to meet current demands for comfort, accessibility, and resilience. The consequences include deteriorated environments, weak service provision, and rising dissatisfaction among long-term residents—making urban regeneration an urgent priority for local authorities and planners.

Figure 1. Location of Daguan Subdistrict – Source: Drawn by author

4.2 Demographic Structure and Needs Analysis

The demographic structure of Daguan Subdistrict reveals both stability and tension. According to the 2020 Seventh National Census, the subdistrict's permanent population stands at 42,036. Among these, 5,488 are children aged 0–14, 29,060 are working-age residents (15–64), and 11,059 are aged 60 or above, with 7,488 of them over 65 years old. This means that approximately 26% of the total population is elderly, exceeding the national average and confirming the district's ageing profile.

This demographic structure reflects two simultaneous trends. On one hand, Daguan is home to a stable base of long-term residents who have lived in these communities for decades. Many of them are retired workers or elderly citizens with deep social ties to the area. On the other hand, the subdistrict's strategic location and strong transport connectivity have attracted a substantial floating population, including young professionals, migrant workers, and university students who rent temporary accommodations.

The coexistence of ageing residents and a transient, youthful demographic creates complex service demands and urban management challenges. While older residents require enhanced accessibility, healthcare facilities, and public resting areas, younger residents seek flexible spaces for leisure, study, and socialising. Community planning must therefore address intergenerational coexistence, catering to both long-term attachment and short-term dynamism.

Notably, infrastructure in many aging communities is mismatched with the evolving demographic needs. For example, elevator access is scarce in walk-up buildings, posing barriers to elderly mobility. There is a shortage of daycare and rehabilitation services, and recreational spaces for seniors often double as storage or parking areas. Without targeted upgrades, these mismatches may continue to erode the wellbeing and autonomy of vulnerable groups.

4.3 Land Use Analysis

Land use in Daguan Subdistrict is dominated by residential zoning, with limited functional diversity and fragmented spatial organisation. Although the subdistrict is urban in character, it lacks the land-use efficiency seen in more contemporary mixed-use districts. Green space, in particular, is in short supply and poorly distributed, primarily confined to narrow riverbanks or dispersed in disconnected green strips between buildings.

Much of the public open space is residual—formed as by-products of outdated planning rather than intentional urban design. These spaces often suffer from poor maintenance, single-use layouts, and minimal ecological or social function. Their low quality undermines opportunities for physical activity, community interaction, and visual relief in a dense urban setting. The functional disconnect between land parcels further compounds the issue. Residential blocks are often physically and perceptually isolated from nearby amenities, schools, and transit nodes. The absence of clear spatial hierarchies (e.g., between private, semi-public, and public zones) diminishes legibility and weakens residents' spatial belonging.

Given the high population density and limited expansion potential, internal spatial optimisation is crucial. Renovation efforts should focus on: reclaiming underused plots for community gardens or seating areas, integrating greenery into pedestrian corridors, and reshaping residual lands into multifunctional, climate-responsive micro-environments. When reimagined thoughtfully, internal green spaces can serve not only as lungs of the community but as anchors for social resilience and environmental health.

