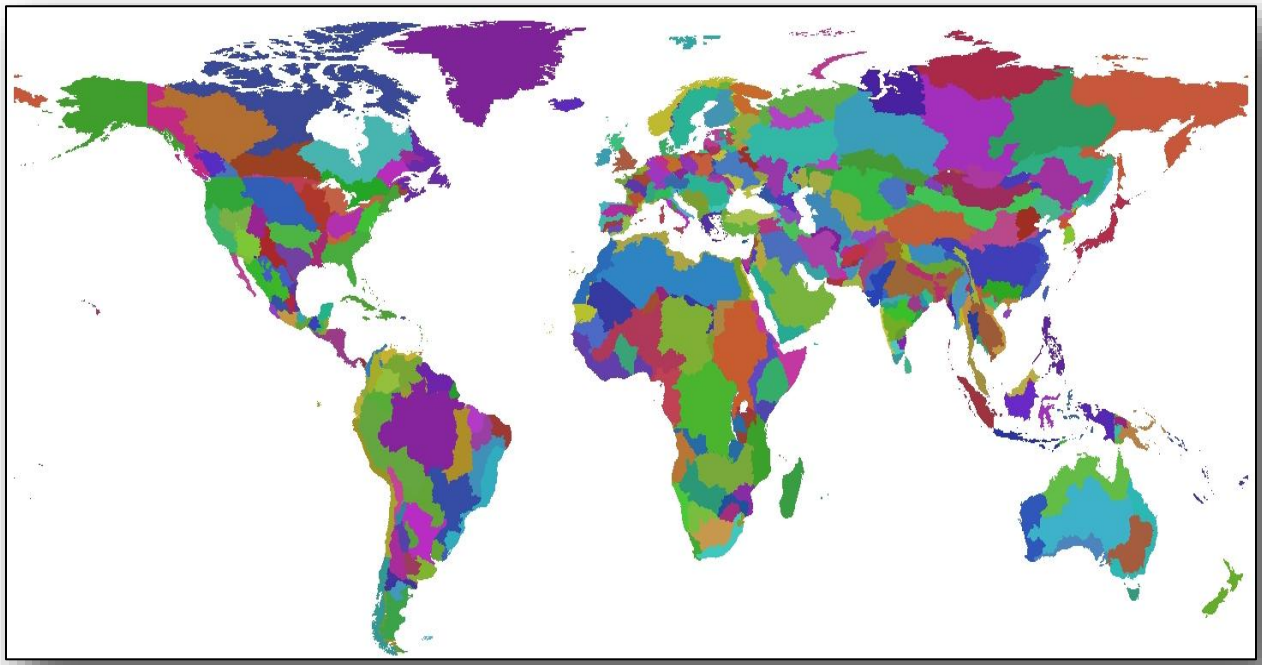
Supplementary information for **"21st-century urbanization drives disproportionate change beyond urban areas"**

