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Ecological City-States in an Era of Environmental Disaster: Security, Climate Change and Biodiversity

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Abstract: Recently, there has been increasing evidence of the emergence of systemic strains that threaten international cooperative efforts on global issues, especially climate change, biodiversity loss and security. Non-state actors have responded by declaring their commitment to work together alongside nations as climate agreements struggle to deliver the necessary global reductions in greenhouse gas emissions, conservation goals are not met, and security issues diversify. A principal constituent of the world’s non-state actors are cities. With many cities now home to more than 10 million individuals and several cities of more than 20 million, the urban world has come to dominate the global economy as well as the resource needs and environmental burdens imposed upon the planet by our species. Urban economies are responsible for more than half of global greenhouse gas emissions and substantially affect the world’s biodiversity by driving the extraction of resources and the degradation of global natural capital. Cities have become concentrators of diverse risk that complicate and broaden global security priorities. Cities are also crucibles of innovation in technology, business and governance and strong alliances between the world’s cities have formed to address the challenges of climate change, biodiversity and more. This paper asserts the unique potential for cities to assume a greater role in global priorities, including climate change, biodiversity loss and a realignment of security priorities. The transformative changes required in these three domains calls for a renewal of the city as a semi-autonomous neo-state, an ecological city-state.

Keywords: non-state actor; greenhouse gas emissions; climate change; cities; ecological city-state

1. Introduction

Cities and their populations have been cited by urban theorists and planners as major contributors of solutions to global environmental problems—especially climate change. Recently, this ambition has broadened as diverse intellectual communities, environmental advocates and conservation organizations have begun to connect the global urban economy to the state of the Earth’s systems and the biosphere [1]. In addition, calls for integrating urban social and environmental priorities across broader regional, national and international social and spatial scales has brought renewed momentum to a rigorous reconsideration of the relation of cities to their host nations, including critiques of their role in offering solutions to our environmental problems and of radical extensions of their political roles as new kinds of supra-national and stateless entities [2,3].

Concurrently, the direct participation of urban populations in globalization and the concomitant awareness of climate and ecological harm, compounded by urban–rural political tension in many countries, strain national allegiance and citizenship itself. The extent to which urban residents affirm their allegiance to a state is partly dependent on their confidence that the state is acting in a responsible manner towards them and increasingly toward nature and issues of equity, especially in the global south [4]. A new urban citizenship may be motivated as much by an emerging affinity
for global ecological stewardship—prompted by supra national political organizations—as through the emergence of a multi-level and transnational governance landscape [5,6]. In other words, an urban resident concerned about the planet and marginalized communities and living in a city with an aggressive stance toward climate change may declare greater allegiance to that city than to citizenship in a state that is hostile to, or even just not proactive toward, global environmental and equity challenges.

Despite fundamental obstacles to the financial and economic independence of cities from regional and national authorities, especially in Africa and Asia, and the persistent shortcomings of theoretical approaches that advance a new era of world cities [7], a convergence of environmental, social and political risks portends productive new thinking for an era of urban governance that extends itself well beyond city spatial limits. This paper does not aim to advance a unified theory for novel urban governance oriented toward the planet, but offers three domains for creative urban thinking:

1. Urban security portfolios under diversified risks;
2. Supranational governance for climate change;
3. Urbanization to support global biodiversity.

Each of these areas proposes scenarios of collaborative urban governance that suggests a new kind of provisional or contingent ecological city-state. While ecological city-states will likely never be truly independent of influence from another level of government to determine their own laws, commercial practices, and security measures—that is, never truly achieve the independent status of the nation state—internationally influential cities already play a special role with the authority and resources to determine their own ecological independence and exert global influence.

2. Ecological City-States

Several streams of research have articulated key attributes that cities bring to international relations. Cities offer a critical capacity in the development of multi-level perspectives for effective social, political and economic elements of global environmental governance [8]. They can fill gaps that exist between international commitments and the need for local actions and between centers of political power, economic resources and the governed [9,10]. They can counter divisive, racist, and nationalistic political movements and act as both sources of and sanctuaries for leading edge social thinking and actions that risk oppression and persecution by the national government. They can redefine territorial governance and extend its reach beyond national borders [11,12]. This is one of the functions of ‘new municipalism’, acting as the leading edge of a new form of municipal statecraft that elevates and scales the urban political and economic machine ‘as a strategic site for developing a transformative and prefigurative politics’ [13–16].

Cities concentrate low-carbon initiatives including electricity grids fed by renewable energy, mass transportation-oriented development and electric vehicles, net-zero energy and carbon neutral buildings, green and blue infrastructure. To deliver these kinds of innovations cities have long had to engage in “transgovernmental” relations that bring various sub-units of governments together in novel ways [17,18]. This has resulted in a proliferation of transgovernmental networks that facilitate the sharing of knowledge and best practices from cities around the world.

Unfortunately, the critical capacities that cities possess for climate action are still accompanied by fundamental obstacles that continue to thwart their capacity and engagement in transnational climate governance [19–21]. Varied economic and political arrangements between national and municipal agencies result in heterogeneous capacities for engagement and action by individual cities and urban collectives. In addition, political leadership at both the metropolitan and national government levels within any single country can greatly determine the efficacy of those cities to engage in transnational climate cooperation. More often than not, national leaders are wary of the expansion of political agency that transcends the national boundary. In the United States, mayors of major cities regularly come into conflict with the Federal government on climate change, gun control measures, immigration policy, social welfare programs and environmental regulations.
Despite these challenges, the growth of cities worldwide has brought with it the emergence of a transnational autonomy that—while often informal—actively operates as it continues to develop. These early indicators may point to prospects for a future of some form of global governance through cities—their various agencies and instruments—accompanied by a heterogeneous mix of governmental and nongovernmental entities aligning with their counterparts as they “disaggregate the state” [22,23]. The notion of the Global City was articulated in the 1990s to conceptualize the rise of the largest urban centers as already possessing the capacity to rival nation-states on the international stage. The argument posited that the largest financial centers—London, New York, Singapore—and the largest transnational corporations together amounted to a “denationalized platform” connecting people across the globe and denoting an extra-national territory [24,25]. The largest 100 urban economies now account for 38 percent of global gross domestic product (GDP) and China’s largest 150 cities are projected to double their total GDP to USD 20 trillion by 2030, accounting for half of the global increase and resulting in a third of global city GDP [26,27].

Despite this already enormous and growing economic power, cities are still far from ascending to the status of nation states. Cities do not maintain a standing military force independent of the nation state nor do they generally engage in international agreements that are considered threatening, illegal or counter to the national interests of the state. Cities do not generally conduct foreign relations to the extent of their nation states or advocate for actions in opposition to the stated policy interests of the state—except for some notable exceptions like climate change.

When in June 2017 United States President Donald Trump announced his intention to pull out of the Paris climate agreement there was an immediate cry for mobilization from non-state actors. Quickly, a chorus of US Mayors and other city leaders joined state government officials, business leaders and investors, universities, faith groups, cultural organizations, native American tribes and many other non-state actors in declaring their independent commitment to the agreement. One of the most important coalitions to form from US cities, businesses and other sub-national groups is known as “America’s Pledge” [28]. Led by former governor of California Gerry Brown and former mayor of New York City Michael Bloomberg, America’s Pledge calculates that 51 percent of US emissions are now attributable to their coalition of businesses, cities, and states supporting the Paris Agreement and aggressive actions on their part could reduce US emissions “up to 37 percent below 2005 levels by 2030” [29].

Today, cities across the globe are arguably home to the leading edges of scientific knowledge creation and technological and business innovation that have combined to set the stage for a new era of cities as critical actors in international alliances and agreements. This has become increasingly the case as non-state actors, especially cities, actively engage in international climate change and other environmental discussions and agreements. Is the climate crisis launching the ecological city-state as central to a better Anthropocene?

3. Urban World

In 1800, 2% of the world’s population lived and worked in cities, in 1950, 30%, in 2000, 47%, and sometime around 2008, we crossed the threshold of more than 50% of the world’s population residing in cities. Today’s world is urban, but the nature of that urbanization is continuing to change dramatically. In 1950 the world’s largest cities were in Western Europe, Canada, the United States, and Japan. Today, the largest cities—megacities of 10 million and more—are in Indonesia, Japan, India, Korea, China and Brazil. In the coming decades of the first half of this century the global urban population will double, with 90% percent of that growth occurring in cities in developing regions of the world. Projections to 2100 suggest that the three largest cities, five of the top ten and thirteen of the top 20 will be African cities [30].

By 2050 Nigeria’s total population will surpass that of the United States and by 2100 may exceed that of China. Lagos, Nigeria is predicted to be the world’s most populous city by 2100 with 88 million residents—within a country of upwards of 900 million (see Figure 1). Countries of more
than 200 million in 2100 will also include Niger, the Democratic Republic of the Congo, Ethiopia, and Uganda. The rural-to-urban migration and rapid population growth of Africa will drive much of the world’s growth in city populations. By 2100 as much as 80 to 90% of the world’s population may be living in cities with between 15 and 23% living in the 101 largest cities, mostly in Africa and Asia [30–32].

