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Review Article

Integrating Affordable Housing into Climate Adaptation and Infrastructure Investment Planning: A Scalable Urban Policy Model

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Abstract

Increasing rate of urbanization and escalating climate risks are transforming the more cities patterns of vulnerability, with low income residents being overly susceptible to environmental risks and inadequate infrastructure. Although the need to adapt to climate has emerged as a primary theme in urban planning, the responses in policies have largely revolved around physical infrastructures without addressing the issue of affordable housing in a systematic manner. This division has been the source of unequal protection results and in certain occasions displacement that comes with resilience to boost investments. The review article is an analysis of the ways in which the affordable housing goals can be incorporated into the climate adapting and infrastructure investment planning with the help of the well-coordinated institutional and financial processes. The paper takes a systematic literature review methodology and consolidates academic and policy-based literature on governance arrangements, housing policy instruments and climate finance architecture applicable to urban resilience planning. The results suggest that present adaptation efforts tend to be performed in sectorally disaggregated planning infrastructures that restrict the prospects of coordinating infrastructure investment and social equity objectives. Isolated governance, mismatched financing, and impediments to implementation remain limiting the scalability of integrated resilience and housing strategies. As a reaction, the article promotes a scaled urban policy model that includes joint planning procedures, capital budgeting consistency, and climate-related housing co benefit measurements at the national, metropolitan, and municipal government levels. The model has a profound impact on urban policy, especially in the situations where infrastructure shortage and informal housing vulnerability are present. The article makes a contribution to the emerging debates on inclusive adaptation planning, and provides a policy-relevant investment strategy by establishing housing affordability as a central element of climate resilience in future city investments in the infrastructure of climate exposed cities.

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1. Introduction

Urbanization is gradually overlapping, as a trend with climate change that puts low income populations at a disproportional risk of exposure to environmental risks and infrastructure breakdowns [1, 2]. In cities of the Global North and the Global South, climate related dangers, including flooding, extreme heat, coastal erosion, and storm surges, are exacerbating already existing spatial and socio economic disequilibrium [3]. These risks are not distributed in homogeneous patterns rather is mediated through the patterns of land use regulation, housing provision and infrastructure investment that are historically established patterns of concentrating vulnerable population in high exposure zones such as floodplains, informal settlement and environmentally degraded urban peripheries [4]. The structurally poor housing commonly inhabited by low income households and their common vicinities are often exposed to climate stressors and are often found in neighbourhoods with poor access to protective infrastructure like drainage systems or green buffers or resilient transport systems [5].

Simultaneously, the current infrastructure investment regimes (especially the ones based on economic competitiveness and commercial strategic-oriented urban development policies) have shown a tendency to focus on high value districts and commercially strategic corridors. Such unequal distribution of adaptive infrastructure supports environmental injustice trends in a different way, by increasing the level of protection in already advantaged regions and exposing marginalized communities to increasing climate risks. Consequently, the interaction between climatic vulnerability and residential disparity has become the target of interest in the modern urban approach and designs [6].

1.1. The Planning Disconnect

Although there is increasing awareness on the issue of climate change as a multidimensional challenge of urban governance, the institutional reactions have remained in a sectorally dispersed policy landscape. Even in most jurisdictions, the affordable housing policy and the infrastructure planning are administratively and financially segregated and regulated by different rule making processes, funding process, and implementation agencies. Climate adaptation plans, often formalized in terms of large scale infrastructure, such as flood defences, coastal defence systems, and transit improvements, are often incorporated without matching alignment to housing affordability targets in capital improvement planning [7].

These dislocations have created a series of undesirable socio spatial outcomes. Investment in adaptation measures aimed at making urban areas more resilient can also transform the value of land and development processes and thus add to the mechanisms of displacement due to climate. Environmental protection and the quality of infrastructure can be improved making areas which were initially considered as vulnerable to be more appealing to private investment. This usually sparks rent hikes, redevelopment compulsions and the subsequent re-housing of the low-income dwellers. In this regard, any efforts towards climate adaptation will make housing precarity replicate or even worsen unless they are comprehensively embedded in inclusive housing policies and protections. Lack of aligned planning structures that can match resilience funding with affordability objectives thus portrays a significant governance lapse in the current urban adaptation practice [8].

