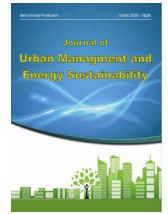


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Towards Biophilic Cities: An Institutional Framework for Urban Transformation in Iran**

Seyed Mohammad Shokrani¹, Homayoon Nooraie^{2*}, Mahmoud Mohammadi²

¹ Ph.D. Candidate, Department of Urban Planning, Faculty of Architecture and Urban Planning, Art University of Isfahan, Isfahan, Iran

^{2*} Associate Professor, Department of Urban Planning, Faculty of Architecture and Urban Planning, Art University of Isfahan, Isfahan, Iran

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ABSTRACT

Biophilic cities restore nature lost through rapid urbanization by fostering deep human–nature connections. However, implementing biophilic principles in developing countries such as Iran faces significant institutional barriers. This study aims to develop a comprehensive institutional framework for biophilic urban transformation, adapted to Iran's sociocultural and political landscape. Employing an abductive approach that blends inductive and deductive reasoning, this study utilized a systematic literature review and qualitative content analysis. In accordance with PRISMA 2020 guidelines, databases including Scopus, Springer, and ScienceDirect were searched for English-language publications from 2011 to 2025. Of 1,147 records, 30 studies addressing institutional aspects of biophilic urbanism were synthesized to identify constructs applied to evaluate Iran's institutional environment. Analysis identified three interrelated components: legal, organizational, and cultural. Results indicate that Iran's transition is impeded by “survivalist urbanism,” characterized by a regulatory void with reactive laws, a fragmented organizational structure, and an engagement gap despite dormant cultural roots. To address these challenges, this study proposes a concentric institutional framework placing biophilic culture at its core and strengthening legal and organizational aspects through interdependence. This framework permeates all aspects of biophilic urban development and provides a basis for effective implementation. The study concludes that biophilic transformation in developing contexts is dependent on sequencing. Meaningful progress requires moving beyond “technocratic isomorphism” toward a bottom-up approach in which cultural internalization is treated as a structural prerequisite for effective regulatory enforcement. Accordingly, the proposed framework offers a transferable model for developing nations seeking to embed biophilic principles within complex institutional environments.

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*Corresponding Author:

Email: H.nooraie@aui.ac.ir

Phone: +98 913 312 5938

ORCID: <https://orcid.org/0000-0002-6343-7117>

**This article is derived from the ongoing doctoral dissertation research of Seyed Mohammad Shokrani, entitled “Developing a Formal Institutional Framework for Facilitating the Transition Toward Biophilic Cities in Iran,” which is being conducted at the Art University of Isfahan under the supervision of Dr. Homayoon Nooraie and Dr. Mahmoud Mohammadi.

INTRODUCTION

The twenty-first century is widely recognized as an era of urbanization. For the first time in history, more than half of the global population resides in cities (United Nations, 2018). In Iran, the pace of urbanization has increased significantly in recent decades, with more than 74% of the population now living in urban areas (Statistical Center of Iran, 2020). This rapid urban growth has led to the overconsumption of natural resources and extensive degradation of urban ecosystems. Consequently, Iranian cities face a host of environmental, social, and public health challenges, including environmental pollution, the loss of green spaces, the expansion of urban heat islands, and a general decline in quality of life (Shokrani and Nooraie, 2022). In response to these challenges and the growing recognition of the importance of preserving and revitalizing nature within urban contexts, biophilic city theory stands out due to its dual focus: not only on the ecological integration of nature within cities but also on the emotional and psychological connections between urban residents and their natural surroundings (Nazemi et al., 2017). The biophilic city theory envisions urban environments that integrate natural assets and green infrastructure to cultivate strong emotional and cognitive bonds between citizens and nature.

Achieving a biophilic city requires more than the preservation and restoration of natural infrastructure; it also calls for systematic reforms and greater investment in institutional systems and emerging local capacities. The existence of biophilic institutions is one of the most essential prerequisites for the development of biophilic urbanism and for overcoming its economic, social, and cultural barriers (Beatley, 2011). In this context, both formal and informal institutions must possess the necessary mandates, capacities, and mechanisms to encourage activities that contribute to nature-based urban development. These institutions should also function through integrated coordination frameworks to help reduce institutional fragmentation in environmen-

tal governance. Collectively, these institutions and their interactions shape a biophilic city's institutional environment. Therefore, improving this environment and proposing an effective institutional framework based on local needs and capacities is essential for making the vision of a biophilic city achievable in the future.

Over the past four decades, the foundation of urban development in Iran has been deeply influenced by the country's unique geographical and environmental context, particularly its oasis-based settlement patterns. Historically, urban expansion in Iran has been closely aligned with these ecological foundations. To preserve the natural lands surrounding cities, the development of the city proper has been limited and controlled under the strict requirements of formal institutions, while natural spaces within cities have been destroyed despite these institutional requirements. However, despite Iran's long-standing cultural legacy of harmony with nature and its potential for biophilic urban planning, contemporary urban development has increasingly been shaped by dominant physical planning paradigms and prevailing institutional arrangements, thereby creating persistent tensions between urban growth priorities and ecological considerations (Madani, 2014). This trajectory has caused significant resource degradation. The literature indicates a 35% decline in the average aquifer recharge rates between 2002 and 2017 (Noori et al., 2023). In Tehran, the vegetation cover shrank from 38.9 ha (1990) to 4.7 ha (2020) (Zenouzi et al., 2022), while Mashhad's green space decreased from 38.1 ha (1987) to 33 ha (2016) (Karami et al., 2019). The drying of Isfahan's Zayandeh-Rud River and associated orchards exemplifies these ecological consequences.

A review of the literature related to this study reveals that most prior research on biophilic cities has focused on the development of criteria and indicators across various scales, along with the evaluation of case studies based on these frameworks. For instance, Pedersen Zari (2023) proposed a specialized biophilic urban

design framework aimed at analyzing and mapping biophilic elements. Similarly, Tardast et al. (2020) introduced a localized model of biophilic urbanism for districts 9 and 10 of Tehran. However, considering the central theme of this study, literature that simultaneously addresses the concepts of biophilic urbanism and institutional structures is particularly significant. Although some studies have indirectly linked these two domains, primarily by exploring how the environmental aspects of cities interact with culture and legal systems, which in turn shape formal and informal institutions, such studies generally lack a comprehensive and in-depth examination of the institutional environment's role in enabling environmentally sustainable urban development. However, most of these contributions remain limited to surface-level or predominantly quantitative analyses. Moreover, no study has directly investigated the role of the institutional environment in the transformation of urban systems towards biophilic principles or proposed an institutional framework grounded in this context. Instead, related research has largely focused on two peripheral themes: first, the concept of the biophilic citizen, which loosely corresponds to informal and subjective institutional factors associated with biophilic values; and second, biophilic governance, which is mainly concerned with legal and organizational structures, often approached from a top-down perspective. Representative studies in these areas include Taghipour et al. (2024), who examined the aspects of biophilic citizenship and evaluated them within urban communities; Salarian et al. (2024), who proposed an institutional capacity-building pattern for citizen participation in environmental policymaking; Novosadová and van der Knaap (2021), who explored the role of biophilic agents in building green and resilient cities; and Valko (2021), who investigated how environmental attitudes and contextual drivers contribute to the development of an environmental culture.

