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The Examination of Urban Climate Mitigation and Adaptation Strategies in the Czech Republic and the United States

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I. Introduction

Climate change is continuously disrupting lives around the world through the impacts wrought on by rising temperatures. Addressing it through effective policy and behavioral changes at every level of government has never been more urgent. With a majority of residents throughout the world living in or near an urban space, climate change mitigation and adaptation must be addressed through the lens of urbanism and its byproducts. It is estimated that 60% of the global population will be urbanized by 2030 (Syrbe et al., 2021, p. 1). To ensure the most success with mitigation efforts in urban spaces, pro-environment and risk-aware attitudinal shifts in residents must be combined with intentional policies by city governments.

In this paper, I compare the differing viewpoints of Czech and American residents and metropolitan policymakers with regards to climate change mitigation and adaptation, finding that Americans are more responsive to human-centric adaptation plans whereas Czechs are more responsive to ecosystem-centric adaptation plans. I analyze the implementation plans of San Jose, California and Prague, Czechia to illustrate how demographically-similar cities in America and the Czech Republic respond to the threats of climate change. Both cities have populations just over one million people with similar racial and age characteristics (OECD, 2018). Each urban area has a land area just under 200 square miles (Líbová et al., 2020). These cumulative similarities qualify them as a suitable comparison. I conclude by arguing that effective urban planning that prioritizes both human well-being and ecosystem preservation is paramount to combating and preventing the devastating effects of climate change.

II. American Attitudes Toward Climate Change Mitigation and Adaptation

In light of increasing urbanization and people flocking to American cities, it can be inferred that the American dream has shifted from owning a single-family home with a two-car garage in the suburbs to being in the urban core with access to transit options and public amenities. Consequently, it is the responsibility of the metropolitan governments to effectively develop policies that accommodate both a shifting urban landscape and a changing climate. Though urbanization is perceived differently by various stakeholders, the process of enacting pro-environmental policies must be framed in such a way to attract as much public support as possible. Because public support is vital, the way climate change and associated policies are viewed has important implications. In recent years, American belief in climate change and support for pro-environmental policies has increased, but there is still a noticeable Republican resistance to legislative action that is viewed as government overreach (Tyson and Kennedy, 2020). Within these constraints, government officials seem to presume that human-centered climate change mitigation and adaptation policies will be the most compelling in American cities.

Individual views regarding climate change are measured by the interpreted threat of climate change and how much action is warranted to combat it. In a 2016 survey of Americans, 74% of respondents expressed concern about climate change (Fletcher et al., 2021). However, "when asked to describe travel in the year 2050 only 29% of participants discussed lower carbon options, suggesting that actively envisioning a sustainable future was less prevalent than climate change concern" (Fletcher et al., 2021). A 2019 study focused on a sample of metropolitan regions in the western United States found that a majority of participants desired comprehensive action on climate change, but were unclear about the best implementation tactics (Sullivan and White, 2019). Around half of survey respondents expressed distrust in the federal government,

halting support of large-scale legislative action (Sullivan and White, 2019). In these cities that are prone to dry conditions, a "pro-environmental worldview and perceived personal responsibility were the strongest predictors of risk perception" (Sullivan and White, 2019). As of 2020, "a majority of Americans continue to say they see the effects of climate change in their own communities and believe that the federal government falls short in its efforts to reduce the impacts of climate change" (Tyson and Kennedy, 2020).

Over the past several years, there has been a significant rise in Americans who say that protecting the environment and addressing climate change should be top priorities for the federal government (Tyson and Kennedy, 2020). In an era of deep polarization in American politics, it is notable that there is overwhelming bipartisan support for large-scale tree planting efforts, tougher restrictions on power plant emissions, and carbon capture tax credits for businesses (Tyson and Kennedy, 2020). There is still party-line separation when it comes to whether human activity is contributing to climate change, with the majority of Democrats believing it does while only 22% of Republicans are in agreement (Tyson and Kennedy, 2020). Notably, those in both parties who live near a coastline are "more likely than those who live further away to say climate change is affecting their local community" (Tyson and Kennedy, 2020). To bypass partisanship, many American policymakers fuse business and environmental interests in their climate plans.

