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INSTITUTIONAL INERTIA OF URBAN PLANNING REGULATIONS AS A BARRIER TO ENVIRONMENTAL JUSTICE: FROM THE SOVIET PARADIGM TO COMMERCIAL URBANIZATION (THE CASE OF ASTANA)

ҚАЛА ҚҰРЫЛЫСЫ НОРМАТИВТЕРІНІҢ ИНСТИТУЦИОНАЛДЫҚ ИНЕРЦИЯСЫ ЭКОЛОГИЯЛЫҚ ӘДІЛЕТТІЛІККЕ КЕДЕРГІ РЕТІНДЕ: КЕҢЕСТІК ПАРАДИГМАДАН КОММЕРЦИЯЛЫҚ УРБАНИЗАЦИЯҒА ДЕЙІН (АСТАНА МЫСАЛЫНДА)

ИНСТИТУЦИОНАЛЬНАЯ ИНЕРЦИЯ ГРАДОСТРОИТЕЛЬНЫХ НОРМАТИВОВ КАК БАРЬЕР ДЛЯ ЭКОЛОГИЧЕСКОЙ СПРАВЕДЛИВОСТИ: ОТ СОВЕТСКОЙ ПАРАДИГМЫ К КОММЕРЧЕСКОЙ УРБАНИЗАЦИИ (НА ПРИМЕРЕ АСТАНЫ)

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Spatial inequality,
Imitation ecology.

ABSTRACT

This study examines the structural continuity between the current urban planning regulations of Astana and the Soviet normative framework of 1958, and considers whether this continuity constrains the practical realization of the Just City and environmental justice concepts. The methodology combines a genetic (document-genealogical) analysis of five normative acts (SN 41-58; SNiP 2.07.01-89*; SNiP RK 3.01-01As-2007; SNiP RK 3.01-02As-2016; Environmental Code of the Republic of Kazakhstan, 2021) with hierarchical modeling of planning priorities, triangulated with secondary empirical evidence (SUDI, NDVI, residents' perception surveys). Three ideal-type regulatory models are reconstructed: declarative (1958), industrial-residual (1989), and contemporary market-oriented. The results suggest that the functional zoning logic of the mid-twentieth century has been repurposed toward the regulation of commercial density. Current provisions permit the substitution of soil-based greenery with artificial surrogates and the utilitarian use of protective buffers, which is consistent with observed patterns of spatial inequality and environmental privilege. A targeted revision of building codes toward adaptive norms and mechanisms of procedural justice appears warranted.

Түйінді сөздер:

Экологиялық
әділеттілік,

ТҮЙІНДЕМЕ

Зерттеу Астана қаласының қолданыстағы қала құрылысы нормативтері мен 1958 жылғы кеңестік нормативтік базаның құрылымдық



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Институционалдық
инерция,
Қала құрылысы
нормативтері,
Әділетті қала,
Табиғатқа негізделген
шешімдер,
Кеңістіктік теңсіздік,
Имитациялық
экология.

сабақтастығын зерттейді және осы сабақтастық «Әділетті қала» мен экологиялық әділеттілік тұжырымдамаларын жүзеге асыруға кедергі келтіре ме деген сұрақты қарастырады. Әдіснама бес нормативтік құқықтық актіге (СН 41-58; ҚНЖЕ 2.07.01-89*; ҚР ҚНЖЕ 3.01-01Ас-2007; ҚР ҚНЖЕ 3.01-02Ас-2016; ҚР Экологиялық кодексі, 2021) генетикалық талдауды жоспарлау басымдықтарын иерархиялық модельдеумен және екінші реттік эмпирикалық деректермен (SUDI, NDVI, тұрғындар пікірі) триангуляциямен біріктіреді. Үш идеалдық-типтік нормативтік модель қайта құрастырылды: декларативтік (1958), индустриалды-қалдықтық (1989) және заманауи нарықтық-бағдарланған. Нәтижелер XX ғасыр ортасының функционалдық аймақтарға бөлу логикасы коммерциялық тығыздықты реттеуге бағытталғанын көрсетеді. Қолданыстағы ережелер топырақ негізіндегі көгалдандыруды жасанды суррогаттармен алмастыруға және қорғаныш буферлерді утилитарлы қолдануға жол береді, бұл кеңістіктік теңсіздік пен экологиялық артықшылық үлгілерімен сәйкес келеді. Құрылыс нормаларын бейімделгіш стандарттар мен процедуралық әділеттілік тетіктеріне қарай мақсатты қайта қарау қажет.

