Shared Resilience Between Business and Society under Climate Change

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Abstract: This paper delves into the intricate relationship between climate change, extreme weather events, urbanization, and its multifaceted impacts on business and society. It charts the historical trajectory from the Industrial Revolution to contemporary urbanization, revealing the critical role of human activity in driving climate change. The changing interplay between urbanization, industrialization, economic growth, and environmental consequences. Through an interdisciplinary lens, this paper reveals the intricate links between climate change, extreme weather events, and urbanization. The escalating frequency and intensity of extreme weather events, from heatwaves to floods, have ripple effects on economies and communities across the globe. In the midst of these climate challenges, the concept of resilience as a guiding framework has taken center stage in the discussion. Once a psychological construct, resilience has evolved into a multidisciplinary approach to climate risk. This paper explores the collaborative efforts of government, business, and civil society in developing adaptive strategies that enhance climate resilience. It emphasizes the crucial role of business in building climate-resilient supply chains, supporting communities, and promoting environmental sustainability. The need for collective action is emphasized, urging stakeholders to work together to address the complex challenges of climate change. By understanding these interconnections, societies can use adaptive strategies to navigate the changing climate landscape and advance toward a future of shared prosperity, environmental sustainability, and resilience in uncertainty.

Keywords: climate change, urbanization, resilience

1. Introduction

The far-reaching impacts of climate change have thrust the world into an era of unprecedented challenges and opportunities for change [1]. Since the seminal declaration of the Intergovernmental Panel on Climate Change (IPCC) in 2007, global warming and its associated consequences have become an apparent reality, fuelling a collective realization of the urgency for comprehensive action. This paper delves into the intricate relationship between climate change, extreme weather phenomena, and urbanization, and their impact on businesses and societies across the globe.

First, climate change has been catalyzed by human activity at its core. The Industrial Revolution, which erupted in the 18th century, marked a pivotal moment when mechanisation and the use of fossil fuels propelled societies to unprecedented economic growth. However, this trajectory has been inextricably linked to the release of greenhouse gases, triggering a cascade of climate change [2].

Tracing the historical evolution from the mechanization of the textile industry to the spread of global urbanization, this paper highlights the role of fossil fuels in driving environmental degradation and climate-induced increases in vulnerability. Moreover, with the accelerating agricultural transformation to urban landscapes, cities have become central to human activity, economic dynamism, and environmental transformation. The rapid expansion of urban areas, often driven by industrialization and economic growth, has raised the standard of living for many but has also created intricate challenges [3]. Highlighting the intricate balance between urban development and its ecological impacts, this paper explores how urbanization, industrialization, and economic progress are intertwined with climate change, creating an intricate web of interdependencies.

The next chapters describe the impacts of these interconnected processes, revealing their implications for business and society. The escalation of extreme weather events, characterized by heatwaves, floods, and storms, highlights the vulnerability of modern systems. From record-breaking heatwaves in Moscow to prolonged heat events in eastern China, these events reflect a global trend of climate-induced economic losses [4,5]. This paper unpacks the intricate relationships between these events and their impacts on industry, agriculture, and communities, painting a detailed picture of the cascading effects of climate change.

Throughout the text, the concept of "resilience" becomes the goal of human development. From its psychological roots to multidisciplinary coping strategies, resilience embodies the ability of humans to adapt and recover in the face of adversity [6]. Through the lens of resilience, this paper explores how individuals, businesses, and communities can work together to cultivate adaptive strategies in response to climate risks. In addition, it reveals the transformative potential of collaboration between various stakeholders, such as governments, businesses, and civil society, in advancing climate resilience.

2. Climate change, extreme weather, and urbanization

The Intergovernmental Panel on Climate Change (IPCC) declared in 2007 that global warming is unequivocal and that its impacts include rising land and ocean temperatures, rising global mean sea levels, and declining snow and ice. These changes have led to changes in ecosystems, water availability, and accessibility, changes in patterns of extreme events, and damage to human health, buildings, livelihoods, and infrastructure, all of which are linked to human activities that emit greenhouse gases [7].

The World Business Council for Sustainable Development (WBCSD) proposed and emphasized the virtually paradoxical relationship between economic activities and climate change in 1992. According to [8], the main categories of anthropogenic forcing are greenhouse gas (GHG) and anthropogenic aerosol (AA) emissions, land use and vegetation change (LUCC), and so on.

