

Appendix 3

RESULTS

Bird diversity

Bird distribution in urban settings varied among species (Table A3.1). The relative abundance of *Corvus splendens*, and *Columba livia* peaked in highly urbanized areas (i.e., locations containing impervious surface >80%), matching the pattern for urban dependent birds. These two birds made up 17.8% of the total bird occurrence in the city. We classified 14 species (i.e., abundant/common) as urban exploiters. Among these, *Passer domesticus*, *Copsychus saularis* and *Apus nipalensis* were widespread throughout. *Acridotheres tristis*, *Cypsiurus balasiensis*, *Dendrocopos macei*, *Dinopium benghalense*, *Egretta garzetta*, *Halcyon smyrnensis*, *Haliastur indus*, *Milvus migrans*, *Psittacula krameria*, *Sturnia malabarica*, *Psilopogon haemacephalus* were relatively abundant in intermediate/suburban areas (i.e., locations containing impervious surface between >30% and <80%) and urban green areas. These birds accounted for 48.8% of the total bird occurrences. The remaining 32 species were classified as urban tolerant, mostly observed in lightly urbanized areas/ urban green areas, and they accounted for 33.4% of the total bird records in the city.

Table A3.1 List of observed bird species and their pattern across urban areas in Dhaka city.

Scientific name	Frequency of occurrence	Relative abundance	Pattern across urban areas	Urban affinity
<i>Corvus splendens</i>	161	0.1997		Urban dependent
<i>Passer domesticus</i>	159	0.1808		Urban exploiter
<i>Acridotheres tristis</i>	98	0.0867		Urban exploiter
<i>Milvus migrans</i>	90	0.0829		Urban exploiter

<i>Gracupica contra</i>	82	0.0533	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant
<i>Pycnonotus cafer</i>	79	0.0308	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant
<i>Copsychus saularis</i>	67	0.0174	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant
<i>Columba livia</i>	57	0.0332	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant
<i>Dicrurus macrocercus</i>	57	0.0172	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant
<i>Apus nipalensis</i>	42	0.0306	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant
<i>Psittacula krameri</i>	32	0.0126	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant
<i>Acridotheres fuscus</i>	26	0.0440	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant
<i>Sturnia malabarica</i>	24	0.0111	<p>Relative abundance</p> <p>Built up:</p>	Urban tolerant

<i>Corvus macrorhynchos</i>	23	0.0059	<p>Bar chart for <i>Corvus macrorhynchos</i>. The y-axis is 'Relative abundance' (0 to 0.025). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.018, 0.015, 0.005, 0.003, and 0.007 respectively.</p>	Urban tolerant
<i>Ardeola grayii</i>	20	0.0075	<p>Bar chart for <i>Ardeola grayii</i>. The y-axis is 'Relative abundance' (0 to 0.06). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.045, 0.005, 0.002, 0.001, and 0.015 respectively.</p>	Urban tolerant
<i>Halcyon smyrnensis</i>	19	0.0038	<p>Bar chart for <i>Halcyon smyrnensis</i>. The y-axis is 'Relative abundance' (0 to 0.014). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.005, 0.011, 0.002, 0.001, and 0.008 respectively.</p>	Urban exploiter
<i>Streptopelia chinensis</i>	18	0.0046	<p>Bar chart for <i>Streptopelia chinensis</i>. The y-axis is 'Relative abundance' (0 to 0.014). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.011, 0.007, 0.001, 0.004, and 0.009 respectively.</p>	Urban tolerant
<i>Orthotomus sutorius</i>	16	0.0028	<p>Bar chart for <i>Orthotomus sutorius</i>. The y-axis is 'Relative abundance' (0 to 0.006). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.005, 0.002, 0.003, 0.004, and 0.001 respectively.</p>	Urban tolerant
<i>Psilopogon haemacephalus</i>	16	0.0028	<p>Bar chart for <i>Psilopogon haemacephalus</i>. The y-axis is 'Relative abundance' (0 to 0.005). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.0015, 0.001, 0.0045, 0.003, and 0.0035 respectively.</p>	Urban exploiter
<i>Cypsiurus balasiensis</i>	15	0.0081	<p>Bar chart for <i>Cypsiurus balasiensis</i>. The y-axis is 'Relative abundance' (0 to 0.03). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.01, 0.028, 0.002, 0.003, and 0.015 respectively.</p>	Urban exploiter
<i>Eudynamys scolopaceus</i>	15	0.0027	<p>Bar chart for <i>Eudynamys scolopaceus</i>. The y-axis is 'Relative abundance' (0 to 0.014). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.011, 0.001, 0.003, 0.001, and 0.002 respectively.</p>	Urban tolerant
<i>Oriolus xanthornus</i>	14	0.0027	<p>Bar chart for <i>Oriolus xanthornus</i>. The y-axis is 'Relative abundance' (0 to 0.008). The x-axis is 'Built up:' with categories: below 30%, 30 to 50%, 51 to 80%, above 80%, and Green. The bars show relative abundances of approximately 0.006, 0.001, 0.002, 0.001, and 0.006 respectively.</p>	Urban tolerant

