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From Plots to Systems: Rethinking an Existing Residential Block for a Self-Sustaining Future

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Abstract

Rapid urbanization in Bangladesh's secondary cities has produced planned residential neighborhoods that appears functional yet remain spatially rigid and socially disconnected. Although widely considered adequate, such areas rarely address long-term sustainability, adaptability, and community resilience—challenges shared by housing systems globally. In this context, Rajshahi, the primary regional center of northern Bangladesh, offers a representative yet underexplored case. This paper examines the redesign of an existing residential block in the Padma Residential Area by reimagining housing not as isolated plots, but as an interconnected urban system. Using a design-led research approach, the study combines field surveys, occupancy mapping, environmental analysis, and spatial design exploration. The block is reinterpreted through five integrated strategies: climate-responsive net-zero housing, Self-sustainable productive landscapes, flexible housing layouts, community-oriented infrastructure, and modular plug-in systems for incremental upgrading. The findings demonstrate that coordinated block-scale retrofitting can significantly enhance environmental performance, spatial adaptability, and social interaction, offering a transferable model for secondary cities facing similar housing challenges.

Keywords: Block design; Residential redevelopment; Neighbourhood; Net-Zero; Productive Landscape; Flexible Housing.

1. Introduction

These days, towns such as Rajshahi in Bangladesh are expanding quicker than anyone expected. However, projects such as Padma Residential Area look good on paper but don't look so good in reality. The layout of the plots usually does not provide for the spontaneous gathering or day-to-day interaction between residents, beginning from the edges in a rigid way. The streets are surprisingly quiet, there is little traffic, drainage problems are ubiquitous after it rains, leaving puddles that don't drain quickly enough. Bad lighting and litter accumulation creates missing links in the human chain that quietly accrue. Planners failed to account for the dynamics of neighborhoods over time behind neat lines drawn years ago. Broad cracks form over time - not only in roads but in trust. Let's face it, it may be our problem with plots. Years of parceling land, and pretending houses are blocks of bricks that stay in the houses they were whelmed into. But this approach of dividing land into private parcels has not created space capable of adapting to change or coping with a changing climate. See a house as just a shell, and you won't see how it relates to the flow of powers, the distribution of rain, the flow of trash. Communities are no different than a collection of bricks, only a few little pieces are falling apart each day. This study shifts focus - away from homes as separate things toward viewing them as pieces within a larger network. Neighborhoods work well when energy, meals, and daily activities are interdependent and accessible within the neighborhood, rather than just separate choices. Local resilience is one way of addressing barriers to structural change and ecological strain. Not seeking to create ideal cities from the ground up, after erasing their former inhabitants. Instead, creating flexible spaces that change over time that serve functional purposes and do not exclude people. Though a house may be stationary, it changes at sunrise and sunset, and through the seasons of summer and winter. If you think of the city blocks as living networks, ideas come to you – energy loops that balance out, gardens that feed households just out their door. Small changes, small but understood that can be monitored, accumulate without fanfare, without noise, without the big words; and they change the way neighborhoods work. Small things can add up to great meaning when repeated and make patterns that many people do not observe.

1.1 Context and Site Analysis

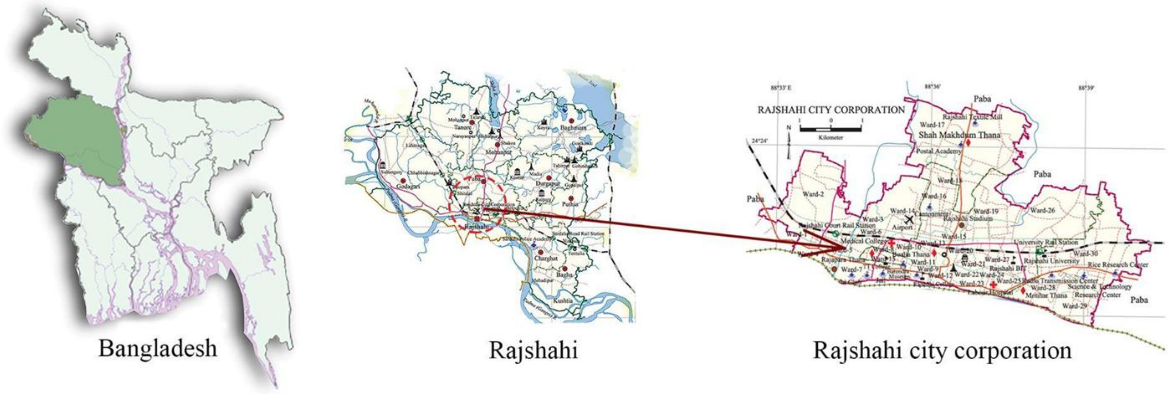

Figure 1. Location of Rajshahi City.

Padma Residential Area is also an area developed by the Rajshahi Development Authority about 2 km outside the old city. This neighborhood has almost 565 plots and it is growing quickly with new home buyers. It's organized, but it's starting to crack under increased demand. As your family expands and your daily life changes, some glaring planning mistakes are more difficult to overlook. The project began as an orderly operation, but urban change is now making its mark. Space is more restricted, services are limited, life goes on anyway. The area is laid out in a flat manner, with straight roads running parallel and identical lots; it is more oriented to cars than to pedestrian walking. Although there are pipes, power systems, and runoff systems, there is little open ground that everyone can enjoy – just one entry-by-fee garden – which reduces neighbor's chats and moments together. As more people have a need for shelter, buildings have skyrocketed to heights of 8 to 12 floors, most of them having many tenants living in the same apartment complexes. Sidewalks run monotonously around all four sides, with repeated patterns block by block, and feeling dull, closed off, shut tight. In this context, the study focus is on a part of Padma Residential Area as a case. It isn't confined to an old way of doing business; it is a way of testing new avenues. The concept of energy balance, the use of goods that last, the changing of room configurations, repeatable homes and common areas form its backbone. It does not adhere to the rules, it demonstrates the growth of areas, more open, flexible, close to nature. By this change, neighborhoods could be another thing entirely.