Ключевые слова:

Экологическая
справедливость,
Институциональная
инерция,
Градостроительные
нормативы,
Справедливый город,
Природоподобные
решения,
Пространственное
неравенство,
Имитационная
экология.

АННОТАЦИЯ

Исследование рассматривает структурную преемственность между современными градостроительными нормативами г. Астаны и советской нормативной базой 1958 года и оценивает, ограничивает ли эта преемственность практическую реализацию концепций Справедливого города и экологической справедливости. Методология сочетает генетический (документально-генеалогический) анализ пяти нормативно-правовых актов (СН 41-58; СНиП 2.07.01-89*; СНиП РК 3.01-01Ас-2007; СНиП РК 3.01-02Ас-2016; Экологический кодекс РК, 2021) с иерархическим моделированием приоритетов планирования и триангуляцией с вторичными эмпирическими данными (SUDI, NDVI, опросы восприятия жителей). Реконструированы три идеально-типические нормативные модели: декларативная (1958), индустриально-остаточная (1989) и современная рыночно-ориентированная. Результаты указывают на то, что логика функционального зонирования середины XX века переориентирована на регулирование коммерческой плотности. Действующие положения допускают замену грунтового озеленения искусственными суррогатами и утилитарное использование защитных буферов, что согласуется с наблюдаемыми моделями пространственного неравенства и экологических привилегий. Целесообразен целенаправленный пересмотр строительных норм в сторону адаптивных стандартов и механизмов процедурной справедливости.

INTRODUCTION

Urban planning worldwide is increasingly oriented towards the interrelated concepts of sustainable development, the Just City, and environmental justice, which imply equitable access of all population groups to high-quality and safe natural amenities. In global practice, nature-based solutions (NbS) are actively used to achieve these goals; however, their uncritical implementation can produce hidden social costs. Recent studies show that environmental renewal of territories may lead to green gentrification and to the displacement of economically vulnerable groups (Cucca et al., 2023), to unequal distribution of environmental amenities and the emergence of environmental privilege (Bauer, 2023), and to the disregard of the basic rights of marginalized populations, including homeless people (Moran & Smardon, 2025). Empirical evidence from megacities in developing economies further indicates that higher GDP and HDI

often correlate with the concentration of high-quality green infrastructure in wealthy neighborhoods (Bressane et al., 2024).

In the Republic of Kazakhstan, the Environmental Code of 2021 declares a transition to an ecosystem approach, yet independent assessments point to persistent implementation gaps. A geospatial assessment of 17 major Kazakhstani cities indicates that none has reached a high level of sustainability, remaining in the moderately sustainable category with SUDI values below 0.750 (Nyussupova et al., 2022). Local-level surveys in Shu and Konaev report low resident evaluations of the environmental and political-institutional dimensions of urban management (Akbar et al., 2025; Turdanova et al., 2024), while remote sensing data on the NDVI in Aktobe document a decline of vegetation cover under anthropogenic pressure (Khamit et al., 2024).

The existing scientific discourse rarely links these outcomes to the historical genesis of building regulations. The basic conceptual apparatus, the typology of recreational zones, and the structural skeleton of the current departmental standards SNIП RK 3.01-01As-2007 and SNIП RK 3.01-02As-2016 largely inherit the framework of the Soviet document SN 41-58 “Rules and norms for the planning and development of cities” (1958). This continuity, hereinafter referred to as institutional inertia, is examined in the present study as a possible constraint on the implementation of environmental justice principles in the contemporary Kazakhstani context.

