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SUPPLEMENTARY INFORMATION

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Learning about urban climate solutions from case studies

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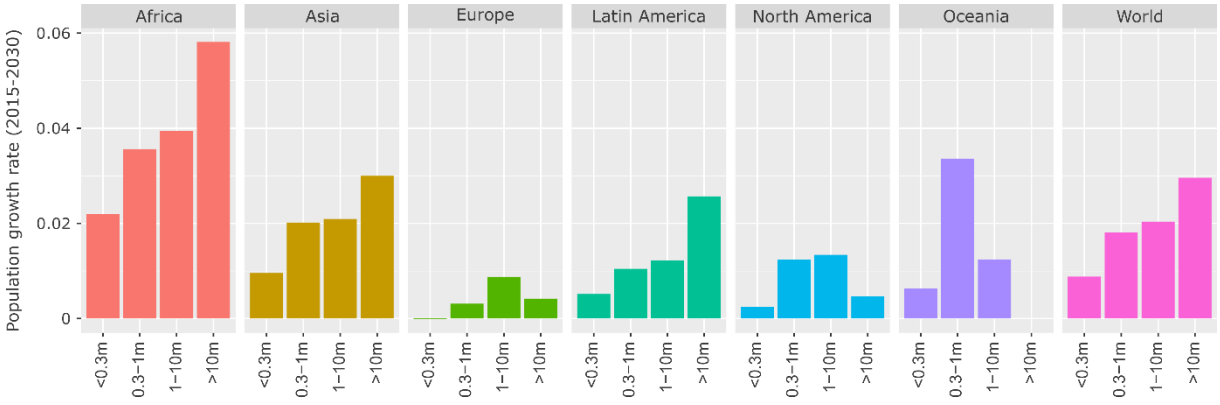
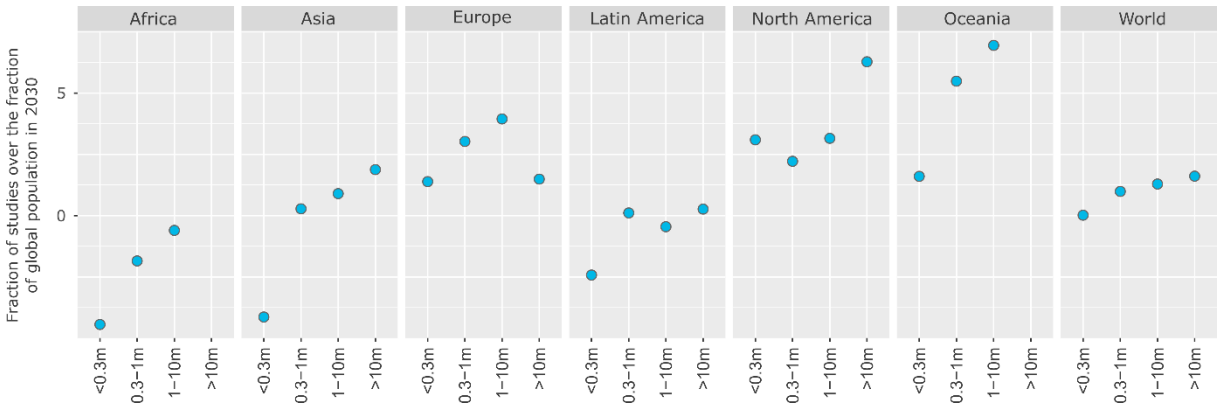
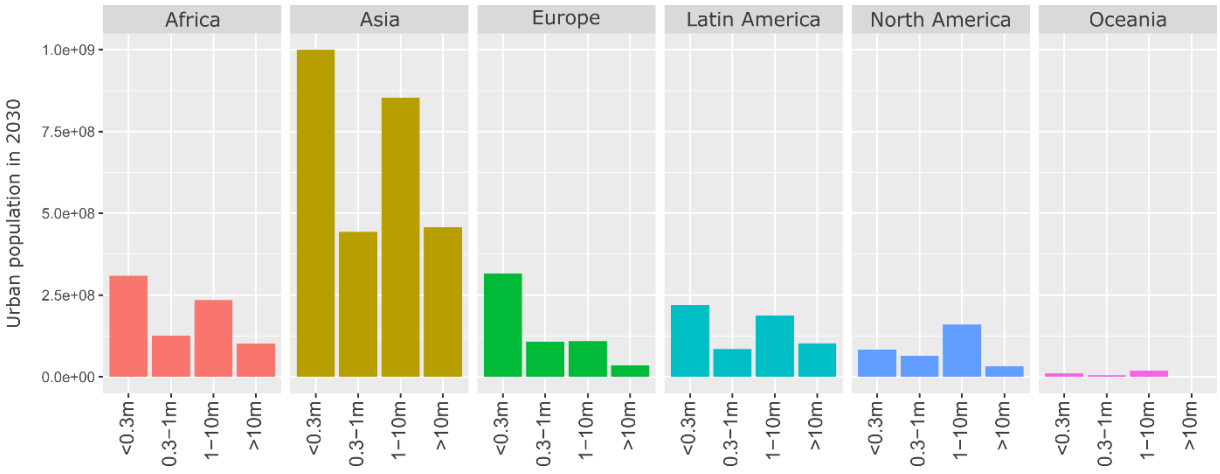
Supplementary Figures