Contents

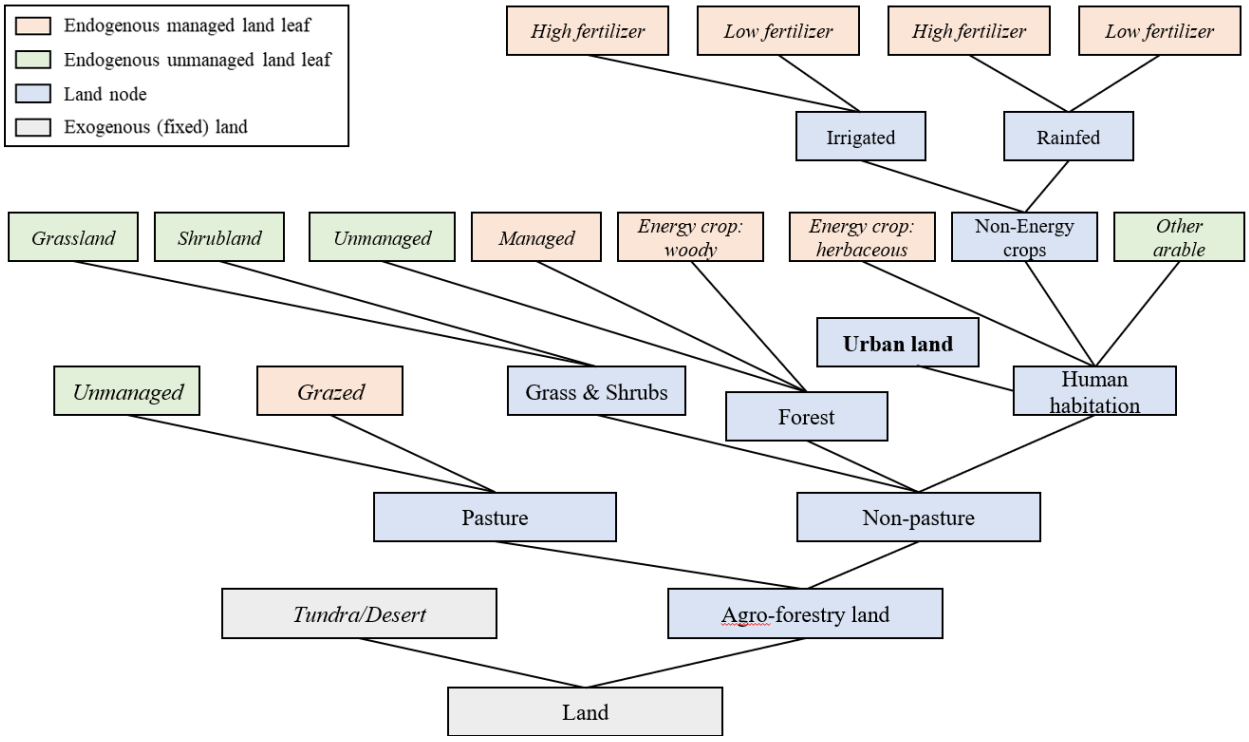
Supplementary Figures- Pages 2-9

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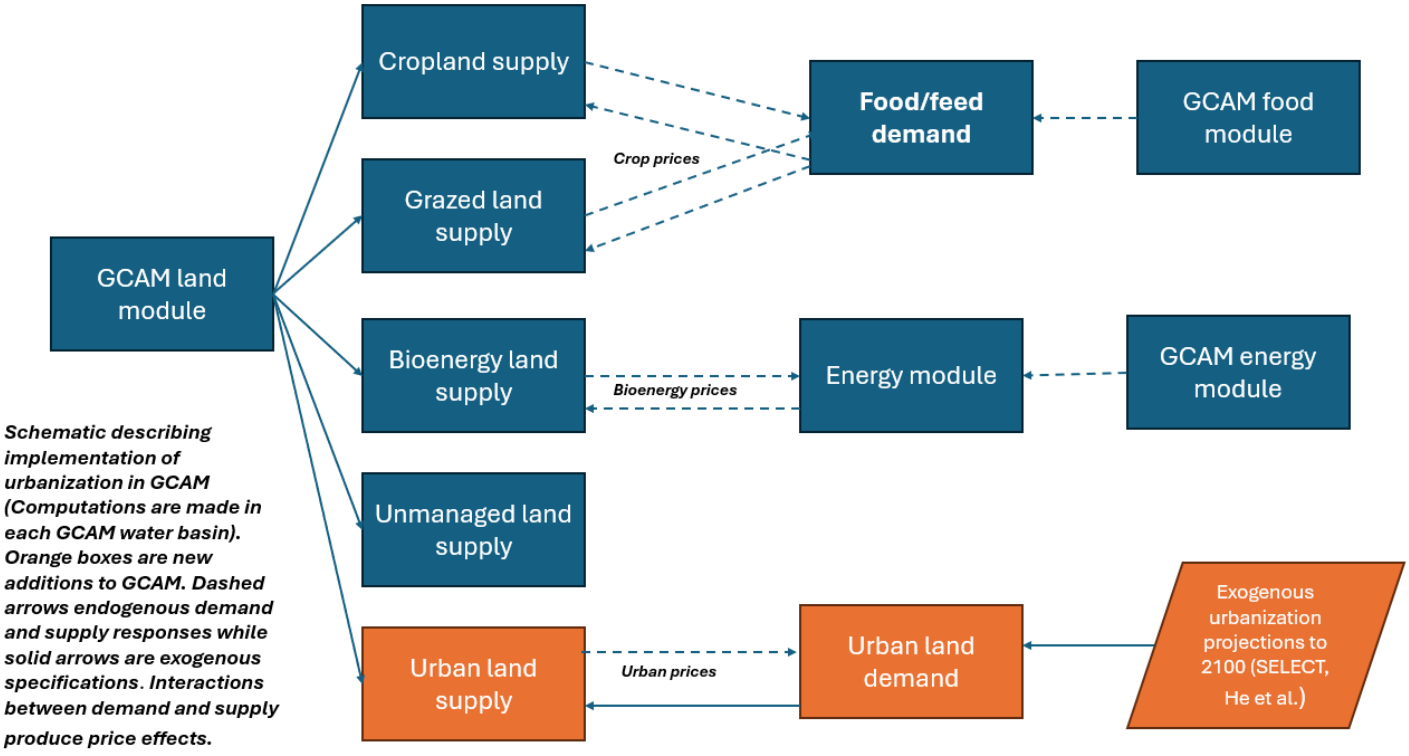
SI Figure 1: Map of GCAM Land use regions. A land use region in GCAM represents the intersection of geopolitical region boundaries (32 regions in total) with several water basins (235 water basins in total). GCAM currently models land use decisions for 384 land use regions.