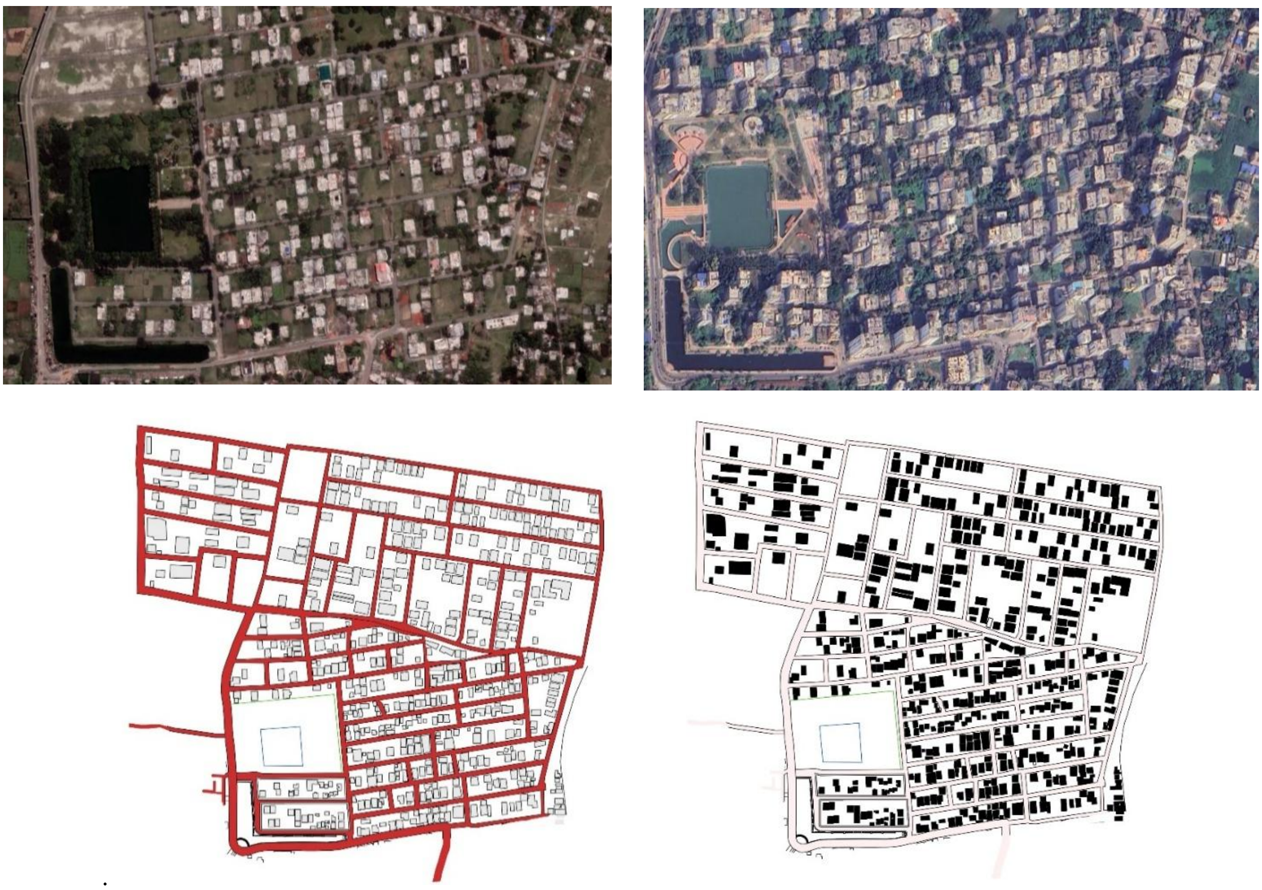

Figure 2. Padma Residential Area, Rajshahi.

