TRANSFORMING CZECH CITIES INTO GREEN CITIES: LEGAL FRAMEWORKS FOR URBAN BIODIVERSITY AND HEAT MANAGEMENT

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Abstract: *The article delves into the impact of climate change on Czech cities and evaluates their preparedness for future challenges. It highlights the significant temperature rise since 1960 and the consequent emergence of heat islands in urban areas, underscoring the urgency for adopting the green cities concept. Through a detailed examination of policies and strategies for urban biodiversity and heat management the article assesses the potential legal instruments facilitating the transition towards sustainable urban development. It emphasises the critical role of municipalities and the private sector in implementing adaptive measures to combat climate change effects, presenting an analysis of the legal framework and practical initiatives in place.*

Keywords: *Climate Change, Green Cities, Spatial Planning, Urban Biodiversity, Urban Heat Management*

INTRODUCTION

Czechia is among the regions in Europe most severely impacted by climate change. Since 1960, the average temperature in Czechia has increased by 2.2 degrees Celsius.[1] This rise in temperature presents challenges not only to natural ecosystems, exemplified by extreme weather patterns, floods, and droughts, but also to urban populations. During summer months, cities are prone to becoming heat islands, experiencing extreme temperatures that render them uninhabitable.

Suffice it to say, Czech cities are, to a significant extent, unprepared for the increasingly warm weather. This lack of preparedness can be attributed, in part, to the historical development of these cities during periods of cooler climate patterns.

One solution to this issue is the adoption of the green cities concept, which emphasises urban development in harmony with both nature and inhabitants.[2] Green cities are not merely places where individuals feel secure and have the optimal conditions for living and thriving; they are also well-equipped to face future challenges. The article examines two pieces of vast mosaic that green cities consist of – urban biodiversity and heat management.

The purpose of this article is to determine, based on selected criteria, whether the Czech legal system contains instruments that could combat loss of urban biodiversity and curb heat during the summer temperatures in cities thus purporting transition towards green cities.

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[1] Průměrná roční teplota v ČR. [Average Temperature in Czechia]. In: *Fakta o klimatu* [online]. [2024-07-30]. Available at: <https://faktaoklimatu.cz/infografiky/teplota-cr>.

[2] BREUSTE, J. *The Green City: General Concept.* In: Jürgen Breuste – Martina Artmann – Cristian Ioja – Salman Qureshi (eds.). *Making Green Cities: Concepts, Challenges and Practice.* Salzburg: Department of Geography and Geology, University of Salzburg, 2020, pp. 1–15. <https://doi.org/10.1007/978-3-030-37716-8_1>.

The article is organised into several sections, each addressing key elements of green cities. The first section examines urban biodiversity, crucial for green city initiatives. Urban settings place considerable pressure on biodiversity due to the impacts of residential, industrial, and commercial activities, which are frequently at odds with maintaining diverse and rich habitats. This situation is exacerbated by the heat island effect, attributed to minimal green spaces, absorption of solar radiation by impervious surfaces, limited wind flow due to dense construction, and additional heat from industry and traffic. At the same time urban biodiversity has an invaluable impact on human health and well-being and provides ecosystem services.[3]

This section first addresses the importance of biodiversity in urban areas[4] and the legal mechanisms for its promotion, followed by a discussion on available measures for municipalities. The second section discusses urban heat management and the current policies and legal instruments that could serve as tools for mitigation of heat in cities. An analysis of this topic is seminal because insufficient heat management can lead to the phenomenon called heat island that is exacerbated by climate change. Furthermore, climate change affects biodiversity and greenery in urban areas and loss of those strengthens heat islands.[5] Therefore, both topics need to be regulated together.

The final section introduces best practices in the Czech Republic both in heat management and urban biodiversity improvement.

Disclaimer: The content of this article is derived from the author's report presented at the Avosetta Meeting in Bern on Green Cities, 2023.[6]

This article reflects the legal framework effective as of June 20, 2024.