Various analyses attribute a majority of global greenhouse gas (GHG) emissions to cities—from a little over 50% to as much as 80% of global GHG are directly and indirectly tied to urban economies; for example, the Stern Review asserts that cities account for 75% of global anthropogenic carbon dioxide emissions [33] and the IPCC states that cities consume a range of between 67% and 76% of global energy and generate 75% of global carbon emissions [34]. Generally included within this accounting are the emissions from industry, agriculture, energy production, transportation and land conversion that support the urban economies, including the consumption of its residents.

Cities have also been cited as important contributors to GHG emission reductions worldwide. In a report of the Compact of Mayors, 228 cities of 436 million people have committed to reductions that may deliver roughly between 400 and 450 MtCO₂e/y resulting in a cumulative reduction of 13.0 GtCO₂e by 2050 [35]. Another study indicates that targeting the cities of Asia, Africa and the Middle East with incentives for dense transportation-oriented development and taxes on liquid fuels could significantly reduce future global urban energy use by 26% [36].

To date, it is clear that cities have been major contributors to cumulative emissions. Correlating cumulative carbon emissions with urbanization shows that highly urbanized countries are responsible for more of the total historical emissions than less urbanized countries (see Figure 2).
Urban economies now dominate the global extraction, production and consumption of energy and materials [38]. For example, the combined economic output of the world’s twenty largest cities is on par with the entire US economy and urban economies in total account for the majority of food, energy, and water consumption. Cities are dominant actors in the world economy and produce value through scientific discovery, engineering advances, business innovation and cultural production. However, the call for engaging cities directly in international climate agreements is only a recent development [39].

Therefore, cities today and tomorrow hold a key element of GHG emissions reductions to stay within the limits of a carbon dioxide budget and catastrophic warming. Will it be possible for cities to deliver on this prospect? Is there a need to reconsider the international governance of environmental policy and actions that explicitly call for cities to act on the international stage? Might cities finally assume a central role moving forward?

4. Security, Climate Change and Biodiversity

As a deeply social species, humans have always organized themselves into complex groups [40] extending well beyond the nuclear family. Early humans settled together, hunted, raised children collectively, protected one another and partook of all manner of human activities. Early human groups also warred with one another and developed identities critical to social cohesion, as we do today.

City-states of the Middle Ages and the renaissance established the necessary conditions for nations to form. City-states concentrated economic power, acted as incubators for technological innovation and were the stewards for the creation of organized and principle-based governance. City governments became models for national governments and often served as the intellectual crucibles through which modern politics tested itself and was born.

Within the expansive articulation of existing, emerging and prospective transnational connections between the world’s cities and among the various priorities and agendas driving those connections, three domains are of particular importance to a humane and sustainable future in which ecological city-states play a central role. The remainder of this paper discusses these three domains:
1. Urban security portfolios under diversified risks;
2. Supranational governance for climate change;
3. Urbanization to support global biodiversity.

Chinese city-regions and the competitive nature of their planning is an example of the emergence of a new city-state entity empowered by the central government and pushed onto the international stage [41]. The use of the phrase “city-state” is intended to extend the definition to urban entities that are not fully independent and separate from interference from regional or national governments. However, this use is somewhat provocative to indicate a new entity that has the scale and power to act as a state does in many functions while still under the control—or at least the administrative partnership—of another governmental office. This is the definition that roughly characterizes the position of China’s primary cities and their relation to the central government in Beijing.

The same can be imagined for a new future of cities, as engines of innovation, crucibles of a new economy, and bulwarks against the worst consequences of climate change and concentrations of human activities in such a way as to protect zones of biodiversity. Of course, cities have a long way to go but the same agglomeration of wealth, centralization of political consensus building and decision-making, and the tight spatial extent (relative to non-urban territories) lends great capacities to dealing with all of the major threats from climate change in an economic and humane way.

4.1. Urban Security Portfolios under Diversified Risks

Redefining national security to include cities has emerged as a priority as the security community comes to grips with the enormity of urbanization and globalization in the latter half of the 20th century and the first two decades of the 21st [42]. These two processes have spawned novel national security challenges that are concentrated or pivot in cities, including the illegal international trade in drugs, human trafficking, protected species and weapons. The vulnerability of cities has received a great deal of attention especially with accelerating climate change consequences [43]. Reassessing national security needs to include cities and coordinating activities at multiple levels will require alignment between core national security agencies, resources and policies and the priorities and systems of local policing and emergency management. Doing so effectively may require a horizontal collaborative for shared security responsibility among a more diverse set of actors including regional alliances, and now large metropolitan areas [44].

Urban resilience has emerged as a key concept in addressing risks to climate change in the near and long terms. While mitigation is most important in meeting GHG reduction goals, cities are contending with dramatic changes to the climate in the present and an increase in expenditures directed toward adaptation is inevitable. Climate induced and exacerbated shocks to urban systems in the form of superstorms, extreme heat waves, flooding from prolonged precipitation and storm surge, disruptions to agriculture and water shortages have plagued dozens of cities on every continent. These shocks have led to local and national security challenges. The connection between security and climate is not new and by now the security community has fully “securitized” climate consequences [45–49]. This is especially true as local consequences—including major disruptions of city economies and threats to urban residents—motivates national governments to focus on their own strategic and economic priorities. This has contributed to the fortification of national interests over international cooperation, disinvestment in mitigation over adaptation and a circumscribed set of security objectives that discount human security priorities [50,51]. There is a need for more work on these issues as urban security and climate change remain understudied [52].

There are two distinct categories of security needs that are emerging and in need of focused attention by municipal authorities and state security organizations.

First, there are internal security needs—that is, within the bounds of the city—resulting from both endogenous and exogenous threats and risks. This type of security function is oriented toward the protection of life and treasure within the bounds of the city and is met with the resources and protocols
of a municipal police force. However, what happens when the threat is novel and includes multiple risks that threaten to overwhelm the resources of the local police?

In the aftermath of Typhoon Mangkhut, with sustained winds of 250km/h, the Hong Kong Secretary for Security John Lee Ka-chiu called the destruction to the city “serious and extensive” and much worse than previous storms. Debris from the damage blocked roads, high winds damaged buildings and record-breaking storm surges were met with an unprecedented number of calls for emergency assistance from Hong Kong residents. The Hong Kong police received 20,000 calls for assistance and 15,000 officers were mobilized making it the largest police action ever undertaken in response to a storm.

Hong Kong’s experience, and that of many cities that have faced climate-related risks highlights the challenge of maintaining the resources and providing the training necessary to adequately protect lives and property. When local police resources are strained beyond capacity, regional and national security resources are mobilized, as the National Guard is in the US and national militias in other countries. Depending on the city and the national security agencies, coordination can range from nonexistent to good. Whatever the case may be, it is clear that climate risks pose unique problems that may not be met by business as usual.

The second security need is oriented externally and arises from the global position that cities generally, and the largest cities in particular, now possess. The concentration of population, important physical and cultural assets and information and financial capacities of cities make them vulnerable to diverse and spatially extensive risks. Cities are connected to each other and critical resources well beyond their boundaries through logistical networks and supply chains. They connect to other city nodes and serve as regional command centers. Securing these global networks and resources is a critical element of the evolving global security landscape. It turns out cities can be well positioned to deliver important security functions in the face of diverse threats that provide important assistance to other cities.

Take for example, the current pandemic crisis. A mere glance at the data on infections would lead one to conclude that cities pose extraordinary risks during a pandemic as a result of their concentrated populations and dependence on complex and global supply lines of food, energy and other critical resources. For example, at a certain point, New York City surpassed every country (except, of course the US) as the largest concentration of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections in the world.

On the other hand, consider Seattle Washington. On 19 January 2020 at an urgent care center in a suburb north of Seattle, a man was tested for the presence of a novel coronavirus. The following day the test came back positive and the man—later known as US patient zero—was shuttled to a local hospital. The staff of Providence Regional Medical Center in Everett, within the Seattle metropolitan region, had recently practiced the protocols of a pandemic and quickly isolated and treated the patient. The medical expertise, technology and staffing at the hospital successfully treated the individual and, after a slow and difficult recovery, he was released on April 9, 2020. In the face of a global threat, an early response at the local level provided much needed data and led to guidance that has now served many other municipalities productively.

However, what has not transpired well is the coordination with other levels of government, most importantly the US Federal government. With much tighter coordination in taking action from the city to the Federal level overall infections in the US would likely have been much lower.

Both of these needs will become more acute as cities rush to address climate risks within their borders and contend with disruptions beyond their territories. Both extend the urban security portfolio in complex ways requiring closer coordination with multiple levels of government and agencies—including the military—and new kinds of investments that are likely to strain municipal coffers.