The Industrial Revolution is considered to be the root cause of climate change [2]. Starting with the mechanization of the textile industry, the first industrial revolution began in Britain around 1760 and then gradually spread to several European countries. Between 1760 and 1860 capital power in Britain grew, industrial technology advanced, and education became widespread [9]. However, the rapid industrial progress during the First Revolution depended on the use of fossil fuels such as coal, gas, and oil. This rapid development brought about environmental degradation, exploitation, and overuse of fossil fuels, leading to serious industrial pollution [10]. The Second Industrial Revolution, which led mankind into the "Electric Age," led to the spread of industrial development from Europe to the United States. Along with the widespread use of electricity, the emergence of new machinery and technology was accompanied by rapid urbanization. Rapidly growing cities became increasingly crowded, providing new opportunities for people to settle in cities and find jobs as factory workers [11].

Urbanization spread rapidly across the globe from the 20th century onwards. According to the United Nations data from 2018, 55 % of the world's population lives in cities, which is expected to reach 68 % by 2050. As one of the most influential human activities, the development of urban systems involves the expansion of urban construction areas, the establishment of urban industries, and the transformation of human living patterns. The increasing level of urbanization, along with continued industrialization and economic growth, has substantially raised the standards of living for residents [12]. However, various environmental problems have also arisen, especially climate change brought by human activities, which has resulted in multiple issues on natural environmental systems and urban development [13].

Take China, a developing country with a huge urban population, as an example. Research indicates that human activities accompanying China's rapid urbanization, economic development, and industrialization in recent decades have led to a rapid rise in Surface Air Temperature (SAT) trends and an increase in the frequency and intensity of extreme climate events [4].

2.1. Impacts on business and society

The global climate has become one of the most critical issues facing business, government, and civil society in the twenty-first century [13]. Increased temperatures brought about by global warming have brought heat waves to cities in different countries. In July 2010, Moscow experienced high temperatures that had not been measured since the nineteenth century [14]. A 2-month long heat wave was experienced in 2013 in East China. This caused economic damage to the city of Nanjing, up to 3.4 % of its city's annual GDP [15]. Southern England has also been hit by record-high temperatures in 2019 and 2020 [16].

The extreme events brought by climate change extend beyond high temperatures, with areas of the UK, for example, suffering from various flooding disasters such as the Beast from the East (2018) and Storms Darcy and Christophe (2021). Fuller (2023) illustrates that Southeast Water in the UK was estimated to have lost around £1,700 in the FY 2022/23 due to the high incidence of extreme weather. Based on a survey conducted by the International Meteorological Organization (IMO), there were nearly 12,000 extreme weather disasters between 1970 and 2021. With developing countries being hit the hardest, climate shocks and extreme weather caused nine out of ten deaths and 60 percent of economic losses [17].

Extreme weather is already having an impact on business, according to Zurich Insurance 2023. In 2022, climate-related events cost the global economy $313bn, of which only $132bn was covered by insurance [18]. Agriculture is one of the sectors vulnerable to natural climate risks. Floods, droughts, extreme cold, and heat pose risks to crops and livestock. The Australian Bureau of Agricultural and Resource Economics reports that farmers have lost more than $1 billion over the 20 years to 2019 as a result of climate change, mainly droughts. U.S. news reports indicate that rising temperatures are also increasing the likelihood of fires. The winery in Napa Valley, California, lost more than 17,000 bottles of white wine to the 2017 wildfires, and its winery buildings were severely damaged. According to the data study, warming will lead to a 56 percent reduction in global wine estate production. Although computer modeling suggests that most of the effects of climate change will be felt by the end of the century, recent research suggests that climate change could cost 215 of the world's largest corporations a total of $1 trillion over the next five years [19]

2.2. The rise of "resilience"

The term "resilience" was first used as an interactive concept in psychological research to refer to the resistance associated with experiencing environmental risks and overcoming stress or adversity [12]. However, with the development of multidisciplinary research and the increasing prominence of

climate change in world development, "resilience" is now increasingly used in research discussions around climate change adaptation and disaster risk reduction. As the problem of climate change worsens, attention to resilience is being paid to a growing number of sectors, including ecology, disaster planning, urban planning, and international development [6]. In its 2007 report, the Intergovernmental Panel on Climate Change (IPCC) noted that public concern about climate change should not focus on 'what human forces are causing climate change, but rather on 'what do we need to do to respond and adapt to climate change?' The report suggests that sustainable development can reduce vulnerability to climate change by improving adaptive capacity and increasing resilience [20].