I. URBAN BIODIVERSITY AS A SPECIFIC LEGAL TOPIC

Variety of all living things, or in other words, biodiversity and its loss has been recently at the forefront of various EU and international policy documents, for example Biodiversity Strategy for 2030[7] or the Kunming-Montreal Global Biodiversity Framework[8]. Loss of biodiversity on the current scale is to be largely attributed to the climate change. Policy documents are usually focusing on biodiversity as a whole with urban biodiversity being given

[3] SOANES, K., TAYLOR, L., RAMALHO, C. E., MALLER, C., PARRIS, K., BUSH, J., MATA, L., WILLIAMS, NICHOLAS, S. G., THRELFALL, C. G. Conserving urban biodiversity: Current practice, barriers, and enablers. *Conservation Letters, A journal of the Society for Conservation Biology.* 2023, Vol. 16, No. 3. <https://doi.org/10.1111/conl.12946>.

[4] REGA-BRODSKY, C .C., ARONSON, M. F. J., PIANA, M. R. et al. Urban biodiversity: State of the science and future directions. *Urban Ecosystems.* 2022, Vol. 25, No. 4, pp. 1083–1096. <https://doi.org/10.1007/s11252-022-01207-w>.

[5] KLÁPŠTĚ, P., PAVELČÍK, P., LUPAČ, M. Současné přístupy k adaptaci sídel na změnu klimatu v kontextu územního rozvoje, územního plánování a urbanismu. [Current Approaches to the Adaptation of Settlements to Climate Change in the Context of Spatial Development, Spatial Planning and Urban Planning]. *Urbanismus a územní rozvoj.* 2022, Vol. 25, No. 4, p. 19.

[6] Green Cities. Erlangen: Friedrich-Alexander-Universität Erlangen-Nürnberg, 2023. In: *Avosetta Group* <https://www.avosetta.oer2.rw.fau.de/contents.html>.

[7] Biodiversity strategy for 2030. In: *European Commission* [online]. [2024-07-30]. Available at: <https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en>.

[8] EU at COP15 global biodiversity conference. In: *European Commission* [online]. [2024-07-30]. Available at: <https://environment.ec.europa.eu/topics/nature-and-biodiversity/eu-cop15-global-biodiversity-conference_en>.

a little to none space at all. Within the EU, a proposal for a Nature Restoration Law aims to improve the current situation.[9] The proposal includes provisions for the restoration of urban ecosystems by 2040 and 2050[10], and the creation of National Restoration Plans[11].

Beyond the EU, organisations such as the World Wildlife Fund are also focusing on urban biodiversity. They highlight that urban growth has led to the loss of original habitats, as well as the fragmentation and destruction of these habitats.[12] Therefore, it is crucial to pay attention not only to the protection and restoration of biodiversity in natural and rural areas but also within urban environments.

The Czech Republic's approach to urban biodiversity is articulated through two strategic documents crafted by the Ministry of Environment. The State Environmental Policy of the Czech Republic 2030 with a view to 2050[13] and Biodiversity Strategy of the Czech Republic 2016–2025.

The policy primarily addresses biodiversity as a general topic and links its loss and protection to specific issues such as the climate change[14], noise pollution[15], urban sprawl[16], renewable energy[17], landscape protection[18], and habitat protection[19]. These topics are transformed into strategic objectives. Urban biodiversity is cautiously included in Strategic Objective 1.6 (Settlements).[20] Although this objective does not explicitly mention urban biodiversity, it focuses on the quality of green infrastructure, contributing to better microclimates in settlements[21] and their adaptation to the climate change.[22] All these aspects are related to urban biodiversity, but the strategic objective does not make this connection explicit.

In contrast, the Biodiversity Strategy of the Czech Republic 2016-2025, recognises the vulnerability of urban biodiversity and underscores the necessity of supporting it through a variety of measures. A significant challenge identified is the difficulty in acquiring relevant and comprehensive biodiversity data from municipalities.[23]

The strategy identifies as a possible threat low awareness about urban biodiversity and missing opportunities to implement urban biodiversity into spatial planning.[24] The Strat-