<i>Dinopium benghalense</i>	10	0.0015	<p>Dinopium benghalense</p>	Urban exploiter
<i>Dendrocopos macei</i>	9	0.0012	<p>Dendrocopos macei</p>	Urban exploiter
<i>Egretta garzetta</i>	8	0.0038	<p>Egretta garzetta</p>	Urban exploiter
<i>Microcarbo niger</i>	8	0.0032	<p>Microcarbo niger</p>	Urban tolerant
<i>Alcedo atthis</i>	8	0.0014	<p>Alcedo atthis</p>	Urban tolerant
<i>Haliastur indus</i>	7	0.0012	<p>Haliastur indus</p>	Urban exploiter
<i>Aegithina tiphia</i>	6	0.0011	<p>Aegithina tiphia</p>	Urban tolerant
<i>Lanius schach</i>	5	0.0005	<p>Lanius schach</p>	Urban tolerant
<i>Motacilla madaraspatensis</i>	4	0.0009	<p>Motacilla madaraspatensis</p>	Urban tolerant

<i>Artamus fuscus</i>	3	0.0013	<p>Bar chart for <i>Artamus fuscus</i>. Y-axis: Relative abundance (0 to 0.005). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at 30 to 50% (approx. 0.0045).</p>	Urban tolerant
<i>Pycnonotus jocosus</i>	3	0.0003	<p>Bar chart for <i>Pycnonotus jocosus</i>. Y-axis: Relative abundance (0 to 0.0007). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at 51 to 80% (approx. 0.0006).</p>	Urban tolerant
<i>Cinnyris asiaticus</i>	2	0.0005	<p>Bar chart for <i>Cinnyris asiaticus</i>. Y-axis: Relative abundance (0 to 0.0016). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at above 80% (approx. 0.0014).</p>	Urban tolerant
<i>Leptocoma zeylonica</i>	2	0.0003	<p>Bar chart for <i>Leptocoma zeylonica</i>. Y-axis: Relative abundance (0 to 0.001). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at above 80% (approx. 0.0009).</p>	Urban tolerant
<i>Merops orientalis</i>	2	0.0003	<p>Bar chart for <i>Merops orientalis</i>. Y-axis: Relative abundance (0 to 0.0007). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at above 80% (approx. 0.0006).</p>	Urban tolerant
<i>Prinia inornata</i>	2	0.0003	<p>Bar chart for <i>Prinia inornata</i>. Y-axis: Relative abundance (0 to 0.002). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at 51 to 80% (approx. 0.0018).</p>	Urban tolerant
<i>Psittacula eupatria</i>	2	0.0003	<p>Bar chart for <i>Psittacula eupatria</i>. Y-axis: Relative abundance (0 to 0.0016). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at above 80% (approx. 0.0014).</p>	Urban tolerant
<i>Streptopelia decaocto</i>	2	0.0003	<p>Bar chart for <i>Streptopelia decaocto</i>. Y-axis: Relative abundance (0 to 0.0016). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at above 80% (approx. 0.0014).</p>	Urban tolerant
<i>Euodice malabarica</i>	1	0.0075	<p>Bar chart for <i>Euodice malabarica</i>. Y-axis: Relative abundance (0 to 0.045). X-axis: below 30%, 30 to 50%, 51 to 80%, above 80%, Green. The highest bar is at 51 to 80% (approx. 0.04).</p>	Urban tolerant