1.2. Aim and Research Questions

To help address such challenges, this review paper will analyze the institutional, financial, and planning aspects in which the consideration of affordable housing can be systematically incorporated into the climate adaptation and infrastructure investment policies. Beyond the project level interventions, the article summarises the newly available scholarship and policy practice in the attempt to find avenues of integrating housing equity into urban resilience planning on a scale. The article tackles three research questions that are related to each other. To begin with, what are the best ways of integrating the affordable housing goals within climate adaptation planning and infrastructure investment frameworks? Second, which institutional structures and sources of funds support upstream housing and resilience planning at multiple levels of governance? Third, how can the city scale urban policy framework be used to help cities align climate resilience investments with long term housing affordability and social equity objectives?

1.3. Methodology: Systematic Literature Review Approach

The article takes a systematic literature review methodology with an attempt to integrate the available knowledge on the incorporation of affordable housing into climate adaptation and infrastructure investment planning. The review will find, evaluate, and analyse pertinent academic and policy-oriented literature that covers institutional coordination and financing mechanisms and planning frameworks regarding how housing affordability goals can be matched with urban climate resilience strategies. Major multidisciplinary and planning focused academic databases such as Scopus, Web of Science, ScienceDirect, and Google Scholar were used as literature search made. All these databases were chosen to cover in depth the peer reviewed journal articles, policy analyses, and interdisciplinary studies that cut across the sectors of urban planning, climate governance, housing policy and infrastructure investment. Further grey literature was located via purposive searches of reports of international development agencies, urban policy institutes and climate finance organizations to identify emerging policy frames and practices of implementation that might not have yet been well-reflected in academic literature.

The selection of literature followed predefined inclusion and exclusion criteria. Included sources comprised peer reviewed journal articles, policy reports, and institutional publications that explicitly addressed the intersection of climate adaptation, infrastructure planning, and housing affordability within urban contexts. Studies that focused exclusively on mitigation strategies, rural development, or technical engineering solutions without governance or policy relevance were excluded. Preference was given to studies that examined institutional arrangements, investment frameworks, and planning instruments applicable to city level or metropolitan scale implementation.

To ensure temporal relevance to contemporary policy debates, the review focused primarily on literature published between 2014 and 2026. This timeframe captures the evolution of integrated climate adaptation planning following the growing incorporation of resilience frameworks into urban development policy and infrastructure investment strategies over the past two decades.

Earlier foundational works were included selectively where they contributed to the conceptual understanding of housing policy integration or infrastructure governance.

Thematic synthesis was employed to analyze the selected literature. This involved the identification and coding of recurring themes related to governance coordination, climate responsive housing finance, infrastructure investment planning, and socio spatial equity outcomes. Through an iterative process of comparative analysis, these themes were organized into conceptual categories that informed the development

of an integrated urban policy model presented in subsequent sections of the article. This approach enables the review to move beyond descriptive summary toward the generation of analytically grounded insights relevant to scalable policy design and implementation.

2. Conceptual Foundations

2.1. Climate Adaptation Planning Frameworks

The current trend is the shift of climate adaptation planning towards proactive and risk aware urban governance as opposed to responsive disaster management. The risk-based planning frameworks are known to put emphasis on identifying, assessing and prioritizing climate related hazards with reference to spatial vulnerability and exposure of city systems. In this strategy, the problem of climate impacts reduction is planned with a set of adaptation measures aimed at mitigating the risks and consequences of climate change by specific interventions in land planning, infrastructure construction, and environmental control. The idea behind such frameworks is to improve urban resilience through incorporating climate risk assessments in the development control processes and in long term investment planning [9, 10].

Simultaneously, infrastructure led resilience models are becoming relevant as cities are trying to secure critical assets and populations against the increasing environmental risks. These models are generally focused on investing in extensive scale protective systems, such as flood control systems, coastal defence, storm water management systems, and climate resilient transport corridors. Although these interventions are critical in protecting urban functionality, they are usually undertaken via sector specific capital planning processes, which fail to consider the issue of housing affordability or social equity directly [11]. Consequently, the infrastructure that strengthens resilience could unwillingly lead to the disproportional protection and investment patterns unless accompanied with goals of inclusive planning.

2.2. Affordable Housing Policy Instruments

The affordable housing policy has long been based on a variety of regulatory and financial tools to facilitate access to a decent shelter to low and middle income families. The inclusionary zoning policies are one of such mechanisms, which require or encourage developers to include affordable housing units in new residential developments [12]. These policies aim to make housing opportunities more equal in urban regions that have been subject to growth and reinvestment by connecting the development rights and the affordability requirements. Land value capture mechanisms provide another tool by which the public authorities can use the growth in land value created by infrastructure investment or change in regulation in favor of affordable housing provision [13, 14]. Betterment levies, development charges, and tax increment financing are some of the tools that allow municipalities to deviate a portion of the infrastructure induced land values towards housing programs or community development projects. The public housing investment is also one of the main aspects of the affordability strategies, especially in the situations when the market based provision is not able to address the needs of the vulnerable groups [15]. Over the recent years, there have been housing finance instruments in the form of subsidized credit programs, housing trust funds, blended finance, among others, used to increase access to affordable housing with the help of partnerships between the government, business, and non-governmental entities [16]. These tools give possible access points into aligning the housing provision with climate adaptation goals in which the planning and investment procedures are synchronized.