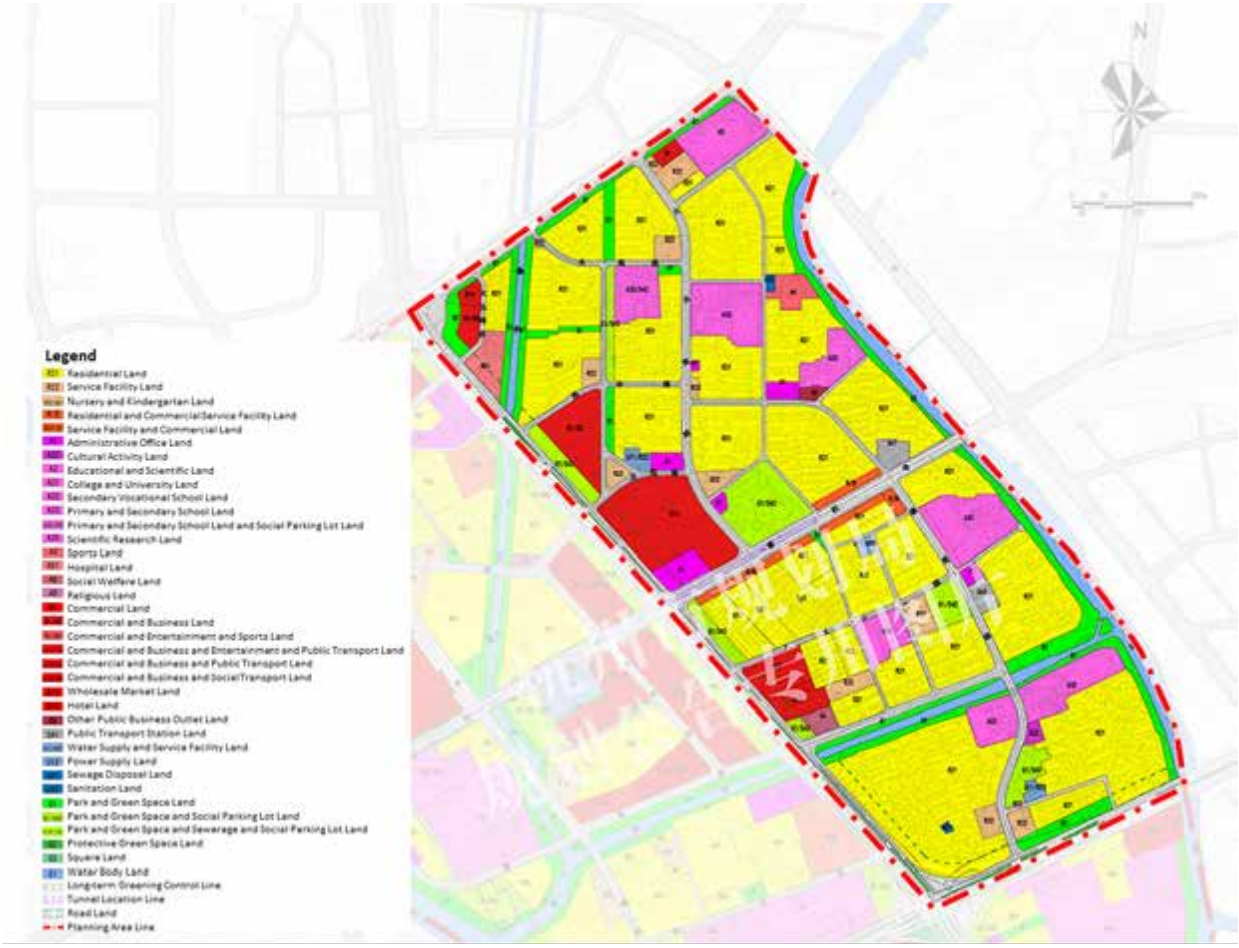

Figure 2. Current Land Use in Daguan Subdistrict – Source: Revised Regulatory Plan for Daguan Unit, Gongshu District, Hangzhou

4.4 Summary of Inclusivity Challenges in Aging Communities

Despite incremental improvements, aging communities in Daguan continue to face a host of barriers to inclusive living. These are structural, spatial, and institutional in nature, and can be grouped into three key domains:

(1) Lack of Functional Public Space

The aging residential compounds in Daguan were largely constructed during the 1980s and 1990s—before the concept of inclusive design was widely adopted in China. Consequently, many public spaces are limited in function, physically degraded, and socially underutilised. For example: 1) Most buildings lack elevators, making upper floors inaccessible to elderly or disabled residents. 2) Entrances typically have steps without ramps, and corridors are too narrow for wheelchairs or walkers. 3) Shared courtyards, when present, are often used for car parking or storage, leaving little room for social gathering or play. These physical limitations isolate vulnerable populations and restrict informal interactions that are vital for mental health and community cohesion. Moreover, women, children, and disabled individuals often experience the most acute forms of spatial exclusion, given the lack of flexible, safe, and accessible environments.