[9] Proposal for a Regulation of the european parliament and of the council on nature restoration, COM/2022/304 final.
[10] Article 6 of the Proposal.
[11] Article 11 of the Proposal.
[12] Urban Biodiversity. In: *WWF* [online]. [2024-07-30]. Available at: <https://wwf.ca/habitat/urban-areas/>.
[13] State Environmental Policy of the Czech Republic 2030 with a view to 2050. In: *Ministry of the Environment of the Czech Republic* [online]. [2024-07-30]. Available at: <https://www.mzp.cz/cz/statni_politika_zivotniho_prostredi>.
[14] State Environmental Policy of the Czech Republic 2030 with a view to 2050, p. 15 et seq.
[15] Ibid., p. 41 et seq.
[16] Ibid., p. 50 et seq.
[17] Ibid., p. 65 et seq.
[18] Ibid., p. 76 et seq.
[19] Ibid., p. 86 et seq.
[20] Ibid., p. 50.
[21] Ibid., p. 56.
[22] Ibid., p. 51.
[23] Biodiversity Strategy of the Czech Republic 2016–2025, p. 56. In: *Ministry of the Environment of the Czech Republic* [online]. [2024-07-30]. Available at: <https://www.mzp.cz/web/edice.nsf/4A46CA81084E521FC1258050002DAE0C/$file/SOBR_CR_2016-2025.pdf>.
[24] Biodiversity Strategy of the Czech Republic 2016-2025, p. 57.

egy formulates several measures that should help the promotion of urban biodiversity. For example, educational events and various methodological guides. However, it would seem that these measures are more theoretical with real-world impact yet to be seen.

Even though, policy documents do not deal with the urban biodiversity comprehensively. There are several legal instruments already contained in the Czech legal system that are able to target biodiversity in urban areas, despite their primary aim being protection of sectoral protected interests such as nature, water, and forests. If these protected interests are found within municipal boundaries, they can be used to protect the urban biodiversity.

I.1 NATURE BIODIVERSITY

Urban biodiversity is a crucial component of sustainable urban development. The loss of biodiversity in cities can lead to various environmental and health issues. Within the Czech legal framework, Act No. 114/1992 Coll., on Nature and Landscape Protection (NLP), provides several mechanisms to enhance local and urban biodiversity. For instance, the protection of wild birds,[25] general protection of animals and plants,[26] the creation of significant landscape elements,[27] the establishment of territorial systems for ecological stability,[28] and the protection of free-standing trees outside of forest areas[29] all contribute to biodiversity improvements in urban areas. Additionally, other specially protected elements of nature could be present in urban areas. These include the Natura 2000 network,[30] specially protected areas,[31] memorial trees, and specially protected animal or plant species.[32]

Except for Natura 2000 sites, specially protected nature and generally protected nature are supplemented with specific obligations for investors. If their projects or use of nature could interfere with the landscape, investors are obliged to conduct a biological assessment.[33] The issue with this obligation is that it is not generally applicable to purely urban environments.[34] Therefore, the author suggests that to improve urban biodiversity, the provision should be amended to include specific projects in urban areas.

Another potential instrument for improving biodiversity in urban areas is stated in Section 68 of the NLP – measures to improve the natural environment. This instrument imposes a general obligation on landowners and tenants to improve, according to their capabilities, the status of preserved nature and the land environment. This instrument is easily envisioned in settlements close to nature, such as small municipalities and municipalities in specially protected areas (e.g., national parks). However, in agglomerations like Prague or Brno, where inhabitants live in suburbs or city quarters with perfectly mowed

[25] Section 5a of Act No. 114/1992 Coll., on Nature and Landscape Protection.
[26] Ibid., Section 5.
[27] Ibid., Section 4(2).
[28] Ibid., Section 4(1).
[29] Ibid., Section 7 and 8.
[30] Ibid., Section 45a et seq.
[31] Ibid., Section 14 et seq.
[32] Ibid., Section 46 et seq.
[33] Ibid., Section 67.
[34] Ibid., Section 3(1)(m) A landscape is a part of the Earth's surface with a characteristic relief, composed of a set of functionally interconnected ecosystems and human-made elements.

lawns, proper enforcement of the provision is difficult. Conversely, one might argue that the provision is self-limiting because it focuses on preserved nature and land environments. Therefore, urban areas heavily influenced by human presence do not necessarily fall under this protection.

As with biological assessments, this is another legal instrument that could be used to improve urban biodiversity, provided some legislative changes are enacted.