2.3. Infrastructure Investment Planning

One of the central institutional areas in which the urban adaptation strategies are put into place is infrastructure investment planning. The processes of capital improvement planning are used to provide guidance on how the public funds can be channeled to the development and maintenance of these infrastructures in the long run and their upgrading. More and more of these processes are being dealt with in terms of climate resilience, by the incorporation of environmental risk assessment and sustainability criteria into the project appraisal and prioritization framework. Simultaneously, mechanisms of climate finance have increased the pool of funding that can be accessed by adaptation related investments in infrastructure. Resilience bonds, climate adaptation funds, and multilateral development financing are some of the tools that have helped the cities to embark on massive infrastructure projects to mitigate climate risk [17].

Nonetheless, these sources of finance are usually dependent on the institutional capacity and the governing structures that have the ability to facilitate the integration of planning among sectors. The multilevel governance relations also influence the processes of implementing infrastructure investments by spreading authority and fiscal roles among the national, regional, and municipal institutions. Their coordination is a key to making sure that the investment in adaptation is consistent with the larger urban development and policy on housing [18]. Without such coordination, the infrastructure planning processes can support sectoral fragmentation and constrain the possibilities of affording considerations to climate resiliency efforts.

3. Review of Existing Integration Approaches

3.1. Resilient Housing Initiatives

The resilient housing programs within the state have been set up to tackle the housing issue of the middle-income earners. Attempts to incorporate housing provision in the climate adaptation planning have been intensified towards the devising of resolute housing programs designed to enhance the structural stability and environmental sustainability of residential units that are inhabited by vulnerable groups of people. These initiatives usually include retrofitting programs, climate responsive building standards and the moving of households out of high-risk areas to areas that are less susceptible with the help of housing schemes that are facilitated by the government. These interventions have helped to improve the level of protection against climate risks in a number of urban settings, and at the same time contribute to the lack of housing quality [19, 20].

Nevertheless, the introduction of resilient housing programs is often introduced under the framework of project-specific initiatives that are not combined with strategies to invest in infrastructure in general. The lack of policy instruments confirms the policy gaps that are presented by the lack of planning tools that would bridge the gap between housing retrofitting or relocation programs and long term

adaptation infrastructure planning [21]. Moreover, the lack of governmental control between the housing government, environmental government, and infrastructure government usually restricts the scale of such interventions to pilot or demonstration project.

3.2. Transit-Oriented Development and Adaptation

Transit oriented development has been advocated as a means of compact urban development and minimizing environmental susceptibility by increasing access to improved transportation system and decreasing the reliance on transport systems that are carbon intensive. Within the climate adaptation framework, resilient transit infrastructure investments can be used to facilitate the creation of more dense residential neighborhoods situated in regions that are not in the path of hazards. Where transit oriented development plans include affordable housing, they can help in achieving social inclusion as well as climate resiliency [22, 23].

However, the mismatching of funding of the transportation investment programs and affordable housing provision usually limits the achievement of such integrated outcome. Capital intensive investment structures which are normally used in the financing of transport infrastructure projects do not have facilities specifically allocated towards the affordability of housing. This can subsequently lead to the distribution of the benefits of improved connectivity and environmental protection in unequal ways among the higher income groups, which would jeopardize the equity goals of adaptation planning [24].

3.3. Nature Based Infrastructure and Social Housing

Green storm water management systems, urban wetlands and coastal buffer zones are known as nature-based infrastructure which is now cost-effective way of reducing the danger of climate and also providing co benefits to urban population. During the past years, the planners and policymakers have introduced the possibility to synchronize such interventions with the development of social housing by introducing green infrastructure into residential developments supported by the state. These approaches seek to enhance environmental protection while improving living conditions in low income neighbourhoods [25].

Despite their potential, implementation barriers persist in relation to land availability, institutional coordination, and long-term maintenance responsibilities. In many cases, the planning and financing of nature-based infrastructure is undertaken by environmental or public works agencies with limited engagement from housing authorities. This separation of responsibilities can impede the integration of green infrastructure investments within affordable housing development programs and reduce the effectiveness of adaptation efforts at the neighbourhood scale [25, 26].