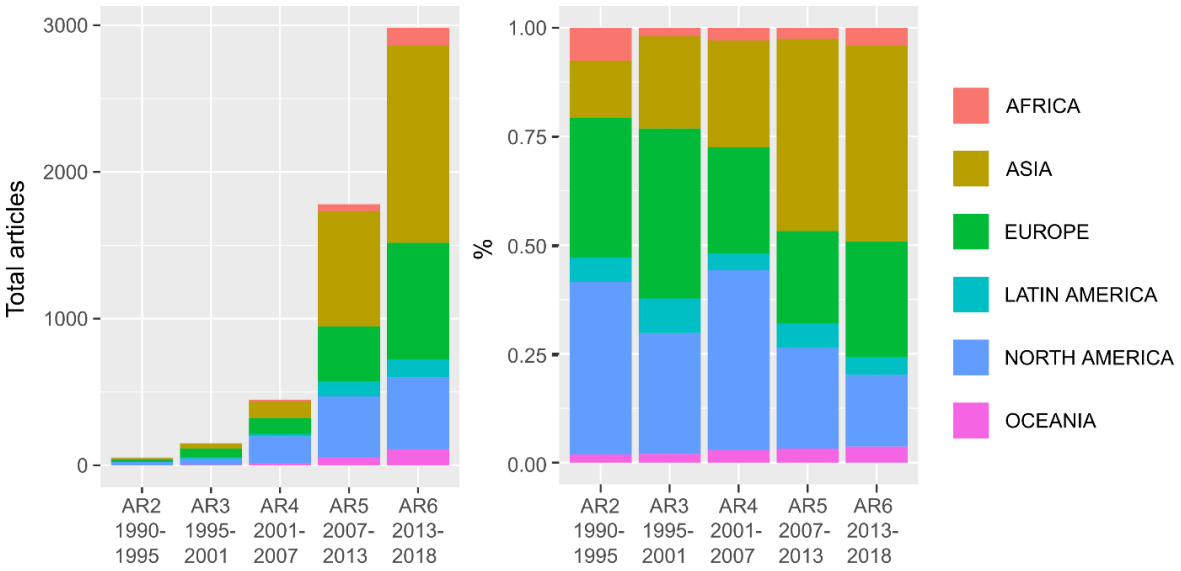
Supplementary Figure 1: Projected population growth rate by region and city size, 2015-2030. *Population data from ref [1], using agglomeration data where available.*