Considering the urgent need to establish an institutional framework for biophilic urban de-

velopment, the challenges arising from a weak institutional environment, which has led to the degradation of a substantial portion of natural resources, particularly in Iran's metropolises, and the existing research gap concerning the role of institutional factors in advancing biophilic urban transformation both globally and within Iran, this study sets out to address these critical issues. This study has two primary objectives. First, it aims to develop a comprehensive institutional framework for evaluating biophilic urban transformation informed by the global literature. Second, based on these criteria, the study seeks to adapt the framework to the Iranian context through a critical assessment of the local institutional environment. This study was carried out in Isfahan, Iran, in 2025 and 2026. The novelty of this study is twofold in nature. First, it provides the first comprehensive institutional framework for biophilic city transition in Iran, filling the theoretical gap between biophilic urbanism literature and studies of planning institutions. Second, it drives home a simple point: context is important. Biophilic city principles from the West must be tailored to fit Iran's social and political conditions.

MATERIALS AND METHODS

Research Philosophy and Design

This study adopts an interpretivist philosophical stance and an abductive methodological approach to develop an institutional framework for biophilic urban transformation in Iran. Given that biophilic cities represent complex and context-dependent phenomena shaped by socio-cultural and political conditions, an interpretive perspective facilitates a deeper understanding of the institutional factors influencing their implementation within the Iranian context.

The research was conducted in two phases. In the first phase, a deductive approach was employed through a systematic literature review and qualitative content analysis to identify theoretical components and institutional constructs associated with biophilic urbanism and institutional transformation. In the second phase, an inductive

approach was applied to examine these identified constructs within Iran's institutional context using document-based data, including academic studies and relevant operational plans. The integration of deductive and inductive reasoning enabled the development of a context-sensitive institutional framework for advancing biophilic cities in Iran.

Systematic Literature Review (Phase I)

The systematic review was conducted in accordance with PRISMA 2020 guidelines (Page et al., 2021).

Information Sources and Search Strategy

To conduct the review, leading academic databases were selected, including Scopus, Springer Nature Link, ScienceDirect, Taylor & Francis, JSTOR, and Wiley Online Library, along with several supplementary sources (including relevant websites and citation searching). The literature

search was aligned with the study's primary objective of identifying the institutional components and constructs that contribute to the realization of biophilic cities. The search terms included "biophilic city" or "biophilic urbanism", in combination with one of the following: "institution," "culture," "law," or "regulation." The search was limited to English-language publications from 2011, the year marking the emergence of biophilic city theory, to 2025.

Eligibility Criteria

In accordance with the PRISMA checklist, specific inclusion and exclusion criteria were established to screen the retrieved records. Studies were selected if they explicitly addressed the legal, organizational or, socio-cultural aspects of biophilic cities. Table 1 presents the specific criteria used for study selection.

Table 1: Inclusion and Exclusion Criteria

Criterion	Inclusion Criteria	Exclusion Criteria
Topic Relevance	Studies focusing on "biophilic city" or "biophilic urbanism" with a specific link to institutional aspects (governance, law, culture, regulations).	Studies lacking emphasis on biophilic concepts or focusing solely on ecological/technical aspects without institutional aspects.
Content Focus	Studies addressing legal frameworks for urban nature, structural practices of nature-based management, or socio-cultural aspects.	Studies failing to address legal, structural, or socio-cultural frameworks.
Time Frame	Published between 2011 and 2025.	-
Language	English language publications.	Non-English language publications.
Document Type	Peer-reviewed journal articles, books and conference papers.	Editorials, short commentaries, or non-verified sources.

Selection Process

As shown in Figure 1, the source selection process for the systematic literature review followed the PRISMA 2020 flow diagram, which includes three main phases: identification, screening, and inclusion. This structured approach ensured comprehensive and methodical coverage of relevant literature. The initial search produced 1,147 records (1,142 from the selected databases and 5 from other sources). After removing duplicates,

1,068 records were retained for title and abstract screenings. Of these, 1,024 records were excluded for lacking relevance to the themes of biophilic cities or urban biophilia. Subsequently, 44 full-text articles were reviewed for their eligibility. Among these, 14 were excluded for not addressing critical themes such as legal frameworks for urban nature, structural practices of nature-based management, or socio-cultural aspects of urban ecosystems. Ultimately, 30 sources were

selected for the final analysis. The findings from these studies were synthesized and categorized according to relevant institutional components,

serving as the basis for the development of the study's conceptual framework. (Fig. 1)