The aim of this study is to trace the structural continuity between the current urban planning regulations of Astana and the Soviet normative model of 1958, and to assess whether this continuity constrains the practical realization of the Just City and environmental justice concepts in the contemporary Kazakhstani context.

The concept of environmental justice has become a global reference framework for urban planning, encompassing distributive, procedural, and recognitional dimensions. A growing body of literature examines how nature-based interventions may unintentionally reinforce social inequalities. Green gentrification has been described as a process in which environmental upgrades displace or exclude economically vulnerable groups (Cucca et al., 2023; Anguelovski & Connolly, 2024). The concept of environmental privilege highlights that the beneficiaries of created green amenities are often unevenly identified (Bauer, 2023), and case studies of São Paulo indicate that higher GDP and HDI can be associated with environmental racism in access to green space (Bressane et al., 2024). Similar exclusionary risks have been documented in blueway restoration projects, where the interests of homeless people may be overlooked (Moran & Smardon, 2025).

In Kazakhstan, empirical work has documented uneven progress toward urban sustainability. A geospatial assessment of 17 major cities places all of them in the moderately sustainable range, with SUDI values below 0.750 (Nyussupova et al., 2022). A survey-based assessment of urban planning in the mono-industry town of Shu reports low sustainability across all six studied dimensions (Turdanova et al., 2024), and residents of Konaev give the lowest ratings to the environmental and political-institutional aspects, including budget transparency and waste management (Akbar et al., 2025). Remote sensing analysis of Aktobe documents a decline in green zones under anthropogenic pressure (Khamit et al., 2024). Broader regional studies also record environmental degradation in Kazakhstani cities (Nurlanova et al., 2023).

What remains largely absent from this literature is a systematic examination of the historical genesis of the regulatory instruments that shape these spatial outcomes. The present study addresses this gap by tracing the structural continuity between the Soviet normative framework and the current departmental standards of Astana, and by considering how this continuity may relate to the observed constraints on the implementation of environmental justice principles.

MATERIALS AND METHODS

The study adopts a qualitative research design that combines a genetic (document-genealogical) analysis of the regulatory framework with hierarchical modeling of urban planning priorities. To assess the practical relevance of the identified institutional patterns, the findings are triangulated with recent secondary empirical evidence on Kazakhstani cities. All datasets used for triangulation (SUDI, NDVI, residents' perception surveys) are drawn from previously published peer-reviewed studies and are treated as external reference points; the present study does not generate these datasets.

Sources of primary material. The primary material consists of five normative documents that have shaped the spatial development of cities in Kazakhstan:

the Soviet standards SN 41-58 "Rules and norms for the planning and development of cities" (1958) and SNiP 2.07.01-89* "Urban planning. Planning and development of urban and rural settlements" (1989); the departmental building regulations SNiP RK 3.01-01As-2007 "Planning and development of the city of Astana" (2007) and SNiP RK 3.01-02As-2016 "Norms and rules for the design of comprehensive landscaping on the territory of the city of Astana" (2016); and the Environmental Code of the Republic of Kazakhstan (2021). Specific clauses referenced in the Results section are cited by number to ensure verifiability.

Genetic analysis. Comparison of the successive normative acts followed three explicit criteria: (i) the composition and definitions of the basic conceptual apparatus (recreational zone, sanitary buffer, greenery); (ii) the typology and structural hierarchy of urban spatial elements; and (iii) the legal modality of each prescription, distinguishing mandatory quantitative requirements (fixed percentages, minimum distances) from recommendatory or default provisions. Recurring formulations across documents were traced clause by clause to identify continuity, reformulation, or omission of the underlying provisions.

Hierarchical modeling. For each normative act, planning priorities were ranked using three complementary indicators derived from the text: (a) the degree of regulatory rigidity (mandatory versus recommendatory language, presence of numerical thresholds); (b) the type of protective measures assigned to each spatial element (quantitative buffer distances, share of vegetation cover, permissibility of substitution); and (c) the scope of legal exceptions or waivers. On this basis, three ideal-type models of urban planning regulation are reconstructed: a declarative model (SN 41-58, 1958) with an absolute priority on sanitary safety; an industrial-residual model (SNiP 2.07.01-89*, 1989) with numerical control of protective boundaries; and a contemporary market-oriented model (SNiP RK, 2007 and 2016). These models are analytical constructions of successive regulatory logics rather than exhaustive historical descriptions.