From the survey data so far collected, it is apparent that successful visualization and risk perception of climate change is crucial to get people on board with mitigation plans that have end goals of 2050 or 2100, oftentimes with near-term costs outweighed by long-term benefits. Increased risk perception means increased personal responsibility and public buy-in to mitigation efforts. Evidently, a "failure to recognize the risks posed by climate change is a despairingly self-corrective issue – eventually, as people experience detrimental effects of climate change,

risk perception will inevitably increase" (Sullivan and White, 2019). Perceived personal responsibility and pro-environmental worldviews were found to be the primary drivers of risk perception (Sullivan and White, 2019). Based on existing plans in various American metropolitan areas, it is clear that human-centric policy proposals are the least political and most unifying. Because there are still many residents of American cities who deny human-caused climate change, mitigation strategies must be promoted as the least disruptive and most beneficial to day-to-day life.

III. Czech Attitudes Toward Climate Change Mitigation and Adaptation

Although Czech cities generally have "relatively low density by EU standards," Prague is the country's most densely populated city (OECD, 2018, p. 187). Prague has a developed multimodal transport system that covers the entire city, with the bulk of residents utilizing public transit options in their daily commutes (OECD, 2018, p. 191). 86% of residents of Prague report high levels of satisfaction with the quality of public transportation in the city, a key outcome of urban investment (OECD, 2018, p. 191).

Similarly to Americans in coastal settings, urban-dwelling Czechs have firsthand experience of the incipient effects of climate change. From 1991-2015, heat waves were the "deadliest extreme weather events in Europe" (Badura et al., 2021). These risks are exacerbated in urban environments, where 73% of the European population and 74% of the Czech population currently live (Badura et al., 2021). Under the climate projections laid out in the Representative Concentration Pathway 8.5 by the Intergovernmental Panel on Climate Change, an increase "in the duration of heat waves and rise in maximum temperatures up to an additional 14°C during

heat waves" is projected for Prague unless comprehensive mitigation plans are urgently enacted (Badura et al., 2021).

Based on statistical analysis by Lorencová et al., "gender, age, and previous experience with extreme weather events have been found to play a significant role in the climate change beliefs of individuals and in the perception of the cause of the changing climate" among citizens of Czechia (2019, p. 4). Younger respondents, women, and those who have encountered climate-related hazards were most inclined to express concern about climate change (Lorencová et al., 2019, p. 5). Just over half of respondents are "already undertaking some type of individual actions (adaptation or mitigation)," though these will need to be paired with compatible climate policy for maximum impact (Lorencová et al., 2019, p. 14).

Badura et al surveyed residents in Prague on their preferences for nature-based solutions (NBS) in public spaces as part of city policies (2021). NBS are cost-effective and multi-functional green and blue infrastructure interventions that enhance a city's carbon sequestration. They promote sustainable urbanization, "restore degraded natural ecosystems and improve disaster risk management while providing multiple social benefits" (Badura et al., 2021). Their results found that NBS have significant support from the public as opposed to maintaining the status quo. Residents' concerns over climate change are parallel to their support for NBS. People who could identify "adverse experiences with heatwaves" have increased support for NBS. Greenery in public spaces (parks, street trees) have more support than greenery in public and commercial buildings (green roofs). Until recently, grey solutions were legally prioritized over green infrastructure in the Czech Republic (Badura et al., 2021). There is optimism to be found in the public support for NBS in that policymakers will hopefully listen to constituents and continue to enable NBS all over Prague.

IV. Case Study: The Climate Adaptation and Mitigation Strategy of San Jose, California

Given the United States' significant contribution to global greenhouse gas emissions and the inconsistent approach of the federal government on the issue of climate change – signing, withdrawing from, and rejoining the 2015 international climate treaty known as the Paris Agreement – the onus to act has often fallen to state and local governments. San Jose, California has a particularly rich history of pro-environmental action.