Urban biodiversity is a very specific topic, and the NLP offers only a limited portfolio of legal instruments to address its loss. On the other hand, the NLP was enacted at a time when urban biodiversity was not a primary concern. Therefore, one cannot fault the NLP for the lack of legal instruments focused on this issue.

I.2 Water Biodiversity[35]

Another legal act that could improve urban biodiversity is Act No. 254/2001 Coll., on Water. The scope of this act is limited to water ecosystems and urban areas where rivers, water streams, and waterworks are present. Although the act does not use the term "biodiversity," it does employ the term "ecosystem" and protects water ecosystems through various instruments and measures.[36] The measures contained in the act are general in nature and do not differentiate between urban and non-urban environments. The Water Act protects water ecosystems through several instruments.

From a policy perspective, water ecosystems are safeguarded through National River Basin Management Plans (NRBMPs) as stipulated by Section 24(4)(a) of the Water Act. These plans are further detailed in Decree No. 50/2023 Coll., on River Basin Management Plans and Flood Risk Management Plans.[37] These plans specify areas that impact ecosystems directly and are subject to close monitoring. Each plan includes a dedicated chapter outlining ecosystem protection goals and strategies for 2021–2027:[38]

- to set international, national and regional priorities for the gradual two-way crossing including a timetable for the implementation of the sub-basin plans, taking into account the capacity and financial resources required for such a process,
- ensure downstream protection of fish at hydropower installations,
- establish principles for protecting existing stream migration passage,
- establish principles for improving the living conditions of flowing water organisms.

The Water Act also conditions specific activities to ensure ecosystem protection during their operation. For instance, Section 7(5) allows the use of surface waters for navigation provided that aquatic ecosystems are not endangered. Navigation is restricted to vessels and water courses that meet criteria set by the Ministry of Transport, in agreement with the Ministry of the Environment and in cooperation with the Ministry of Agriculture, as determined by Decree No. 46/2015 Coll.

[35] This section was based on author's contribution at meeting of Avosetta Group 2024 in Rennes. *Water Law & Sustainable Trajectories*. Erlangen: Friedrich-Alexander-Universität Erlangen-Nürnberg.

[36] Both terms are connected because without resilient ecosystems biodiversity will fade.

[37] National River Basin Management Plan. In: *The Ministry of Agriculture* [online]. [2024-07-30]. Available at: <https://eagri.cz/public/portal/mze/voda/planovani-v-oblasti-vod/ramcova-smernice-o-vodach/x3-planovaci-obdobi/zverejnene-informace/narodni-plan-povodi>.

[38] These goals are the same for all national RBMP.

Another protective measure is the establishment of minimum groundwater levels under Section 37, applicable when water authorities permit groundwater management. Section 38(10)(a) mandates that water authorities consider ecosystem protection when authorising wastewater discharges into surface/ground waters. Additionally, watercourse administrators must conduct their activities in ways that minimise potential negative impacts on ecosystems, as required by Section 47(5).

Finally, under Section 55a(2) of the Water Act, the protection of aquatic and related ecosystems must be considered when permitting water works. Water works should not create barriers to the free movement of fish and other aquatic life forms, although several exemptions exist, such as for ponds, water reservoirs, other public interests, technical infeasibility, or excessive costs.

To summarise the above-stated the water act does not directly protect biodiversity in the urban areas. However, under the water act a general protection of water ecosystems is required. Thus, one can assume that through this general protection obligation biodiversity in the urban areas is supported.

I.3 Forest Biodiversity

Other specific acts that, although not necessarily suited for all urban areas, can improve urban biodiversity include the Forest Act (Act No. 289/1995 Coll.), which primarily focuses on the protection of forest ecosystems.

Forests in urban areas (sometimes referred to as urban forests) are often confused with parks and vice versa. However, each operates under a different legal regime (NLP vs. Forest Act). Not all municipalities have a forest within their urban areas.[39] This can be a particular issue in large cities and agglomerations that cannot accommodate large forest areas due to building density. However, exceptions can be found in Czechia. For example, Brno has the game enclosure Holedná, which contains forests and is not far from the city centre; Ostrava has Halda Ema; and Prague has Divoká Šárka, which is still within city limits but rather far from the city centre. Forests in highly urbanised areas provide not only protection of biodiversity but can also cool down cities during heat waves and serve as leisure spots for city inhabitants. Additionally, examples of urban forests can be found within the EU, such as the Foresta Urbana di Lecce in Italy.