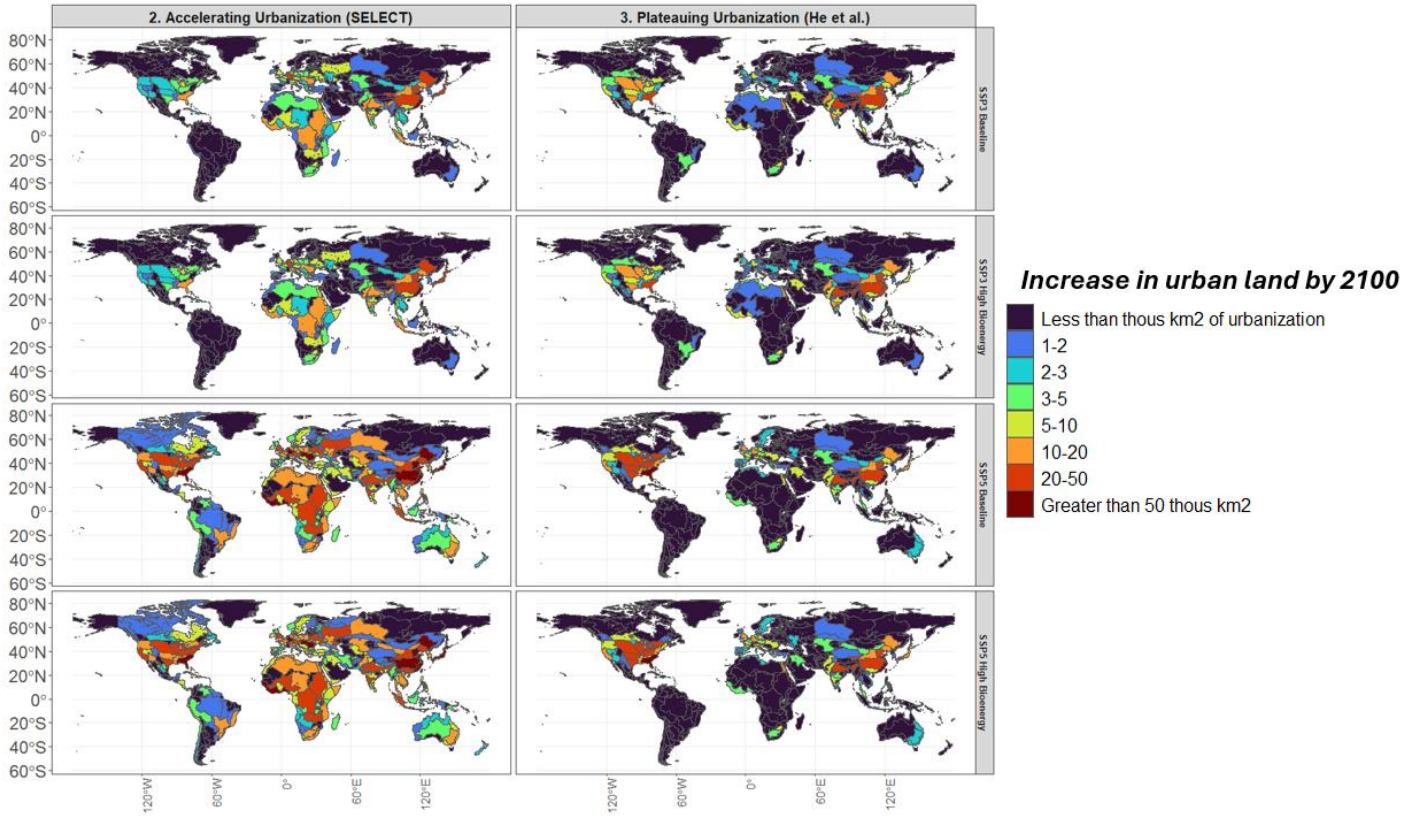
SI Figure 2: Land types modelled in GCAM 8.0, including new urban land type