In 2008, California passed Senate Bill 375, the Sustainable Communities and Climate Protection Act, which mandated that each metropolitan area in the state "design and implement a plan to reduce greenhouse gas emissions from transportation in compliance with targets set by the state's Air Resources Board" (Benfield, 2012). The City of San Jose developed its first General Plan to address environmental issues over forty years ago while subsequently addressing urban sustainability through the San Jose Green Vision (SJGV) ten years ago (Romanow et al., 2018). The SJGV laid the foundation for future plans toward climate change mitigation. Climate Smart San Jose (The Plan) was developed in 2018 to bring together various city partners to address urban sustainability through a multi-faceted approach (Romanow et al., 2018, p. 10). To incorporate community input into the creation of The Plan, the city hosted town halls, workshops, focus groups, and established a Neighborhood and Youth Commission over a fifteen-month period (Romanow et al., 2018, p. 46).

A key component of The Plan is the Good Life 2.0 framework – which merges sustainability measures with overall quality of life for residents (Romanow et al., 2018, p. 10). The Good Life calls for the "scaling of renewable energy, the electrification and sharing of

vehicle fleets, investments in public infrastructure, and the role of local jobs" in achieving decarbonization goals (Romanow et al., 2018, p. 10). City officials who put the plan together prioritized community networks by incorporating play, shopping, finance, real estate, home, workplace, and mobility into the strategies of the plan (Romanow et al., 2018, p. 15).

To address the financial aspect of The Plan, the city analyzed the "economic costs, avoided costs, and savings of a low-carbon pathway through the use of discounted cash flow based on extended cost-benefit analysis techniques" (Romanow et al., 2018, p. 21). The Plan will cost $264 billion between now and 2050, and while this number "will initially seem very large, it works out to approximately 2.6% of San Jose's metropolitan GDP, or $4,260 per resident each year until 2050" (Romanow et al., 2018, p. 138). Although it is also expected to save the city around $269 billion through the avoidance of fossil fuel usage and the investment in low-carbon infrastructure (Romanow et al., 2018, p. 138).

San Jose's plan is designed by way of a human-centered lens through its emphasis on the Good Life 2.0 and individual benefits. It strives to "facilitate the creation of economically, culturally, and demographically diverse and integrated communities where residents have easy access to transit, cultural and commercial amenities, and jobs" (Romanow et al., 2018, p. 41). To achieve the bold goals set forth by the plan, community involvement will have to be coupled with city-led policies. The Plan needs to inspire action at every level of the San Jose community, from homeowners to developers to business owners, and city officials know that a human-centered approach is the best way to do exactly that.

V. Case Study: The Climate Mitigation and Adaptation Strategy of Prague, Czech Republic

In response to rising temperatures, water shortages, and extreme weather events in recent history, the Prague City Council approved a "Capital City of Prague Climate Change Adaptation Strategy" in 2017 with the aim to "achieve an adjustment of the city and its inhabitants to the changing climate conditions through a defined framework of adaptation measures and goals, and by extension improve the quality of life in the city of Prague" (Líbová et al., 2020, p. 7). This plan followed the national Strategy on Adaptation to Climate Change in the Czech Republic that was published in 2015 (Líbová et al., 2020, p. 7). The City of Prague also participates in EU projects such as Urban Adapt and UNaLAb, which were "valuable resources in the formulation" of the City's Adaptation Strategy (Líbová et al., 2020, p. 7). Approximately 66% of EU cities have mitigation plans and around 26% have adaptation plans (Badura et al., 2021). The Plan advertises six specific targets: "lessening the impact of extreme hydrological events, and improving energy performance in buildings, crisis management, microclimatic conditions, sustainable mobility, and environmental education and outreach" (Líbová et al., 2020, p. 18). To secure community input, the city hosted workshops and established an Adaptation Working Group that informed the plan's indicator framework (Líbová et al., 2020, p. 17).