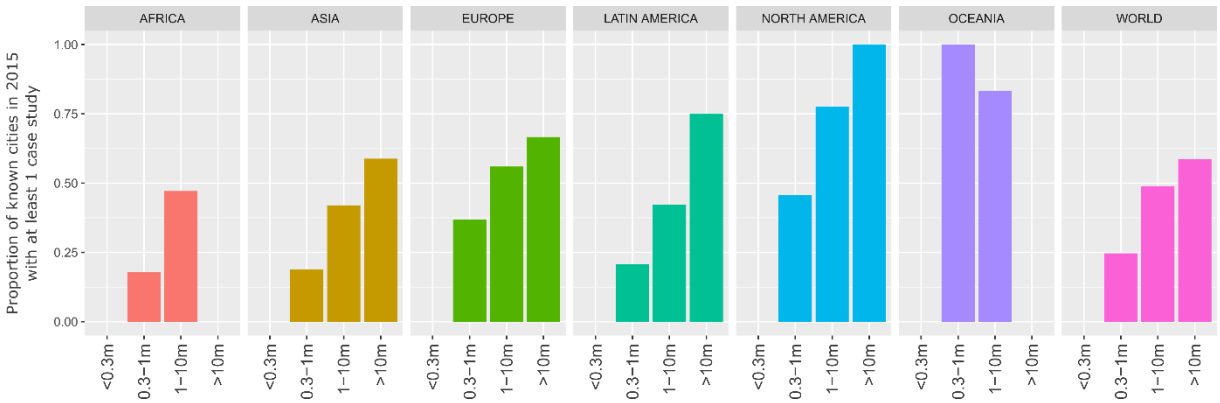
Supplementary Figure 2: The global distribution of urban case studies versus population size*. To normalise, where the numerator (% of global population in a region & city size) exceeds the denominator (% of case studies in a region & city size), we subtract the fraction from 2. Population data from ref [1], using agglomeration data where available.*



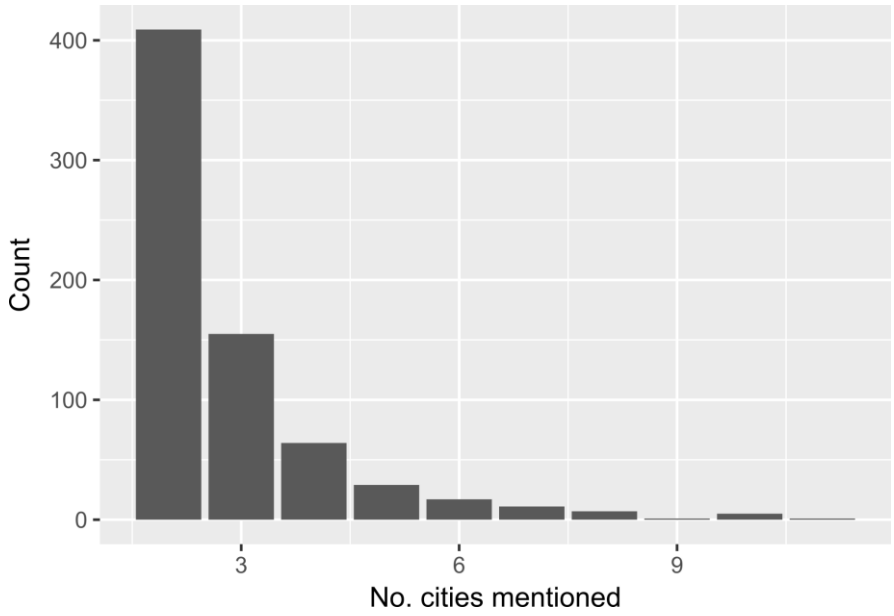
Supplementary Figure 3: Total urban population in 2030 by region and city size. *Population data from ref [1], using agglomeration data where available.*