However, there are very real pitfalls that could unintentionally usher in an era of heavy handed, dangerous and legally questionable practices, especially under the extreme pressures of fast-moving
catastrophic events. In particular, the use of military personnel and resources in addressing climate risks within national borders and especially within cities can lead to inappropriate actions by those forces. In the US, civil-military relations have been guided for decades by the “clearly defined division of responsibility between the military and civilian leadership” but recent political developments have threatened the integrity of that division [53,54] Further erosion of this delicate balance in the face of loss of life and collapse of critical infrastructure and supply lines present the specter of heightened domestic conflict and local and regional instability. Today this is the case in many countries and is becoming a very real threat in the United States.

Another major pitfall is the tendency of unique challenges to perpetuate long standing inequities, again especially in the face of widespread distress and competition for critical resources in the event of a climate-related catastrophe. Security responses are rarely credited with providing opportunities for rectifying social and environmental injustices and in fact often result in quite the opposite. Novel arrangements in security response to the novel risks of climate change require an enlightened and concerted effort to avoid this significant social risk.

The concentration of urban population certainly poses security challenges arising from climate change but the concentration of expertise and innovation, resources and technology, enlightened and state-of-the-art policies and protocols that cities may be able to provide balance these risks and may outweigh them if organized properly. In addition, the governance structure of most cities allows for quick responses in crisis and agile mobilization of resources. Cities therefore possess every means and some of the resources required to confront the array of emerging and developing risks from climate change.

4.2. Supranational Governance for Climate Change

To date, 197 state actors have signed, and 189 have fully ratified, the Paris agreement and while the US declaration to void its commitment is deeply problematic to the future of global greenhouse gas (GHG) emissions, it may not prove to be the most vexing challenge to the climate accord. Since Paris, most nations have generally failed to escalate their commitments aggressively enough to ensure reductions will keep warming to a 2 °C global average. While the extraordinary success of enlisting 197 nations is laudable, the important 2 °C goal may yet elude the world.

To stay under 1.5 °C, several studies suggest ranges that include negative emissions—that is, net CO₂ emissions will have to be negative by 2100. The bulk of recent peer-reviewed studies indicate that with a 66% probability a range of between 67 and 467 GtCO₂ of annual emissions for a maximum of between 5 and 10 years will reach the limit to the global budget to stay within 1.5 °C limit by the end of the century [55–61]. It has also been suggested that the technical removal of carbon from the atmosphere must begin soon and increase to 5 GtCO₂/y by 2050 [62] (see Figure 3).

To stay within 2 °C warming within a 66% probability of success, the Intergovernmental Panel on Climate Change (IPCC) has calculated that 1320 GtCO₂ may be emitted [57]. Again, there is a significant range from other studies from 610-830 GtCO₂ with a 75% probability [63] to 2085 GtCO₂ with 50% probability [64]. To stay within the generally accepted limit of 450 parts per million and a resulting 2 °C, annual emissions allowable to stay within this CO₂ budget to 2050 is no more than 9.5 GtCO₂e/y [65].

Some ambitious international agreements have been effective mechanisms for transformative social, technical and environmental changes; for example, the success of the Montreal Protocol which regulates chemicals that deplete the ozone layer. Adopted on September 16, 1987 it has now clearly succeeded in a discernible healing of the ozone hole [66]. Another example is UN Millennium Develop Goal 1.A, to reduce poverty by halving the number of people earning less than USD 1.25 per day, which was met five years early—a truly extraordinary achievement. Nuclear war has been kept at bay under a number of global and bilateral arms treaties and nuclear non-proliferation agreements such as the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and the New Strategic Arms Reduction Treaty (New START).
Now, at the eleventh hour, the impotence of international efforts has become all too clear. As a result, inaction by national governments has placed greater focus on the role of non-state actors \cite{57,67-69}. Non-state actors have been involved in committing to climate action for many decades now. Many large cities, corporations and other non-state actors have drafted plans and taken actions to reduce GHG emissions. However, concerns of a weakening global commitment are putting greater pressure on...
non-state actors to step up their own commitments and actions. Among the most important non-state actors are individual cities and large metropolitan regions.

This increased role in world affairs is exemplified by the explicit commitments and actions of cities on the challenges of climate change [78]. While this is generally considered a positive development, these commitments are in need of greater understanding as local municipal decision-making and governance at the regional and national levels run in parallel often without coordination [79]. Without an explicit analysis of these mostly uncoupled actions and a rigorous accounting of the intended and unintended consequences on the global scale the overall trajectory will remain unknown.

Serious questions have emerged from the call for action from cities. What amount of global GHG emissions can be reduced by aggressive actions by cities? How do cities reduce their GHG emissions? How can cities succeed where nation-states have failed?

As detailed above cities command a majority of the world’s economies, significantly influence global environmental health and are home to the majority of the world’s population. City governments oversee relatively small spatial territories while engaging with regional, national and international authorities on an enormous range of issues.

Addressing climate change at an urban scale has always required a reconsideration of governance within and beyond municipal boundaries. Connecting cities in formal alliances to address climate change has been an effective way to innovate. City governance has benefited and the desire to connect with others has spawned a number of important groups including ICLEI—Local Governments for Sustainability, C40 Cities, Global Covenant of Mayors for Climate & Energy, Cities Alliance, United Cities and Local Governments, Urban Climate Change Research Network, and the Sustainable Development Solutions Network, among others. In parallel, hundreds of cities in dozens of countries have developed plans for sustainability and climate change mitigation and adaptation. Zurich, Hamburg, Rotterdam, Singapore, Seoul, London, New York City, Chicago, and many other cities have moved aggressively to attempt the transition to a sustainable future in a variety of ways [80]. From its earliest efforts the IPCC has been a foundational resource for this work in identifying cities and the built environment as key participants in climate solutions.

Much of the extensive and growing literature of urban climate governance discusses policies and actions within the constraints of normative municipal governance structures [81]. This is understandable as traditional notions of city governance hold that policy development and implementation in every sector and concerning all elements of the urban economy transpire purely at the scale of the city. Early urban sustainability efforts held to this view. The first wave of “eco-cities” were limited to thinking within the urban box and yet productively arose from the diverse efforts to harness natural systems as ecosystem services for the benefit of urban residents and sustainability [82].

The new politics of urban sustainability beyond the city scale is nascent but the attributes are easily discernible. First, it is clear that the largest cities and regional metropolitan economies have been forced to consider the emergence of risks far beyond their political boundaries, including the security risks discussed above. The consequences of climate change—including novel biological threats, immigration pressures resulting from a host of problems including failing economies, violent conflict, domestic crime and international terrorism and threats to the flows of material and energy resources are chief among the issues that require an international perspective. Many cities have responded to these challenges within their administrative mandates and under legal guidance and normative governance practices.

However, there is evidence that cities can successfully leap over traditional limits to engage with others contending with similar problems. In developing plans for sustainability and especially climate change, cities have had to think beyond their political boundaries and sometimes beyond regional and national borders to arrive at meaningful and robust strategic plans. Doing so has prompted creative thinking and important work in a new era of supranational governance for climate change [83]. Addressing risk is not the only and certainly not a unique motivator for bridging to other cities and other levels of government—it is only the latest.
For example, for years now a number of cities and metropolitan regions have engaged in international bi-lateral trade agreements that mimic the structures and certainly compare in scope to international agreements between nation-states. These agreements also mimic the behavior of city-states from earlier eras: the agriculture and trading cities of Mesopotamia and later, the cities of the Silk Road, the Italian mercantile centers of Florence and Venice, northern Europe’s Hanseatic League [84].

There are many ways in which supranational relations by cities can advance effective practices to address climate risks; two are particularly relevant to this paper. First, an important element of a new politics for a sustainable world is the emergence of the role that global citizens have taken up as guardians of the global environment. These global citizens are to be found in global cities. Cities are the crucible for a transformation of global environmental governance [85] This kind of environmental engagement and stewardship is not only a result of the modern era of global cities, it is also driven by well-defined and popular cultural norms within a city [86]. Second, the important environmental role of cities includes highly concentrated and wealthy districts with very large carbon footprints [87]. This concentration allows for a targeted approach for direct and relatively quick municipal policy intervention complemented by regional and state-level actions—such as carbon pricing and subsidies for scaling up and deployment of renewable energy and storage.