3.4. Climate Gentrification Risks

An emerging literature has been concerned with the fact that adaptation investments are likely to have undesirable socio spatial externalities through mechanisms often referred to as climate gentrification. Infrastructure development to mitigate environmental risk may boost the prices of properties and encourage the investment in areas, which have been deemed susceptible by the private sector. Although these developments can make the built environment more resilient, it can also lead to rent increase, redevelopment stresses and removal of low-income earners. These processes point out the important governance and policy issues related to linking the goal of adaptation with the goal of housing affordability. Specifically, the lack of implicated regulatory controls and specific financing vehicles can enable resilience enhancing investments to increase existing inequalities as opposed to decreasing them. To overcome these issues, planning frameworks will be required to coordinate housing policy, infrastructure investment and climate adaptation plans in such a way that will facilitate fair planning and ensure that the risk of displacement is reduced.

4. Institutional and Financial Mechanisms for Integration

4.1. Governance Coordination Models

There is a need to have governance structures that can facilitate coordination of policy sectors and administrative levels as the affordable housing goals are integrated in the planning of climate adaptation and infrastructure investments. In most urban situations, housing, urban development, and environmental management is handled by different institutions with different regulatory mandates that are governed by different budgetary frameworks. Such institutional fragmentation tends to limit the ability of cities to coordinate resilience investments with social equity goals [27]. The governance coordination models that facilitate interdepartmental coordination and cross sector planning have thus become an essential tool that can facilitate integrated strategies of urban adaptation. These models can include the formation of joint planning committees, integrated development authorities or metropolitan level coordination platforms that provide a means of harmonizing the housing policy, land use planning decisions and infrastructure investments. These arrangements can help to incorporate some affordability considerations into the climate adaptation activities done under the capital improvement programs by facilitating information sharing and achieving policy coherence across agencies [12, 28].

4.2. Climate Responsive Housing Finance

Money mechanisms are in the center of facilitating the adoptability of affordable housing into the adaptation planning processes. Climate responsive housing finance is the type of funding programs that have particular objectives of resilience as the part of housing investment strategies. Such mechanisms can involve concessional finance on climate resilient residential developments, resiliency associated mortgage products, and hybrid finance frameworks whereby government subsidies are complemented by capital of the private sector in favor of inexpensive buildings and environmentally adaptive residential development. Moreover, the targeted distribution of the climate adaptation funds to the housing retrofitting/relocation programmes can contribute to a better resilience of the vulnerable community as well as the shortcoming of housing quality. Proper implementation of such financing instruments needs institutional structures that can be able to match housing investment priorities with the overall adaptation strategies. Devoid of this alignment, flows of climate finance may continue to be

skewed to large scale infrastructural projects which have little or no direct impact on the poor [16, 29].

4.3. Public Private Partnership Structures

Public private partnership deals are also another institutional avenue of incorporating housing affordability into infrastructure-based adaptation strategies. The partnerships would also enable the public authorities to use the skills and financial resources of the private sector in provision of climate resilient infrastructure being made in the development agreements and also acknowledging the affordability requirements. Infrastructure projects done via partnership structures can have an option of developing affordable housing units in secure or enhanced urban space. The success of such arrangements however lies in the structure of contractual and regulatory guarantees that are designed to yield fair results. Without the mandate of clearly defining the affordability, partnership driven development can give preference to commercial gain above the social concern. The incorporation of housing needs into the arrangement of the public- private partnerships is thus a significant tool of harmonizing the infrastructure investment with the objectives of inclusive urban development [30, 31].

4.4. Cross Sector Infrastructure Funds

It has suggested cross sector infrastructure funds as one way of breaking the barriers of financing in silo items between housing investment and climate adaptation planning. The resources gathered by these funding mechanisms across various policy areas, such as housing, transport, environmental protection, and urban development, are pooled to fund projects, which provide a mixture of resilience and affordability benefits. Such funds can encourage the effective prioritization of state funds as well as improving policy coherence between sectors by helping to jointly invest in integrated infrastructure and housing projects. International climate finance can also be enhanced through the establishment of cross sector financing arrangements, which can help cities to show that there is a social co benefits linked to the adaptation investments. Such funds can be utilized as the platform of the integrated planning approaches, which are able to tackle the problems of the environmental risk and housing vulnerability on the metropolitan level, when complemented by the proper governance frameworks [32, 33].