Interpretive framework. The analysis of the normative provisions is guided by the multidimensional concept of environmental justice — distributive, procedural, and recognitional — supplemented by the concept of environmental privilege, which draws attention to the uneven distribution of the beneficiaries of created green amenities. The literature on green gentrification, in which the introduction of nature-based solutions may be associated with the marginalization or displacement of vulnerable populations, is used as an additional interpretive reference.

Ensuring objectivity. To reduce interpretive bias, each clause classification was documented with its original numbering and formulation; the coding was reviewed by two co-authors independently before consolidation, and discrepancies were resolved by returning to the original document text.

Triangulation with secondary empirical evidence. The institutional patterns identified in the genetic analysis are compared with three types of independent evidence drawn from peer-reviewed studies: (i) the Sustainable Urban Development Index (SUDI) values for the 17 largest Kazakhstani cities, none of which exceed 0.750 (Nyussupova et al., 2022); (ii) remote sensing NDVI data for the industrial city of Aktobe, documenting a decline in vegetation cover under

anthropogenic pressure (Khamit et al., 2024); and (iii) residents' perception surveys (Likert scale) conducted in Shu (Turdanova et al., 2024) and Konaev (Akbar et al., 2025), which provide indicators of the environmental and political-institutional dimensions of urban management. These datasets are used as external reference points to assess whether the institutional patterns identified in the documents are consistent with observed empirical outcomes.

RESULTS AND DISCUSSION

The genetic analysis of the urban planning regulatory framework reveals a persistent institutional continuity. Regulation has evolved through a sequential shift of priorities — from ensuring the physical safety of the population to accommodating the interests of commercial development. Hierarchical modeling of the successive normative acts allows the distinction of three regulatory models that have succeeded each other from the mid-twentieth century to the present day (Figure 1).