Prague is unique in that it is "characterized by a high percentage of built-up areas, paved surfaces, and high concentrations of grey infrastructure" but it also boasts a large proportion of natural greenery (Líbová et al., 2020, p. 10). The Adaptation Strategy prioritizes ecosystem-based approaches in combination with grey-technical measures to secure a long-term high quality of life for residents (Líbová et al., 2020, p. 10). Ecosystem services in urban environments improves the physical and mental health of residents while also aiding in sustainable development. The EU Biodiversity Strategy for 2030 "stipulates that cities with over 20,000 inhabitants should develop green concepts by 2021" (Syrbe et al., 2021, p. 2). In light of

the "limits imposed on free movement by the COVID-19 pandemic as well as the heatwaves experienced in Europe in recent summers," urban green space has never been more important (Syrbe et al., 2021, p. 2). Based on the responses of Czech residents in a survey conducted by Syrbe et al., "visitors to green spaces particularly value the recreational opportunities, aesthetic qualities, climate regulatory function and high biodiversity they offer" (2021, p. 22).

From 2021-2024, the project is expected to cost 3.6 billion CZK ($153 million), but the socioeconomic benefits "far outweigh investment and operating costs" from the perspective of ecosystem services, according to Prague officials (Líbová et al., 2020, p. 49). A majority of project proposals are in the category of "blue-green infrastructure" which exploits urban greenery and natural water supplies to build flood resilience (Líbová et al., 2020, p. 49). Prague's plan has urban residents in mind but places preeminent focus on ecosystem-driven mechanisms, dissimilar to the San Jose plan.

VI. Conclusion & Moving Forward

In most developed countries, we are now at a point in time with increasing densification whereby "investment is flowing faster into urban cores than to sprawling suburbs" with centralized regions growing faster than outlying ones (Benfield, 2012). This presents an opportunity for more effective and far-reaching climate action at the city level. From the perspective of the Organisation for Economic Cooperation and Development (OECD), urban sustainability is best realized through densifying development, raising public awareness of environmental issues, and enhancing coordination with metropolitan and national government agencies (2018, p. 213). A lot of difference can be made in urban planning initiatives as realized by the fact that "a 10% increase in urban density correlates with a 2% decrease in per capita

carbon emissions" (Mountford et al., 2019). Effective policies will increase economic growth as well as access to affordable housing and public transport options. To increase public support for mitigation and adaptation plans, city planners have to meld sustainable measures with other noticeable benefits for residents, such as switching to an electric bus fleet that also maximizes time efficiency for work commuters.

Within the climate change mitigation space, policy change and behavioral shifts in social norms are the most challenging achievements to undertake but also the most enduring in their impact. As a collective action issue, climate change risk perceptions at the individual and institutional levels help to determine the urgency and extensiveness of responses. Public and private institutional partnerships will likely help to create public trust and engage more residents in cross-sector sustainability solutions. The promotion of community input will also lead to increased public support for adaptation planning. Comprehensive public engagement means transparency about implementation strategies and the assumed costs and benefits of such plans. Both the City of Prague and the City of San Jose were effective in their community outreach while developing their respective climate mitigation and adaptation plans; they included residents from the outset and sought their input through accessible avenues.

To maximize socio-economic and climate benefits of mitigation and adaptation plans, there needs to be significant investment in ecological infrastructure and green space as well as human-centered urban planning policies. Adequate focus both on ecosystem preservation and the way humans interact with those ecosystems is vital to achieving long-term advancements in climate resilient urbanism. One manifestation of this convergence would look like sporting and play facilities integrated into urban forests and parks. As noted by the Czech researchers, urban planners should increase the use of natural green spaces in lieu of artificial greenery. People's

viewpoints are shown to be a reflection of their experiences. When people can experience their relationship with resources and the convenience of sustainable practices, it “makes it easier for them to make sustainable choices as consumers, as voters, and as land stewards” (Cavel, 2012, p. 58). Moving forward, metropolitan government officials will need to implement policies that integrate both ecosystems and urban residents for the best chance at addressing climate change in the long term.

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