5. Toward a Scalable Urban Policy Model

Following the previous discussion on institutional arrangements, policy instruments, and financing mechanisms, this part goes further to propose a scalable urban policy framework of incorporating the aim of affordable housing within climate adaptation and infrastructure investment framework. The suggested model aims to transcend fragmented project-based interventions to offer a systematic framework in which cities can focus long term resiliency investments with housing affordability targets at a variety of governance levels. To theorize the incorporation of affordable housing goals in the climate adaptation and infrastructure investment planning, this article develops a scalable urban policy framework that connects the process of sectoral planning via the coordinated institutional and financial practices. The proposed framework places the policy instruments of housing policy, infrastructure investment planning, and climate adaptation strategies in a reinforcing relationship as components of an integrated process of capital budgeting and planning, which can produce the resilience and affordability outcomes, which Figure 1 demonstrates can be achieved together and not separately.

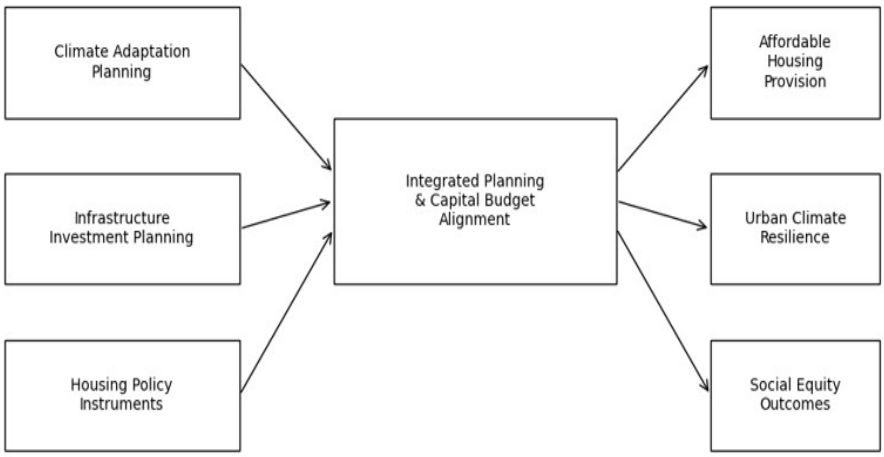

Figure 1: Integrated planning framework for aligning affordable housing provision with climate adaptation and infrastructure investment strategies

5.1. Integrated Planning Framework

The integrated planning setup that is shown in Figure 1 offers a systematic method of integrating the housing affordability factors into the climate-responsive infrastructure investment procedures. Another key element of the intended model is the creation of a unified planning system that would allow considering housing provision and climate adaptation priorities as the priority in the urban development processes. This strategy implies that the goals of housing affordability must be included in climate risks assessment, land use planning tools, and infrastructure investment plans at the very beginning levels of the project planning. Instead of using housing policy as a downstream social

intervention, the framework frames affordable housing as one of the central pillars of urban resilience planning. The joint housing and adaptation planning process can take into account the coordinated spatial analysis of locating areas that may be affected by cameras and infrastructure investments that can affect land values, development trends, and chances of displacement. With these evaluations being tied to the housing policy tools, including inclusionary zoning or providing public housing, they can help planning authorities to reduce the unintended socio spatial impacts of resilience strengthening infrastructure developments [34–36]. This way, adaptation investments may be designed in such a way that they provide protective benefits but do not increase the vulnerability of the low-income population in terms of housing.

5.2. Investment Alignment Strategy

Integrated planning is effective when the policy objectives are aligned to financial resources. The proposed model thus proposes to incorporate housing affordability issues in the capital budgetary processes applied in the determination of the infrastructure investment. This could include provision of specific channels of funds towards affordable housing in climate adaptation schemes or through the presence of affordability standards in infrastructure projects appraisal schemes. Besides this, more equitable investment choices can be facilitated through the development of climate and housing co benefit measures, which would allow policymakers to assess the social impacts of adaptation efforts [37]. These metrics can evaluate how many infrastructure investments help to bring positive changes in the access to housing, the environmental safety, and the long-term affordability to vulnerable groups. These indicators may be incorporated in investment planning processes which can help. In order to assist in aligning the infrastructure investment choices with the objectives of housing affordability, the present review suggests a number of climate-housing co-benefit measures that can be introduced into the capital budgeting and project appraisal procedures, summarized in Table 1.