<i>Ardea intermedia</i>	1	0.0009	<p>Relative abundance</p> <p>Built up: below 30% 30 to 50% 51 to 80% above 80% Green</p>	Urban tolerant
<i>Athene brama</i>	1	0.0002	<p>Relative abundance</p> <p>Built up: below 30% 30 to 50% 51 to 80% above 80% Green</p>	Urban tolerant
<i>Megalurus palustris</i>	1	0.0002	<p>Relative abundance</p> <p>Built up: below 30% 30 to 50% 51 to 80% above 80% Green</p>	Urban tolerant
<i>Pelargopsis capensis</i>	1	0.0002	<p>Relative abundance</p> <p>Built up: below 30% 30 to 50% 51 to 80% above 80% Green</p>	Urban tolerant
<i>Amaurornis phoenicurus</i>	1	0.0001	<p>Relative abundance</p> <p>Built up: below 30% 30 to 50% 51 to 80% above 80% Green</p>	Urban tolerant
<i>Dendrocitta vagabunda</i>	1	0.0001	<p>Relative abundance</p> <p>Built up: below 30% 30 to 50% 51 to 80% above 80% Green</p>	Urban tolerant
<i>Geokichla citrina</i>	1	0.0001	<p>Relative abundance</p> <p>Built up: below 30% 30 to 50% 51 to 80% above 80% Green</p>	Urban tolerant
<i>Upupa epops</i>	1	0.0001	<p>Relative abundance</p> <p>Built up: below 30% 30 to 50% 51 to 80% above 80% Green</p>	Urban tolerant