2. Methodology

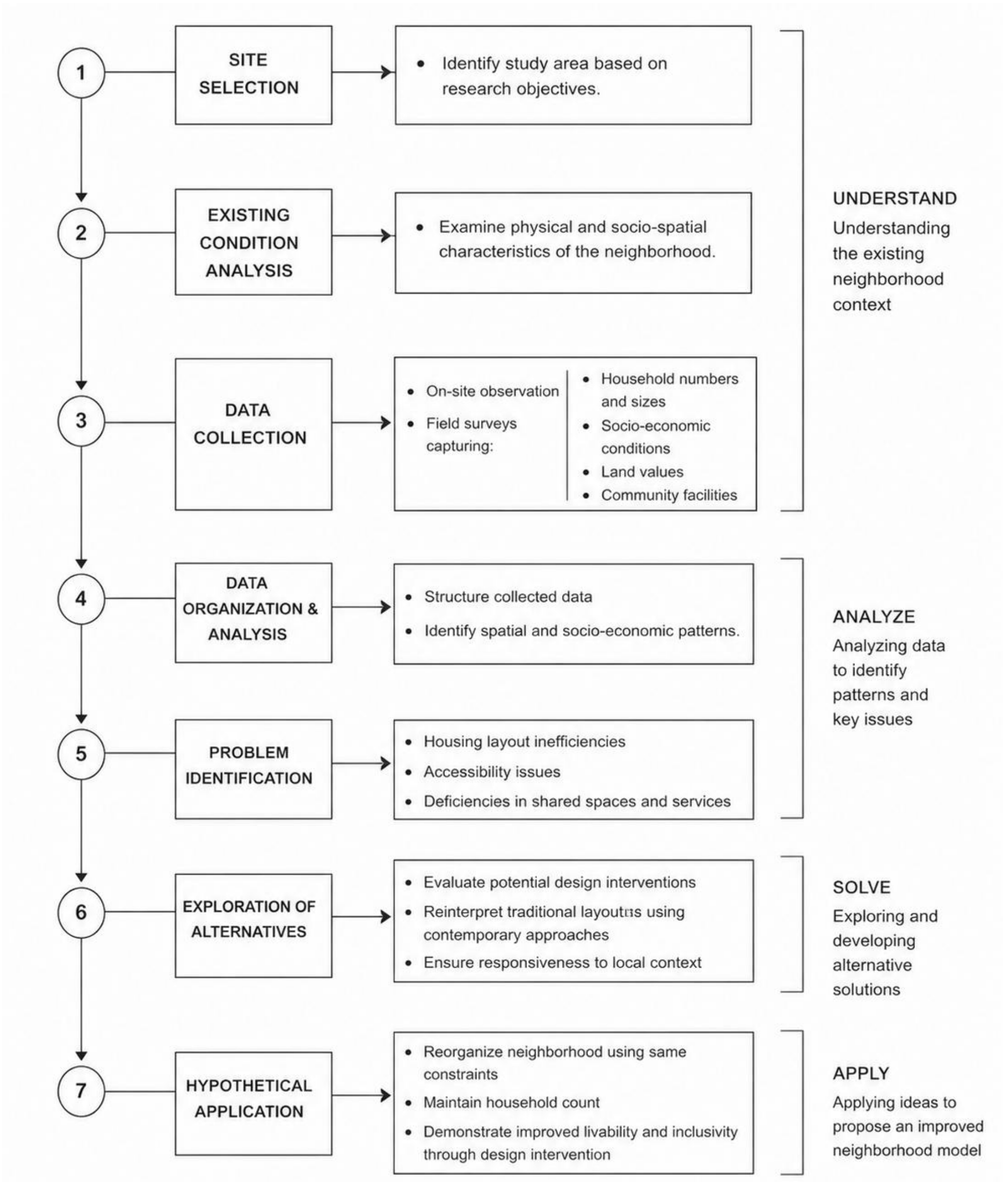

Figure 3. Methodology Workflow.

The work progresses through various phases and attempts to learn about the current state of the neighborhood, and how it could be enhanced over time. Each phase relies on the previous one, considering of the prevailing conditions and possible changes. The first step in the process is to choose the study area, which is determined by the principal interest in the research project. Once sited, the interest shifts to a discussion of the current condition of the neighborhood and how it is lived in.

Data is collected on site, from observations and by conducting structured field surveys. These visits record the number of houses in the household, the size of the family, the economic status of the household, land values etc. and whether shared facilities and services are available within the area.

Once collected, the information is sorted and studied thoroughly to get a better sense of both the condition of the neighborhood as it appears and how it operates as it is.

From this analysis the major problems within the area begin to emerge. Emphasis is given to such matters as housing arrangement, movement and access, and the condition of shared spaces and supporting infrastructure.

The second step is on the lookout for other options. The concepts are explored, and variation is introduced by examining the prospect of replacing the neighborhood concept with a changing one. Modern design methods are considered, but local needs and realities are always kept in mind. Rather than undertaking a complete renovation of the neighborhood, the study concentrates on how to evolve the neighborhood over a period through incremental changes and purposeful adjustments. The goal is to change, not destroy. Finally, a speculative suggestion is put forward that could be tested to prove these ideas correct. The study shows that, by strategically designing interventions within the existing constraints consistent with the same number of households, the neighborhood can be transformed to provide for better living conditions, greater connectedness, and more shared, inclusive spaces. Finally, the methodology proposes a straightforward notion: the layout of spaces directly influences the people's life, interaction, and experience of the surrounding neighborhood.