Table 1: Climate–housing co-benefit metrics for evaluating the integration of affordable housing objectives within climate adaptation infrastructure investment planning

Investment Dimension	Climate Adaptation Objective	Housing Affordability Indicator	Policy Integration Function
Flood Protection Infrastructure	Reduction of hazard exposure in vulnerable areas	Retention of low-income households in protected zones	Mitigates displacement risk associated with resilience investment [37]
Climate-Resilient Transit Systems	Improved accessibility to low-risk urban areas	Expansion of affordable housing near resilient transit corridors	Aligns infrastructure investment with inclusionary zoning [25]
Nature-Based Infrastructure	Urban heat and stormwater mitigation	Upgrading of social housing environments	Enhances environmental performance of low-income neighbourhoods [38]
Urban Service Upgrading	Improved drainage and sanitation coverage	Increased tenure stability in informal settlements	Integrates adaptation with incremental housing upgrading [39]
Capital Improvement Programs	Long-term climate risk reduction	Dedicated affordable housing allocation	Embeds housing within infrastructure budgeting processes [29]

5.3. Implementation Pathways

An integrated housing and adaptation policy model implementation need overall coordination of both national, metropolitan and municipal governance levels. On a national scale, the regulatory environment and fiscal policy may offer enabling conditions towards integrated planning by setting climate adaptation funds in terms of housing affordability needs. Resilience objectives can also be integrated into national housing plans and infrastructure investment plans in a bid to facilitate the creation of climate responsive residential settings [7]. Figure 2 shows the multilevel governance structure in which all these integrated planning objectives can be operationalized. Regional planning bodies at the metropolitan level are placed at a position to align the infrastructure investments and land use policies across jurisdictions. This coordination is especially relevant in the process of dealing with the pressures of development that might be created through the resilience building the investments in transport or environmental infrastructure. Housing strategies and adaptation planning efforts can be used by the metropolitan institutions to encourage balanced growth and reduce the risk of displacement as the regional plans are aligned [40].

The diagram shows that there are coordinated implementation channels at national, metropolitan, and municipal levels of governance. Regulatory and fiscal enabling conditions are set at the national institutions. Metropolitan councils harmonize spatial planning and infrastructure prioritization to discourage the risk of displacement. The municipal governments implement integration in form of zoning, capital improvement programs and project interventions. Cross-level processes facilitate capital budget complementation, climate-housing co-benefit observation, and equity protection. The national governments are very important in the implementation of the integrated planning frameworks by the use of development control processes, capital improvement programs, and community level adaptation initiatives. Local authorities tend to be in the best position to evaluate vulnerabilities at the neighbourhood level and to carry out specific housing interventions that would be added value to infrastructure investments. Strategic interaction between the levels of governance is, therefore, critical in ensuring that integrated policy goals are implemented into planning outcomes specific within a context.

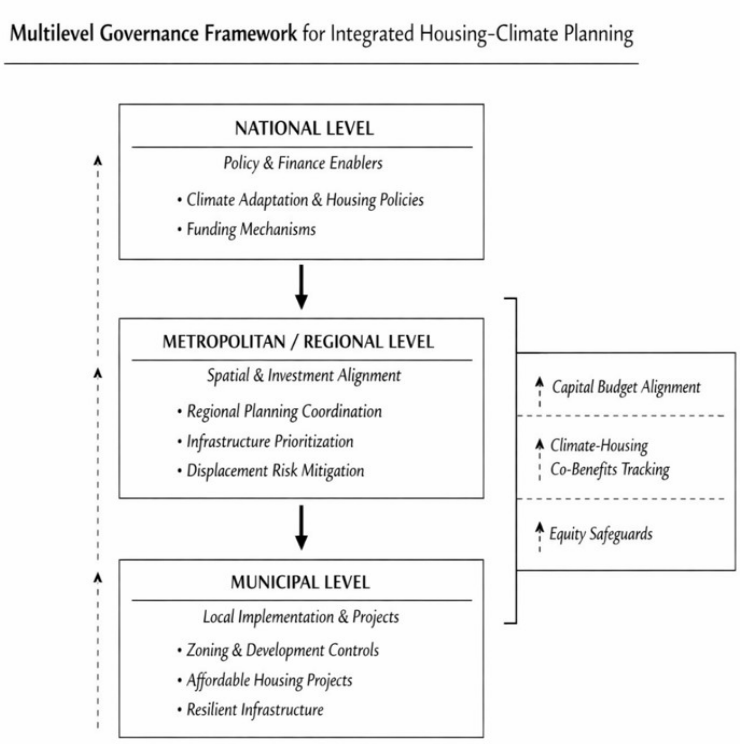

Figure 2: Multilevel governance framework for implementing integrated affordable housing and climate adaptation planning

6. Policy Implications for Cities in the Global South

The combination of affordable housing targets with climate adaptation and infrastructure investment planning is especially urgent in cities of the Global South, where high urbanization rates, insufficient coverage of services, intertwined with exposure to the impact of climate changes, contribute to the increase of the level of social and environmental vulnerability. Although the policy model, suggested in the present review, can be scaled to various urban environments, the application to the Global South situation must be properly considered with the structural limitations that precondition the local implementation power and the feasibility of investments [41].

