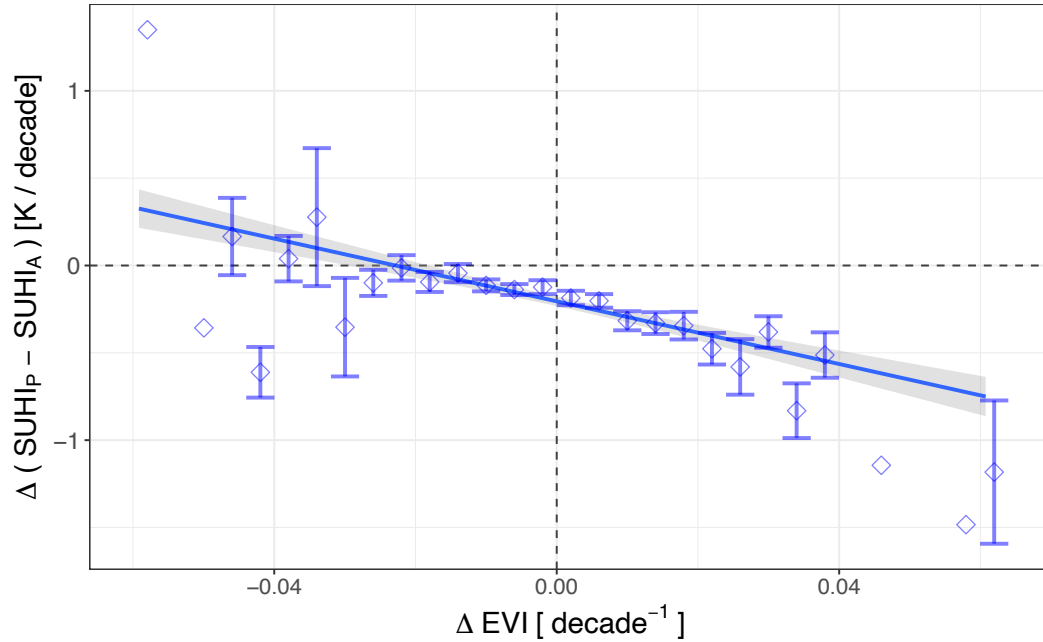
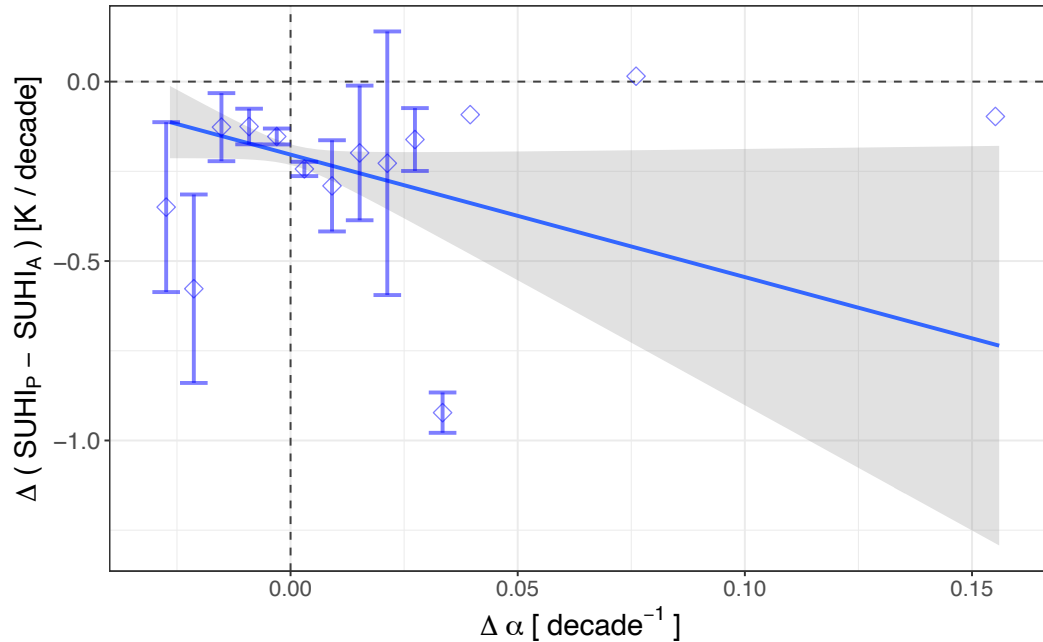




Supplementary Figure 1 The relationship between the contribution from intra-city population distribution to extreme surface heat exposure, $\Delta(SUHI_P - SUHI_A)$, and the changes in population-weighted average enhanced vegetation index (ΔEVI). Blue diamonds and error bars show the binned averages and standard deviations of $\Delta(SUHI_P - SUHI_A)$, where the number of bins is 30. The blue line is the linear regression of all cities using the least-square method.



Supplementary Figure 2 The relationship between the contribution from intra-city population distribution to extreme surface heat exposure, $\Delta(SUHI_P - SUHI_A)$, and the changes in population-weighted average surface albedo ($\Delta \alpha$). Blue diamonds and error bars show the binned averages and standard deviations of $\Delta(SUHI_P - SUHI_A)$, where the number of bins is 30. The blue line is the linear regression of all cities using the least-square method.

Supplementary Table 1 the distribution of population growth across cities with different trends of population-weighted surface urban heat island ($\Delta SUHI_P$), in different regions.

Region	Population Growth		
	$\Delta SUHI_P < 0$	$\Delta SUHI_P > 0$	$\Delta SUHI_P > 0.5$
East Asia & Pacific (EAP)	41,077,708	88,131,399	39,957,997
South Asia (SA)	31,100,215	76,583,997	27,145,823
Sub-Saharan Africa (SSA)	36,724,957	55,747,287	19,093,158
Rest of World	60,711,747	67,762,296	9,644,456
Total (EAP + SA + SSA)	108,902,880	220,462,683	86,196,978
Total (World)	169,614,627	288,224,979	95,841,434

Supplementary Table 2 The numbers of cities with combinations of different signs of $\Delta \rho_N$ and $\Delta(SUHI_P - SUHI_A)$.

	Decline in Density ($\Delta \rho_N < 0$)	Densification ($\Delta \rho_N > 0$)	Total
$\Delta(SUHI_P - SUHI_A) > 0$	147	181	328
$\Delta(SUHI_P - SUHI_A) < 0$	434	238	672
Total	581	419	1,000

Supplementary Table 3 Summary statistics of the variables

Variables	Units	Min.	Max.	P5	P95	Mean	Std. Dev
$\Delta(SUHI_P - SUHI_A)$	<i>K/decade</i>	-3.02	1.90	-1.0	0.37	-0.20	0.46
$\Delta \rho_N$	<i>persons/km²/decade</i>	-23,357	12,553	-7,283	3,374	-773	3,548
ΔEVI	<i>decade⁻¹</i>	-0.059	0.061	-0.024	0.026	-0.000011	0.015
$\Delta \alpha$	<i>decade⁻¹</i>	-0.03	0.16	-0.0088	0.0080	0.00046	0.0080

Supplementary Table 4 Pearson's correlation coefficients of the independent variables. Statistical significance: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

	$\Delta \rho_N$	ΔEVI	$\Delta \alpha$
$\Delta \rho_N$	1		
ΔEVI	-0.2***	1	
$\Delta \alpha$	-0.13	0.02	1