3. Problems of the Current Situation

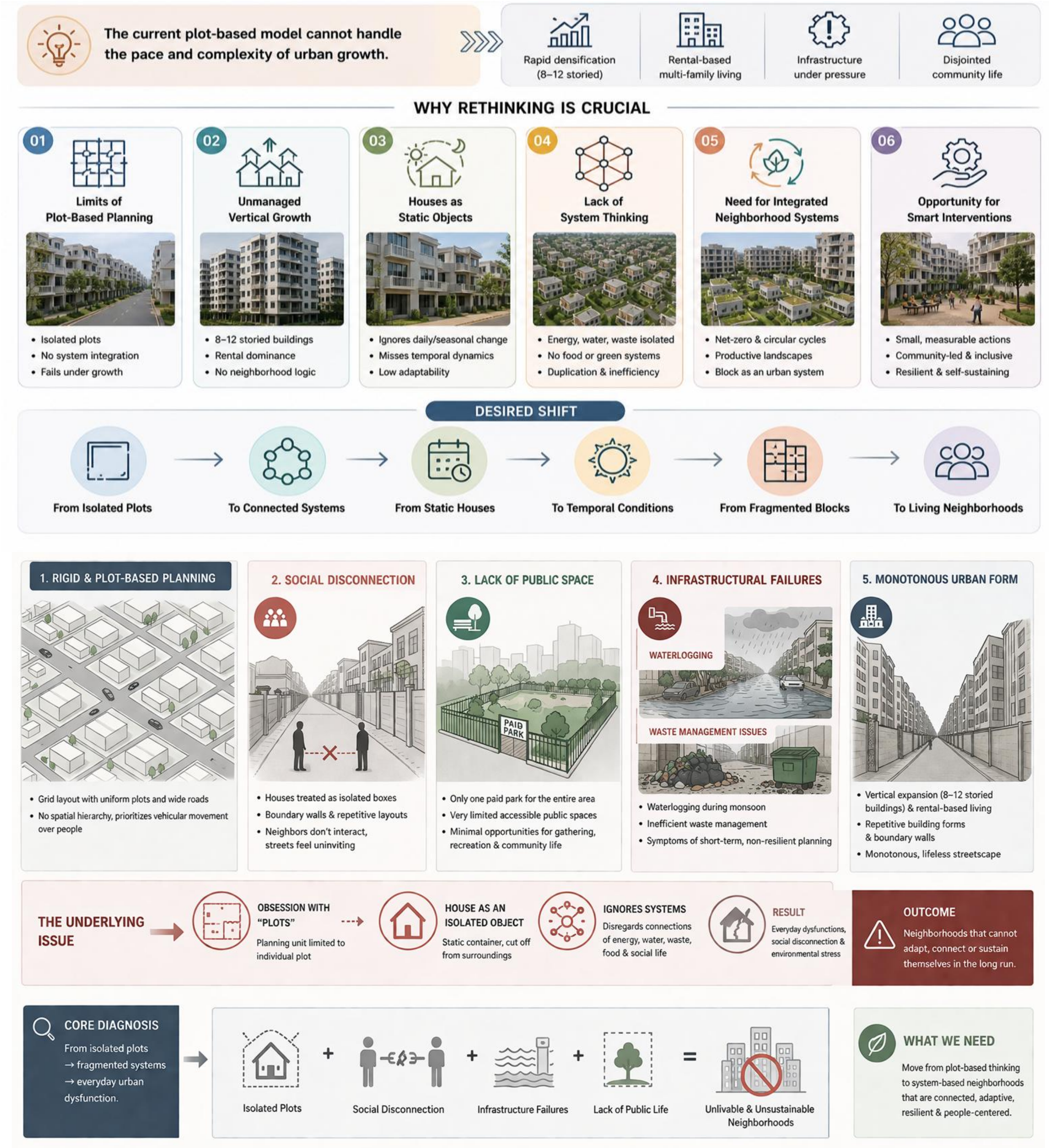

Figure 4. Problems and Issues of current situation.

Go for a walk in a place such as the Padma Residential Area and reality changes in an instant. Upon paper plans are neat blocks, wide streets, order from above. Walk on the ground and it will alter its shape entirely. The layout is too rigid, will not bend where life overflows. When the corners are unexpected, they have no chance to form. Movement in script too much - room for noise, color and actual drift of human movement too little. Here, plots have the characteristics of independent units. One home after another, with only an occasional consideration of the way people move from one home to the next. Where there should be links there are no links, there are no words, there are no people inches away, worlds away. Walls are tall, repeat patterns, stiff pathways. You arrive in a street that does not welcome you – it awaits you. There are real problems every day that one cannot ignore. Street flooding during rains is due to the failure of the drainage system as proof plans did not take into consideration future needs. Rather than quick fixes, deeper flaws reveal themselves. There are few places for people to rest or speak; only one ticketed park for whole neighborhoods. If there are no spots to sojourn, there are no opportunities to connect. Life stays separate. There are folks going by and they never stop.

The truth is, we have been stuck on plots - developing them as the central element of city design. Land parcellation has been accepted for years as good planning. However, addressing regions such as fixed grids has not resulted in more resilient communities to adapt to changing climates. If you're thinking only about a single house as an individual unit, you're missing out on what else it's part of: air flow, drainage, electricity, everyday life, the unseen gears it is a part of.

4. Why Alternative Solution Needed

Truth is, tearing up entire cities won't help much. Starting fresh sounds neat but isn't practical. Instead, imagine places that evolve slowly - where homes breathe, streets adapt. Think long-term care, not quick fixes. Growth happens best when people stay rooted. Real change means working beside those already there - not replacing them.

Buildings eight to twelve stories tall now rise on every block in places such as Rajshahi - growth outpaces what roads, water lines, and power grids can handle. Apartments multiply, families rent under one roof more often than before, yet little attention goes to how these shifts reshape daily life across the area. What happens down the street matters just as much as what stands front door.

One curious idea floats up from sustainable neighborhood designs: a home feels less like a fixed object, more like a shifting moment shaped by light through dawn and dusk, reshaped again with each season's turn (Rakib et al., 2020). Seen not as separate lots but as one flowing city mechanism, the block opens space for self-sustaining power loops, green patches feeding residents just steps from their doors.

Small changes, when clear and tracked, might shift how cities operate overall. Figuring out ways energy, meals, and daily interactions fit together on one city block becomes more useful than waiting for every single landholder to act alone. Shifting focus inward helps neighborhoods handle strain on systems like power and water. Solutions grow from inside, reducing pressure from outside forces.

5. Integrated Strategies

We've developed five strategies that work together—kind of like pieces of a puzzle fitting into each other. Each strategies are connected to meet the challenges faced.

5.1 climate-responsive net-zero housing

This goes beyond rooftop solar, even if rooftops play a role. Buildings shaped by climate - how hot it gets, how heavy the rains arrive, when humidity lingers - start to make sense here. Energy moves between them now, shared block by block, not trapped inside single walls. Each structure does more than take - it gives back, quietly linking to what surrounds.

Buildings shaped by nature start smarter. Form follows climate, not just style. When structure meets smart responses, less power gets wasted. Shape does work before machines turn on. Efficiency begins with layout, not equipment. Details adjust as conditions shift. Performance grows from design choices made early. Systems blend into walls, windows, roofs. Energy demand drops when architecture leads.

Figure 5. Climate responsive net-zero housing concept.

Energy Performance & Optimization

The sheet highlights how much "smart design" can reduce the burden on technology:

- **Daylight Impact:** By optimizing daylighting, the block saves **2,250 kWh/day** in lighting energy.
- **Solar Efficiency:** The initial solar capacity needed was 3.1 MW, but through daylight optimization, this was reduced to **2.75 MW**—a total capacity reduction of **350 kW**.
- **Carbon Footprint (Baseline):** The current neighborhood emits roughly **4,841 tons of $CO2$ per year**.