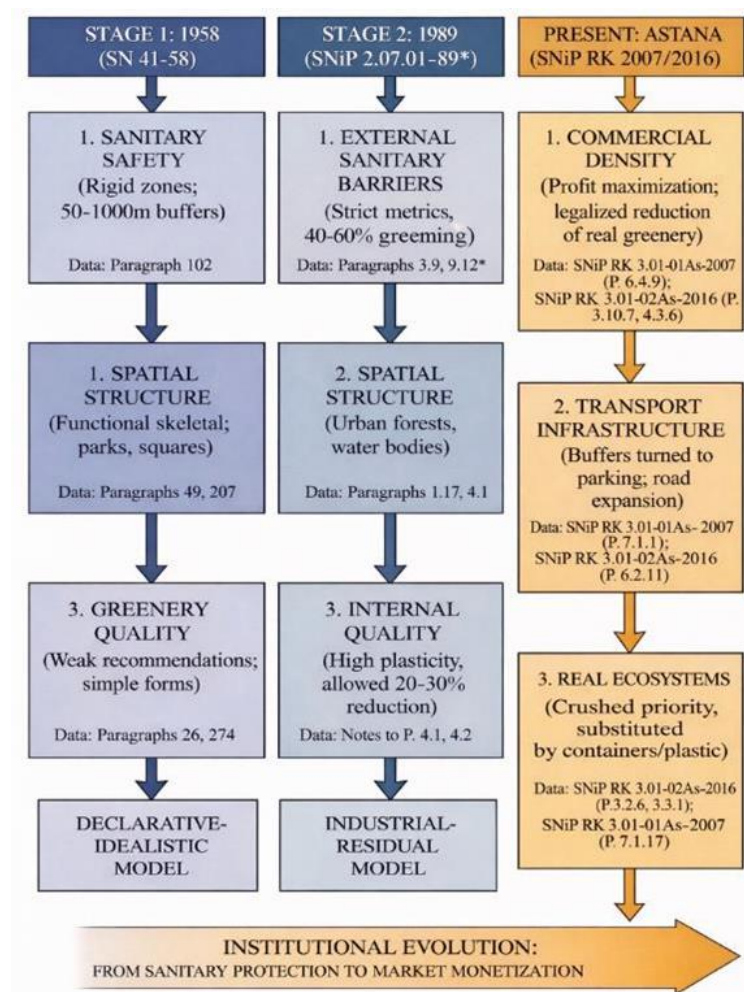


Figure 1. Evolution of urban planning priorities in Kazakhstan's normative framework (1958–2016): From sanitary protection to commercial urbanization.

Note – compiled by the authors

The first comprehensive urban planning standards built a hierarchical structure in which sanitary safety occupied the highest position. This priority was expressed with the highest regulatory rigidity and was reinforced by quantitative indicators. Clause 102 of SN 41-58



established fixed sanitary buffer gaps of 50 to 1000 meters between industrial enterprises and residential areas.

Functional and structural organization occupied an intermediate priority. The document formed the basic framework of recreational zones: clauses 49 and 207 of SN 41-58 established the mandatory presence of gardens, squares, and public parks, laying the foundation of the spatial typology still in use today.

By contrast, high-quality landscaping and the morphology of the built environment occupied the lowest position in the hierarchy and remained in a zone of legal vulnerability. According to clauses 26 and 274 of SN 41-58, developers were only recommended to use simple and economical forms of landscaping and free planning. The qualitative filling of the natural framework was treated as a secondary, optional task.

By the late 1980s, the system had shifted toward numerical regulation of protective barriers. The highest priority was placed on the sanitary and environmental integrity of external boundaries. Clause 9.12 of SNiP 2.07.01-89* introduced specific metrics for water protection zones ranging from 15 to 500 meters, while clause 3.9 required landscaping of sanitary zones at 40–60 percent.

The functional-spatial structure remained an intermediate priority: clauses 1.7 and 4.1 required forests, forest parks, and water bodies to be integrated into the settlement structure.

The internal quality of the residential environment, however, remained highly flexible. The normative framework introduced legal instruments allowing the reduction of natural territories: notes 1 to clause 4.1 and 2 to clause 4.2 permitted a reduction of green areas by 20–30 percent. External protective boundaries were strictly regulated, while the internal composition of the environment was determined on a residual basis, without comparable numerical safeguards.

The contemporary stage is characterized by a combination of humanistic declarations, for example in the Environmental Code of the Republic of Kazakhstan of 2021, and market-oriented regulation of space in the departmental building codes of Astana. The highest priority is now attached to commercial density and the maximization of sellable area. Several provisions illustrate this shift.

Clause 6.4.9 of SNiP RK 3.01-01As-2007 permits a reduction of park area by up to 25 percent when the park is adjacent to a forest.

Clauses 3.10.7 and 4.3.6 of SNiP RK 3.01-02As-2016 allow the built development of up to 7 percent of park territories and the allocation of up to half the width of sidewalks for commercial use.

Clause 5.1.9 permits the transfer of playgrounds from high-density residential complexes to municipal land.

Transport infrastructure receives an intermediate priority. The ecological buffer is redefined in functional terms: clause 7.1.11 of SNiP RK 3.01-01As-2007 permits the paving of sanitary protective forest belts to accommodate parking, and clause 6.2.11 of SNiP RK 3.01-02As-2016 confirms the priority of transport by allowing the removal of landscaping strips for road widening.

At the lowest level of the hierarchy lies the living natural framework, which is largely reassigned to what may be described as an “imitation ecology”. Clauses 3.2.6 and 3.3.1 of SNiP RK 3.01-02As-2016 place living plants and artificial surrogates — including synthetic grass and trees in mobile containers — on the same regulatory footing, and clause 7.1.17 of SNiP RK 3.01-01As-2007 permits the substitution of soil-based greenery with container plants (Figure 2).