Figure 3. Problems of Functional Deficiency – Source: Drawn by author

(2) Fragmented Spatial Environment

Another critical challenge lies in spatial disconnection and poor environmental integration. Many internal road networks in Daguan's communities are incoherent, with dead-end lanes, non-continuous sidewalks, and inadequate signage. These conditions undermine walkability and deter residents from engaging in outdoor activities. Green infrastructure is similarly fragmented. Landscaped zones, if present, are often isolated patches with minimal ecological layering. Tree species are few, shrubs are scarce, and flowerbeds are replaced by concrete or tiles. This lack of biodiversity and spatial continuity reduces environmental benefits such as shade, air purification, and stormwater absorption. Furthermore, fragmented spaces impair social legibility—residents have no clear sense of where communal life should occur, and visual monotony diminishes aesthetic engagement. Addressing this issue requires a deliberate design strategy that reconnects circulation routes, consolidates fragmented green areas, and creates coherent spatial hierarchies that support everyday life.

Figure 4. Spatial Fragmentation Problems – Source: Drawn by author

(3) Inadequate Community Services
Community services in Daguan are insufficient in both quantity and quality. Most aging communities were developed as open-access neighbourhoods without enclosed management or comprehensive service provision. Although some property management companies have since been introduced, many operate with limited capacity, resulting in: inconsistent sanitation, poor facility maintenance, and unreliable security services. Specialised services such as elderly care centres, daycare for children, rehabilitation clinics, or community kitchens are scarce or entirely absent. Services that do exist are often difficult to access or operate with restricted hours and staffing. Governance mechanisms also remain weak. Communication between government agencies, property managers, and residents is often sporadic or unidirectional. Resident engagement in decision-making is minimal, and co-governance structures are still in a formative stage. This limits the community's capacity for self-management and constrains the long-term success of renovation efforts. In sum, the lack of coordinated services and participatory governance undermines the inclusiveness and resilience of Daguan's aging communities.

Figure 5. Deficiencies in Community Services – Source: Drawn by author

5. Inclusive Renewal Strategies for Aging Communities in Daguan Subdistrict

5.1 Multifunctional Integration and Barrier-Free Design

One of the most pressing spatial challenges in Daguan's aging communities is the lack of multifunctional and inclusive public space. Many of these communities were built during an era when design focused primarily on basic shelter and infrastructure, neglecting the broader social and behavioural dimensions of urban life. As a result, public spaces today are often narrowly functional, underutilised, and devoid of flexibility.

Addressing this issue requires a paradigm shift in design thinking—from static and single-purpose environments to dynamic, adaptable, and multi-use spaces that support a broad range of activities across different age groups and daily time cycles (Ferraro, D'Andria & Fiore, 2024). Designers should adopt an integrated, systems-level approach that reimagines courtyards, alleyways, and transitional spaces as opportunities for interaction and activation. For example, vacant lots or underused corners of the community could be retrofitted with: intergenerational playgrounds that combine fitness equipment for the elderly with safe zones for children, modular seating areas that can be rearranged for gatherings or quiet reading, or seasonal installations that support community events, cultural exhibitions, or pop-up markets.

Such interventions must go beyond decorative beautification. True multifunctionality is achieved through responsive programming, modular infrastructure, and participatory planning processes that reflect actual resident needs and habits (Douka, Mazzoli & Benedetti, 2024). By aligning spatial function with behavioural rhythms, public areas become not just "spaces" but catalysts of community vitality.