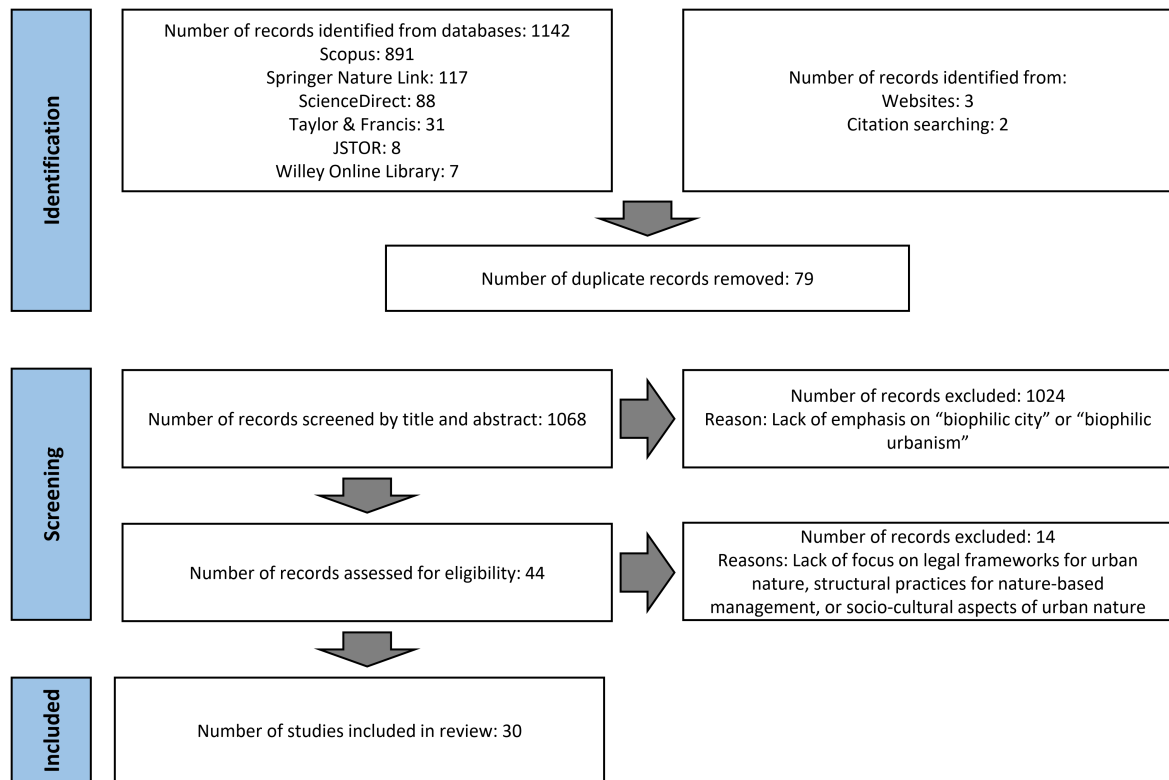


Figure 1: Source selection process for systematic review (Created by the authors and adapted from Page et al., 2021)

Qualitative Content Analysis and Coding Procedure
Following the selection of 30 eligible sources through the PRISMA protocol, a qualitative content analysis was conducted to systematically distill the raw textual data into the institutional constructs and components presented in Figure 3. The conceptual framework was developed through systematic coding and analytical procedures.

•**First-Cycle Coding and Category Development:** The full texts of the 30 selected sources were reviewed, with the unit of analysis defined as explicit policy statements, institutional guidelines, and socio-cultural practices relevant to biophilic urbanism. During this stage, relevant textual extracts were assigned descriptive codes

that captured their substantive meanings. Similar codes were iteratively compared across the studies and synthesized into broader theoretical constructs based on thematic proximity and conceptual alignment. For example, textual evidence relating to “integrating national environmental documents into urban management missions” and “enacting binding regulations for green roofs” was consolidated under the construct Alignment of Current Laws with Biophilic Principles. Likewise, codes pertaining to “financial support to facilitate investment” and “employing new green economy tools” were aggregated under Adequacy of Funding.

•**Higher-Order Categorization:** In the subsequent analytical stage, the identified constructs

were organized into three overarching institutional macro-components: Legal Framework, Organizational Capacity, and Cultural and Community Factors. This higher-order categorization was achieved through an abductive analytical process informed by institutional theory and recurring themes identified in the reviewed literature.

Theoretical Background

The Concept of Biophilia and the Biophilic City Theory

Biophilia, defined as the innate human affinity for nature, posits that daily exposure to natural environments significantly enhances well-being (Beatley and Newman, 2013; McDonald and Beatley, 2021). Building on this concept, Beatley (2011) introduced the biophilic city theory, emphasizing that the integration of nature is essential for urban health. However, the aim of biophilic urban planning extends beyond the mere physical coexistence of cities with nature; it requires the realization of the “philic” dimension through the cultivation of emotional bonds between people and the natural world. This profound human-nature connection fundamentally depends on supportive behavioral patterns, attitudes, knowledge systems, institutions, and governance mechanisms (Beatley, 2011; Lee and Kim, 2021).

Institutionalism in Urban Development

This study adopts Greif’s comprehensive definition of institutions, in which an institution is understood as a system of rules, beliefs, norms, and organizations that creates a social behavioral order (Greif, 2006). Consequently, the institutional environment comprises formal structures (laws, regulations, and organizations) and informal components (shared beliefs, norms, and practices) operating across multiple levels (North, 1990; Nooraie, 2020). While effective institutions serve as primary drivers of spatial transformation and sustainable development, this crucial dimension is often overlooked in less developed nations, where socio-environmental and political institu-

tions function as foundational infrastructures for urban progress (Kozegar Kaleji and Norozi, 2022).

The relationship between biophilic city theory and institutionalism

According to Figure 2, The transformation of urban environments into biophilic spaces depends on political will, robust institutional frameworks and effective governance structures (Carter and Henríquez, 2025). Biophilic institutions, both formal and informal, draw inspiration from or focus on nature, shaping the urban landscape in ways that influence individual behaviors and social interactions. These institutions may include land-use and building regulations, water and energy management policies, urban development plans, educational programs promoting environmental awareness, and both formal and informal rules that encourage and legitimize human-nature interactions (Novosadová and van der Knaap, 2021). To achieve a biophilic city, it is essential to establish effective institutions that support nature-based development and promote biophilic behaviors. Equally important are the mechanisms that ensure coordination and communication among these institutions. Proposing an institutional framework that reflects the local institutional context provides a crucial foundation for advancing the biophilic urban transformation.

Based on existing research, as shown in Figure 3, three key components legal, organizational, and cultural are essential for a biophilic-oriented urban transition through an institutional lens:

- Legal Component: Formal institutions establish the legal and political foundations of biophilic urbanism (Beatley, 2016). Legal tools, such as zoning regulations, green infrastructure mandates, and green roof standards, are crucial for institutionalizing biophilic principles in urban planning (Carter and Henríquez, 2021). However, the effectiveness of these nature-supportive laws depends on more than just their alignment with other legal frameworks. They must also be compatible with informal institutions, the cultural