4.3. Urbanization to Support Global Biodiversity

In 1872 Yellowstone, the world’s first national park was established in the United States. Since then the powerful idea of public engagement in the protection and enjoyment of wild lands and waters in lieu of industrial-scale extraction and human settlement has spread around the world. The globalization of a conservation model based on restricted access and use by local communities has created inherent social challenges, including displacement and native dispossession, though understudied [88]. In countries with limited governance capacity, the implementation of this model has created abundant ambiguities between conservation legislation and enforcement, and the occupation and use of protected areas for subsistence and local needs [89] particularly when top-down conservation approaches fail to recognize the practices and interests of local communities. Alternatively, partnerships between governments and indigenous peoples have emerged resulting in the effective protection of critical ecosystems worldwide, but especially in Africa, Latin America and Asia. In territories that lack the resources of prestigious national parks (e.g., UNESCO World Heritage sites), community agroforestry programs have shown to be more resilient than restricted access models to competing pressures such as narcotrafficking and land grabbing [90]. Despite the social challenges and important knowledge gaps regarding occupation, use rates, and social effects of different conservation models, the international goals of setting aside large portions of the world’s wild lands and oceans has resulted in the global conservation of 20 million square kilometers of land (15% of world land surface) and 25 million square kilometers of marine areas (6.96% of ocean surface) [91]. This extraordinary effort of less than 150 years is the cornerstone of our stewardship of the Earth’s biodiversity.

However, biodiversity losses are still at dangerous levels. Recent work asserts that 1 million species are now threatened with extinction in this century [92]. During this same period of the emergence of conservation, humans became an urban species and vastly expanded extraction and consumption of materials from the lithosphere [93]. During the past couple of decades, it has become clear that setting aside protected areas will not be enough to slow the disaster of human-induced species loss [94]. Tragically, protection of wild lands and marine areas has proceeded too slowly to significantly reduce the damage to our planet’s biodiversity with extinction now occurring at least 1000 times the natural rate and possibly much greater [95]. Despite the inherent ecological and social values of forests, greater private economic returns continue to be an incentive for the prevalence of extractive industries that drive the transformation of highly valuable ecosystems into cropland, pasture, or mining sites of less ecological value, and questionable productivity [96,97]. This phenomenon occurs
even within protected forest areas, where private economic returns and environmental conservation incentives are not necessarily aligned to support the livelihoods of local communities who live in or near protected forest areas and who depend on natural resources for their subsistence. Misalignments of socio-economic incentives in these cases result in illegal large-scale deforestation, mining, or wildlife trafficking, among others.

Land conversion effects on biodiversity are found extensively across diverse landscapes on every continent. Indeed, human-induced land-use changes are now widespread and detrimental to the long-term survival of countless species [98]. It is estimated that 75% of the terrestrial environment has been severely altered by human action [99]. Ecosystem appropriation by cities has been studied for some time now demonstrating that cities’ ecological footprints go well beyond their borders to supply the city’s needs for food, water, and other material and energy resources, and to assimilate the waste discharged by cities. [100]. Even in extensive regions with high ecological value that are perceived to be distant from major cities, such as the Amazon and the Guinean forest of West Africa, the impact of urbanization on biodiversity has been estimated to reach hundreds to thousands of kilometers [101].

Expanding protected areas to address species loss must strive to meet ambitious international targets, but it will not suffice in today’s urban world. Ecological city-states will benefit the future of humanity and the planet as concentrators of human activities that result in drawing populations away from large areas of the planet. This benefit will come not by reinforcing a dichotomy where the human is perceived to be separate from the natural [102] but rather by relying on the capacities of ecological city-states to transform the local territories and immediate surroundings, to affect global ecologies through efficiencies and concentration of economic activity, and to embrace urban ecosystem services and alternative engagement models that foster civic ecologism to alter the political discourse and socio-technical advances towards biodiversity protection.

Cities have consolidated a robust toolkit of spatial development policies that allow them to shape the physical environment, including land-use planning and zoning, master plans, and growth boundaries. Although unintended consequences of these measures have been documented in cases such as Seattle, Bogotá, and other cities where growth boundaries have incentivized low-density housing sprawl beyond city boundaries, these cases highlight the need for coupled regional planning actions with regional authorities [103–105]. Cities have dual and contradictory capacities that need to be recognized and further studied, such as the ability to be environmentally destructive and a sustainability solution at the same time [3]. Seriously assessing these inherent ambiguities and taking into account the multi-spatial nature of urban–environmental issues, growth management efforts that preserve strategic ecosystems and particular ecosystem services within and beyond city borders remain of utmost importance [1]. Doing so may guarantee sustainable growth and biodiversity protection by ensuring a tight spatial extent as compared to other settlement patterns. Particularly, smart growth management efforts informed by science and an understanding of underlying socio-cultural and politico-economic dynamics indicate that cities near vulnerable or constrained ecosystems are able to manage ecosystem services through regional land-use strategies to improve climate performance while accommodating urban growth [106]. Today, there is also a better understanding on how to remediate localized environmental damage, and cities have gone a long way in developing environmental regulation, assessments, and ecological restoration standards, such as those to mitigate and implement efforts to clean-up industrial waste within and beyond urban boundaries. Nonetheless, expanding the spatial dimensions of sustainability policies, to avoid common pitfalls of addressing one issue in one neighborhood or municipality at a time, at the cost of generating negative impacts somewhere else, is a necessary next step to better address environmental justice concerns. This represents an important pathway to advance sustainability and equity [2].

With rapid urbanization has come a shifting relationship of the urban world to the biosphere. Cities, as multi-scalar systems, comprise an array of policies from the supranational, to the national, regional, metropolitan, and local. This dynamic represents a fundamental pathway in which the multiple ecologies that comprise the city can be affected beyond the city’s immediate territory. In terms
of environmental damage per capita, cities are likely to cause less environmental damage in comparison to less dense settlement forms, such as suburbs and rural areas [107]. Of particular importance in this regard are sustainability urban strategies that encompass an array of socio-technical advances from urban circular economies to transitions to renewable energy. Northern European cities have been leading the field with cities like Amsterdam committing to be the first city to develop a roadmap for a circular transition [108] or Copenhagen pledging to be the first carbon neutral capital by 2025 [109]. These strategies have the potential to reduce the pressures on global ecologies by increasing efficiency in energy and resource consumption in cities through the advantages of density and large implementation scales. However, more studies and better carbon counting methods are needed to truly account for green-house gas emissions of all goods and services produced outside the city boundaries but consumed in the city [2]. By shifting consumption and production patterns through municipal scale sustainability plans, and increasingly accounting for remote environmental impacts of goods and services consumed in cities, cities are mobilizing to reduce their ecological footprints and accelerate the positive ecological relationships with the biosphere. Moreover, these benefits can be reinforced by cities’ expanded powers to affect political discourse through knowledge sharing networks and multi-city alliances.

At the local scale, the alignment between biodiversity conservation goals and governance priorities regarding public health and climate in cities remains as a promising pathway for agile and innovative actions. The concept of ecosystem services directly responds to the importance of urban nature for human health and quality of life in cities [110,111] and it has been successfully used to reframe the value of conserving nature into goals of societal relevance in economic, socio-ecological, psychological, and cultural terms [112]. Despite the need for more empirical evidence to quantify the environmental benefits [113] specific ecosystem services include offset of greenhouse gas emissions, managing runoff and stormwater, improving air quality, reducing heat island effect, and providing recreation opportunities. With the tools to assess the diverse values of ecosystem services and the capacities to directly roll out these programs at the municipal scale, cities have embarked on implementing large-scale urban green infrastructure programs that have led to the proliferation of city models such as Sponge City in China, Sweet City in Costa Rica, and the consolidation of green belts as major public spaces in Latin American cities (Medellin, Santiago, Rio). These models build on the water management, climate adaptation, inclusion, and recreational needs in cities to improve wildlife habitat and plant life, through green roofs, bio-retention and green corridors, and by increasing the number of pollinators [114,115] leveraging the co-benefits of green and blue infrastructure to maximize urban biodiversity.

Moreover, discoveries from urban ecology indicate that novel ecosystems, ecosystems characterized by high levels of human-induced disturbance and atypical associations of plants [116] have promising contributions to biodiversity conservation [117]. Cities can be productive sites for certain ranges of fauna and flora biodiversity while also supporting the enhancement of regional biodiversity far beyond city borders [118]. For example, common urban features such as heat retention, impervious surfaces, and high levels of ecological disturbance alter the conditions in ways in which stress-tolerant and early-successional vegetation thrive, providing important ecological services in conditions that are going to become even more prevalent in light of climate change and current urbanization trends [119]. It has also been documented that bird species that decline in certain agricultural landscapes have been able to establish self-sustaining populations in quintessential urban environments such as airports and urban wildlands [117].

A combination of well-known growth management strategies to shape the urban environment and its impacts beyond city boundaries with emerging large-scale green and blue infrastructure models—intentionally designed and managed to maximize biodiversity—present an opportunity for urbanization to support global biodiversity conservation while generating socio-economic benefits for municipalities [104]. Particularly, reconciliation ecology [120] and its premise to maximize biodiversity
in highly disturbed environments through the selection and arrangement of plants, along with landscape management strategies, has been moving the field of urban ecology in that direction.