Lastly, urban forests can also be part of green infrastructure within municipalities.

I.4 Spatial Planning

Spatial planning at the regional and municipal levels under Act No. 283/2021 Coll., the Building Act, could serve as relevant instrument for biodiversity conservation. Spatial plans have the potential to establish biocorridors and territorial systems for ecological stability.[40] Nevertheless, these tools are predominantly associated with rural rather than urban environments but can exist within large agglomerations.

[39] This section is focused solely on urban forests, or forest within cities. Otherwise, Municipal Offices of a Municipalities with Extended Powers (municipalities of the third category) usually have forests within their administrative areas.

[40] Section 3 of Act No. 114/1992 Coll.

Furthermore, the Building Act contains a general provision in Section 38(1) (objectives of spatial planning) …to ***create conditions for sustainable development*** *of the territory based on a balanced relationship between the conditions for a* ***favourable environment****, economic development, and the cohesion of the community of inhabitants,* ***which meets the needs of the present generation without jeopardising the conditions for the lives of future generations****.* The general objective should also focus on urban biodiversity, as it is crucial for a healthy and favourable environment for humans. Additionally, Section 38(4) positions spatial planning as an activity that protects the landscape and creates green infrastructure.

Together with the above, the impact assessment on sustainable development of the territory under Section 40 of the Building Act is another instrument aimed at the protection of urban biodiversity and biodiversity in general. The specifics of the assessment are stated in Annex 4 of the Building Act. From a practical perspective, this protection could be seen in the strategic environmental assessment (SEA) of the proposed Brno-city spatial plan.[41] The impact assessment does not specifically mention urban biodiversity, but it identifies the protection of biodiversity as a general topic[42] and introduces biocorridors and territorial systems for ecological stability within the municipality's borders.[43] The proposal suggests that biodiversity will be enhanced due to the expansion of green public spaces,[44] and specific locations will be chosen as focal points for enhanced biodiversity protection.[45] Some proposed measures were seen as controversial, especially the transformation of areas near the city centre that have served as private allotments[46] into areas with residential living and green public places. This change will have a negative impact on local biodiversity, but on the other hand, it will make the area more accessible to the public.

Urban biodiversity can be enhanced through the use of green infrastructure [public infrastructure according to Section 10(1)(c)].[47] The Building Act considers green infrastructure as mostly interconnected system of areas and other elements with natural and semi-natural character. This means that green infrastructure predominantly consists of vast areas, leaving an opening for possibly smaller areas that could also contain urban greenery but are not necessarily a part of green infrastructure. This issue can be addressed with another public infrastructure instrument—public spaces.[48] Under Section 141(1), public spaces can be designed to support local biodiversity.

However, the current framework lacks a comprehensive strategy specifically addressing biodiversity in urban contexts, rendering the existing approach insufficient for the nuanced challenges of urban biodiversity conservation.

[41] Proposal for a Spatial Plan of Brno-city. In: *SEA Information System* [online]. [2024-07-30]. Available at: <https://portal.cenia.cz/eiasea/detail/SEA_JHM070S?lang=cs>.
[42] Ibid., p. 113 et seq.
[43] Ibid., p. 114.
[44] Ibid., p. 221.
[45] Ibid., p. 328.
[46] Nedej se. Brno zahrádkami žije. [Brno lives through its allotments]. In: *Česká televize* [online]. [2024-07-30]. Available at: <https://www.ceskatelevize.cz/porady/1095913550-nedej-se/220562248410029/>.
[47] Supported with Section 11 of Act No. 283/2021 Coll., Building Act - publicly beneficial construction or measure.
[48] Section 10(1) (e) of Act No. 283/2021 Coll.