Definitions of resilience across disciplines recognize resilience as a capacity rather than a fixed outcome. It involves managing shocks and changes and recognizing the dynamic nature of systems. An ongoing debate revolves around the different requirements for resisting and adapting to shocks. Resilience works at multiple levels, from the individual to society [21]. Adopting a resilience framework facilitates systems analysis, especially as covariate shocks affecting groups become more common. It recognizes the interconnectedness of processes across scales and facilitates collaboration by providing a shared language for different stakeholders [22].

In 2021, UK Prime Minister Boris also raised the importance of climate and security issues at a UN Security Council meeting and called on Council members to take immediate action to adapt vulnerable countries to the impacts of climate change. The 23rd UN Climate Change Conference was held in Germany in November 2017, and the theme of its Climate and Development session was 'Global Ambition, Local Action. Climate Resilience for All." More than 450 policymakers, researchers, and development practitioners from around the world attended the conference and explored four key themes of climate resilience for all. One of these themes was 'shared resilience'. These themes promote the idea that no single actor can solve this complex problem alone, as climate risks are no longer seen as a threat only to small island States, but also to businesses, the global economy, and major countries [23].

3.   Linkages between business and society in the development of resilience

David Dodman, President of the International Institute for Environment and Development, speaking at the International Climate Conference, said that innovative cooperation between all types of urban stakeholders is essential to achieving sustainable and effective climate-critical resilience solutions. Climate change is a substantial and cascading risk for the private sector, with far-reaching consequences throughout supply chains and in vulnerable populations [24]. Businesses influence and rely on the communities and locales in which they operate, leading to the significant role they can play in adapting to climate change and developing resilience. As a result, if adequately equipped with a good diagnostic of climate risk and personalized strategies for building adaptive capacity, businesses have the potential to be significant agents of climate resilience across society [25].

Extreme weather, resource constraints, and regulatory changes brought about by climate change could disrupt business supply chains. Therefore, for businesses working with suppliers to build climate-resilient supply chains, it is more likely that they will be able to maintain stable operations, reduce the likelihood of risks, and create a network that is resilient to climate-related disruptions [26]. Businesses' operations within their communities are also directly affected by climate change. Businesses that demonstrate concern for the environment and well-being of local communities are more likely to help build mutual trust and cooperation. Businesses that engage in community development projects, disaster response planning, and support for vulnerable groups also contribute to their overall climate resilience [13].

The role that businesses play in promoting environmental sustainability cannot be ignored. Through sustainable practices such as reducing carbon emissions, conserving resources, and minimizing waste in production processes, businesses can contribute directly to climate change

mitigation. These practices are good for the environment and can be cost-effective for businesses and enhance their corporate reputation [27]. Moreover, social awareness and public participation are crucial to advancing climate action. Businesses can contribute to developing climate resilience by raising awareness of the importance of climate resilience and encouraging responsible consumer behavior. Engaging businesses and communities in collaborative educational activities can better practice and publicize climate-friendly initiatives [28].

3.1. Business and Community Cooperation

It is widely recognized that those currently poor and marginalized are at greater risk of future negative impacts of climate change [29]. Theoretically, when livelihood advances that contribute to poverty reduction are themselves dependent on fragile systems and are directly or indirectly disrupted by climate change, they can instead be costly [12].

This two-year project facilitated by Kellogg's India and Techno Serve provides local farmers with climate-smart agriculture training to understand agricultural productivity, farm resilience, and the impact of farms on the environment. As a result, agricultural productivity is increased, soil health is restored, species and habitats are protected, and greenhouse gas emissions are reduced, while their livelihoods are improved in a way that protects and respects human rights [30]. As part of the program, Farmer Producer Companies (FPCs), founded by local farmers, are promoted to share income and advantages among members [31]. More than 12,000 farmers have benefited from the program, generating more than $4.7 million in incremental, replicable economic gains in less than three years.

A growing number of companies, such as Kellogg's, are using their core business to help vulnerable communities adapt to climate change. For example, Swiss Re's Kenya Livestock Insurance Program helps livestock survive during severe droughts, while world-leading consulting firm Arcadis has trained more than 60 mayors in climate change and adaptation measures to improve their capacity infrastructure for designing and implementing resilient cities [32]. Through collaboration between individuals, communities, and businesses, a wider range of options and ideas may emerge to address the stresses and disruptions caused by climate risks, which could not only increase resilience but also bring wider economic and social benefits [33].