Water & Resource Management

The "Productive Landscape" and "Net Zero Water" strategies provide hard numbers on self-sufficiency:

- **Rainwater Harvesting:** With an annual rainfall of 1,500 mm, the system can harvest **144,000 Liters per year**.
- **Demand Met:** This strategy meets **61% of the total household water demand** (based on a daily demand of 650 L/day).
- **Waste Collection:** The total collection of resources/waste for the block is estimated at **1,207.3 tons per year**.

The "Green Space" Strategy

The project doesn't just treat greenery as decoration; it treats it as a carbon sink:

- **Total Floor Area:** 160,000 $m2$.
- **Green Space:** 8,000 $m2$ (approx. 5% of the area).
- **Direct Carbon Absorption:** This green strategy alone absorbs **45 tons of $CO2$ per year**.
- **Total Environmental Impact**
- When you combine all these strategies—passive design, solar energy, and carbon absorption, the results are significant:
- **Indirect Carbon Reduction:** 260 tons/year.
- **Combined Total Carbon Reduction: 1,855 tons of $CO2$ per year**.

Table 01: Energy Performance & Design Considerations.

	Parameter	Value	Unit	Performance Indicator	Design Contribution
Carbon Footprint Reduction	Combined Reduction	1,855	tons CO2/year	Net emissions decrease	Passive design and renewable energy systems
Energy Consumption Assumptions	Total Energy Saved (Lighting)	17,650	kWh/day	Reduction from maximum daylight use	Daylight optimization features
Rainwater Harvesting	Annual Rainfall and Harvest	1,500; 144,000	mm; L/year	Potential water resource and self-sufficiency	Passive water collection from 120 sqm roof area
Rainwater Harvesting	Demand Met	61	%	Percentage of demand met	Reduces dependency on external water supply
Architectural Design Conditions	Window to wall ratio	30-40	%	Daylight autonomy (DA)	+15% Daylight Autonomy
Architectural Design Conditions	Courtyard housing	Not in source	Not in source	Daylight autonomy (DA)	+15-20% Daylight Autonomy
Green Space Strategy	Green Space (5%)	5,000	sqm	Direct Carbon Absorption	45 tons/year carbon absorption
Residential Programs	Nursery/Kindergarten	43,900	sqft	Proposed Area	Educational program integration
Residential Programs	Community Hall	21,500	sqft	Proposed Area	Social gathering and net-zero ecosystem
Residential Programs	Mosque	7,200	sqft	Proposed Area	Community support infrastructure

This data proves that the shift from "isolated plots" to an "integrated system" isn't just a theoretical goal; it's a measurable way to cut the neighborhood's carbon footprint by nearly 40% while making it significantly more self-reliant.

5.2 Self-Sustainable Productive Landscapes

It's pretty neat because it's growing the food where people live. Rather than merely providing a green space decoration or recreation, we're pondering how these areas can generate, vegetables and fruit, perhaps even small-scale livestock. It provides a meaningful link to the environment for residents and a neighborhood level solution for food security.

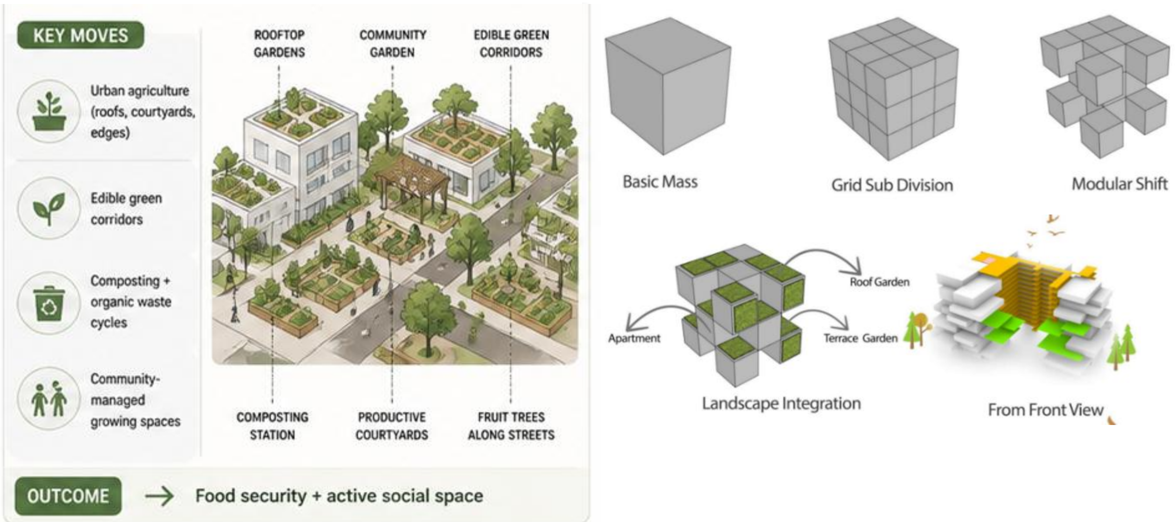

Figure 6. Self-Sustainable Productive Landscapes Housing Concept.

This is a departure from housing as a mere shelter and looks at it as a socio-economic system that allows the people occupying it to produce, earn and sustain themselves through integrated agriculture and local economic cycles.

Key Project Statistics & Site Data

- **Total Site Area:** 15.44 Acres (672,566 sq. ft.).
- **Ground Coverage (MGC):** 50%.