One of the initial implications is related to deficits in infrastructure that emerge before climatic adaptation planning and limit the effectiveness of resilience interventions. In most of the cities, there are incomplete or unevenly distributed basic drainage, sanitation, solid waste management, and reliable transportation systems. In such circumstances, the process of climate adaptation cannot be discussed as an extra investment layer that can be overlaid on otherwise working urban systems. Rather, the priorities of adaptation are frequently bound up with the infrastructure provision itself especially in low income settlements where gaps in the provision of services are immediately reflected in skewed vulnerability to flooding, heat stress, and potentially health risks to the populace. The strategies of housing integration must thus be made so that the upgrading plans, extension of services and reduction of hazards may strengthen each other instead of running the processes through the disjointed planning [42].

The second implication is associated with the informal nature of housing and the complications of tenure insecurity. An often-high risk areas of a flood plain, steep slope, and coastal areas are often inhabited by informal settlements not at the preference of the residents, but because they have not been included in the formal land and housing markets. Informal housing is hence both physically and institutionally vulnerable. The inability to adopt adaptation planning that focuses on relocation or formal redevelopment and does not provide equivalent protections may intensify precarity especially in cases where the displaced households cannot have access to other affordable forms of housing. Risk reduction, including incremental upgrading, extending basic services, and tenure responsive policies that augment security but do not demand the full formalization at once where institutional channels are constrained should be put at the heart of policy approaches that combine housing and resilience in such contexts [3].

The third implication is the affordability of climate finance and the difficulty of steering the adaptation funds to inclusive housing outcomes. Despite an increase in international climate finance instruments over the past few years, cities in the Global South are frequently subject to obstacles in the creation of bankable projects, to fiduciary demands and the presentation of quantifiable impacts in accordance with funder priorities. Interventions related to housing (or particular interventions focused on informal settlements) can be underestimated in a climate finance system that focuses on large scale infrastructure with obvious asset based payoff [43]. Enhancing the prominence of housing as a type of adaptation investment, and the expression of social co benefits in project appraisal are thus critical in helping cities to mobilize external finance in a direct manner that minimizes vulnerability in low income populations.

Another last implication is institutional capacity limitations such as understaffing, divided mandates and financial reliance on upper levels of government. Although local governments may understand the required changes in local housing and adaption planning, they might lack technical and administrative support to have coordination of different sectors of activities, keep current risk data, implement development regulation and long-term capital planning processes. In such circumstances, scalable integration demands governance strategies that can be practicable under limited institutional settings [44].

These are easier coordination systems, co benefit indicators that are standardized and can be used in projects and programmatic techniques enabling incremental scalability as opposed to depending on isolated pilot projects. Practically, the most effective channels would be

those that incorporate the integration demands into the normal planning and budgeting processes, so that they will not be dependent on extraordinary institutional designs that are hard to maintain. Combined, these implicates indicate that integrated housing and adaptation policies in the Global South should be based on the realities of informal urbanization, scarcity of infrastructure and disparities in access to finance. Integration of policies, not just technical integration, but ensuring that the necessary institutional and financial conditions are established in which resilience investments will help secure housing and affordability of populations at highest risk of climate risk [45].

7. Discussion

This review finds that there should be drastic change in the current paradigm in the way people plan cities. Traditionally, climate adaptation is a policy problem that is not only tackled based on a different institutional mission, but is also approached through a different investment logic. Nevertheless, the fact that environmental risk and socio spatial inequality in city centres are increasingly becoming intertwined issues denotes that adaptation planning cannot be regarded as a mere technical endeavour in terms of infrastructure provision. Instead, it demands a more holistic solution that takes into consideration housing security as an important aspect of urban resilience. Integrating the aspect of affordability into the reconstruction plans thus does not reflect a policy modification alone but a wider shift in the city perception of resilience planning and its practical implementation.