II. URBAN HEAT MANAGEMENT IN PUBLIC POLICIES

However, biodiversity is not the only environmental concern for urban areas. The phenomenon of urban heat islands, where cities experience significantly higher temperatures than their rural surroundings, poses another major challenge. Effective urban biodiversity strategies can also contribute to heat management. For example, increasing green spaces and planting trees can mitigate the heat island effect by providing shade and cooling through evapotranspiration.

The Czech Ministry of Environment has addressed the issue of heat development primarily through policy initiatives, notably the amended National Action Plan for Adaptation to Climate Change.[49] This Plan sets forth objectives to enhance urban resilience to climate change, specifically aiming to mitigate heat development in cities. It outlines actionable policy measures such as decentralised rainwater management, minimising the use of road salt, herbicides, and pesticides in urban settings, and enhancing the quality, efficiency, and connectivity of urban greenery and water bodies.

Addressing urban heat islands requires a multifaceted approach, integrating policies and legal instruments designed to manage both biodiversity and heat. The Building Act plays a crucial role in this context. Although the act does not explicitly mention heat islands, it includes provisions that can be leveraged to address them. Section 39 introduces an indicative list of spatial planning tasks, specifically Sections 39(l) and (m). These two provisions need to be read together when dealing with heat islands: letter (l) addresses weather extremes such as floods, droughts, erosion, and extreme temperatures, while letter (m) focuses on the adaptation of settlements to climate change. When thoroughly applied together, these provisions should create a synergy effect that comprehensively addresses heat islands in spatial plans. Since urban heat islands are a phenomenon that directly affects city-dwellers and thus the sustainable development of municipalities, it is necessary to include this negative factor within the sustainable development analysis under Annex 4 of the Building Act.

Additionally, public spaces under Section 141(1) are to be delineated in a way that supports quality of living, absorption of water, creation of green infrastructure, and limits the effects of climate change. Therefore, public spaces serve a vital role in mitigating and combating heat islands under the Building Act. Municipalities and urban planners should emphasise greenery over parking spots to harness this vital function.

Lastly, provisions in Section 80(2)(c) and (e) of the Building Act presume that spatial plans will contain residential green areas and green infrastructure, though their implementation is left to municipal discretion.

Spatial planning plays a vital role. Therefore, several general recommendations for spatial planners regarding heat management can be found in the literature:[50]

[49] National Action Plan for Adaptation to Climate Change. In: *Ministry of the Environment of the Czech Republic* [online]. [2024-07-30]. Available at: <https://www.mzp.cz/cz/narodni_akcni_plan_zmena_klimatu>.

[50] KLÁPŠTĚ, P., PAVELČÍK, P., LUPAČ, M. *Současné přístupy k adaptaci sídel na změnu klimatu v kontextu územního rozvoje, územního plánování a urbanismu. [Current Approaches to the Adaptation of Settlements to Climate Change in the Context of Spatial Development, Spatial Planning and Urban Planning]*. p. 21.

- Formulate principles for increasing the preparedness of the region/municipality/city for climate change (adaptation) while simultaneously reducing the impact of the region/municipality/city on climate change (mitigation) within the framework of the basic concept of territorial development.
- Consider adaptation and mitigation in the urban planning concept and the landscape arrangement concept.
- Protect well-functioning and valuable elements and their key properties in the area that do not use other forms of protection, ensuring they are not removed during development.
- Support the development of nature-friendly areas or permeable surfaces through appropriate coefficients.
- Set conditions and rules for coordinating various development activities in the city and its components, especially such as utility networks and vegetation, where such coordination is not already provided by legislation.
- Set rules for investments by private entities and third parties in the area.
- Clarify public interests under local conditions and create conditions for the implementation of necessary publicly beneficial constructions and measures by defining them.
- Set conditions for balancing and coordinating conflicting public interests (e.g., climate measures and protection of historical values).

To complete the legal framework, it should be noted that the, environmental and public health requirements must be taken into account during the design and construction of new buildings, as stated in Section 148 of the Building Act.

III. BEST PRACTICES IN CZECHIA

Regional and municipal authorities have developed climate strategies and Sustainable Energy and Climate Action Plans (for example Prague),[51] aligning with initiatives like the Covenant of Mayors.[52] These plans, varying in scope and focus (for example Ostrava-city[53] has strategy on development), sometimes address heat management (for example Brno-city)[54] through financial measures rather than direct intervention.