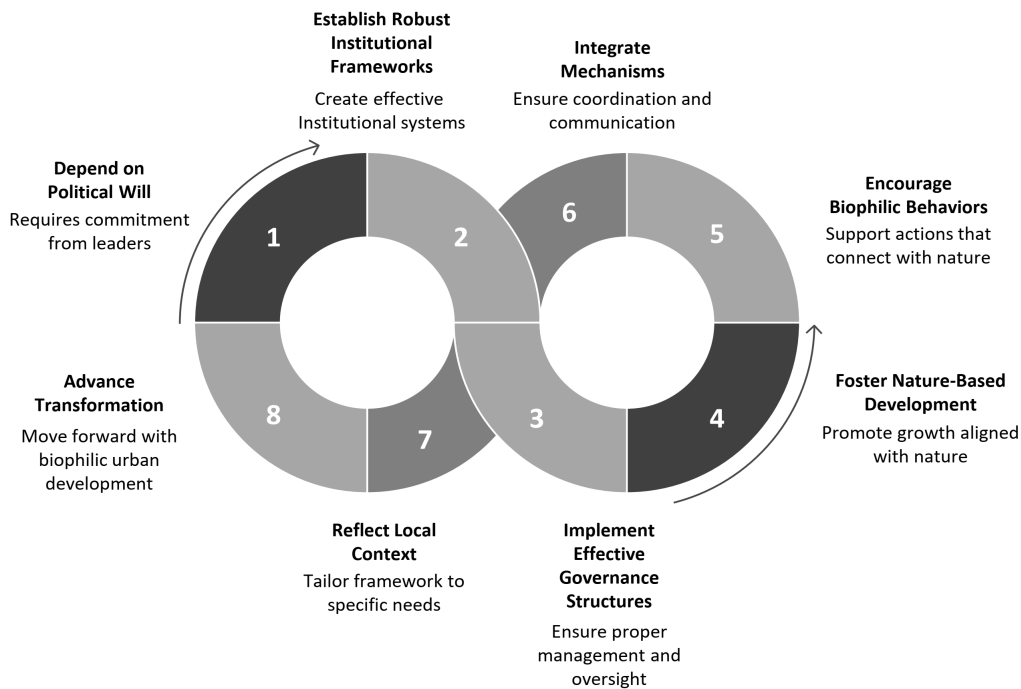


Figure 2: Cycle of urban biophilic transformation

context, and citizens' biophilic property rights (North, 1990).

- Organizational Component:** Successful urban transformation towards biophilic cities requires capable organizations with the necessary expertise and resources to plan, execute, and maintain natural infrastructure (Carter and Henríquez, 2021). Formal institutions are primarily responsible for mobilizing and allocating financial resources to support biophilic projects (Carter and Henríquez, 2025). Simultaneously, informal networks, such as local community associations, non-governmental organizations, and grassroots environmental movements, often fill the gaps left by formal institutions. These actors can provide resources, share knowledge, and foster public participation, thereby enhancing the effectiveness and inclusivity of biophilic initiatives (Söderlund and Newman, 2022).

- Cultural Component:** Informal institutions rooted in culture significantly influence urban residents' perceptions and interactions with

nature. In many cases, these cultural institutions help nurture a sense of responsibility for maintaining local green spaces and the natural infrastructure. This cultural engagement can enhance the effectiveness and long-term sustainability of formal environmental policies (Beatley, 2016; Novosadová and van der Knaap, 2021).

The components and constructs shown in Figure 3 constitute the first comprehensive institutional framework endorsed by scholars and developed from the global research literature for evaluating biophilic urban transformation. This framework allows cities in both developed and developing countries to conduct a holistic, multi-level evaluation of their institutional environments across legal, organizational, and cultural aspects. Such evaluations help create the necessary conditions to advance biophilic city development. Furthermore, each city can adapt the framework by considering its unique opportunities and constraints, thereby generating a localized version tailored to its specific context.

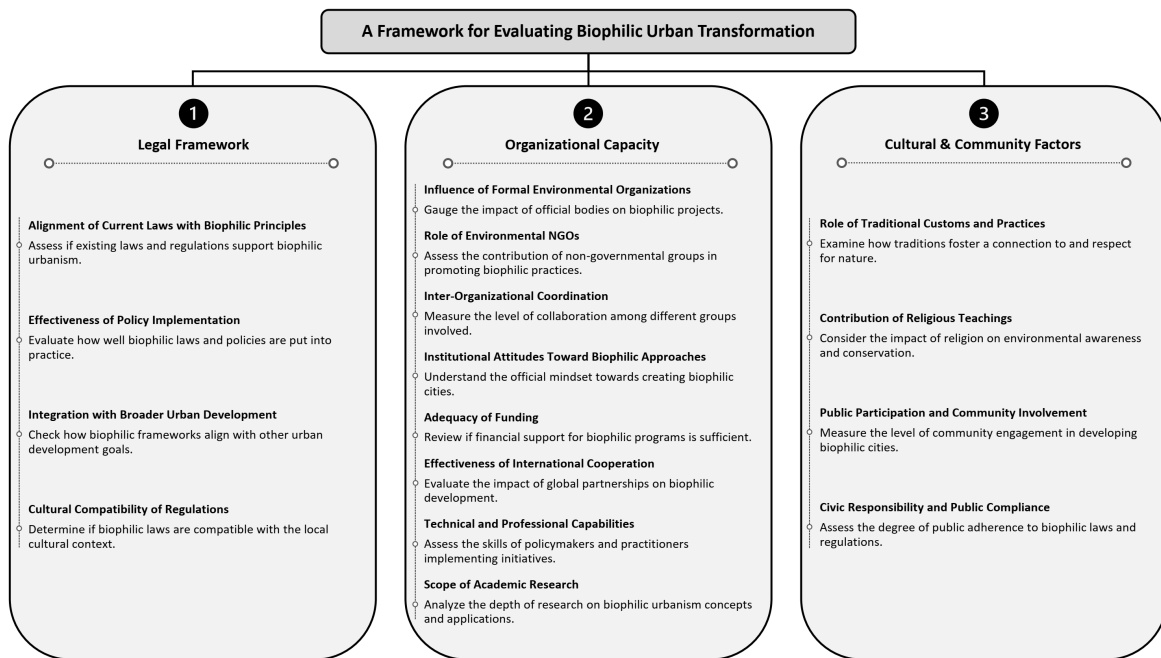


Figure 3: Key institutional components and constructs for transition to biophilic cities (Developed by the authors based on (Beatley, 2011; SBEnrc, 2012; Beatley & Newman, 2013; Reeve, 2014; Beatley, 2016; Littke, 2016; Scott et al., 2016; Newman et al., 2017; Ziari et al., 2018; Arof et al., 2020; Barau et al., 2020; Sini, 2020; Totaforti, 2020; Zingoni de Baro & Macedo, 2020; Cabanek, 2021; Carter & Henríquez, 2021; Carter et al., 2021; McDonald & Beatley, 2021; Novosadová and van der Knaap, 2021; Panlasigui et al., 2021; Brown & Santiago Fink, 2022; Carter & Henríquez, 2022; Söderlund & Newman, 2022; Iskander and Lowe, 2023; Pedersen Zari, 2023; Alashwah et al., 2024; Fatmadewi, 2024; Moarefi et al., 2024; Carter & Henríquez, 2025; Lefosse et al., 2025).

DISCUSSION AND FINDINGS

Institutional Assessment of Iran's Urban Environment

This section evaluates Iran's institutional environment based on a content analysis of the relevant literature, focusing on the institutional constructs that influence the transformation of urban sys-

tems towards biophilic principles. As presented in Table 2, Iran's legal framework demonstrates significant institutional limitations that constrain the integration of biophilic principles into urban development. These limitations highlight the need for legal reforms to establish a more supportive framework for biophilic policies.