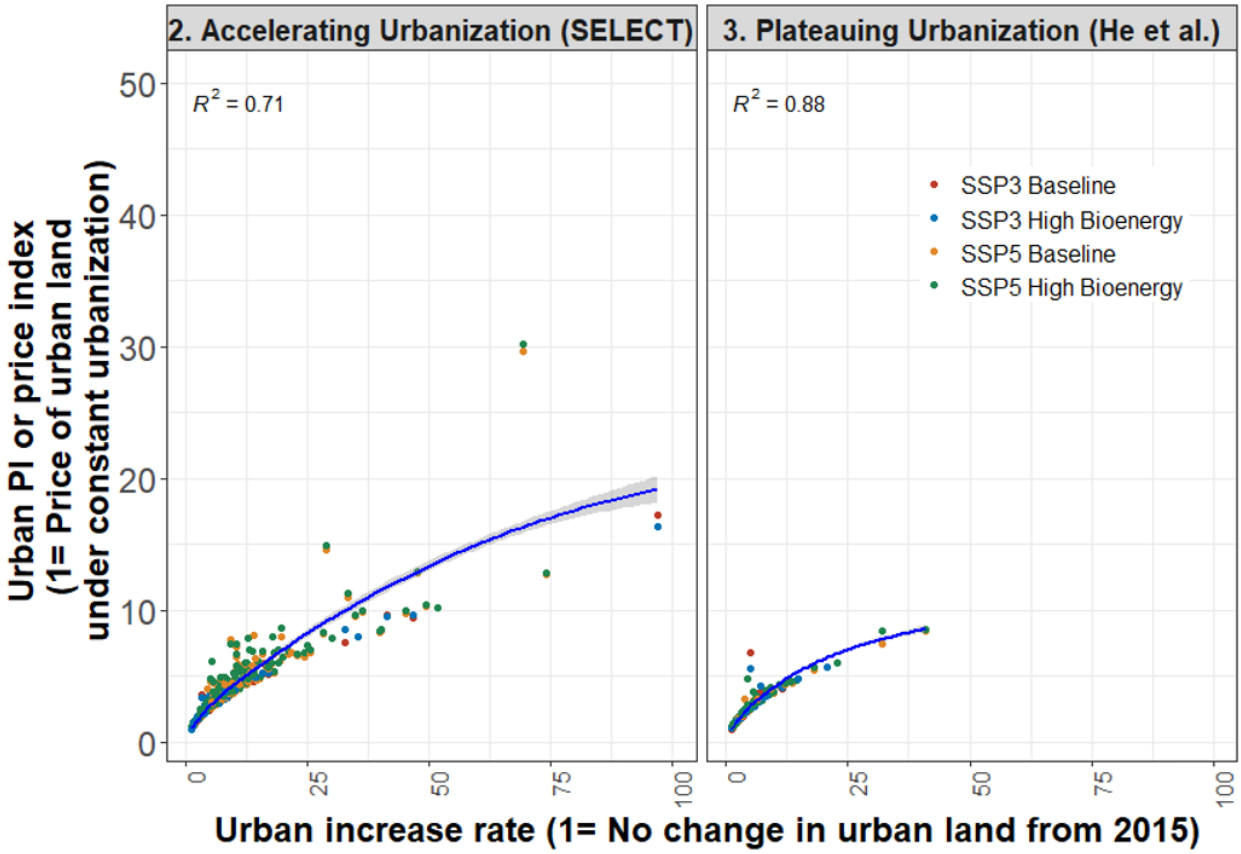
SI Figure 3- ***Schematic showing implementation of endogenous dynamic urbanization in GCAM. Orange boxes are new additions to GCAM. Dashed arrows endogenous demand and supply responses while solid arrows are exogenous specifications. Interactions between demand and supply produce price effects.***