- **Farming & Cultivation Space:** 1.6 Acres (10.5% of the total ground coverage) is specifically allocated for productive use.
- **Population Density:** Targeted at **600 people per acre** in high-density areas.
- **Residential Structure:** 138 Units across 3.8 acres, with a total floor area of **202,800 sq. ft.**.

Achievements in Self-Sufficiency

The primary goal of this "edible landscape" is to achieve household-level food security. The sheet quantifies the success of these strategies across several categories:

- **100% Vegetable Sufficiency**.
- **100% Egg Sufficiency**.
- **58% Fish Sufficiency**.
- **30% Fruit Sufficiency**.
- **20% Milk Sufficiency**.
- **Total Edible Landscape:** 40% of the total site is productive, split between the ground level (20%), semi-public spaces (10%), and water-based systems (10%).

Food Production Logic

The design is grounded in precise daily intake calculations to determine the necessary land area:

- **Vegetables:** Based on a 300g daily intake (110kg/year per person), requiring approximately **25 sqm** per person.
- **Fish:** Based on a yearly intake of 22kg per person, utilizing shallow pond fish like **Tilapia, Rui, and Shing**.
- **Species Selection:** The plan prioritizes high-yield, local varieties such as **Spinach, Bottle Gourd, Tomato, Lemon, Guava, and Papaya**.

Strategic Analysis (SWOT)

- **Strengths:** Leveraging an established residential area with permanent households and a suitable climate for food growth.
- **Weaknesses:** Currently lacks community facilities, a cooperative management system, or a designated maintenance plan.
- **Opportunities:** Potential for **local business/job opportunities**, reduced household expenses, and stronger social interaction spaces through shared farming.
- **Threats:** Faces future densification pressure, climate-related heat and rainfall stress, and uncoordinated building/landscape development.

Architectural & System Integration

The buildings develop from a simple mass by subdividing the grid and changing its modulations to include roof gardens and terrace gardens.

Closed-Loop Systems: The landscape masterplan includes a Waste Management System, which connects housing and energy production to farming, as well as planned new water systems and roads to enable resource flow.

Social Goal: The strategy includes sharing of space and a community market to promote social connection and economic transactions, leading to a more self-sufficient and interdependent lifestyle.

5.3 Flexible Housing Layouts

Figure 7. Flexible Housing Layout Conceptual Masterplan.

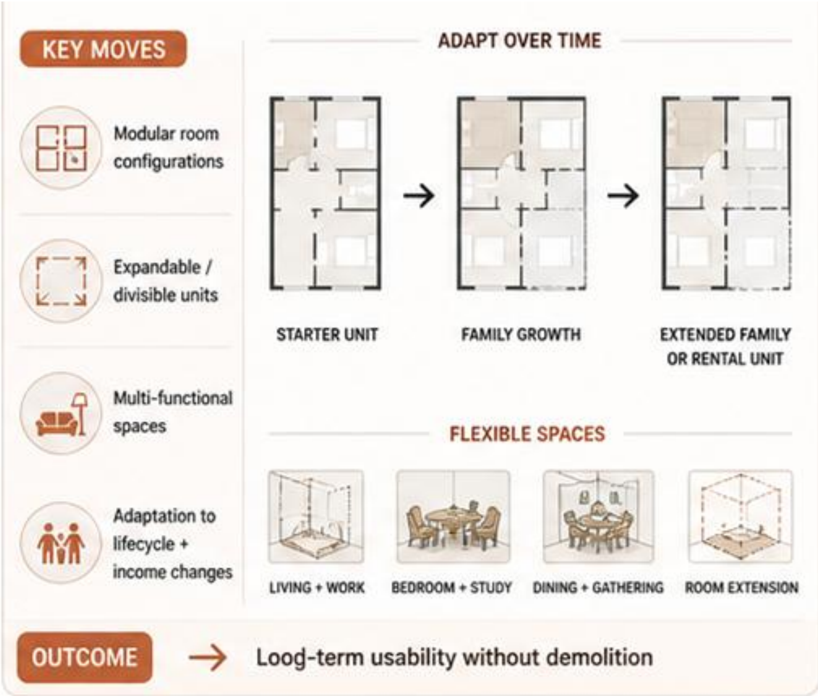

Figure 8. Flexible Layouts in Housing.

Now that is where we question the notion of houses being static objects. Flexible layouts consider spaces that are adaptable with time – when a family expands and contracts, when needs change, when the economic climate changes and so on. For neighbors to live long term without their continual demolition and reconstruction, this kind of adaptability is needed.

The central argument is that a dwelling should not be a "static container" but a **temporal condition**. This approach, termed **"Temporal Domesticity,"** recognizes that a home is read and used differently depending on the time of day (morning vs. evening), the season, or special events like festivals.

– **Definition:** A design approach where homes are planned to be **adaptable, expandable, and reconfigured** to adjust to changing family needs, income levels, or lifestyles.
– **Key Mechanisms:** Emphasizes the use of **modularity, movable elements, and incremental growth** rather than fixed, rigid plans.
– **Architectural Expression:** Focuses on the seasonal use of spaces, vertical greenery, and day/night transformations.

Why Flexibility is Required in Modern Housing

The sources highlight several practical reasons for moving away from traditional rigid planning:

– **Adaptability:** Allowing spaces to change with lifestyle or work-from-home needs.
– **Incremental Growth:** Reducing initial financial burdens by allowing homes to expand step-by-step.
– **Sustainability:** Reducing waste from future demolition by supporting the long-term use of existing structures.
– **Efficient Space Use:** Utilizing movable partitions and multi-functional furniture to maximize limited urban land.