Project UrbanAdapt is at the forefront of developing urban adaptation strategies that leverage ecosystem-based approaches to enhance climate resilience. This initiative involves several major Czech cities in a pilot endeavour, with one of its notable outcomes being the creation of a heat map for Brno-city. This tool is designed to inform and improve

[51] LÍBOVÁ, T. Modrozelená budoucnost Prahy v kontextu klimatického plánu do roku 2030. [Prague's green and blue future in the context of the Climate Plan until 2030]. *Urbanismus a územní rozvoj*. 2022, Vol. 25, No. 4., pp. 23–46. Capital City of Prague. In: *Prague Climate Action Plan 2030* [online]. [2024-07-30]. Available at: <https://adaptacepraha.cz/en/documents-to-download/>.

[52] Covenant of Mayors – Europe. In: *European Commission* [online]. [2024-07-30]. Available at: <https://eumayors.ec.europa.eu/en/about>.

[53] Magistrát města Ostravy. In: *fajnOva* [online]. [2024-07-30]. Available at: <https://fajnova.cz/strategicky-plan/>.

[54] Magistrát města Brna. In: *Priprav Brno* [online]. [2024-07-30]. Available at: <https://priprav.brno.cz/>.

urban planning processes by identifying areas most affected by heat, thereby guiding the implementation of effective adaptation measures.[55]

A commendable example of regional climate adaptation efforts is seen in the Liberec region. The regional authority has enacted the Action Plan for Adaptation to Climate Change in the Liberec Region for 2021–2027, which outlines strategic objectives to be achieved through specific actions.[56] A significant focus of this plan is on the development and expansion of green infrastructure projects. The regional authority commits to incorporating green solutions on its properties and those of its subordinate entities. Additionally, it aims to provide specialised assistance to municipalities for the initiation and management of green infrastructure projects and other adaptive interventions.

As stated in the introduction, the loss of urban biodiversity and the formation of heat islands are consequences of climate change. Therefore, introducing more green spaces within urban areas is necessary. Greenery also serves other vital functions, such as mitigating noise and pollution.[57] Selected measures of urban greenery are recognised with the Adapterra Awards, highlighting successful projects across the Czech Republic.[58] Unfortunately, there are still only dozens of exemplary projects within Czechia.

In practice, municipalities have only begun to implement these integrated strategies. For example, Prague's Municipal Standard for Planning, Planting, and Maintenance of Street Tree Alignments[59] not only promotes urban biodiversity but also helps manage urban heat. Similarly, SEA of Brno-city's spatial plan includes measures to enhance green public spaces, which can mitigate heat islands while supporting biodiversity.

CONCLUSION

The integration of urban biodiversity and heat management strategies within the legal framework is essential for creating sustainable green cities. By leveraging existing legal instruments and focusing on practical implementation, Czech cities can enhance their resilience to climate change and improve the quality of urban life.

The aim of this article was to evaluate whether Czech cities are prepared for a warmer future climate based on selected criteria. The analysis suggests that while Czech cities face

[55] Magistrát města Brna & CzechGlobe, Ústav výzkumu globální změny AV ČR, v. v. i. In: *Teplotní mapa [Heat Map]* [online]. [2024-07-30]. Available at: <https://gis.brno.cz/mapa/teplotni-mapa/?c=-596411.15%3A-1162376.85&z=4&lb=of-brno_akt&ly=tepmap02019&lbo=1&lyo=> and CzechGlobe, Ústav výzkumu globální změny AV ČR, v. v. i. In: *UrbanAdapt: Urban adaptation to climate change* [online]. [2024-07-30]. Available at: <https://urban-adapt.cz/en>.

[56] Liberec Region. In: *The Action Plan for Adaptation to Climate Change in the Liberec Region for 2021–2027* [online]. [2024-07-30]. Available at: <https://zivotni-prostredi.kraj-lbc.cz/Adaptace_na_zmenu_klimatu>.

[57] BLATOVÁ, T. Aby město nepálilo. [So That the City Doesn't Burn]. *Urbanismus a územní rozvoj*. 2022, Vol. 25, No. 4, pp. 45–46.