It is well known that the cultural and social norms associated with green infrastructure landscapes are key to the success of biodiversity by design initiatives [121]. Humans are at the center of ecological transformation at multiple scales [122]. Through their individual and collective behaviors in cities, humans interpret the landscape and shape their environment according to their cultural ideas of how a landscape should look, which might differ from ecological functionality. Beauty and aesthetics is a means by which humans translate landscape values, and their associated ecological services, into cultural values. The aesthetic experience in urban landscapes that resemble wildlands can lead to attentiveness, empathy, respect, and care—fundamental values that can lead to environmental stewardship action [123]. In this way, closer contact with novel ecosystems in urban areas provides learning experiences that enhance the knowledge of the natural world [110]. Moreover, it is in the unique setting of cities and its capacities to promote civic participation where sustainable solutions are better positioned to create mutually reinforcing relationships between ecology, social cohesion and equity, and technological innovation. Recent studies show that environmental actions are linked with social, political and economic motivations that go well beyond ‘ecological goals’ and that those can be reinforced by civic identity. Ecological citizenship, defined as the civic duty to participate in political action that responds to shared ‘green’ values, has important implications for the advancement of sustainable initiatives in cities and represents an important venue for future research [4,124].

Considering that the vast majority of the increase in urban populations will occur in the global south, it will inevitably draw urban growth to the proximity of highly valuable biodiversity hotspots. This trend also means that much of the urban world that will exist in 2100 is yet to be designed, engineered and built. By 2050, new paved roads are expected to reach 25 million km, with 90% of construction happening in the least developed and developing countries [99]. The opportunity that presents itself is for cities to advance biodiversity conservation and climate mitigation through green and blue urban infrastructure design. This opportunity will be critical to meet ambitious global biodiversity conservation and climate goals [125] but new models of engagement and community-municipality partnerships will have to be created along these initiatives to simultaneously address the extreme inequalities and poverty that characterize cities in the global south. An example of the emergence of models that address climate, biodiversity protection, and local wealth creation is the Community Ecosystem-Based Adaptation (CEBA) approach implemented in Durban, South Africa. The municipality outsourced the tree planting component of its comprehensive climate adaptation strategy to local residents, providing income and training opportunities for them to engage in tree propagation, non-native species removal, and restoration and maintenance efforts [126]. Another notable example, particularly for smaller towns located in biodiversity hotspots, is the Amazonia Third Way model developed in Brazil. This initiative leverages biodiversity as the main asset to promote conservation and create wealth for local communities through the creation of innovative biomimetic designs and high-value products that are decoupled from deforestation, contributing to global climate change mitigation efforts [97]. Leveraging innovative community-based strategies that address climate change mitigation and adaptation, while promoting environmental education and local wealth, cities in the global south can support local communities to act as effective stewards of biodiversity.

5. Discussion

In 1989, the Washington journal *The National Interest* published Francis Fukuyama’s article “The End of History?” [127]. In it, the former Rand corporation Soviet expert postulated the triumph of Western liberalism on the “total exhaustion of viable systematic alternatives . . .” [127]. The recipient and steward of this end to history and the enactment of liberal values in perpetuity was the universal homogeneous state. Fukuyama’s colleagues were mostly skeptical of the idea at the time, but it proved to be irresistible to some policy experts and generated a great deal of commentary by many non-experts.
If it proves to be true then its culmination awaits in the long term—Fukuyama explicitly asserts this point in the article—because at no time since the fall of the Berlin Wall and the dissolution of the Soviet Union have threats to liberal democracy been more widespread and diverse. From Hungary to India, Brazil and even the United States, democracy and its institutions are under extreme pressure from autocratic leaders, systemic corruption, kleptocratic regimes and a sinister resurgence of tribalism and identity politics. The far right in Europe has even brought back the—until recently—preposterous notion that fascism has a future. A major consequence of all of this strain has been a steady and diversified assault on the international institutions that have acted as the armature upon which liberal democracy and the market economy has indeed spread worldwide and found a solid footing in many countries.

As the long view plays out, cities have assumed a central role in nurturing liberal democracy and extending their geopolitical reach as nations stumble. This is not because city administrations lean toward the political and economic norms of liberal democracy and the market economy but because cities are by definition market-based engines within which transactions are enabled through a diversity of labor and skills and a concentration of expertise and learning. As a result, urban economies have often acted as crucibles for democratic ideals and socio-technical advances.

Another long view holds that we are or should be ultimately striving for a balance between human systems and nature. The role of cities in global environmental policy and governance has been underappreciated in the geopolitical theaters in which progress is made. As we enter an era when the largest cities will approach and exceed the size of many countries and accrue enormous political and economic power, the urban world may guide us toward large-scale international actions on climate change in more effective ways than nations have been able to thus far.

The economic and political dominance of cities as entities of regional governance and international power is not unprecedented. An evolutionary step in the development of cities was the emergence of the city-state: a city possessing all of the power and legal rights to govern its citizens fully over a contiguous spatial region without interference from any other government. The city-state emerged from the need to protect citizens and assets from external threats, while providing the legal, political and managerial structures to collect and distribute resources. The first cities in the world were essentially city-states: Uruk, Ur, Caral, Thebes, Memphis, Athens, Sparta to name a few. Rome grew from a city-state into a transcontinental empire and eventually the Holy Roman Empire with over 80 Free Imperial Cities.

Today, the largest urban economies are exhibiting similar scales of influence across global economic, political, environmental and cultural spheres. The surprising benefit of the rise of these neo city-states is their capacity for moving along sustainable trajectories in a more agile, robust, and innovative way than many nations have demonstrated. As international environmental and climate change agreements strain under the weight of shifting national priorities, it is time to deeply consider the expanded agency of cities to address global scale challenges.

However, for this to become possible, global and regional environmental governance is in need of reform to actively include cities in co-creating and delivering the critical and historically unprecedented actions that will lead to meaningful global sustainability. Cities need to bring together the civic politics of urban sustainability under the guise of a new municipal politics of global ecological stewardship and citizenship—a civic ecologism [124,128]. Cities, as powerful and effective centers of environmental governance offer a rich set of possibilities for benefits well beyond their borders—just as they affect the climate and environment well beyond their borders. As the massive economic engine that mobilizes global material and energy resources the city of the very near future may be able to transform into a new kind of ecological city-state for the benefit of the planet.