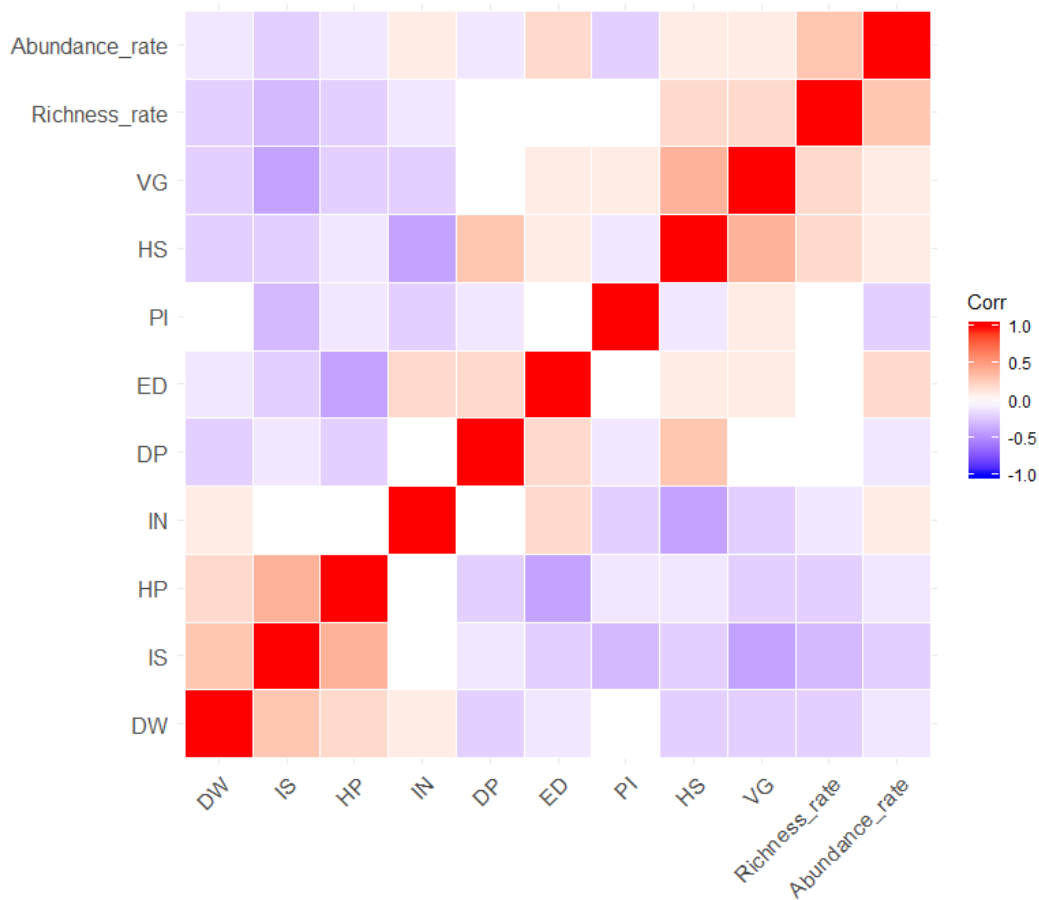


Figure A3.1. Visualisation of correlation matrix among the variables using hierarchical clustering. Here, IS = percentage of impervious surface, HS = habitat Shannon metric representing habitat heterogeneity, DP = distance to nearest parks DW = distance to nearest waterbody, VG = percentage of vegetation, HP = human population (number per hectare), PI = poverty index ratio, IN= household income (in USD), ED = Percentage of people with higher education.

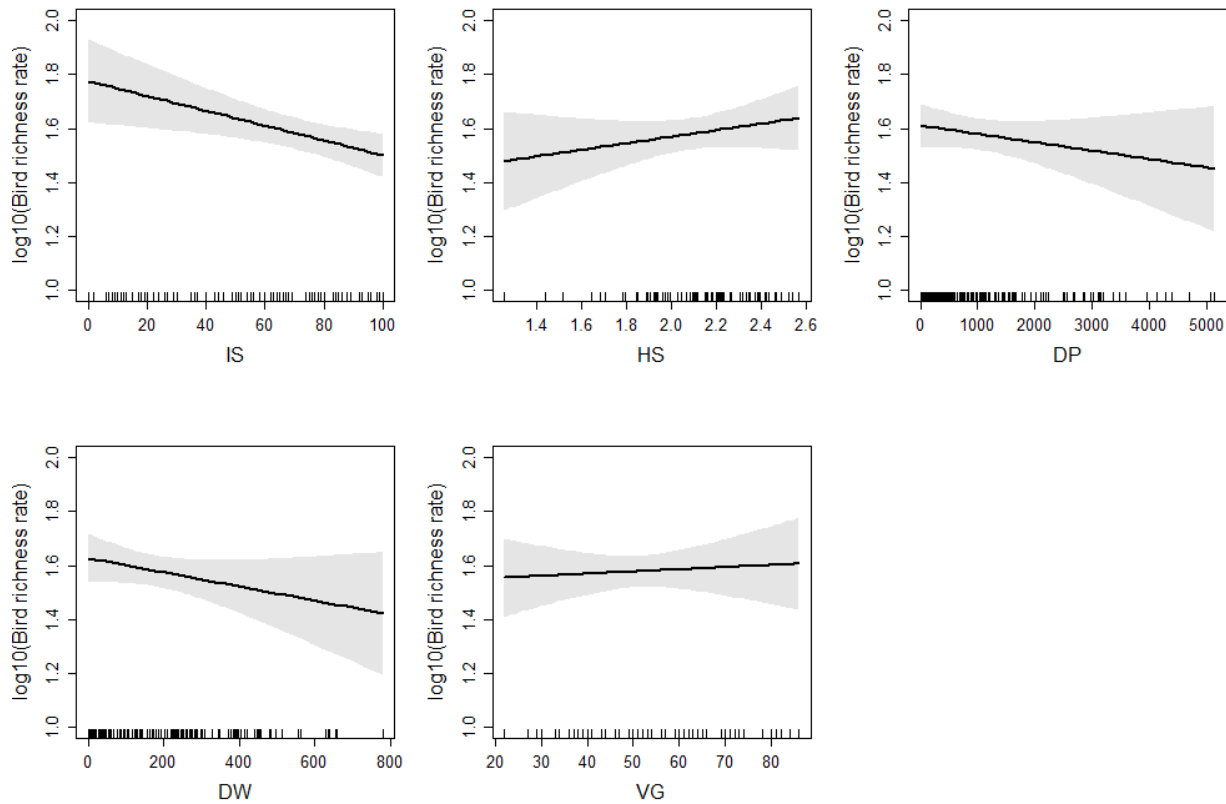


Figure A3.2 Fitted relationship of bird richness rate with different urban land cover variable in the top ranked model. Here, IS = percentage of impervious surface, HS = habitat Shannon metric representing habitat heterogeneity, DP = distance to nearest parks (in meter), DW = distance to nearest waterbody sites (in meter), VG = percentage of vegetation.