Quantitative Site Data & Population Projections

The analysis provides a technical framework for the 15.44-acre site in **Padma Abashik, Vodra, Rajshahi**:

– **Site Area:** 6,80,230 sqft.
– **Built Area (MGC 50%):**
  - **Housing (40%):** 2,72,000 sqft.
  - **Service (10%):** 67,083 sqft (Internal roads and walkways).
– **Density Projections:**
  - **Projected Population:** 6,000 people.
  - **Total Units:** 1,200 units.
  - **Building Strategy:** Approximately **40 buildings** are proposed (4 units per floor per block).
  - **Verticality:** To meet the population needs, buildings would ideally be **8 to 10 stories** high.

Programmatic Requirements (Proposed Facilities)

The sheet outlines specific commercial and social infrastructure needed to support the self-sustaining block:

– **Commercial:** A **13,066 sqft Super Market** and a **6,000 sqft Kacha Bazar** to serve the families.
– **Socio-Cultural:** A **13,066 sqft Mosque** (standardized for 5,000 persons).
– **General/Health:** A **15,168 sqft Community Hall** and a **5,000 sqft Clinic**.
– **Education:** A **21,780 sqft Primary School** (based on a standard of 0.5 acres per 5,000 persons).

5.4 Community-Oriented Infrastructure

Figure 9. Community Oriented Infrastructure.

Remember how we talked about the lack of public space? This addresses that head-on by designing shared facilities—community centers, gathering spaces, maybe even shared workshops or kitchens—that encourage interaction rather than isolation. The idea is that infrastructure should serve social connection as much as practical needs.

The "Interwoven Living" Concept
The core idea is to treat housing as a **communal fabric** rather than a collection of separate units. This is achieved by:

- **Traditional Language:** Reintroducing the **"loggia" (corridors)** and the **"Goli" (traditional lanes)** as the primary architectural language, reflecting the character of old Rajshahi.
- **Space Hierarchy:** Defining a clear transition from the "Family Domain" (private) to the "Street" (public) through intermediate "Courts".
- **Water-Centric Design:** Centralizing a waterbody to serve as the heart for communal activities.

Step-by-Step Form Generation
The design follows a logical "subtraction and addition" process to ensure the buildings perform well for the residents:

1. **Pattern Study:** Analyzing the existing pattern of the Old Town.
2. **Water Integration:** Introducing a waterbody to anchor the community.
3. **Connectivity:** Establishing Road and pedestrian networks around the site.
4. **Functional Corridors:** Designing loggias to act as the main functional and social arteries.
5. **Climate Response:** Distancing apartment blocks to ensure **better ventilation**.
6. **Site Wrapping:** Orienting building blocks to frame the central water feature.
7. **Courtyard Subtraction:** Subtracting mass from the building forms to create internal **courtyards** specifically for courtyard-centric social activities.

Social Infrastructure Features
The sheet highlights several "vibrant" shared spaces that combat the current social disconnection:

- **Shaded Gathering Spaces:** Designed to handle Rajshahi's heat.
- **Small Market Plaza:** A local economic hub for the residents.
- **Active Rooftops:** Utilizing the "fifth elevation" for community use.
- **Community Courtyards:** Focal points for daily interactions within building clusters.

5.5 Modular Plug-In Systems For Incremental Upgrading

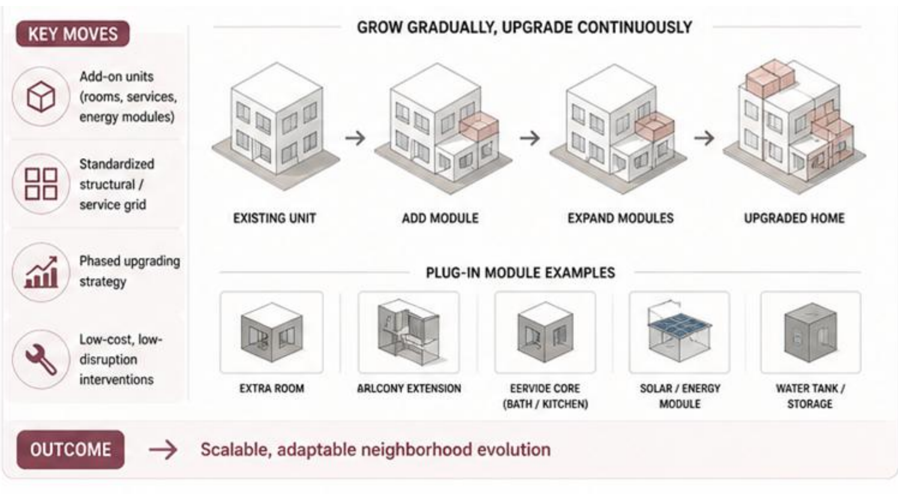

Figure 10. Modular plug-in systems for incremental upgrading.

Social change does not happen quickly, rather it happens gradually within communities. Change happens gradually when people reside in a place. Flexible design enables homes to expand and grow incrementally. Next year a new section may be added, and later a better insulation. Every adjustment fits in a common setup on other side of the street. Nothing stands alone. Everything connects, remains organized even when it's built on a step-by-step basis.

It is significant that one approach reinforces the other. Food production relates to open spaces where people come together. Instead of static patterns, modular components move incrementally. Building back a return of energy relieves the burden on nature, while co-owned facilities support neighbors in times of transition. Together, these make a pattern, which is not unique to Rajshahi's streets, but may be applicable elsewhere. In the modular approach you have made a special attempt to use one of the geometric ideas to address the "spatial rigidity" noted in the earlier versions of your paper. It is more flexible than standard boxes and is made using a prefabricated aperiodic tiling system. "Eine-stein" tile (also known as the "Hat" aperiodic mono-tile), discovered in 2023, can be experimented as a module for residential apartment. These tiles differ from regular grids in that they can be used to cover a surface without any repetition of a pattern.

- Why uses this geometry? It breaks the monotony of typical residential blocks. These tiled formations allow for more natural lighting and air circulation.
- Spatial Diversity: This provides a non-repetitive layout, while maintaining a consistent structural system, essentially, each person has a "unique" home in a "mass produced" structure.