Table 2: Legal component of iran's institutional framework for biophilic city transition (Authors' synthesis based on Khedmatgozar, 2018; Shantir, 2022; Ebrahimi et al., 2023; FaghihHabibi, 2024)

Construct	Status of Iran's Institutional Environment (Key Observations)	Key Challenges & Implications
Biophilic Urbanism in Laws	- Lack of explicit terminology for biophilic cities. - Indirect/fragmented support via general laws (e.g., Constitution Art. 50, Clean Air Act, Agricultural Land Law) (Ebrahimi et al., 2023; FaghihHabibi, 2024). - Reliance on reactive rather than proactive biophilic planning	- Regulatory Void: Absence of a dedicated legal framework creates ambiguity in enforcement. - Interpretation Issues: Indirect laws are open to varied interpretations, weakening mandatory implementation.

Implement- ation of Bio- philic Laws	- Presence of multiple responsible authorities leading to institutional fragmentation (FaghihHabibi, 2024). - Weakness in legislative formulation and lack of preventive provisions (FaghihHabibi, 2024). - Shortage of specialized legal personnel in environmental sectors (FaghihHabibi, 2024)	- Implementation Gap: High disparity between law on paper and law in practice. - fragmented Governance: Lack of integrated enforcement mechanisms allows environmental degradation to continue.
Integration with Urban Development	- Prioritization of short/medium-term economic and political agendas (Shantir, 2022). - Dominance of modernist development objectives over sustainable principles (Shantir, 2022).	- Goal Conflict: Biophilic principles are marginalized by immediate economic pressures. - Unsustainable Growth: Development laws inadvertently support gray infrastructure over green.
Cultural Compatibility	- Insufficient legal attention to the protection of folk culture and local identity (Khedmatgozar, 2018). - Symbolic rather than substantive references to cultural preservation (Khedmatgozar, 2018).	- Social Disconnect: Laws remain formal and external, failing to be internalized as social norms. - Identity Crisis: Legal frameworks fail to leverage traditional ecological knowledge.

According to Table 3, Iran's organizational structure demonstrates significant institutional limitations that may constrain the implementation of biophilic interventions, particularly in rela-

tion to institutional capacity and coordination mechanisms. These limitations highlight the need to strengthen organizational capacities to support biophilic transformation.

Table 3: Organizational component of iran's institutional framework for biophilic city transition ([Authors' synthesis based on Rasoolimanesh et al., 2013; Ziari et al., 2018; Madani, 2021; Alizadeh & Meshkini, 2025; Faryadi, 2025; Raisi et al., 2025](#))

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Construct	Status of Iran's Institutional Environment (Key Observations)	Key Challenges & Implications
Influence of Formal Organizations (DoE)	- Department of Environment (DoE) lacks comprehensive legal authority (Faryadi, 2025). - Role restricted to advisory/supervisory with minimal veto power in urban plans (Faryadi, 2025). - Conflicts with resource-extractive entities (Faryadi, 2025).	- Institutional Marginalization: Environmental bodies cannot effectively regulate powerful development Organizations. - Authority Deficit: DoE directives are often overridden by construction priorities.
Role of NGOs	- Absence of supportive mechanisms to integrate NGOs into planning (Rasoolimanesh et al., 2013). - Decision-making largely excludes non-governmental actors (Rasoolimanesh et al., 2013).	- Exclusionary Governance: Loss of social capital and grassroots support for biophilic initiatives. - Implementation Blind-spots: Top-down plans miss local nuances provided by NGOs.
Coordination & Collaboration	- Fragmented landscape with overlapping organizational roles (Rasoolimanesh et al., 2013). - Independent operation of ministries without inter-sectoral coordination (Rasoolimanesh et al., 2013).	- Structural Fragmentation: Hinders the holistic approach required for complex biophilic systems. - Resource Wastage: Duplication of efforts and conflicting operational goals.
Institutional Attitudes	- Traditional, centralized, and top-down management style (Alizadeh & Meshkini, 2025). - Perception of new approaches as costly and disruptive (Alizadeh & Meshkini, 2025).	- Resistance to Change: Innovation is stifled by bureaucratic inertia. - Lack of Autonomy: Local authorities lack the power to contextualize biophilic solutions.
Funding Adequacy	- Severe underfunding (e.g., Tehran: 1.2% of budget vs. benchmark of 5%) (Ziari et al., 2018). - Allocation reflects low priority of environmental issues.	- Financial Incapacity: Feasibility of large-scale biophilic projects is compromised. - Maintenance Failure: Lack of funds for long-term upkeep of green assets.

International Cooperation	- Sanctions restrict access to technology and scientific knowledge (Madani, 2021). - Increased reliance on natural resource exploitation due to economic isolation (Madani, 2021).	- Knowledge Isolation: Lag in adopting global best practices and smart biophilic technologies. - Resource Stress: Economic pressure forces environmentally damaging survival strategies.
Technical Capacity	- Shortage of skilled professionals in biophilic design (Raisi et al., 2025).	- Skills Gap: Inability to technically execute complex nature-based solutions.
Scope & Depth of Academic Research	- Gap between growing academic research and practical application.	- Theory-Practice Void: Academic findings are not translated into policy or urban form.

As shown in Table 4, Iran presents a cultural paradox: despite its strong historical and spiritual connections with nature, contemporary urbanization has weakened the translation of these values into everyday practices and institutional support for biophilic development.

Table 4: Cultural component of Iran's institutional framework for biophilic city transition (*Authors' synthesis based on Salehi & Emamgholi, 2016; Ziari et al., 2018; Abe, 2021; Pilehvar, 2021; Shantir, 2022; Shokrani & Nooraie, 2022*)

Construct	Status of Iran's Institutional Environment (Key Observations)	Key Challenges & Implications
Social Norms for Biophilic Behavior	- Gap between individuals' environmental attitudes and actual behaviors (Salehi & Emamgholi, 2016). - Prevalence of modern lifestyle habits (e.g., car dependency, high waste) opposing biophilic norms (Salehi & Emamgholi, 2016).	- Behavioral Dissonance: High awareness does not translate to action due to entrenched modern habits. - Lifestyle Lock-in: Urban form reinforces non-biophilic behaviors.
Traditional Customs	- Strong historical roots (Persian Gardens, Nature Day, Arbor Day) (Pilehvar, 2021). - Connection weakened by rapid urbanization and congestion (Pilehvar, 2021).	- Cultural Erosion: Loss of historical ecological identity. - Spatial Disconnect: Urban density leaves little physical room for traditional nature practices.
Religious Teachings	- Rich Islamic teachings on environmental stewardship exist (Abe, 2021). - Values are not widely reflected in everyday civic behavior (Abe, 2021).	- Ethical Disengagement: Religious ethics remain theoretical rather than practical drivers of urban conduct. - Missed Opportunity: Failure to leverage religious platforms for environmental advocacy.
Public Participation	- Extremely low participation rates (e.g., Tehran: 0.08% vs. benchmark 1-5%) (Ziari et al., 2018). - Widespread distrust in decision-making mechanisms.	- Civic Apathy: Projects lack community ownership and long-term viability. - Trust Deficit: Citizens view interventions as governmental duties rather than collective responsibilities.