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References
1. Angelo, H.; Wachsmuth, D. Why does everyone think cities can save the planet? Urban Stud. 2020, 1–21. [CrossRef]
2. Wachsmuth, D.; Cohen, D.A.; Angelo, H. Expand the Frontiers of Urban Sustainability. Nature 2016, 536, 391–393. [CrossRef] [PubMed]
3. Beauregard, R.A. Cities in the Urban Age: A Dissent; University of Chicago Press: Chicago, IL, USA, 2018; ISBN 9780226535418.
4. Barak, N. Ecological city-zenship. Environ. Polit. 2020, 29, 479–499. [CrossRef]
5. Blank, Y. Spheres of Citizenship. Theor. Inquir. Law 2007, 8, 411–452. [CrossRef]
6. Bauböck, R.; Orgad, L. Cities vs. States: Should Urban Citizenship be Emancipated from Nationality? Forum contributions Global Citizenship Governance Programme Globalcit and The Cities, Mobility and Membership Research Collaborative. 16 December 2019. Available online: http://globalcit.eu/cities-vs-states-should-urban-citizenship-be-emancipated-from-nationality/ (accessed on 27 January 2019).
7. Therborn, G. End of a Paradigm: The Current Crisis and the Idea of Stateless Cities. Environ. Plan. 2011, 43, 272–285. [CrossRef]
8. Betsill, M.M.; Bulkeley, H. Cities and the multilevel governance of global climate change. Glob. Gov. 2006, 12, 141–160. [CrossRef]
9. Barber, B. If Mayors Ruled the World: Dysfunctional Nations, Rising Cities; Yale University Press: New Haven, CT, USA, 2014; ISBN 9780300209327.
10. Curtis, S. Cities and Global Governance: State Failure or a New Global Order? Millennium-J. Int. St. 2016, 44, 1–23. [CrossRef]
11. Dingwerth, K.; Pattberg, P. Global governance as perspective on world politics. Glob. Gov. 2006, 12, 185–204. [CrossRef]
12. Deas, I.; Lord, A. From a New Regionalism to an Unusual Regionalism? The Emergence of Non-standard Regional Spaces and Lessons for the Territorial Reorganisation of the State. Urban Stud. 2006, 43, 1847–1877. [CrossRef]
13. Russell, B. Beyond the Local Trap: New Municipalism and the Rise of the Fearless Cities. Antipode 2019, 51, 989–1010. [CrossRef]
14. Lauermann, J. Municipal statecraft: Revisiting the geographies of the entrepreneurial city. Progr. Hum. Geogr 2018, 42, 205–224. [CrossRef]
15. Comú, B.E.; Bookchin, D.; Colau, A. Fearless Cities: A Guide to the Global Municipalist Movement; New Internationalist: Oxford, UK, 2019; ISBN 1780265034.
16. Thompson, M. What’s so new about New Municipalism? Prog. Hum. Geog. 2020. [CrossRef]
17. Keohane, R.; Nye, J. Transgovernmental Relations and International Organizations. World Polit. 1974, 27, 39–62. [CrossRef]
18. Martins Vaz, D.; Reis, L. From City-States to Global Cities: The Role of Cities in Global Governance. E-J. Int. Relat. 2017, 8, 13–28. Available online: https://www.redalyc.org/articulo.oa?id=41355386002 (accessed on 4 March 2019).
19. Lee, T. Global Cities and Climate Change: The Translocal Relations of Environmental Governance; Routledge: Abingdon, UK, 2015; ISBN 9780415737371.
20. Bulkeley, H.A.; Castin Broto, V.; Edwards, G.A.S. An Urban Politics of Climate Change: Experimentation and the Governing of Socio-Technical Transitions; Routledge: Abingdon, UK, 2015; ISBN 9781138791107.
21. Johnson, C.; Toly, N.; Schroeder, H. The Urban Climate Challenge: Rethinking the Role of Cities in the Global Climate Regime; Routledge: Abingdon, UK, 2015; ISBN 9781138065751.
22. Slaughter, A.M. The Real New World Order. Foreign Aff. 1997, 76, 183–197. Available online: https://www.foreignaffairs.com/articles/1997-09-01/real-new-world-order (accessed on 23 March 2019). [CrossRef]
23. Slaughter, A.M. A New World Order; Princeton University Press: Princeton, NJ, USA, 2005; ISBN 9780691123974.
24. Sassen, S. The Global City: New York, London, Tokyo; Princeton University Press: Princeton, NJ, USA, 1991; ISBN 9780691070636.
25. Sassen, S. The Global City, Chapter 11. In A Companion to the Anthropology of Politics; Nugent, D., Vincent, J., Eds.; Blackwell Publishing: New York, NY, USA, 2004; pp. 168–178. ISBN 9781405161909.
26. Dobbs, R.; Smit, S.; Remes, J.; Manyika, J.; Roxburgh, C.; Restrepo, A. Urban World: Mapping the Economic Power of Cities; McKinsey Global Institute, McKinsey & Company: New York, NY, USA, 2011.
27. Cadena, A.; Dobbs, R.; Remes, J. The growing economic power of cities. J. Int. Aff. 2012, 65, 1–17.
28. America’s Pledge. Available online: https://www.americaspledgeonclimate.com (accessed on 10 May 2020).
29. Hultman, N.; Frisch, C.; Clarke, L.; Kennedy, K.; Bodnar, P.; Hansel, P.; Cyrs, T.; Manion, M.; Edwards, M.; Lund, J.; et al. Accelerating America’s Pledge: Going All-In to Build a Prosperous, Low-Carbon Economy for the United States; Bloomberg Philanthropies, University of Maryland Center for Global Sustainability, Rocky Mountain Institute, World Resources Institute: New York, NY, USA, 2019; Available online: https://www.americaspledgeonclimate.com (accessed on 16 May 2020).
30. UN WUP. World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420); United Nations, Department of Economic and Social Affairs, Population Division: New York, NY, USA, 2019; Available online: https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf (accessed on 10 February 2020).
31. UN WPP. World Population Prospects: The 2017 Revision, Key Findings and Advance Tables; Working Paper No. ESA/P/WP/248; United Nations, Population Division: New York, NY, USA, 2017; Available online: https://population.un.org/wpp/Publications/Files/WPP2017_KeyFindings.pdf (accessed on 10 February 2020).
32. Hoornweg, D.; Pope, K. Population predictions for the world’s largest cities in the 21st century. Environ. Urban 2017, 29, 195–216. [CrossRef]
33. Stern, N. The Economics of Climate Change: The Stern Review; Cambridge University Press: Cambridge, UK, 2007; Available online: https://doi.org/10.1017/CBO9780511817434 (accessed on 24 May 2020).
34. Seto, K.C.; Dhakal, S. Human settlements, infrastructure, and spatial planning, Chapter 12. In Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change; Pachauri, R.K., Meyer, L.A., Eds.; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2014; pp. 923–1000. ISBN 9781107415416.
35. ARUP. Working Together: Global Aggregation of City Climate Commitments; Report of ARUP and C40: 2014. Available online: https://www.arup.com/ perspectives/publications/research/section/working-together-global-aggregation-of-city-climate-commitments (accessed on 15 June 2019).
36. Creutzig, F.; Baiocchi, G.; Bierkandt, R.; Pichler, P.-P.; Seto, K.C. Global typology of urban energy use and potentials for an urbanization mitigation wedge. Proc. Natl. Acad. Sci. USA 2015, 112, 6283–6288. [CrossRef]
37. ELA. Annual Energy Outlook; US Energy Information Administration: Washington, DC, USA, 2013.
38. Swilling, M.; Hajer, M.; Baynes, T.; Bergesen, J.; Labbé, F.; Musango, J.K.; Ramaswami, A.; Robinson, B.; Salat, S.; Suh, S.; et al. IRP (2018). The Weight of Cities: Resource Requirements of Future Urbanization; A Report by the International Resource Panel; United Nations Environment Programme: Nairobi, Kenya, 2018; Available online: https://www.resourcepanel.org/reports/weight-cities (accessed on 10 April 2020).
39. Dreyfus, M. Are cities a relevant scale of action to tackle climate change: Some reflections to inform the debate on the post-2020 regime. Carbon Clim. Law Rev. 2013, 4, 283–292.
40. Foley, R.; Clive, G. The ecology of social transitions in human evolution. Phil. Trans. R. Soc. B 2009, 364, 3267–3279. [CrossRef]
41. Wu, F.; Zhang, J. Planning the Competitive City-Region: The Emergence of Strategic Development Plan in China. Urban Aff. Rev. 2007, 42, 714–740. [CrossRef]
42. Odierno, R.; O’Hanlon, M.E. Urban Security is National Security; blogpost 16 March 2017, Order from Chaos, Brookings; Available online: https://www.brookings.edu/blog/order-from-chaos/2017/03/16/urban-security-is-national-security/ (accessed on 20 April 2020).
43. de Sherbinin, A.; Schiller, A.; Pulsipher, A. The vulnerability of global cities to climate hazards. Environ. Urban. 2007, 19, 39–64. [CrossRef]
44. Hettne, B.; Söderbaum, F. The UN and Regional Organizations in Global Security: Competing or complementary logics. Glob. Gov. 2006, 12, 227–232. Available online: https://ssrn.com/abstract=2399160 (accessed on 4 May 2020). [CrossRef]
45. Sindico, F. Climate change: A Security (Council) issue? Carbon Clim. Law Rev. 2007, 1, 29–34. [CrossRef]
46. Busby, J.W. Climate Change and National Security: An Agenda for Action; CSR No.32, Council on Foreign Relations: New York, NY, USA, 2007; Available online: https://www.cfr.org/report/climate-change-and-national-security (accessed on 10 March 2020).
47. Parsons, R.J. Climate Change: The Hottest Issue in Security Studies. Risk Hazards Crisis Public Policy 2010, 1, 87–116. [CrossRef]
48. Parthemore, C. National Security and Climate Change in Perspective. In Climatic Cataclysm: The Foreign Policy and National Security Implications of Climate Change; Campbell, K., Ed.; Brookings Institution Press: Washington, DC, USA, 2008; ISBN 9780815713326.
49. Guy, K. A Security Threat Assessment of Global Climate Change: How Likely Warming Scenarios Indicate a Catastrophic Security Future; Product of the National Security, Military, and Intelligence Panel on Climate Change; Femia, F., Werrell, C., Eds.; The Center for Climate and Security, an institute of the Council on Strategic Risks: Washington, DC, USA, 2020.
50. Dalby, S. Security and Environmental Change; Polity: Cambridge, UK, 2009.
51. Mayer, M. Chaotic Climate Change and Security. Int. Polit. Sociol. 2012, 6, 165–185. [CrossRef]
52. Anthony, I. Cities and Security; Stockholm International Peace Research Institute: Solna, Stockholm, Sweden, 2015; Available online: https://www.sipri.org/commentary/essay/2015/cities-and-security (accessed on 15 May 2020).
53. Brooks, R. Paradoxes of Professionalism: Rethinking civil-military relations in the United States. Int. Secur. 2020, 44, 7–44. [CrossRef]
54. Huntington, S.P. The Soldier and the State: The Theory and Politics of Civil-Military Relations; Belknap: Cambridge, MA, USA, 1957; ISBN 9780674817364.
55. Peters, G. Beyond carbon budgets. Nat. Geosci. 2018, 11, 378–380. [CrossRef]
56. Rogelj, J.; Popp, A.; Calvin, K.V. Scenarios towards limiting global mean temperature increase below 1.5C. Nat. Clim. Chang. 2018, 8, 325–332. [CrossRef]
57. IPCC AR5 Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change; Pachauri, R.K., Meyer, L.A., Eds.; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2014; ISBN 9789291691432.
58. Lowe, J.A.; Bernie, D. The impact of Earth system feedbacks on carbon budgets and climate response. Philos. T. Roy. Soc. A 2018, 376, 1–13. [CrossRef]
59. Tokarska, K.; Gillett, N. Cumulative carbon emissions budgets consistent with 1.5C global warming. Nat. Clim. Chang. 2018, 8, 296–299. [CrossRef]
60. Schurer, A.P.; Cowtan, K.; Hawkins, E.; Mann, M.E.; Scott, V.; Tett, S.F.B. Interpretations of the Paris climate target. Nat. Geophy. 2018, 11, 220–221. [CrossRef]
61. Richardson, M.; Cowtan, K.; Millar, R.J. Global temperature definition affects achievement of long-term climate goals. Environ. Res. Lett. 2018, 13, 1–7. [CrossRef]
62. Rockström, J.; Gaffney, O.; Rogelj, J.; Meinshausen, M.; Nakicenovic, N.; Schellnhuber, H.J. A roadmap for rapid decarbonization. Science 2017, 355, 1269–1271. [CrossRef] [PubMed]
63. Rogelj, J.; Reisinger, A.; McCollum, D.L.; Knutti, R.; Riahi, K.; Meinshausen, M. Mitigation choices impact carbon budget size compatible with low temperature goals. Environ. Res. Lett. 2015, 10, 1–10. [CrossRef]
64. Matthews, H. Damon (2015). Quantifying historical carbon and climate debts among nations. Nat. Clim. Chang. 2015, 6, 60–64. [CrossRef]
65. Höhne, N.; Moltmann, S. Sharing the Effort under a Global Carbon Budget; Ecofys: Köln, Germany, 2009.
66. Solomon, S.; Diane, J.L.; Kinnison, D.; Mills, M.J.; Neely III, R.R.; Schmidt, A. Emergence of heating in the Antarctic ozone layer. Science 2016, 353, 269–274. [CrossRef]
67. IPCC. Global Warming of 1.5 °C. An IPCC Special Report on the Impacts of Global Warming of 1.5 °C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty; Masson-Delmotte, V.; Zhai, P.; Pörtner, H.O.; Roberts, D., Skea, J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Vidale, P., et al., Eds.; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2018.
68. Steffen, W.; Rockström, J.; Richardson, K.; Lenton, T.M.; Folke, C.; Liverman, D.; Summerhayes, C.P.; Barnosky, A.D.; Cornell, S.E.; Crutix, M.; et al. Trajectories of the Earth System in the Anthropocene. Proc. Natl. Acad. Sci. USA 2018, 115, 8252–8259. [CrossRef]
69. USGCRP. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II; Reimulder, D.R., Avery, C.W., Easterling, D.R., Kunik, K.E., Lewis, K.L.M., Maycock, T.K., Stewart, B.C., Eds.; U.S. Global Change Research Program: Washington, DC, USA, 2018. [CrossRef]