Additionally, inclusive spaces should foster social equity, ensuring accessibility for all, particularly for those historically excluded from public life. This includes elderly residents, persons with mobility impairments, visually impaired individuals, and caregivers with strollers. Spatial configurations must therefore anticipate diverse mobility and sensory experiences. Barrier-free design is central to this vision. Renovation plans should include the retrofitting of: step-free entries, standard-compliant ramps and handrails, lift installations in multi-storey walk-up buildings, tactile paving and auditory signals for wayfinding. These elements are not "special" features but essential components of universal usability. Importantly, they must be integrated aesthetically into the urban fabric—not as appendages, but as intentional design choices that dignify rather than stigmatise users. Inclusive environments enable all residents to navigate their neighbourhoods confidently and independently, thus enhancing community cohesion and emotional security.

Ultimately, by reconfiguring spatial hierarchies, enriching functional layers, and embedding accessibility into the design DNA, aging communities can transform shared spaces into "second living rooms"—warm, inclusive, vibrant domains where everyday life unfolds with dignity and joy.

Figure 6. Renovation Vision: Multifunctional Integration and Accessibility – Source: Internet

5.2 Spatial Connectivity and Green Environment Reconstruction

The fragmented spatial structure of Daguan's aging communities poses significant obstacles to everyday mobility, social interaction, and environmental performance. Decades-old planning models prioritised car access or isolated block layouts, resulting in poor connectivity, disjointed pathways, and underperforming green zones.

To restore spatial logic and ecological coherence, community renewal must begin with the reconstruction of internal circulation networks. This includes improving pedestrian flow, eliminating "dead-end" roads, and creating continuous, legible pathways that prioritise walkability (Pang & He, 2025). Such networks should include permeable pavement materials for sustainability, be shaded by vegetation for climate comfort, and include resting

spots, lighting, and signage to support safe and intuitive use, especially for seniors and children.

Small but impactful changes—like converting former fire lanes into green corridors or opening gated barriers between blocks—can substantially improve spatial integration. While large-scale road reengineering may be constrained by high density and ownership issues, tactical urbanism (small-scale, low-cost interventions) offers a pragmatic way forward. Temporary pilot projects and community feedback loops can gradually build consensus for more permanent restructuring.

Equally critical is the reimagining of green infrastructure. Presently, most greenery in Daguan is fragmented and ornamental. Green zones are either leftover marginal lands or mono-functional lawns with minimal social or ecological value.

Future-oriented design should treat green spaces as multifunctional ecological-social infrastructure. Proposals may include biodiverse gardens with medicinal herbs and native species, community farming plots to promote food literacy and intergenerational engagement, stormwater-absorbing rain gardens that reduce urban heat and flooding risk (Harde, 2025). Vertical greening on façades, rooftop gardens, and tree-lined boulevards can expand the green footprint without competing for scarce horizontal space. Vegetation layering is especially important: low shrubs and grasses enhance ground-level visibility and microclimate regulation, while avoiding excessive shading of lower residential units.

Moreover, green environments must be inclusive and programmable. Spaces should cater to diverse rhythms—quiet reflection, physical activity, group celebration—and offer physical, visual, and symbolic relief from urban density. This shift from fragmented green patches to connected green systems will not only improve environmental performance but also anchor communities in a renewed relationship with nature and place.

Figure 7. Renovation Vision: Connectivity and Green Environment Reconstruction – Source: Internet

5.3 Improved Service Facilities and Co-Governance

High-quality service infrastructure is foundational to inclusive communities. In aging neighbourhoods like Daguan, many public services—such as elderly care, health clinics, childcare, and cultural venues—are either outdated or entirely absent. To ensure long-term sustainability, community service systems must be adaptive, modular, and co-created with users.

Facilities should be designed for transformation: e.g., a classroom can function as a community cinema in the evening; a medical outpost can host wellness workshops; a vacant commercial storefront can become a shared tool library or repair station. This multifunctionality extends the lifecycle of limited resources while adapting to evolving demographic needs.