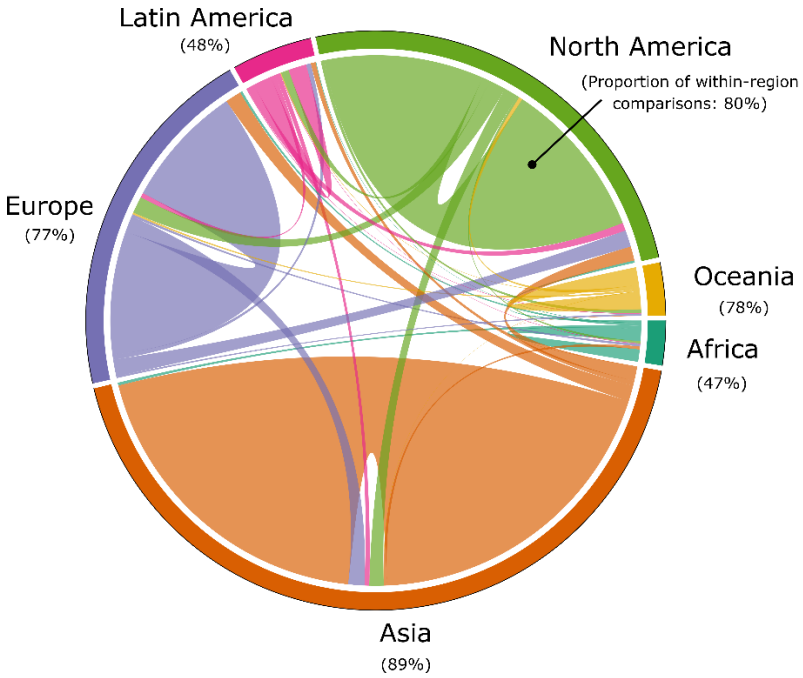
Supplementary Figure 4: Total articles and regional proportions of case study literature by IPCC Assessment Period



Supplementary Figure 5: Direct coverage of case studies. *Missing values due to absent data (small cities) and because there are no mega-cities in Africa and Oceania as of 2015. Population data from ref [1], using agglomeration data where available.*



Supplementary Figure 6: Number of cities mentioned in comparative studies



Supplementary Figure 7: Inter and intra-regional comparative research on urban climate mitigation. *Each link in the chord diagram is based on the pairwise coupling of two cities within a document. Documents where more than one city is mentioned in the abstract are used, totalling 699 studies. The proportion of regional couplings that pair with other regions (i.e. inter-regional urban comparisons) are indicated as percentages.*

Supplementary Tables

ID	Topic Name	Stemmed Keywords	Marginal Topic Distribution (%)
1	Climate governance	climat; chang; polici; local; govern	8.9
2	Energy use	energi; consumpt; effici; sector; renew	8.0
3	Energy systems	system; electr; power; cost; generat	7.4
4	Urban form	urban; land; area; model; ecolog	7.3
5	Buildings	build; energi; design; residenti; perform	6.8
6	CO2 emissions	carbon; emiss; industri; low; intens	6.7
7	GHG emissions	emiss; ghg; reduct; greenhous; gas	6.3
8	Cooling demand	air; temperatur; cool; roof; climat	6.3
9	Transportation	transport; traffic; travel; public; car	5.8
10	Vehicles	vehicl; fuel; electr; charg; drive	5.0
11	Households	household; incom; behavior; survey; resid	4.7
12	Waste management	wast; landfil; solid; recycl; manag	4.7
13	Heat demand	heat; district; thermal; pump; network	4.6
14	Water demand	water; suppli; treatment; manag; wastewat	4.3
15	Renewable energy	solar; radiat; energi; photovolta; collector	3.8
16	Urban ecology	tree; forest; benefit; speci; plant	3.4

Supplementary Table 1: List of topics and their keywords. *Topic names are manually coded by the authors based on a review of the stemmed keywords and associated documents. The marginal topic distribution denotes the percentage of the document set where this topic is found. One topic was manually removed (keywords: lowcarbon; develop; industri; economi; citi) as this is largely synonymous in content with 'CO2 emissions' and is only relevant for a specific (but large) subset of studies in China.*

Authors	Year	Title	Topics
Khalil, H.A.E.E.	2009	Energy efficiency strategies in urban planning of cites	Buildings; Climate governance; energy use; urban form