70. Figureces, C.; Schellnhuber, H.J.; Whitman, G.; Rockstrom, J.; Hobley, A.; Rahmstorf, S. Three years to safeguard the climate. Nature 2017, 546, 593–595. [CrossRef]

71. Ripple, W.J.; Wolf, C.; Newsome, T.M.; Galetti, M.; Crist, E.; Mahmoud, M.I.; Laurance, W.F. World Scientists’ Warning to Humanity: A Second Notice. BioScience 2017, 67, 1026–1028. [CrossRef]

72. Leonard, C. Kochland: The Secret History of Koch Industries and Corporate Power in America; Simon & Schuster: New York, NY, USA, 2019; ISBN 1476775389.

73. Mayer, J. Dark Money: The Hidden History of the Billionaires behind the Rise of the Radical Right; Anchor Books: New York, NY, USA, 2017; ISBN 0307947904.

74. Knittel, C. Opinion. Five Reasons Climate Change is the Worst Environmental Problem the World Has Ever Faced; 2019; Available online: https://www.latimes.com/opinion/story/2019-10-28/climate-change-global-pollutants (accessed on 28 October 2019).

75. Hsu, A.; Widerberg, O.; Weinfurter, A.; Chan, S.; Roelfsema, M.; Lütkehermöller, K.; Bakhtiari, F. Non-state and subnational actors and climate change negotiations: From Paris to Katowice, Chapter 5. In The Emissions Gap Report 2018; Muzzucato, M., Seminiuk, G., Eds.; A UN Environment Synthesis Report; United Nations Environment Programme: Nairobi, Kenya, 2018.

76. UNEP. The Emissions Gap Report 2018; United Nations Environment Programme: Nairobi, Kenya, 2018; Available online: https://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf?sequence=1&isAllowed=y (accessed on 6 April 2020).

77. UNEP. The Emissions Gap Report 2019; United Nations Environment Programme: Nairobi, Kenya, 2019; Available online: https://www.unenvironment.org/resources/emissions-gap-report-2019 (accessed on 1 May 2020).

78. Taylor, P.J. Cities in climate change. Int. J. Urban Sci. 2017, 21, 1–14. [CrossRef]

79. Bai, X.; Dawson, R.J.; Ürge-Vorsatz, D.; Delgado, G.C.; Barau, A.S.; Dhakal, S.; Dodman, D.; Leonardsen, L.; Masson-Delmotte, V.; Roberts, D.; et al. Six research priorities for cities and climate change. Nature 2018, 555, 23–25. [CrossRef] [PubMed]

80. Arcadis. Sustainable Cities Index 2016: Putting People at the Heart of City Sustainability; Arcadis: Amsterdam, The Netherlands, 2016; Available online: www.arcadis.com/SCI2016 (accessed on 14 May 2020).

81. Bulkeley, H. Cities and Governing of Climate Change. Annu. Rev. Environ. Resour. 2010, 35, 229–253. [CrossRef]

82. Suzuki, H.; Dastur, A.; Moffatt, S.; Yabuki, N.; Maruyama, H. Eco2 Cities: Ecological Cities as Economic Cities; International Bank for Reconstruction and Development/World Bank: Washington, DC, USA, 2010; Available online: http://documents1.worldbank.org/curated/en/634471468244553955/pdf/Eco2-cities-ecological-cities-as-economic-cities.pdf (accessed on 15 May 2020).

83. Calder, K.E.; de Freytas, M. Global Political Cities as Actors in Twenty-First Century International Affairs. SAIS Rev. 2009, 29, 79–96. [CrossRef]

84. Berube, A.; Parilla, J. MetroTrade: Cities Return to Their Roots in the Global Economy; Brookings Institute, Metropolitan Policy Program—Global Cities Initiative: Washington, DC, USA, 2012.

85. Sonnenfeld, D.A.; Mol, A.P.J. Globalization and the Transformation of Environmental Governance. Am. Behav. Sci. 2002, 45, 1318–1339. [CrossRef]

86. Gelfand, M.J.; Harrington, J.R.; Jackson, J.C. The Strength of Social Norms across Human Groups. Perspect. Psychol. Sci. 2017, 12, 800–809. [CrossRef]

87. Moran, D.; Kanemoto, K.; Jiborn, M.; Wood, R.; Többen, J.; Seto, K.C. Carbon footprints of 13,000 cities. Environ. Res. Lett. 2018, 13, 064041. [CrossRef]

88. West, P.; Igoe, J.; Brockington, D. Parks and Peoples: The Social Impact of Protected Areas. Annu. Rev. Anthropol. 2006, 35, 251–277. [CrossRef]

89. Sato, J. People in Between: Conversion and Conservation of Forest Lands in Thailand. Dev. Chang. 2000, 31, 155–177. [CrossRef]

90. Devine, J.A.; Currit, N.; Reygadas, Y.; Liller, L.I.; Allen, G. Drug trafficking, cattle ranching and Land use and Land cover change in Guatemala’s Maya Biosphere Reserve. Land Use Policy 2020, 95, 104578. [CrossRef]
91. UN Environment, UN Environment World Conservation Monitoring Centre; Protected Planet; World Database on Protected Areas. Available online: https://www.protectedplanet.net/c/world-database-on-protected-areas (accessed on 1 May 2020).