However, some climate risk reduction projects as part of resilience development programs have resulted in wide variations in the affordability of different populations to respond to opportunities offered by external actors. In some of the projects that invested in refurbishing houses to increase resilience, the biggest beneficiaries were not the most vulnerable groups, but those who still had access to discretionary funds in the aftermath of the crisis. In such projects, once the poor (vulnerable groups) have opted for short-term investment (home renovation), they may face increased debt and reduced capacity to make long-term strategic choices [12].

3.2. Organizations and Stakeholders in Resilience Action

The World Conservation Union (IUCN), in its report on how business, government, and non-governmental organizations can work together to cope with the turbulence and change of the twenty-first century, highlights the importance of collaboration in activating the resilience of innovation, which brings together different stakeholders to work on solutions and change. These stakeholders may bring a wide range of resources to the action, including financial, social, and natural capital [34].

The UK Corporate Leaders Group (CLG) is a key partner in the UN Climate Change Conference and has been a strong voice in helping the UK to lead the transition to a carbon-neutral, nature-positive, and socially inclusive economy, both domestically and globally. Convened by The Prince of Wales and managed by the University of Cambridge's Institute for Sustainability Leadership (CISL), which specializes in interdisciplinary research, the conference believes that a path to a sustainable economy

can be pursued through collaboration between business, government, and financial institutions. Positive outcomes for people and the environment can be accelerated [35].

CLG believes that governments should take on the primary task of increasing resilience. However, a wide range of businesses can also play an essential role in improving their ability to respond to climate threats through adaptation action. Adaptation action can benefit businesses by ensuring continuity of production and service delivery but can also provide broader advantages and positive social outcomes that translate into greater business benefits. In the case of Newcastle, UK, for example, Newcastle City Council has no direct regulatory responsibility for utilities, drainage infrastructure, or watercourses. Therefore, while fully recognizing its need to play a key role in monitoring climate policy, Newcastle City Council also recognizes the importance of involving other local players in a coordinated approach [36]

IPCC (2007) mentions that 'the new architecture of global climate governance means that 'the engagement of citizens, groups, organizations, and businesses is now a fundamental element of the response to climate change'. Whether climate action takes place at the local, regional, national, or international level, networked governance provides an opportunity structure for these initiatives to engage in transnational climate governance. For example, the Climate Action Network (CAN) can be defined as a transnational advocacy network, a forum where information can be exchanged, resources can be pooled, and actions can be coordinated, and a non-governmental organization (NGO) that focuses on the strategies of activists and lobbyists. Its participating members share the same beliefs and values on sustainable development and environmental adaptation [37]. The effectiveness of NGO action depends to a large extent on whether their objectives are consistent with those of local governments. When the goals are aligned, cooperation between the two maximizes efficiency and contributes to the sustainable building of the government in order to strengthen its legitimacy. However, if their organizational goals are contrary to those of the local government, NGOs usually resort to confrontational initiatives, such as demonstrations and other radical measures, thus maximizing public pressure [38].

4. Conclusion

In conclusion, the intricate interplay between climate change, extreme weather events, urbanization, and their consequential impacts on business and society underscores the urgency of a collective, multifaceted response. The dependence on fossil fuels for human activities, particularly industrial development, has pushed the globe into an era of unprecedented climate change [8]. The consequences of rising temperatures, sea-level rise, and increased extreme weather events are having serious impacts on ecosystems, economies, and communities across the globe [7].

Urbanization, a hallmark of modern development, complicates the climate equation. Rapidly expanding cities have fuelled economic growth and improved living standards while increasing the vulnerability of urban populations to climate hazards [12]. As more and more of the world's inhabitants congregate in urban centers, the design of disaster-resilient urban spaces becomes imperative. Recognizing this, resilience becomes a key strategy, including climate adaptation and disaster risk reduction [6].

Businesses play a vital role in this process as contributors to climate change and potential catalysts for change. Their roles range from promoting climate-aware supply chains to engaging in community development activities to increase social and environmental resilience [13]. Collaboration is critical, weaving together the efforts of governments, businesses, NGOs, and communities. By working together, these stakeholders can pool resources, share expertise, and work together to develop solutions to address complex climate challenges holistically. However, further research and studies are needed to maximize the effectiveness of these collaborative practices [38].

Looking ahead, the trajectory of climate change requires a paradigm shift not only in terms of technological innovation and policy reform but also in terms of societal values and behaviors. Climate risk awareness must be integrated into our daily lives, changing consumption patterns, influencing business behavior, and guiding policy decisions. The mounting economic losses, environmental degradation, and human suffering underline the urgent need for such transformative action.

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