This transformation is directly associated with the politics of infrastructure distribution. Infrastructure decisions on the place, the magnitude and the time of investment are influenced by competing economic agendas, constrained fiscal choices, and governance agendas. Your growth oriented objectives usually inform infrastructure development in most environments in line with commercially strategic districts or areas likely to generate high revenues. This can lead to over-investment in urban areas that are already more economically and institutionally advantaged, and leave low income populations in more significant exposure to climate risk. The incorporation of housing affordability aims in infrastructure planning then requires a review of investment requirements in order to make sure that resilience improving projects can lead to fair urban development and not to the reinforcement of current inequalities. Another aspect of the discussion that brings out the dangers of maladaptation is where activities designed to diminish climate vulnerability lead to the unanticipated adverse social effects. Massive security infrastructure, environmental enhancement, and transportation beautification can change the relationship of development patterns in a manner that will push property prices and speculative building. The absence of proper regulatory protection means that the changes can result in a rise in rents, displacement strain, and loss of affordable housing stock in the places that have been the beneficiaries of resilience investment. In this regard, any adaptation strategies that do not consider the housing market responses might end up contributing to the vulnerabilities that such strategies are supposed to be.

8. Limitations and Areas for Future Research

The review is limited to a number of aspects which must be taken into account when understanding its results and the relevance of the suggested policy model. The main limitation is connected with the problem of availability of data, especially in fast-growing cities where the information about the state of housing, infrastructure functioning, and the local climate risks are not completely analyzed or reported. The merging of low-cost housing factors in the adaptation planning necessitates comprehensive spatial and socio economic information that is in most cases inaccessible or disjointed throughout the institutions. Consequently, the study provided in this article is based on secondary sources that might not be able to reflect the variety of local implementation conditions, particularly in informal or underserved urban settlements. Another weakness relates to complexity of governance relating to harmonization of housing policy and investment in infrastructure at various administrative tiers. The institutional frameworks needed to facilitate the implementation of integrated planning very much vary among jurisdictions and this is due to the differences in the regulatory powers, financial capacities, and the intergovernmental coordination mechanisms. Although the review suggests that there are various forms of governance that can be used to facilitate integration, the success of such arrangements will be determined by the circumstances involving political and institutional forces beyond the perspective of the current analysis. There is also an issue of uncertainty in financing scalability. Even though there are emerging climate financing vehicles and blended investment models that could hold possible avenues to assist integrated housing and adaptive efforts, long-term sustainability of this kind of venture is to be determined by the market conditions, financial policy restrictions, and changing international funding priorities. The ability of cities to assemble adequate resources to achieve combined resilience and affordability goals may thus differ significantly, especially in the areas where concessional funding opportunities are low. The potential solution to these shortcomings is that future research ought to employ empirical studies of the integrated planning efforts on a city or metropolitan level. The comparison of the cases involving the deployment of housing inclusive adaptation strategies would be helpful in understanding the institutional effectiveness, financing deals, and socio spatial results. Secondly, more effort is required in order to come up with standardized indicators that can be able to measure the joint savings of resilience and affordability of infrastructure projects. These would help in building a stronger body of evidence on assessing scalability and equity consequences of integrated urban adaptation policies.

9. Conclusion

The growing relationship between climate vulnerability and housing inequality in cities highlights why affordable housing goals should be incorporated into climate adaptation/infrastructure investment planning. Since cities are facing an ever-increasing environmental threat, any adaptation plan that does not consider socio spatial differences and solely emphasizes the physical infrastructure is not likely to produce sustainable resilience results. The planning frameworks necessary to ensure that the low-income populations not only stay safe and well in their urban settings but also get the opportunity to do so with the climate hazards need to be designed in both ways: to actively synchronize resilience investments with the objectives of housing affordability. This review has brought forth the applicability of scalable policy frameworks that have the capacity of closing institutional and financial gaps between housing delivery and the development of infrastructure. By supporting the development of an integrated urban policy framework extending to integrate the joint planning processes, investment alignment strategies, and multilevel implementation pathways, the article is one of the contributions to the current attempts to achieve more inclusive types of climate governance. The proposed framework may provide the foundation to introduce the housing consideration into the adaptation planning on the scale larger than individual projects or pilot projects. This approach has a great impact on planning implications.

Any effort to incorporate the affordability goals into capital improvement planning, climate finance allocation, and land use regulation will help to mitigate the unintentional impact of resilience enhancing investments, such as displacement and climatic induced gentrification. This sort of integration also encourages a transformation to more equal processes of distributing infrastructure that acknowledges housing security as the compositional element of urban solidarity. In the future, the future of urban investment will be critical in determining how cities will be able to deal with climate change without compromising social inclusion. To make sure that the process of adaptation will not care about strengthening existing inequalities and instead help to build resilient and inclusive urban settings, it will be necessary to align future infrastructure expenditures with housing affordability concerns. Further research and policy development will be needed to help improve integrated planning models and even to help implement the models in various urban settings that share common climate issues.

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