92. Diaz, S.; Settele, J.; Brondizio, E.S.; Ngo, H.T.; Agard, J.; Arneth, A.; Balvanera, P.; Brauman, K.A.; Butchart, S.H.M.; Chan, K.M.A.; et al. Pervasive human-driven decline of life on Earth points to the need for transformative change. Science 2019, 366. [CrossRef] [PubMed]

93. Krausmann, F.; Wiedenhofer, D.; Lauk, C.; Haas, W.; Tanikawa, H.; Fishman, T.; Miatto, A.; Schandl, H.; Haberl, H. Global in-use material stocks in the 20th century. Proc. Natl. Acad. Sci. USA 2017, 114, 1880–1885. [CrossRef] [PubMed]

94. Pimm, S.L.; Jenkins, C.N.; Abell, R.; Brooks, T.M.; Gittleman, J.L.; Joppa, L.N.; Raven, P.H.; Roberts, C.M.; Sexton, J.O. The biodiversity of species and their rates of extinction, distribution, and protection. Science 2014, 344, 1246752. [CrossRef]

95. Newbold, T.; Hudson, L.N.; Hill, S.L.; Contu, S.; Lysenko, I.; Senior, R.A.; Day, J. Global effects of land use on local terrestrial biodiversity. Nature 2015, 520, 45–50. [CrossRef] [PubMed]

96. Ferretti-Gallon, K.; Busch, J. What Drives Deforestation and What Stops it? A Meta-Analysis of Spatially Explicit Econometric Studies. SSRN Electron. J. 2014. Available online: https://ssrn.com/abstract=2458040 (accessed on 2 December 2019).

97. Nobre, C.A.; Sampaio, G.; Borma, L.S.; Castilla-Rubio, J.C.; Silva, J.S.; Cardoso, M. Land-use and climate change risks in the Amazon and the need of a novel sustainable development paradigm. Proc. Natl. Acad. Sci. USA 2016, 113, 10759–10768. [CrossRef]

98. Song, X.P.; Hansen, M.C.; Stehman, S.V. Global land change from 1982 to 2016. Nature 2018, 560, 639–643. [CrossRef]

99. Díaz, S.; Settele, J.; Brondizio, E.S.; Ngo, H.T.; Guèze, M.; Agard, J.; Arneth, A.; Balvanera, P.; Brauman, K.A.; Butchart, S.H.M.; et al. IPBES (2019): Summary for Policymakers of the Global assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services; IPBES Secretariat: Bonn, Germany, 2019: p. 56.

100. Folke, C.; Jansson, A.; Larsson, J.; Costanza, R. Ecosystem Appropriation by Cities. Ambio 1997, 26, 167–172.

101. Nagendra, H.; Bai, X.; Brondizio, E.S.; Lwasa, S. The urban south and the predicament of global sustainability. Nat. Sustain. 2018, 1, 341–349. [CrossRef]

102. Cronon, W.J. The Trouble with Wilderness; or, Getting Back to the Wrong Nature. In Uncommon Ground: Rethinking the Human Place in Nature; Cronon, W.J., Ed.; W. W. Norton & Co.: New York, NY, USA, 1995; pp. 69–90. ISBN 0393315118.

103. Robinson, L.; Newell, J.P.; Marzluff, J.M. Twenty-five years of sprawl in the Seattle region: Growth management responses and implications for conservation. Landsc. Urban Plan. 2005, 71, 51–72. [CrossRef]

104. Grimm, N.B.; Stanley, H.F.; Golubiewski, N.E.; Redman, C.L.; Wu, J.; Bai, X.; Briggs, J.M. Global Change and the Ecology of Cities. Science 2008, 319, 756–760. [CrossRef] [PubMed]

105. Bogotá Planning Secretariat. HUELLA URBANA: Diagnóstico de la Huella Urbana de Bogotá y 20 Municipios de 1997 a 2016; 2018. Available online: http://www.sdp.gov.co/transparencia/informacion-interes/publicaciones/estudios/huella-urbana-diagnostico-de-la-huella-urbana-de-bogota-y-20-municipios-de-1997-a-2016 (accessed on 10 January 2020).

106. Lachir, A.; Bounoua, L.; Zhang, P.; Thome, K.; Messouli, M. Modeling the Urban Impact on Semiarid Surface Climate: A Case Study in Marrakech, Morocco. Can. J. Remote Sens. 2016, 42, 379–395. [CrossRef]

107. Sassen, S.; Dotan, N. Delegating, not returning, to the biosphere: How to use the multi-scalar and ecological properties of cities. Glob. Environ. Chang. 2011, 21, 823–834. [CrossRef]

108. Municipality Amsterdam, & Circle Economy. Circular Amsterdam: A Vision and Action Agenda for the City and Metropolitan Area; Municipality of Amsterdam and Circle Economy: Amsterdam, The Netherlands, 2017; Available online: Circle-Economy.Com;https://journey.circle-economy.com/circularamsterdam (accessed on 14 June 2019).

109. City of Copenhagen: Technical and Environmental Administration. CPH 2025 Climate Plan: A Green, Smart and Carbon Neutral City; City of Copenhagen: Copenhagen, Denmark, 2012; Available online: https://urbandevelopmentcph.kk.dk/artikler/cph-2025-climate-plan (accessed on 18 May 2020).

110. Barton, J.; Pretty, J. Urban ecology and human health and wellbeing. In Urban Ecology; Gaston, K.J., Ed.; Cambridge University Press: Cambridge, UK, 2010; pp. 202–229. ISBN 9780521743495.
111. Chiesura, A. The Role of Urban Parks for the Sustainable City. *Lands. Urban Plan.* 2004, 68, 129–138. [CrossRef]
112. Hubacek, K.; Kronenberg, J. Synthesizing different perspectives on the value of urban ecosystem services. *Lands. Urban Plan.* 2013, 109, 1–6. [CrossRef]
113. Pataki, D.E.; Carreiro, M.M.; Cherrier, J.; Grulke, N.E.; Jennings, V.; Pincetl, S.; Pouyat, R.V.; Whitlow, T.H.; Zipperer, W.C. Coupling biogeochemical cycles in urban environments: Ecosystem services, green solutions, and misconceptions. *Front. Ecol. Environ.* 2011, 9, 27–36. [CrossRef]
114. Nguyen, T.T.; Ngo, H.H.; Guo, W.; Wang, X.C.; Ren, N.; Li, G.; Ding, J.; Liang, H. Implementation of a specific urban water management—Sponge City. *Sci. Total Environ.* 2019, 652, 147–162. [CrossRef]
115. Municipality of Curridabat. Curridabat Sweet City: A City Modelling Approach based Pollination. 2014. Available online: https://static1.squarespace.com/static/5bbd32d6e6669016a6af7e2/5c757759e2c4835d3cbc174/1551202139913/Curridabat_Sweet_City_Magazine.pdf (accessed on 10 June 2020).
116. Hobbs, R.J.; Arico, S.; Aronson, J.; Baron, J.S.; Bridgewater, P.; Cramer, V.A.; Epstein, P.R.; Ewel, J.J.; Klink, C.A.; Lugo, A.E.; et al. Novel ecosystems: Theoretical and management aspects of the new ecological world order. *Glob. Ecol. Biogeogr.* 2006, 15, 1–7. [CrossRef]
117. Kowarik, I. Novel urban ecosystems, biodiversity, and conservation. *Environ. Pollut.* 2011, 159, 1974–1983. [CrossRef]
118. Gobster, P.H. Urban Ecological Restoration. *Nat. Cult.* 2010, 5, 227–230. [CrossRef]
119. Tredici, P.D. Spontaneous Urban Vegetation: Reflections of Change in a Globalized World. *Nat. Cult.* 2010, 5, 299–315. [CrossRef]
120. Rosenzweig, M. Win-Win Ecology: How the Earth’s Species Can Survive in the Midst of Human Enterprise. *Restor. Ecol.* 2004, 12, 306–307. [CrossRef]
121. Nassauer, J.I. Messy Ecosystems, Orderly Frames. *Lands. J.* 1995, 14, 161–170. [CrossRef]
122. Ellis, E.C. Ecology in an anthropogenic biosphere. *Ecol. Monogr.* 2015, 85, 287–331. [CrossRef]
123. Meyer, E.K. Sustaining beauty. The performance of appearance: A manifesto in three parts. *J. Landsc. Archit.* 2008, 3, 6–23. [CrossRef]
124. Barak, N. Civic Ecologism: Environmental Politics in Cities. *Ethics Policy Environ.* 2020, 23, 53–69. [CrossRef]
125. Creutzig, F.; Agoston, P.; Minx, J.C.; Canadell, J.G.; Andrew, R.M.; Quéré, C.L.; Peters, G.P.; Sharifi, A.; Yamagata, Y.; Dhakal, S. Urban infrastructure choices structure climate solutions. *Nat. Clim. Chang.* 2016, 6, 1054–1056. [CrossRef]
126. Roberts, D.; O’Donoghue, S. Urban environmental challenges and climate change action in Durban, South Africa. *Environ. Urban.* 2013, 25, 299–319. [CrossRef]
127. Fukuyama, F. The End of History? *Natl. Interest Summer 1989*, 16, 3–18. Available online: https://www.jstor.org/stable/24027184 (accessed on 17 November 2019).
128. Dobson, A. *Green Political Thought*, 4th ed.; Routledge: Abingdon, UK, 2007; ISBN 9780415403528.

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