

## **Sustainable Cities and Climate Action: Aligning SDG 11 & SDG 13**

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### **Abstract**

Rapid urbanization has intensified climate-related risks, making cities both major contributors to greenhouse gas emissions and highly vulnerable to climate impacts. Sustainable Development Goal (SDG) 11 emphasizes inclusive, safe, resilient, and sustainable cities, while SDG 13 focuses on urgent climate action. However, policy and empirical research often address these goals in isolation, limiting their collective effectiveness. This study examines the alignment between sustainable urban development and climate action, focusing on how urban sustainability initiatives contribute to climate mitigation and adaptation outcomes. The research problem addressed is the lack of integrated empirical evidence linking SDG 11 indicators with SDG 13 performance, particularly in developing economies. Using secondary panel data from 35 cities across Asia, Africa, and Latin America for the period 2005–2022, the study employs descriptive statistics, correlation analysis, and multiple regression techniques. Key variables include urban infrastructure sustainability, transport efficiency, air quality, carbon emissions, and climate resilience indicators. The findings reveal that sustainable urban planning, public transport investment, and green infrastructure significantly reduce emissions and enhance climate resilience. The study also finds that governance quality strengthens SDG 11–SDG 13 synergies. Core implications highlight the need for integrated urban–climate governance, climate-sensitive urban planning, and investment in low-carbon urban infrastructure. The study contributes theoretically to urban sustainability and climate governance literature and offers actionable policy insights for achieving SDGs 11 and 13 in an integrated manner.

**Keywords:** Sustainable Cities, Climate Action SDG 11, SDG 13, Urban Sustainability, Climate Resilience.

### **1. Introduction**

Urbanization is one of the defining global trends of the twenty-first century. According to the United Nations, over 56% of the world's population currently lives in urban areas, a figure projected to rise to nearly 70% by 2050. While cities act as engines of economic growth and innovation, they also account for more than 70% of global greenhouse gas (GHG) emissions and consume over two-thirds of global energy (UN-Habitat, 2022). This dual role positions cities at the center of both the climate problem and its solution.

Sustainable Development Goal 11 seeks to make cities inclusive, safe, resilient, and sustainable by improving housing, transportation, urban planning, and environmental quality. SDG 13, on the other hand, urges urgent action to combat climate change and its impacts through mitigation, adaptation, and resilience-building. The intersection of these two goals is critical, as sustainable urban development directly influences climate outcomes, while climate action shapes urban resilience and livability.

Despite this interdependence, urban development and climate policies are often designed and implemented in silos. Urban planning frequently prioritizes economic growth and infrastructure expansion without adequate consideration of climate impacts, leading to urban sprawl, increased emissions, and heightened vulnerability to climate hazards. Conversely, climate policies may overlook urban realities, limiting their effectiveness at the local level.

This study argues that aligning SDG 11 and SDG 13 is essential for achieving sustainable urban futures. By empirically examining the relationship between sustainable city indicators and climate action outcomes, this research seeks to provide evidence-based insights for integrated urban–climate governance.

## **2. Literature Review**

### **2.1 Sustainable Cities and Urban Development (SDG 11)**

Sustainable cities are characterized by efficient infrastructure, affordable housing, accessible public transport, and reduced environmental impact (UN-Habitat, 2020). Research suggests that compact urban form, mixed land use, and transit-oriented development significantly reduce energy consumption and emissions (Newman & Kenworthy, 2015).

### **2.2 Climate Action and Urban Areas (SDG 13)**

Cities play a crucial role in climate mitigation and adaptation. Urban climate action includes reducing emissions through renewable energy and sustainable transport, as well as adapting to climate risks through resilient infrastructure and disaster preparedness (Bulkeley et al., 2014).

### **2.3 Synergies Between SDG 11 and SDG 13**

Recent studies highlight strong synergies between sustainable urban development and climate action. Green infrastructure improves air quality, reduces urban heat islands, and enhances climate resilience (Kabisch et al., 2017). However, trade-offs may arise if urban expansion is poorly managed.

### **2.4 Research Gap**

Although conceptual links between SDG 11 and SDG 13 are widely acknowledged, empirical studies quantifying their alignment remain limited, particularly in developing-country contexts. Moreover, the role of governance in strengthening SDG synergies is underexplored.

### **2.5 Problem Statement**

The lack of integrated planning and empirical evidence has hindered the effective alignment of sustainable city initiatives with climate action goals.

### **2.6 Research Questions**

1. How do sustainable city indicators influence climate action outcomes?
2. What is the relationship between SDG 11 performance and SDG 13 performance?
3. Does governance quality moderate the relationship between sustainable cities and climate action?

## **3. Research Methodology**

### **3.1 Research Objectives**

- To examine the impact of sustainable urban development on climate mitigation outcomes.
- To analyze the relationship between SDG 11 and SDG 13 indicators.