The Modular Advantage

Growth is only possible in a sustainable way through "Modular Housing. This should be a modular pre-engineered system with standardized units being installed.

- It is about 60% more efficient than the normal construction method, as the majority of the work is done in a controlled factory setting.
- Incremental Growth: The floor plans illustrate how a unit can begin small and add onto it, such as an extra room or a duplex upper level to accommodate a growing family or an increase in income.
- Sustainability: This approach reduces waste and delays caused by weather and noise and disruption to the current community in the work zone.

6. Result

The redesign of the residential blocks outlined herein illustrates how rethinking residential blocks as a system of systems, and not just individual lots, can substantially improve environmental, social, and spatial performance. It created measurable results in several aspects and preserved the current residential structure and density through its integrated strategies. The net-zero strategy, which is climate responsive, demonstrated significant environmental advantage, such as a potential carbon footprint reduction of around 1,855 tons of CO_2 per year due to passive design, renewable energy use, and green infrastructure. Optimization of daylight usage reduced energy consumption and reduced the required solar energy capacity, and rainwater harvesting systems provided almost 61% of household water demand. These results show that neighborhood environmental measures can significantly lower reliance on outside resources. The productive landscape strategy enabled the creation of active socio-economic systems capable of providing total vegetable and egg production, along with a partial production of fish, fruits, and milk. This shows how food systems can be embedded in residences to support local resilience and minimize household reliance. Long-term adaptability and social interaction challenges were addressed through flexible housing layouts, modular plug-in systems, and community-oriented infrastructure. Shared courtyards, gathering spaces, and incremental housing systems provided a way to foster greater community involvement and to allow for neighborhood evolution over time. The results indicate that not all urban transformation has to be a wholesale affair; incremental and integrated interventions can contribute to the development of more resilient and adaptable neighborhoods. The proposal is still conceptual but has a framework that can be transferred to rapidly expanding secondary cities that have similar environmental and urban issues.

7. Conclusion

This research aimed to rethink an existing block of houses in Padma Residential Area, Rajshahi as a self-sustaining and adaptive urban system instead of a cluster of housing plots. The research question was to investigate alternative methods to neighborhood development in the urban context and, to this end, the research adopted a design-led approach and deployed a series of block-scale intervention design solutions to test the feasibility of improving environmental performance, social cohesion and future resilience. The results show that the problems encountered in traditional residential developments, such as spatial rigidity, lack of public interaction, inefficiency in the use of the environment, and high pressure on infrastructure can be solved by an integrated approach, consisting of net zero climate-responsive housing, productive landscapes, flexible housing design, community-based infrastructure and modular incremental development systems. The proposed strategy does not involve wholesale demolition and redevelopment, but instead demonstrates the potential to achieve a significant improvement in neighborhood performance by using targeted interventions in the existing urban fabric. The environmental analysis suggests that sustainable joint block scale solutions have the potential to substantially decrease resource use and carbon emissions, and improve self-sufficiency through renewable energy production, rainwater collection and effective green infrastructure. At the same time, shared space and community facilities and flexible housing typologies can foster greater social interaction, inclusiveness, and neighborhood resilience. The findings thus validate the main theory of the study, which suggests that it is possible to increase the sustainability and adaptability of residential neighborhoods through planning as socio-ecological systems as opposed to individual plots. This study is of significance to the voluminous literature on sustainable neighborhood regeneration, resilient urbanism and housing change in fast-growing secondary cities beyond its specific application in the context of Rajshahi. Most of the current research is either in the field of new town development or building-scale sustainability measures, but this paper is based on the block-scale concept, which can be considered an attempt to synthesize the three aspects (environment, society, space, economy) in an integrated design framework. The research also highlights the successful synthesis of the concepts of circular resource management, productive landscapes, incremental housing, and community-based infrastructure development into a full neighborhood retrofitting strategy for the context of the Global South. With regard to practice, the suggested framework provides an alternative approach for the development of existing residential neighborhoods, when planning, architecture and policy decisions are to consider upgrading without causing significant displacement or redeveloping in a resource-intensive way. What was revealed indicates that flexibility, efficient use of resources, and community integration are key factors in the design of neighborhoods and should be considered essential elements in urban growth strategies. However, the study is still conceptual/design based. The proposed interventions have not been proven with full-scale implementation or long-term post occupancy evaluation. Further studies are therefore needed to examine the economic viability, governance mechanisms, mechanisms for involving stakeholders, and lifecycle performance of such interventions in actual use. Comparative applications in other secondary cities could also be used to assess the transferability and scalability of the framework in different urban contexts. Finally, the study suggests that the sustainability of booming cities may not come from developing new urban districts but from the smart reconfiguration of pre-existing urban areas as a cohesive, resource efficient and socially sustainable urban system. The research presents a new way of considering neighborhood networks as a way of rethinking residential development as a means of sustainable and resilient urban development over time.

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Conflicts of Interest
The author(s) report no conflicts of interest.

Data Availability Statement
The data that support the findings of this study are openly available at the corresponding author. The research materials include field survey data, observational records, occupancy mapping, spatial analyses, and design development documents generated during the study. These materials may be shared for academic and research purposes subject to reasonable conditions.

This is the statement by the Institutional Review Board.
No experiments on humans or animals were performed in this study which would require ethical approval. Academic and design research field surveys and observational studies were undertaken only. Thus, this study was exempt from IRB approval.

Credit Author Statement
Sheikh Hameem: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Visualization, Writing – Original Draft, Project Administration.
Ashiqur Rahman Turjo: Conceptualisation, Methodology, Validation, Supervision, Writing – Review & Editing.
None of the authors have declined to approve the manuscript.

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