Civic Responsibility & Justice	- Trust Deficit: Citizens view interventions as governmental duties rather than collective responsibilities. - Perception of inequality reduces motivation to comply with regulations	- Equity Barrier: Lack of fairness undermines the collective social contract needed for biophilic maintenance. - Compliance Failure: Laws are ignored when citizens feel systemically disadvantaged.
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Comparative Analysis: Benchmarking Against Global Pioneers

To identify Iran's specific institutional shortcomings, Figure 4 presents a comparative analysis with a group of global pioneer cities, including Berlin, Singapore, Portland, Chicago, Toronto, and Freiburg (Reeve, 2014). These cities were selected for their proven success in institutionalizing biophilic principles through clearly defined regulatory frameworks and economic instruments, as outlined in the supplementary analysis of global leaders. Rather than relying on the broad and often superficial comparisons prevalent in the literature, this analysis focuses on three key structural divergences between Iran and these benchmark cities:

- Regulatory Precision versus Ambiguity:** Cities such as Berlin and Toronto apply binding, performance-based regulatory tools, such as the Biotope Area Factor and Green Roof Bylaws, to systematically integrate nature into urban development. In contrast, Iran's legal framework relies largely on general environmental protection laws that lack urban-specific standards and effective enforcement mechanisms. This gap reinforces the "Regulatory Void" identified in our findings.

- Economic Instrumentalization:** As shown in Figure 4, cities such as Portland and Chicago have successfully translated the ecological value of nature into economic incentives through mechanisms such as incentive zoning and stormwater fee reductions. However, in Iran, urban development operates within the context of what may be termed "survivalist urbanism," where economic sanctions and municipal revenue structures, largely dependent on density sales, actively discourage the preservation and expansion of green spaces.

- Governance Integration:** Singapore's "City in

a Garden" strategy is supported by strong institutional coordination between development and environmental agencies. In contrast, Iran's governance system is characterized by significant institutional fragmentation, with the Department of Environment (DoE) holding an advisory rather than an executive role in urban development decisions.

Overall, this comparative benchmarking indicates that Iran's main obstacle to advancing biophilic urbanism is not a lack of technical expertise but rather institutional limitations. Specifically, it highlights the absence of an integrated framework capable of converting existing cultural and ecological potential into a sustained political commitment and economic value.

A Context-Specific Framework: The Concentric Model

The findings indicate that the primary barrier to the advancement of biophilic urbanism in Iran is not a lack of technical expertise but rather a systemic institutional failure characterized by regulatory gaps, fragmented governance structures, and a deep cultural disconnect. The comparative analysis illustrated in Figure 4 further highlights the pronounced divergence between Iran and leading international examples in this field. While Western models tend to emphasize performance-based instruments, such as Berlin's Biotope Area Factor, the analysis suggests that the direct transfer of these technical tools is unlikely to be effective in the Iranian context because of entrenched institutional attitudes.

- The Trap of Technocratic Isomorphism:** In many global frontrunners, nature is framed as an asset capable of producing measurable economic and environmental returns on investment. In contrast, Iran's institutional framework

	Global Leaders	Iran	Gap
Legal & Regulatory Framework	Performance-Based & Mandatory Tools: • Berlin: Biotope Area Factor (BAF) enforces green density. • Toronto: Mandatory Green Roof Bylaws for new constructions. • Singapore: Green Mark Scheme & Landscape Replacement Policy.	Fragmented & Reactive Regulations: • Regulatory void regarding specific biophilic terminology. • Indirect laws (e.g., Clean Air Act) lack enforcement power. • Absence of preventive provisions in urban plans.	Enforcement Gap: Global cities use quantifiable metrics (e.g., BAF), whereas Iran relies on qualitative/vague guidelines that are easily bypassed by developers.
Organizational & Economic Capacity	Integrated Governance & Incentives: • Portland/Chicago: Density bonuses, expedited permits, and stormwater fee discounts. • Singapore: "City in a Garden" vision with centralized agency coordination (NParks/URA). • Funding: Tax Increment Financing (TIF) and dedicated eco-funds.	Siloed Governance & Resource Scarcity: • DoE (Dept. of Environment) lacks veto power over municipalities. • Conflict of interest in revenue generation (selling density vs. greening). • Severe underfunding (approx. 1.2% of budget) & Sanctions impact.	Implementation Gap: Global leaders treat nature as an asset with economic value (ROI); Iran treats it as a cost. The lack of economic incentives halts private sector participation.
Socio-Cultural Foundation	Participatory & Value-Driven: • Freiburg: Citizen-led planning (Vauban district) & strong civic ownership. • Chicago/Portland: CSO events & philanthropy driving green infrastructure. • Education: Nature integrated into civic identity.	Paradoxical Disconnect: • Strong historical/religious roots (Persian Gardens) exist but represent a "lost identity". • Modern lifestyle and distrust in governance reduce public participation (0.08% in Tehran).	Engagement Gap: In global cities, biophilia is bottom-up (demand-driven); in Iran, it is seen as a top-down government duty, leading to citizen apathy.

Figure 4: Comparative Analysis of Institutional Environments: Iran versus Leading Global Cities (Authors based on Reeve, 2014)

continues to view nature as a financial liability. Consequently, the implementation of advanced policy mechanisms, such as green roof bylaws in Toronto or stormwater fee discounts in Portland, is unlikely to yield meaningful outcomes unless the underlying "survivalist" economic logic that dominates urban decision-making is fundamentally restructured.

•**Contextual Adaptation:** These findings indicate that urban policy reform in developing contexts must follow a sequence-dependent trajectory. Before introducing advanced regulatory instruments (Level 2), governments must first establish foundational conditions at Level 1, including strengthening social norms, increasing civic responsibility, and improving public engagement. Addressing this "engagement gap" is essential for effective policy-making. Accordingly, the bottom-up participatory model observed in Freiburg should be understood not as an optional governance approach but as a structural prerequisite for overcoming the pervasive distrust in decision-making processes evident in Iran. This conclusion directly challenges the universalist

assumption that biophilic cities can be achieved solely through zoning regulations or technological interventions.