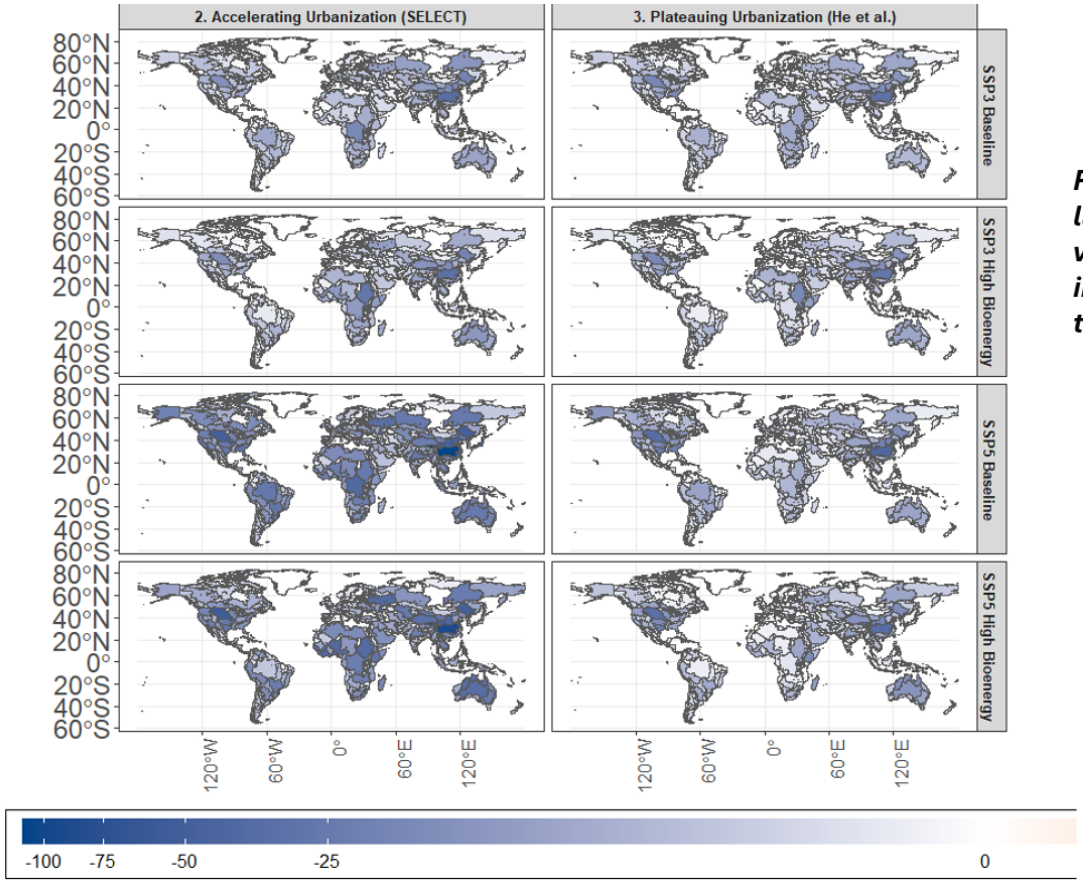
SI Figure 4- ***Urbanization projections across models (boxplot) from 2020 to 2100. Colors represent the two urbanization pathways selected for this study along with the socioeconomic scenarios, bioenergy scenarios they are implemented for. Note that the levels of urbanization are not influenced by the bioenergy scenarios.***



SI Figure 5: Change in urban price index relative to change in level of urbanization across all basins in all years across scenarios under two urbanization scenarios. R squared is calculated by specifying a linear model