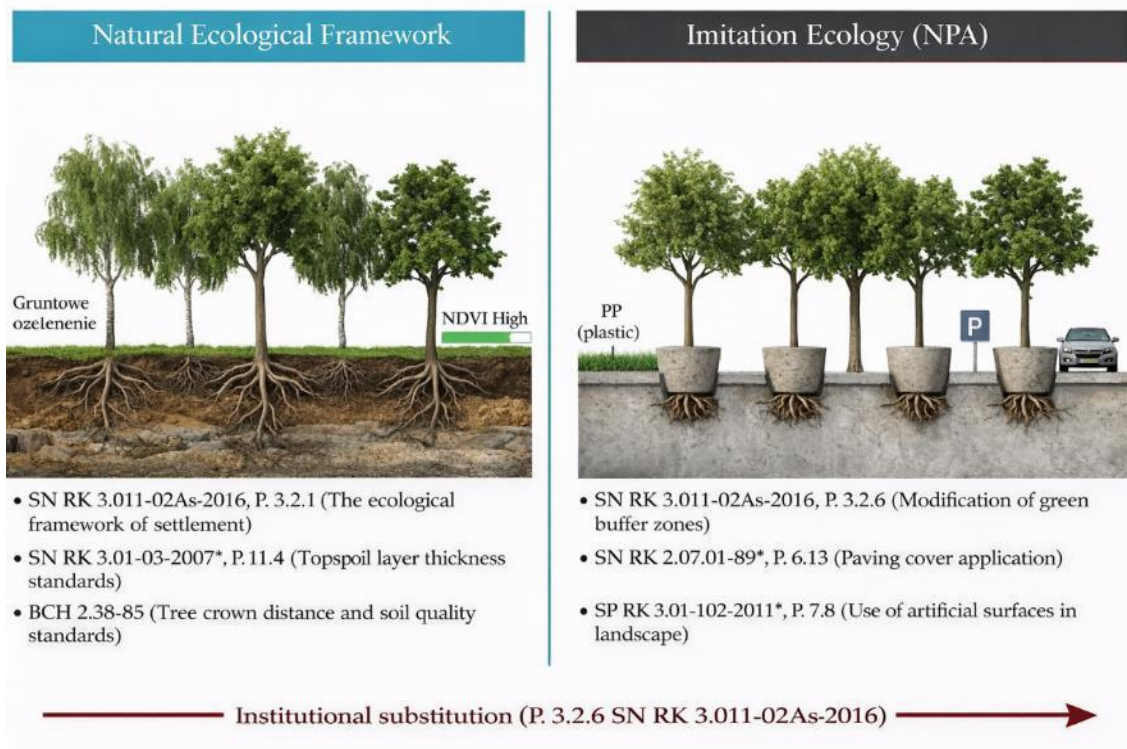


Figure 2. Institutional substitution of the natural framework: Legalization of "imitation ecology" and the replacement of soil-based greening with artificial surfaces (based on the analysis of SNiP RK 3.01-02As-2016 and SNiP RK 3.01-01As-2007)

Note – compiled by the authors

A comparison of this institutional evolution with the empirical evidence from related studies is consistent with the interpretation that the outdated structural framework of these norms constrains the practical implementation of environmental justice principles. Declarative requirements of sustainable development, including the ecosystem approach, are difficult to realize within a system in which the substitution of living greenery with artificial surrogates is legally admissible. The retention of the functional-zoning logic of the 1958 model, which does not take into account the extreme wind and temperature regimes of Astana, together with modern legal exemptions in favor of developers, is associated with the fragmentation of the urban environment. This interpretation is consistent with independent findings of moderate SUDI values (Nyussupova et al., 2022) and low resident satisfaction with the quality of the urban environment (Akbar et al., 2025; Turdanova et al., 2024).