Attia, S & De Herde, A	2010	Active solar retrofit of a residential house, A case study in Egypt	Buildings; Heat demand; Cooling demand; Renewable energy
Fahmy, M & Sharples, S	2011	Urban form, thermal comfort and building CO2 emissions - a numerical analysis in Cairo	Buildings; GHG emissions; Cooling demand; Urban form
El-Deeb, K, El-Zafarany, A & Sherif, A	2012	Effect of building form and urban pattern : On energy consumption of residential buildings in different desert climates	Buildings; Urban form
Verdeil, E, Arik, E, Bolzon, H & Markoum, J	2015	Governing the transition to natural gas in Mediterranean Metropolis: The case of Cairo, Istanbul and Sfax (Tunisia)	Climate governance; Energy use; Heat demand; Renewable energy; Urban form
Dabaieh, M, Wanas, O, Hegazy, MA & Johansson, E	2015	Reducing cooling demands in a hot dry climate: A simulation study for non-insulated passive cool roof thermal performance in residential buildings	Buildings; Cooling demand
Kares, M & Singh, P	2016	Assessment of building integrated photovoltaics for the residential section in representative Urban areas in Egypt	Buildings; Energy use; Households; Renewable energy; Urban form
Aboulnaga, M.	2016	High-rise buildings in context of sustainability; urban metaphors of greater Cairo, Egypt: A case study on sustainability and strategic environmental assessment	Buildings
Chen, H & Dietrich, U	2017	Land-use planning for zero-energy-buildings: Comparison of four high-density cities	Energy use; Urban form

Supplementary Table 2: Urban climate mitigation literature on Cairo

Title	Method	Ref
The neglected social dimensions to a vehicle-to-grid (V2G) transition: a critical and systematic review	Systematic review	2
Interdependence between Urban Processes and Energy Transitions: The Urban Energy Transitions (DUET) Framework	Case meta-analysis	3
Decarbonising transport to achieve Paris Agreement targets	Quantitative synthesis	4
Green roofs against pollution and climate change. A review	Narrative review	5
Urban and peri-urban agriculture and forestry: Transcending poverty alleviation to climate change mitigation and adaptation	Narrative review	6
Prospects and challenges for sustainable sanitation in developed nations: a critical review	Narrative review	7
A meta-analysis of urban and peri-urban agriculture and forestry in mediating climate change	Narrative review	8
A review on co-benefits of mass public transportation in climate change mitigation	Narrative review	9
What do we know about the study of distributed generation policies and regulations in the Americas? A systematic review of literature	Bibliometric study	10
Co-benefits of greenhouse gas mitigation: a review and classification by type, mitigation sector, and geography	Bibliometric study & narrative review	11
Benefits of green roofs: A systematic review of the evidence for three ecosystem services	Quantitative synthesis	12

Assessing the success of electricity demand response programs: A meta-analysis	Meta-analysis	13
The economic benefits and costs of trees in urban forest stewardship: A systematic review	Bibliometric study, quantitative synthesis & narrative review	14

Supplementary Table 3: Systematic reviews of urban climate change mitigation. *The minimum criteria for a 'systematic review' here is the formal selection of literature via a database search query. Some reviews ([10,11,13]) focus on non-urban issues, but derive important conclusions for scientific learning at urban scale, and thus should be included in the relevant literature base on urban-scale climate change mitigation. See methods for our identification procedure.*

Topic	**Proportion (%)**	**Topic**	**Proportion**
GHG emissions	9.6	Waste management	5.5
Climate governance	8.9	Vehicles	4.3
Energy consumption	8.3	Heat demand	3.9
Transportation	7.5	Renewable energy	3.8
Air pollution	7.5	Water demand	3.5
CO2 emissions	6.9	Urban ecology	2.9
Buildings	5.8	Cooling demand	2.7
Urban form	5.7	Households	2.6

Supplementary Table 4: Topic proportions of 'forward-looking' case studies

Region	**No. case studies**	**No. 'forward-looking' studies**	**Proportion (%)**
Africa	158	12	8
Asia	1934	335	17
Europe	1145	227	19
Latin America	206	37	18
North America	1054	131	12
Oceania	151	23	15

Supplementary Table 5: Regional coverage of 'forward-looking' case studies

Supplementary references

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14. Song, X. P., Tan, P. Y., Edwards, P. & Richards, D. The economic benefits and costs of trees in urban forest stewardship: A systematic review. *Urban For. Urban Green.* **29,** 162–170 (2018).