This section contemplates these points in a tailored proposed framework, filling a theory gap and justifying its novelty. In developing an institutional framework for transition to biophilic cities, the process should begin with subjective institutions (such as customs, traditions, and cultural beliefs). These informal factors serve as the foundation for fostering a sense of love and emotional connection with nature within urban communities. Based on this foundation, practical interventions and the establishment of objective institutions can be introduced to encourage behaviors that align with biophilic principles. Given the long-lasting influence of informal institutions and the emphasis of biophilic city theory on citizens' emotional attachment to the environment, this approach is particularly relevant. Additionally, an analysis of Iran's institutional landscape based on the key components and constructs necessary for the transformation of urban systems towards biophilic principles supports this

direction. Accordingly, a context-specific institutional framework was proposed for Iran. As illustrated in Figure 5, the framework consists of three concentric levels, progressing from informal and subjective institutions to formal and objective ones:

- At the first and most fundamental level considered the deepest of the three concentric layers and encompassing the others lie the cultural foundations or informal subjective institutions of a biophilic city. These include biophilic norms, traditions, beliefs, and participatory behaviors. The realization of a biophilic city begins with the institutionalization of biophilic culture, which can be achieved through environmental education, public awareness campaigns, information dissemination, and promotion of biophilic behaviors among urban residents. This foundational process helps shape the perceptions of both citizens and authorities toward biophilia and seeks to revive the innate human affinity for emotional connection with nature throughout society.

- The intermediate level includes formal subjective institutions, specifically laws, regulations, and policies related to biophilic urbanism. After establishing a biophilic culture within urban society, it is essential to create a specialized and unified legal framework that incorporates biophilic principles. This framework should embed the concept of biophilia within formal rules, ensure that these rules take precedence, and align other urban development rules, particularly those related to economics with biophilic goals. Additionally, establishing enforcement mechanisms for biophilic rules is crucial for their successful implementation.

- The third level involves both formal and informal objective institutions of a biophilic city, including formal environmental organizations and biophilic NGOs. At this level, key actors are responsible for implementing the biophilic interventions. The organizational structure for realizing a biophilic city in Iran should focus on coordinating organizations, ensuring alignment in their functions, and avoiding overlaps. This structure

must allocate adequate and diverse financial resources to protect and restore biophilic infrastructures while also investing in human capital at all levels of biophilic governance to move from theory to practice. Additionally, biophilic governance should strengthen public participation in nature-based initiatives and empower local communities and NGOs to take greater responsibility and authority in biophilic efforts.

The institutional framework proposed in this study emphasizes that biophilic city transition depends on effective interaction and coordination across three interconnected levels: cultural, legal, and organizational. The following section examines the relationships among these levels:

- Cultural–Legal Linkage:** Culture and biophilic laws and regulations influence each other in several important ways. Legal measures that align with the cultural context are more likely to be accepted by the public. Over time, such laws and regulations can become embedded in social norms. However, when laws conflict with prevailing cultural attitudes, they may face resistance, reducing their effectiveness. In addition, legal frameworks can gradually shape public attitudes and behaviors. In Iran, effective biophilic legislation must be grounded in the country's rich cultural heritage, which emphasizes a close connection with nature while also addressing modern urban issues. For example, if green roofs are culturally valued, regulations that require their integration into building designs can help to institutionalize this cultural preference.

- Cultural–Organizational Linkage:** The implementation of biophilic interventions by organizations depends on the internalization of cultural contexts within those organizations, public support for such initiatives, the integration of cultural characteristics into urban planning and design, and the use of community participation, particularly through the empowerment of non-governmental organizations (NGOs). For instance, in a city where citizens have a cultural tradition of planting trees on specific days of the year as part of their heritage, the municipality

can support and reinforce this tradition through tree-planting campaigns, urban gardening projects, or green space preservation programs.

•**Legal–Organizational Linkage:** The interaction between legal frameworks and organizational structures can be examined from various perspectives. Laws and regulations impose mandatory requirements on organizations, compelling them to act in specific manners. In response, organizations adapt their operations to comply with legal mandates. Implementing biophilic laws and regulations requires adequate organizational capacity, including resources, expertise, and coordination. Simultaneously, organizations depend on clear legal frameworks with well-defined enforcement mechanisms to effectively guide their actions. For example, if regulations require that a certain percentage of green infrastructure be included in new urban

developments, municipalities or environmental protection agencies must coordinate their efforts to ensure that these requirements are met.

The proposed biophilic institutional framework, comprising three interconnected levels, serves as a fundamental prerequisite for a shift towards biophilic urbanism. This framework not only directly influences the feasibility of biophilic urban development but also plays a critical role in shaping other key aspects, including biophilic conditions and infrastructures, attitudes and knowledge, and activities. In the context of Iran, the framework underscores the importance of prioritizing institutional structures and their mechanisms of interaction as foundational. Strengthening these institutional foundations is essential to improve the effectiveness of other aspects of biophilic urbanism.

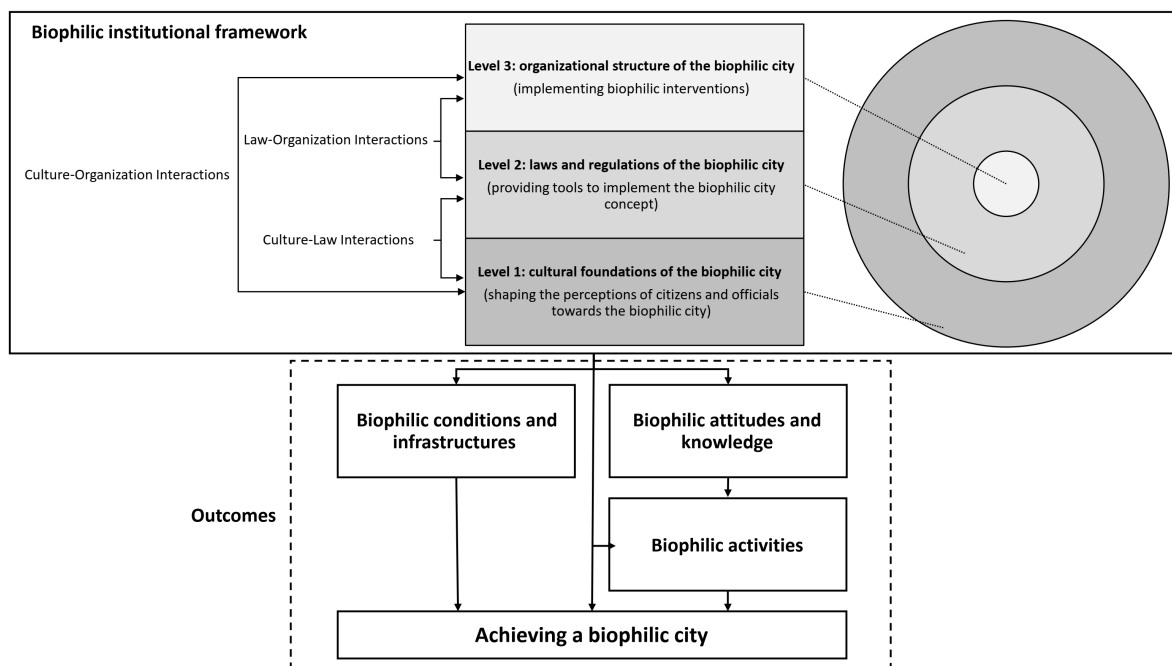


Figure 5: Institutional framework for urban transformation towards biophilic cities