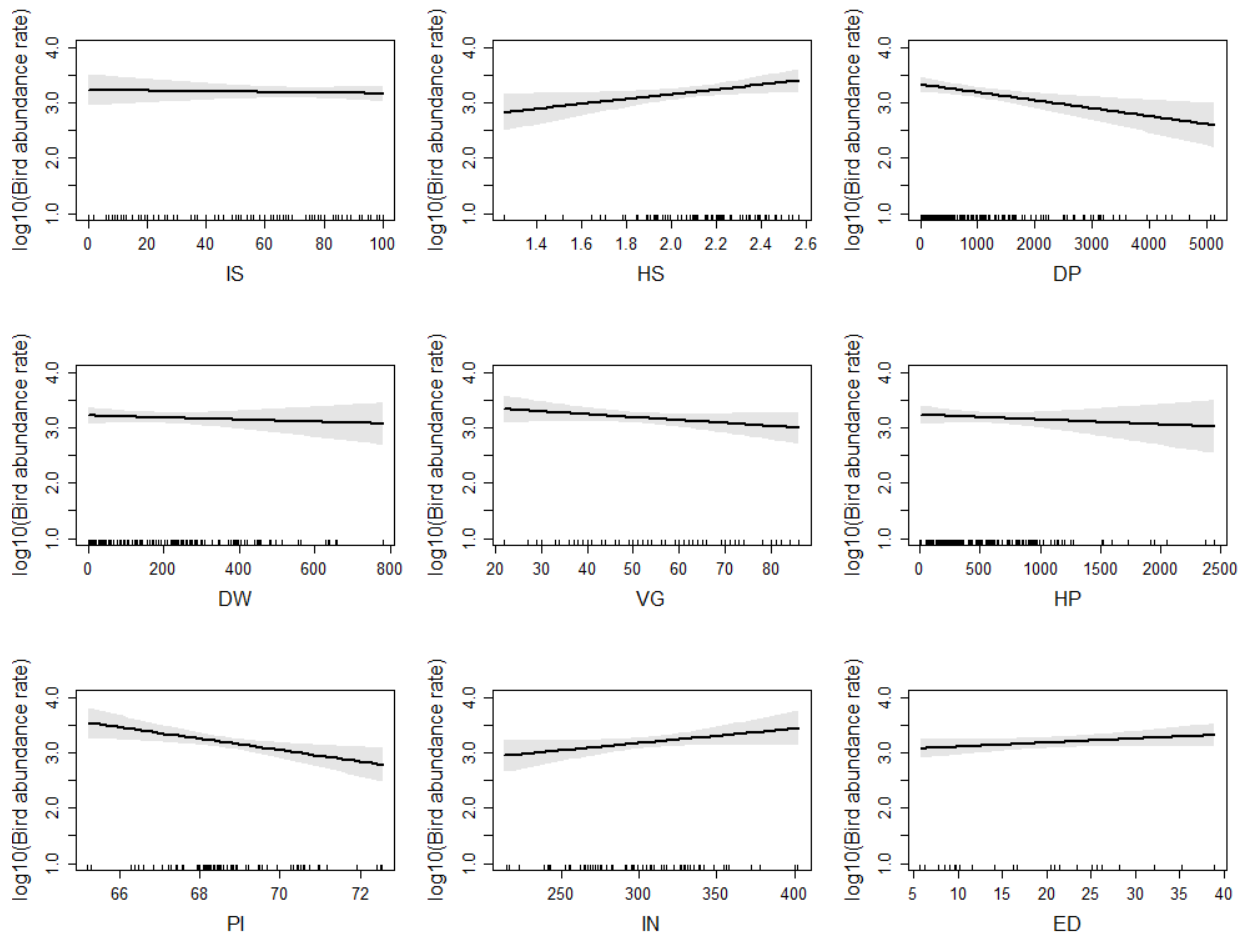


Figure A3.3 Fitted relationship of bird abundance rate with different variables related to land cover and socioeconomic status in the top ranked model. Here, IS = percentage of impervious surface, HS = habitat Shannon metric representing habitat heterogeneity, DP = distance to nearest parks, DW = distance to nearest waterbody, VG = percentage of vegetation, HP = human population (number per hectare), PI = poverty index ratio, IN= household income (in USD), ED = Percentage of people with higher education.