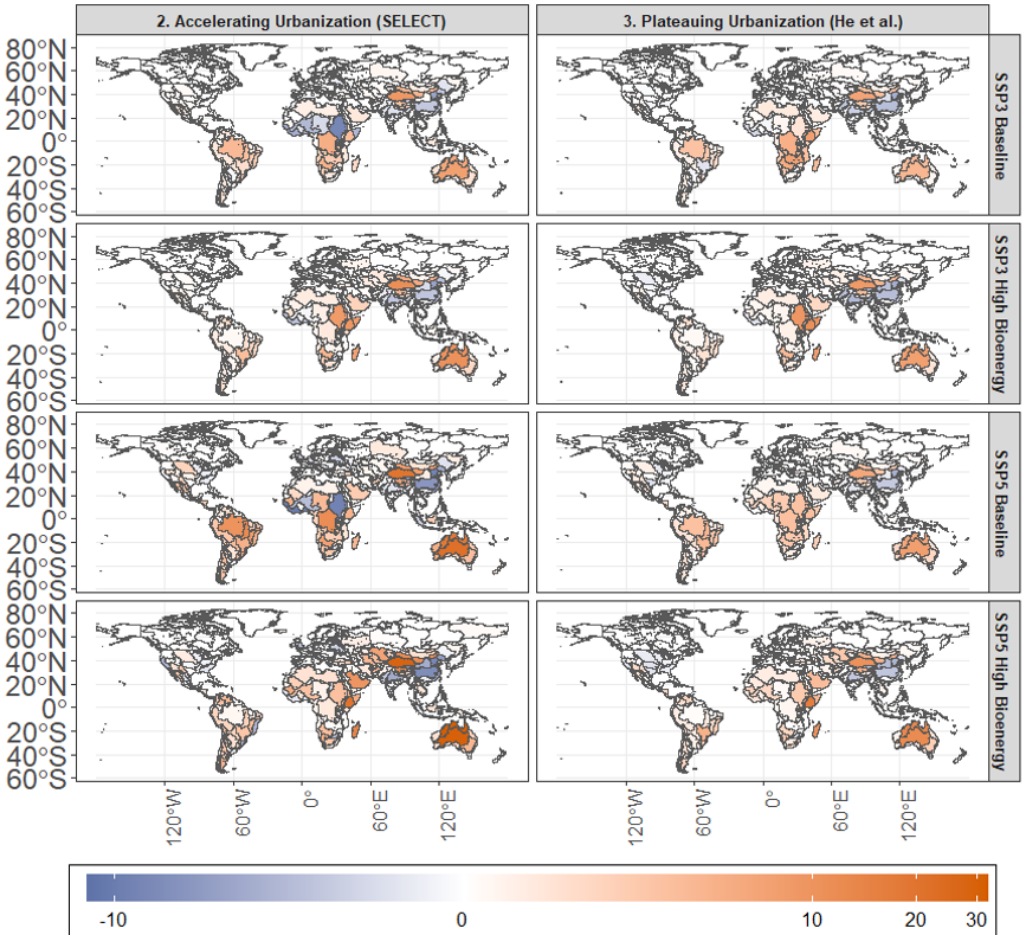


SI Figure 6- Reductions in natural/unmanaged land cover as a result of increasing urban land cover across all GCAM basins by 2100