The genetic analysis of urban planning norms points to a plausible institutional explanation for the systemic difficulties observed in the development of Kazakhstani cities. The market-oriented model consolidated in current departmental standards — in particular clause 6.4.9 of SNiP RK 3.01-01As-2007 and clause 3.2.6 of SNiP RK 3.01-02As-2016 — is not simply a set of technical provisions but reflects a coherent hierarchy of priorities that has been inherited from the Soviet framework and repurposed for a market context. This interpretation is consistent with the empirical observation that none of the 17 largest cities has crossed the SUDI threshold of 0.750 (Nyussupova et al., 2022). The structural framework inherited from SN 41-58 appears to have limited capacity to support a high-quality urban environment, an interpretation that is also consistent with the observed reduction of vegetation cover in industrial centers under increasing anthropogenic pressure (Khamit et al., 2024).

The global literature emphasizes that the uncritical implementation of nature-based solutions may produce hidden social costs and reinforce environmental privileges for narrow segments of society (Bauer, 2023). In the Kazakhstani case, the observed provisions appear to allow such privileges to be reproduced through the regulatory framework itself. Provisions permitting the built development of park territories (clause 3.10.7 of SNiP RK 3.01-02As-2016) and the substitution of soil-based landscaping with container plants (clause 7.1.17 of SNiP RK 3.01-01As-2007) create conditions under which access to high-quality green amenities may be concentrated within elite residential complexes, while the surrounding districts have limited access to comparable amenities. This pattern is broadly consistent with observations from developing economies, where the concentration of green infrastructure has been shown to correlate with income and human development indicators (Bressane et al., 2024).

International studies also point to green gentrification as a mechanism whereby environmental upgrading may displace vulnerable groups (Cucca et al., 2023), a trend that is especially visible in urban waterway restoration projects that overlook the rights of marginalized populations (Moran & Smardon, 2025). In the Kazakhstani case, however, the primary mechanism observed appears to be different. Rather than displacement through elite hyper-landscaping, the more visible pattern is the reduction of protective ecological buffers through their reassignment for utilitarian purposes. The provision permitting the paving of sanitary protective forest belts for parking (clause 7.1.11 of SNiP RK 3.01-01As-2007) illustrates how the ecological buffer is redefined as an infrastructural resource, an outcome that affects urban residents broadly (Figure 3).

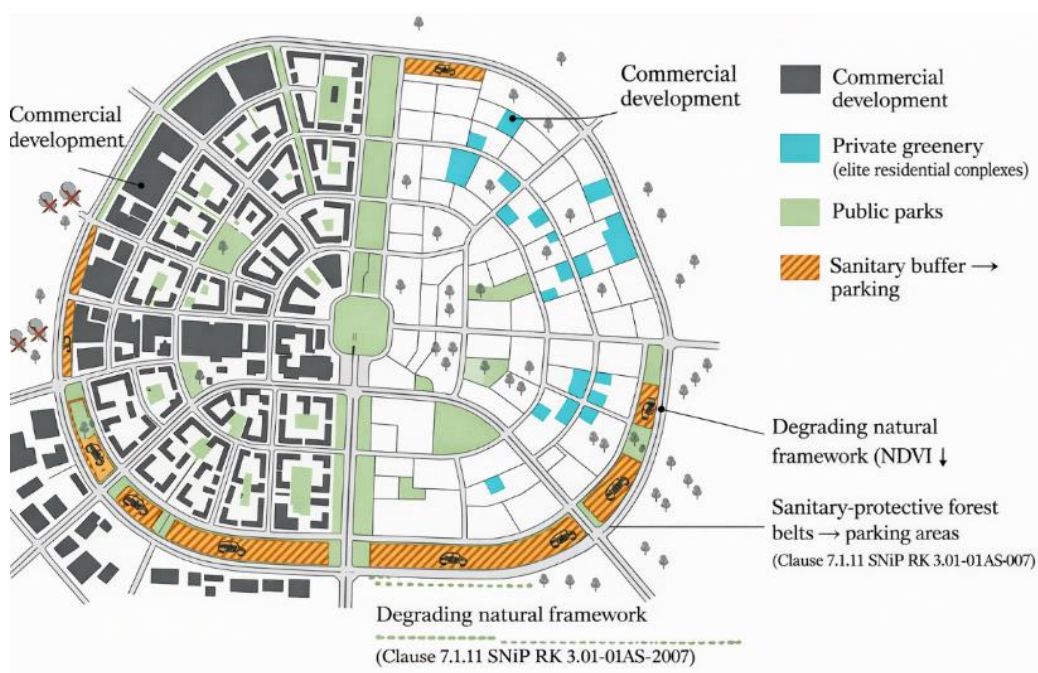


Figure 3. Spatial inequality and environmental privileges: Transformation of sanitary-protection forest buffers into parking lots (per Paragraph 7.1.11, SNiP RK 3.01-01As-2007) and privatization of the natural framework by elite residential complexes.