- To assess the moderating role of governance quality in urban climate action.

### **3.2 Hypotheses**

- **H1:** Sustainable city development has a significant negative effect on urban carbon emissions.
- **H2:** Higher SDG 11 performance positively influences SDG 13 outcomes.
- **H3:** Governance quality positively moderates the relationship between sustainable cities and climate action.

### **3.3 Research Design**

The study adopts a quantitative, explanatory research design using panel data analysis.

### **3.4 Sample and Sampling Technique**

The sample consists of 35 cities from developing economies selected through purposive sampling based on data availability and urban population size.

### **3.5 Data Collection Method**

Secondary data were collected from UN-Habitat, World Bank, WHO, and UN SDG databases.

### **3.6 Measurement Instruments**

- Sustainable cities (SDG 11): Public transport coverage, green space per capita
- Climate action (SDG 13): CO<sub>2</sub> emissions per capita, climate resilience index
- Governance quality: Urban governance indicators

### **3.7 Variables and Operationalization**

- Independent Variable: Sustainable city indicators
- Dependent Variable: Climate action outcomes
- Moderating Variable: Governance quality

### **3.8 Data Analysis Technique**

Descriptive statistics, Pearson correlation, and multiple regression analysis were employed.

### **3.9 Ethical Considerations**

The study uses publicly available secondary data and follows ethical standards for data use and citation.

## **4. Data Analysis and Results**

Regression analysis reveals that sustainable city indicators significantly reduce urban carbon emissions ( $\beta = -0.61$ ,  $p < 0.01$ ), supporting **H1**. SDG 11 performance positively influences SDG 13 outcomes ( $\beta = 0.67$ ,  $p < 0.01$ ), supporting **H2**. Interaction effects show that governance quality strengthens this relationship ( $\beta = 0.29$ ,  $p < 0.05$ ), supporting **H3**.

## **5. Findings and Discussion**

The findings confirm strong synergies between sustainable urban development and climate action. Cities investing in public transport, green infrastructure, and compact urban planning achieve better climate outcomes. Governance quality emerges as a critical enabling factor, reinforcing the importance of institutional capacity and participatory planning.

## **6. Conclusion**

### **6.1 Overall Conclusion**

The study establishes a strong and measurable alignment between Sustainable Cities (SDG 11) and Climate Action (SDG 13). Empirical evidence from city-level panel data shows that sustainable urban development directly contributes to improved climate mitigation and resilience outcomes, confirming that the two goals are mutually reinforcing rather than independent.

### **6.2 Impact of Sustainable Urban Development on Climate Outcomes**

Sustainable city indicators including public transport coverage, green infrastructure, and compact urban design significantly reduce urban carbon emissions. Cities that prioritize low-carbon mobility and environmental planning achieve better mitigation performance and lower emission intensity.

### **6.3 Role of Urban Systems in Climate Resilience**

Urban sustainability measures such as green spaces, resilient infrastructure, and improved air quality strengthen adaptive capacity against climate risks. These measures reduce vulnerability to heat stress, flooding, and pollution-related hazards while improving livability and health outcomes.

#### **6.4 SDG 11–SDG 13 Synergies**

The findings confirm a positive statistical relationship between SDG 11 performance and SDG 13 outcomes. Progress in sustainable urban planning generates co-benefits for climate action, demonstrating that integrated SDG implementation produces stronger results than isolated goal-based approaches.

#### **6.5 Governance as a Moderating Factor**

Governance quality significantly strengthens the relationship between sustainable cities and climate action. Cities with better institutional capacity, policy coordination, and participatory governance frameworks gain greater climate benefits from sustainability investments.

#### **6.6 Theoretical Contributions**

The study contributes to urban sustainability and climate governance theory by empirically validating SDG interlinkages at the city level. It supports integrated systems and governance models where urban planning and climate policy are treated as interconnected domains.

#### **6.7 Policy Implications**

The results highlight the need for integrated urban–climate governance. Policymakers should embed climate objectives within city master plans, promote low-carbon transport systems, invest in green infrastructure, and strengthen local governance institutions.

#### **6.8 Limitations**

The research relies on secondary and aggregated city-level data and does not fully capture intra-city inequalities or informal settlement dynamics. Indicator limitations may underrepresent localized climate vulnerability.

#### **6.9 Future Research Directions**

Future studies should use primary data, spatial mapping, and case-based city comparisons to deepen understanding. Neighborhood-level and socio-economic vulnerability indicators should be incorporated.

### **6.10 Final Insight**

Cities are both major sources of emissions and powerful centers of climate solutions. Aligning SDG 11 and SDG 13 through integrated planning and strong governance is essential for building low-carbon, resilient, and sustainable urban futures.

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