In response to the growing proportion of elderly residents, planners should incorporate ageing-in-place strategies. This includes establishing satellite elderly care centres, installing telehealth kiosks, expanding access to barrier-free toilets and rest areas, and integrating volunteer support networks into the formal service system

(Correia, Leite & Reis, 2024). At the same time, services should support young families and mobile workers through flexible coworking areas, parent-child activity rooms, and after-school tutoring spaces. This inclusive mix not only meets diverse demands but encourages cross-generational solidarity.

On the governance side, community renewal must shift from service delivery to co-production. Rigid top-down management systems must give way to collaborative governance models where government departments, property managers, and residents act as joint stakeholders (Antona, 2024). Practical strategies include: resident assemblies or participatory budgeting platforms, mobile apps for reporting maintenance issues and providing feedback, and rotating volunteer boards that help oversee public facilities. Such approaches democratise planning, increase transparency, and foster a sense of ownership. Empowered residents are more likely to maintain public assets, resolve disputes constructively, and cultivate a resilient social fabric.

Finally, capacity-building programmes for both residents and community managers—covering topics such as digital literacy, participatory planning, and conflict resolution—can enhance administrative professionalism and inclusivity. Over time, these models contribute to a governance culture rooted in trust, shared responsibility, and mutual support.

Figure 8. Renovation Vision: Service Improvement and Co-Governance – Source: Internet

6. Conclusion

This study has examined the Daguan Subdistrict of Hangzhou as a representative case for understanding how inclusive design principles can guide the renewal of aging residential communities. Against the backdrop of accelerating urbanisation, the demand for human-centred, equitable, and sustainable living environments has become more urgent. Many older communities, particularly those built in the late 20th century, now face multifaceted challenges stemming from deteriorating infrastructure, outdated planning paradigms, and fragmented service systems. These conditions compromise not only the quality of life for residents but also the social cohesion and ecological resilience of the broader urban fabric.

Through a comprehensive assessment of Daguan's spatial structure, demographic composition, land use, and service provision, this study identified a series of structural problems that hinder inclusivity. These include a lack of functional and flexible public spaces, insufficient barrier-free infrastructure for elderly and disabled residents, fragmented pedestrian and ecological networks, and limited or underperforming community services. These issues are further compounded by institutional and governance constraints, such as limited resident participation and weak coordination among stakeholders. Together, they paint a picture of communities that, while rich in historical value and social memory, are increasingly mismatched with the needs and expectations of contemporary urban life.

In response to these challenges, the study proposed a set of context-sensitive and adaptable design strategies grounded in the principles of inclusive urbanism. These include: restructuring and activating public spaces for multi-generational use, implementing barrier-free design standards to promote mobility and autonomy, en-

hancing green space continuity and ecological performance, and strengthening community services through co-governance models and flexible facility programming. These interventions are not isolated technical solutions but form part of a holistic renewal framework that views aging communities as living systems—embedded within complex social, environmental, and governance networks. As such, inclusive design must be understood not merely as an aesthetic or functional upgrade, but as a strategic and ethical commitment to creating urban environments where all individuals—regardless of age, ability, or socioeconomic background—can participate fully and equally in public life.

Importantly, the strategies developed for Daguan are scalable and replicable, offering practical insights for other urban districts across China and beyond that face similar challenges. By rooting the design process in empirical research, local specificity, and participatory dialogue, the framework balances universal accessibility principles with place-based adaptations, thus enhancing its transferability and long-term impact. Looking ahead, the success of inclusive community renewal efforts will depend on cross-sector collaboration, integrating the knowledge and resources of government institutions, urban planners, architects, community leaders, and residents themselves. Policy support must be coupled with design innovation, financial tools must support long-term maintenance, and participatory mechanisms must be institutionalised rather than ad hoc.