Note – compiled by the authors

The limited flexibility of the current regulations and their low sensitivity to local context also point to a deficit of procedural justice. Decision-making regarding commercial densification and the reduction of green zones typically proceeds without meaningful participation of urban

residents. Survey evidence from Shu (Turdanova et al., 2024) and Konaev (Akbar et al., 2025) shows that residents consistently give the lowest ratings to the environmental and political-institutional aspects of urban management, including budget transparency, waste recycling, and the development of ecological transport. This pattern suggests that a formal application of outdated urban planning templates in a market context is difficult to reconcile with contemporary societal expectations of environmental justice. The present study relies on document-based analysis triangulated with secondary empirical evidence and does not include original quantitative measurements of SUDI or NDVI, nor primary survey data; these are used as external reference points. Moreover, since the normative acts are analyzed as texts, their legal effects in specific administrative practice are inferred rather than directly measured, a limitation that further empirical work could address.

CONCLUSION

The genetic analysis of urban planning regulations suggests that a substantial degree of institutional continuity connects the current normative framework of Astana with the Soviet document SN 41-58. The current departmental standards SNIIP RK 3.01-01As-2007 and SNIIP RK 3.01-02As-2016 largely rely on the conceptual and structural framework introduced in 1958. Over time, the initial emphasis on sanitary safety has been reoriented toward a market-driven regulation of space, which has been accompanied by the admissibility of substituting living greenery with artificial surrogates and by the allowance for utilitarian use of protective ecological buffers.

This institutional pattern is consistent with the observed constraints on the sustainable development of Kazakhstani cities: in particular the moderate SUDI values reported by Nyussupova et al. (2022), the decline of vegetation cover documented by remote sensing (Khamit et al., 2024), and the low resident satisfaction with the environmental and political-institutional dimensions of urban management (Akbar et al., 2025; Turdanova et al., 2024).

Situating this study within the broader debate on environmental justice, the Kazakhstani case illustrates a somewhat different mechanism from that discussed in the countries of the Global North and in developing megacities, where the central concern is often green gentrification and the concentration of environmental privileges (Bauer, 2023; Bressane et al., 2024; Cucca et al., 2023; Moran & Smardon, 2025). In the Kazakhstani context, the more prominent mechanism appears to be the institutional weakening of protection for basic natural amenities, including the admissibility of built development in park territories and the reassignment of forest belts for parking, which affects the urban population broadly.

Overcoming these constraints appears to require a targeted revision of the urban planning legislation. Moving beyond the strict functional zoning of the 1958 model toward adaptive planning frameworks that account for local climatic conditions and provide meaningful mechanisms of resident participation could strengthen the procedural dimension of environmental justice. Future research could focus on developing locally adapted normative criteria that integrate the principles of nature-based solutions and social equity.

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in the cited peer-reviewed sources listed in the References. Additional information regarding the classification of clauses and the analytical procedure may be obtained from the corresponding author upon reasonable request.

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STATEMENT ON THE USE OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES: During the preparation of this manuscript, the authors used the generative artificial intelligence tool "Grammarly" to improve the stylistic coherence of the text, refine wording, and check grammatical correctness. The tool was applied exclusively to the technical editing of the language; the intellectual content of the article including the research design, methodology, analysis, results, and conclusions was developed entirely by the authors. All AI-assisted edits were subsequently reviewed by the authors, who take full responsibility for the accuracy, completeness, and compliance of the material with scientific standards.

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