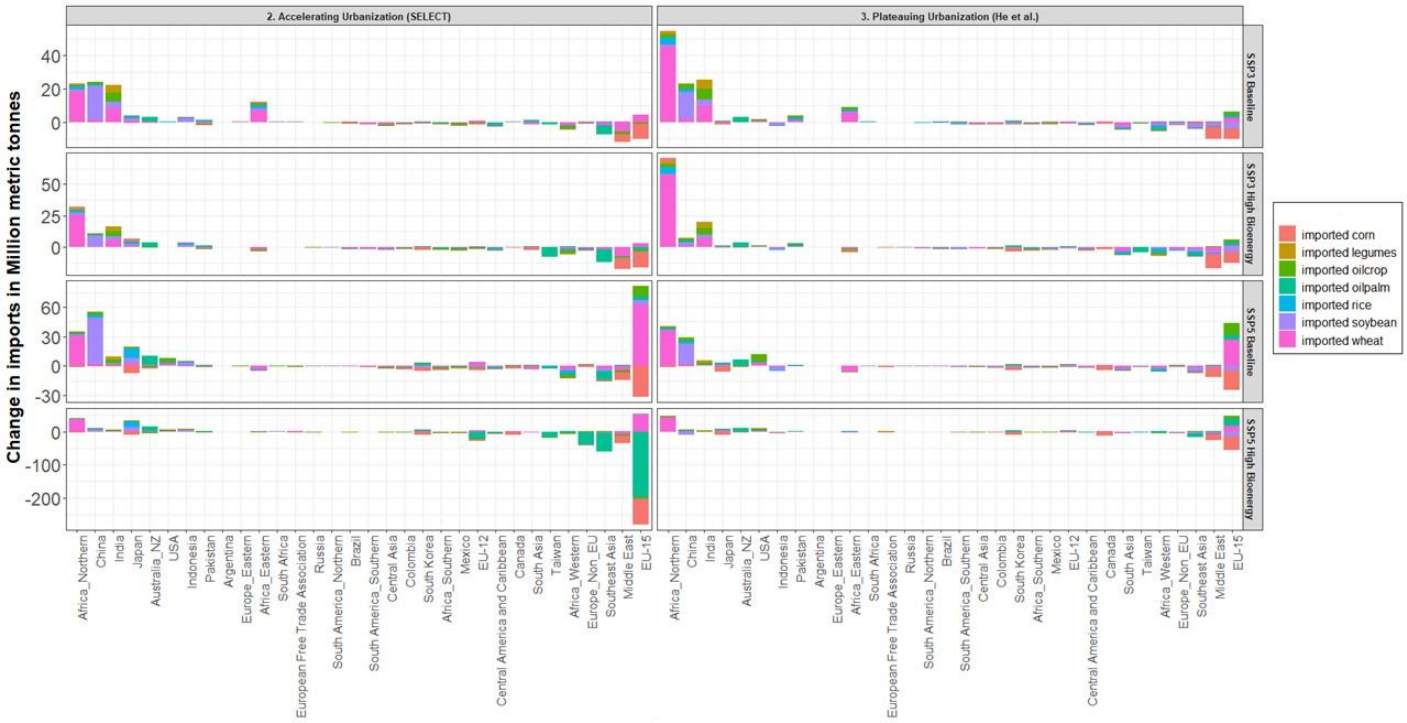
Reduction in unmanaged land cover/natural vegetation induced by increasing urban land in thous km2 in 2100

SI Figure 7- Changes in grazed land cover as a result of increasing urban land cover across all GCAM basins by 2100



Change in grazed land induced by increasing urban land in thous km2 in 2100

SI Figure 8- Changes in imports induced by increasing urban land cover by 2100 in million metric tonnes across all GCAM regions



SI Table 1- Changes in land allocation across (positive + negative values) land types in 2100 induced by urbanization. Column I and K show the induced land change from urbanization divided by urban land change itself for both total land and unmanaged land

		Land change in 2100 (in million km2)										
SSP	Urban_model	A.) Biomass	B.) Crops	C.) Irrigated Crops	D.) Managed Forest	E.) Pasture	F.) Unmanaged	G.) Urbanland	H.) Total non urban (A.+B.+C.+D.+ E.+F.)	I.) Total non urban change/urban land (H/G)	J.) Total managed land (A+B+C+D+E)	K.) Total managed land change/urban land (J/G)
SSP3 Baseline	2. Accelerating Urbanization (SELECT)	0.1	0.3	0.07	0.1	0.2	0.7	0.8	1.4	1.8	0.7	0.9
SSP3 Baseline	3. Plateauing Urbanization (He et al.)	0.0	0.2	0.06	0.1	0.1	0.6	0.5	1.1	2.0	0.5	1.0
SSP3 High Bioenergy	2. Accelerating Urbanization (SELECT)	0.0	0.3	0.06	0.2	0.2	0.7	0.8	1.4	1.9	0.8	1.0
SSP3 High Bioenergy	3. Plateauing Urbanization (He et al.)	0.0	0.2	0.05	0.1	0.2	0.5	0.5	1.1	2.0	0.6	1.0
SSP5 Baseline	2. Accelerating Urbanization (SELECT)	0.1	0.7	0.10	0.5	0.4	2.4	2.8	4.2	1.5	1.9	0.7
SSP5 Baseline	3. Plateauing Urbanization (He et al.)	0.0	0.3	0.04	0.2	0.2	0.8	0.9	1.5	1.7	0.7	0.8
SSP5 High Bioenergy	2. Accelerating Urbanization (SELECT)	0.4	0.6	0.13	0.7	0.5	2.1	2.8	4.4	1.6	2.3	0.8
SSP5 High Bioenergy	3. Plateauing Urbanization (He et al.)	0.1	0.2	0.06	0.2	0.2	0.7	0.9	1.6	1.9	0.9	1.0
	Mean	**0.1**	**0.4**	**0.1**	**0.3**	**0.2**	**1.0**	**1.2**	**2.1**	**1.8**	**1.0**	**0.9**