Moreover, future research should explore the development of quantitative metrics for evaluating inclusivity in community renovation projects, as well as post-occupancy studies to track the lived impacts of design interventions. Expanding the analytical lens to include digital inclusion, environmental justice, and care infrastructure will also be vital in adapting to emerging urban challenges—especially in the context of climate change, demographic ageing, and post-pandemic urban life.

In conclusion, the inclusive regeneration of aging residential communities is not only a spatial or technical project but also a moral imperative for equitable and sustainable urban development. Through targeted design strategies, institutional reforms, and a culture of shared responsibility, it is possible to reimagine older urban areas not as sites of decline, but as resilient and inclusive neighbourhoods that reflect the values and aspirations of a just and future-ready city. Only through such shared vision and multi-stakeholder commitment can we ensure that the urban environments we build today remain welcoming and liveable for generations to come.

References

Antona, M. (2024). HCI International 2024: Human-Computer Interaction and Inclusive Cities. Springer.

Camellato, A. (2024). (How to) Draw a Process – Architectural Storytelling of Social Innovation. Parallel Workshop, University of Florence.

Carmona, M. (2019). Principles for public space design, planning to do better. Urban Design International, 24(1), pp.47–59.

Correia, L.M., Leite, V. & Reis, I. (2024). Participatory urban regeneration strategies: Lessons from Porto. In: Transforming Cities. Google Books.

Dempsey, N., Brown, C. & Bramley, G. (2012). The key to sustainable urban development in UK cities? The influence of density on social sustainability. Progress in Planning, 77(3), pp.89–141.

Douka, K., Mazzoli, C. & Benedetti, A. (2024). The DumBO Space as an Example of a Dynamic Change and Social Innovation in Bologna. Sustainable Cities VI, University of Bologna.

Ferraro, A., D'Andria, E. & Fiore, P. (2024). Experiences of Participatory and Shared Co-Design: The Metaplan Method for a "Possible City" in Calitri. In: Proceedings of ArTec. Springer.

Gehl, J. (2011). Life Between Buildings: Using Public Space. Island Press.

Gong, M., Wang, N., Chu, Y., Wu, Y., Huang, J. & Wu, J. (2025). Optimizing Public Spaces for Age-Friendly Living: Renovation Strategies for 1980s Residential Communities in Hangzhou, China. Buildings.

Harde, P. (2025). Rethinking Publicness and Creating Equity: A Case of Lakefront and Mill Lands. SPAB India.

Imrie, R. (2012). Universalism, universal design and equitable access to the built environment. Disability & Society, 27(3), pp.367–380.

Irawati, I., Ashari, D., Sandriano, Y. & Mareta, R. (2025). Adopting the 5P Framework to Enhance Revitalization Policy: Lessons from Cihampelas Terrace. Jurnal Manajemen Pembangunan Daerah.

Leite, V., Reis, I. & Correia, L.M. (2024). Cultural mapping for intergenerational urban design in Porto. In: Urban Regeneration and Co-Creation Strategies. Google Books.

Mace, R.L., Hardie, G.J. & Place, J.P. (1991). Accessible Environments: Toward Universal Design. The Center for Universal Design, North Carolina State University.

Ma'rof, A.A., Noor, M.Z.M. & Xiang, T.W. (2023). Harnessing the Potential of Recycling Architecture for Sustainable Development. KW Publications.

Mitrović, N. (2024). Post-socialist New Belgrade blocks as a potential for inclusive territory. Inclusive Cities and Regions Conference.

Obermuller, L.J. (2024). Between Forests and Policies: Sustainability in Amerindian Urbanisation. In: Sustainable Urbanisation in the Caribbean.

Pang, Y. & He, Z. (2025). Age-friendly Outdoor Space Renovation Design Combined With Tactical Urbanism. AEHSSR Proceedings.

Triggiano, A. (2024). Abitare l'Università e vivere la città. University of Florence Doctoral Thesis.

Zhou, S. (2024). EquiVision Habitat: The Collective Dreamworks. Rhode Island School of Design.