[58] Nadace partnerství. In: *Adapterra Awards* [online]. [2024-07-30]. Available at: <https://www.adapterraawards.cz/cs/Databaze>.

[59] HORA, D., KŘÍŽ, K., PÁNEK, P., PEJCHAL, M., et al. *Městský standard plánování, výsadby a péče o uliční stromořadí jako významného prvku modrozelené infrastruktury pro adaptaci na změnu klimatu.* [Municipal Standard for Planning, Planting, and Maintenance of Street Tree Alignments as a Significant Element of Blue-Green Infrastructure for Climate Change Adaptation]. In: *Institut plánování a rozvoje hlavního města Prahy* [online]. [2024-07-30]. Available at: <https://iprpraha.cz/assets/files/files/b2c8378b7b20f1d02498f9b7925eafa9.pdf>.

significant challenges due to climate change, there exists a viable pathway towards resilience and sustainability through the adoption of green city concepts and strategies.

The Czech legal framework includes several instruments designed to prepare cities for the future. Although none explicitly acknowledge the concept of green cities, their objectives align closely with the principles of green urban development. Spatial planning, in particular, plays a crucial role in addressing urban biodiversity and heat management.

However, practical implementation of green measures remains inconsistent. Large cities often prioritise infrastructure development over green spaces, exacerbating vulnerability to climate change and urban heat islands. The potential for integrating urban biodiversity and heat management into spatial planning exists within the Building Act, which mandates impact evaluations on sustainable development. Yet, these evaluations do not necessarily address urban heat or biodiversity specifically.

The successful implementation of these strategies hinges on a collaborative effort involving municipalities, the private sector, and the broader community. Overcoming existing hurdles, such as legislative gaps, infrastructure limitations, and social resistance, is essential.

Based on the analysis and findings presented in the article, several key recommendations can be made to enhance urban biodiversity and manage urban heat islands in Czech cities:

- Amend legal provisions to include urban biodiversity:
  Modify Act No. 114/1992 Coll., on Nature and Landscape Protection (NLP), to explicitly include provisions for urban biodiversity. This could involve extending obligations for biological assessments to urban projects and emphasising the protection of biodiversity within urban planning documents.
- Enhance the Building Act for heat island mitigation:
  Expand the Building Act to specifically address urban heat islands. This can be achieved by detailing measures in Sections 39(l) and (m) to focus on urban heat management, including mandatory green infrastructure in urban development projects.
- Develop comprehensive urban biodiversity and heat management strategies:
  Encourage municipalities to create integrated strategies that address both biodiversity and heat management. These strategies should be incorporated into spatial plans and emphasise the importance of green infrastructure, such as parks, urban forests, and green roofs.
- Promote practical implementation through best practices and standards:
  Adopt and promote standards like Prague's Municipal Standard for Planning, Planting, and Maintenance of Street Tree Alignments across other cities. Such standards can guide the practical implementation of green infrastructure projects, ensuring consistency and effectiveness.
- Foster collaboration between stakeholders:
  Encourage collaboration between municipalities, the private sector, and communities to implement green initiatives. This can be facilitated through public-private partnerships, community-led green projects, and incentives for businesses to invest in green infrastructure.
- Leverage financial mechanisms for green projects:

Identify and utilise financial instruments and funding opportunities to support green infrastructure projects. This could include grants, subsidies, and incentives for municipalities and private entities to develop and maintain green spaces.

- Improve data collection and monitoring:
  Enhance efforts to collect and monitor biodiversity data in urban areas. Reliable data is crucial for informed decision-making and for assessing the effectiveness of biodiversity and heat management measures.
- Incorporate green solutions in public spaces:
  Designate public spaces under Section 141(1) of the Building Act to support local biodiversity. Emphasise the creation of green infrastructure in public spaces to mitigate heat islands and improve the urban environment.

As Czech cities strive towards a greener future, the continuous evolution of legal instruments and policy measures, and bolstered by local initiatives, will be paramount. This journey towards green urbanism aims not only to mitigate the adverse effects of climate change but also to enhance the quality of life, fostering a harmonious coexistence between humans and nature.