The proposed institutional framework offers a flexible model that can be adapted by other developing countries facing similar challenges in implementation. Its three-dimensional structure

legal, organizational, and cultural proves applicable across diverse contexts while accommodating local institutional variation. Importantly, the emphasis on cultural foundations challenges

universalist assumptions about biophilic city development, particularly those that neglect variations in environmental values, traditional practices, and community organization. This suggests that successful biophilic city initiatives require culturally responsive adaptation rather than the application of standardized models.

The findings of this study align with several established research trajectories. First, as in several earlier studies, this study identifies culture as a foundational element in the structure of planning institutions. For example, Salarian et al. (2024) highlighted culture as a central driver in their research on policymaking for citizen participation in environmental matters. Similarly, Panlasigui et al. (2021) emphasized that individuals' lived experiences with nature strengthen their connection to the environment and that education and public awareness are essential for institutionalizing a culture of biophilia at the urban level. Second, the case studies reaffirm the crucial role of formal interventions. For example, Ziari et al. (2018) identified mandatory green roofs, biodiversity conservation planning, and municipal green budgeting as essential actions for unlocking Tehran's biophilic potential. Third, there is widespread agreement on the importance of cross-sector collaboration and community engagement. Ziari et al. (2018) and Panlasigui et al. (2021) stressed the need for interdisciplinary coordination and active public participation in urban decision-making processes. Fourth, the framework proposed in this study echoes Ziari et al. (2018) in recognizing how various aspects of biophilic urbanism influence the feasibility of implementing biophilic cities. Simultaneously, the framework of this study introduces several important distinctions from the existing literature. First, unlike many institutional models that broadly address the macro-level aspects of urban planning, this framework specifically focuses on human-nature relationships and the concept of a biophilic city. Second, while much of the existing literature is based on experiences in developed countries, where institutional systems

are generally more robust, this framework takes a pragmatic approach to the challenges faced by developing countries, particularly in Iran. These challenges include limited resources, constrained institutional capacity, and development priorities that often take precedence over environmental considerations. Third, in contrast to static models that regard institutions as fixed constraints, this framework emphasizes institutional dynamism and the feedback mechanisms that operate between different institutional layers. In summary, the key innovation of the proposed framework lies in its integration of biophilic urban principles with the operational requirements of formal institutions, the adaptive capacities of informal institutions, and the communicative mechanisms between them within the specific context of Iran. Future research can use this framework as a theoretical and practical guide to analyze how change in each component or construct affect the outcomes of urban-greening initiatives in Iranian cities.

RESULTS AND CONCLUSION

This study aimed to bridge the theoretical gap between biophilic urbanism and institutional analysis by developing a contextualized institutional framework for urban transformation in Iran. While universal prerequisites for a biophilic transition encompass legal, organizational, and cultural dimensions, an evaluation of the Iranian institutional environment reveals a tension between institutional potential and structural constraints. Iran possesses considerable cultural and institutional foundations rooted in constitutional provisions and historically embedded traditions, including Persian garden principles and Islamic values of environmental stewardship. However, these assets are constrained by persistent structural shortcomings, including legal frameworks characterized by regulatory ambiguity and the absence of explicit biophilic provisions, fragmented organizational governance in which the Department of Environment lacks executive veto authority, and a cultural paradox whereby

rapid urbanization has weakened nature-based identities and reduced public engagement with environmental integration.

To address these structural constraints, this research proposes a concentric institutional framework comprising interconnected cultural, legal, and organizational layers. By positioning informal, subjective institutions, such as cultural values and emotional connections with nature, at its core, the framework challenges technocratic isomorphism and the uncritical adoption of top-down models from high-income contexts, such as Berlin's Biotope Area Factor, which emphasize physical metrics over institutional readiness. In institutional environments characterized by survivalist urbanism and implementation gaps, biophilic transformation is inherently sequence-dependent; therefore, cultural internalization and social acceptance must precede formal regulatory enforcement. Within this framework, a foundational biophilic culture supports the development of legal mechanisms, which subsequently empower and guide biophilic organizations in implementing, enforcing, and refining urban environmental policies.

For urban managers and policymakers in Iran and comparable developing contexts, these findings provide strategic implications for navigating fragmented institutional conditions. Rather than relying on uncritical policy transfers, such as standardized green roof bylaws, interventions should leverage existing cultural resources, including Islamic principles of environmental stewardship and Persian garden traditions, to strengthen social capital. Addressing survivalist urbanism, where municipal revenues are substantially dependent on the commercialization of urban density, requires the restructuring of economic incentives through instruments such as green bonds, environmental taxes, and innovation subsidies to reposition urban nature as a productive asset. Furthermore, closing the identified engagement gap requires the institutionalization of participatory governance through the empowerment of non-governmental organizations (NGOs) and the

integration of indigenous knowledge into planning processes. Finally, overcoming siloed governance necessitates legally binding cross-sectoral coordination between environmental agencies and urban development authorities, supported by independent regulatory bodies with clearly defined enforcement capacities.

While this study provides a theoretically grounded institutional framework, its primary methodological limitation lies in the absence of empirical validation, as the proposed model was developed through the synthesis of international literature and qualitative document analysis. Future research should empirically examine this concentric framework through comparative case studies of major Iranian metropolises, such as Tehran and Isfahan, to assess how changes in informal institutions influence regulatory compliance and green space preservation over time. Additionally, comparative analyses across other Global South contexts with diverse cultural backgrounds but similar governance constraints could contribute to evaluating the broader applicability of the framework. Further research is also required to develop standardized institutional metrics for assessing organizational readiness for biophilic urban transformation and to conduct detailed economic modeling of municipal transitions away from density-dependent development practices.

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