Supplementary Information for "Assessment of NO_2 purification by urban forests based on the i-Tree Eco model: Case study in Beijing, China"

Figure:

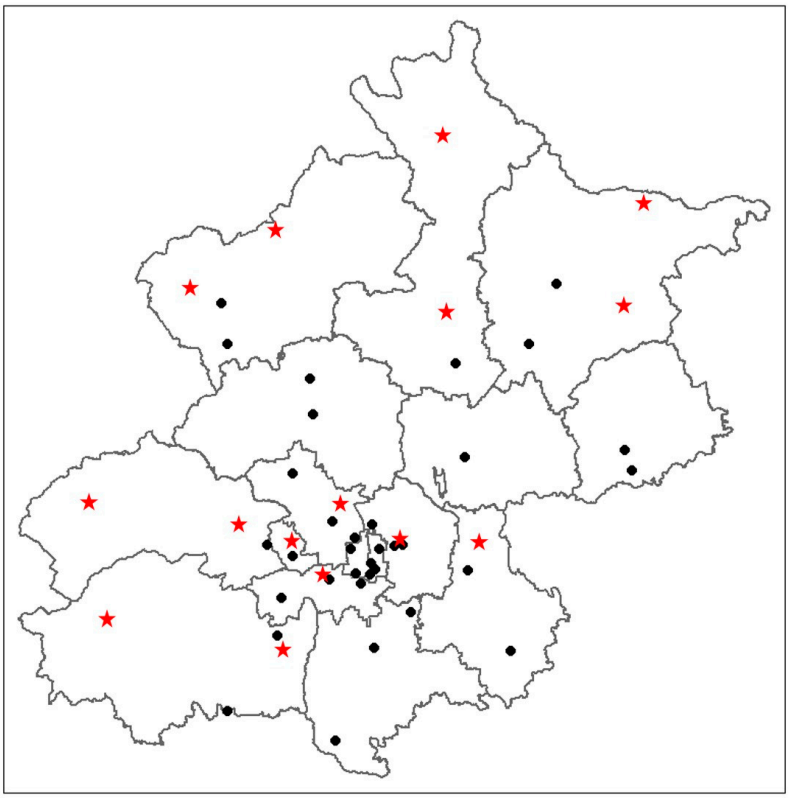

Figure S1. Air pollutants monitor stations and meteorological stations in 16 districts of Beijing. (Dot: location of air pollutants monitor station, Star: location of meteorological station.)

Table:

Table S1 Previous studies on the effects of urban forests on air quality.

Study area	Method	Air pollutants	Study period	Sources
Beijing, China	UFORE	NO_2/O_3/ SO_2/PM_{10}	1 year	Yang et al. (2005)

United States	UFORE	$NO_2/O_3/SO_2/CO/PM_{10}$	1 year	Nowak et al. (2006)
Santiago, Chile	i-Tree Eco	$NO_2/O_3/SO_2/CO/PM_{10}$	2 year	Escobedo and Nowak (2009)
Baltimore, MD, US	i-Tree Eco	NO_2	1 year	Cabaraban et al. (2013)
United States	i-Tree Eco	$NO_2/O_3/SO_2/PM_{2.5}$	1 year	Hirabayashi and Nowak (2016)
Shenzhen, China	i-Tree Eco	$PM_{2.5}$	1 year	Wu et al. (2019)
Tabriz, Iran	i-Tree Eco	$NO_2/O_3/SO_2/CO/PM_{10}$	1 year	Parsa et al. (2019)

Table S2. The area of 16 districts in Beijing

District name	Urban/Suburban	Area (km^2)[1]
DongCheng (DC)	Urban	41.84
Xicheng (XC)	Urban	50.70
Chaoyang (CY)	Urban	470.80
Haidian (HD)	Urban	430.77
Fengtai (FT)	Urban	306.00
Shijingshan(SJ)	Urban	85.74
Shunyi(SY)	Suburban	1021.00
Tongzhou(TZ)	Suburban	1193.95
Daxing (DX)	Suburban	1036.33
Fangshan (FS)	Suburban	2019.00
Mentougou (MT)	Suburban	1447.85
Changping(CP)	Suburban	1343.50
Pinggu(PG)	Suburban	948.24
Miyun(MY)	Suburban	2229.45
Huairou(HR)	Suburban	2122.80
Yanqing(YQ)	Suburban	1994.88

1 The area data were acquired from Beijing Municipal Bureau Statistics (Beijing Municipal Bureau Statistics, 2020).

Table S3: NO_2 deposition velocity for three forest types (m/s)

Type of vegetation	Mean	S.D.	Max	Min
Evergreen forest	0.0016	0.0011	0.0029	0.0002
deciduous forest	0.0023	0.0016	0.004	0.0002
Mix forest	0.0016	0.0013	0.0034	0.0002

Table S4: Model selection using a backward procedure based on AICc , VIF, and adjusted r square of the best set of explanatory factors explaining the variation of NO_2 removal capacity.

Models		Model 1 (green-only)	Model 2 (envir)	Model 3 (eco)	Model 4 (energy)	Model 5 (full)	Model 6 (final)
Model parameters	Max VIF	1.89	13.40	21.97	57.91	106.24	4.81
	Adj.r^2	0.59	0.63	0.71	0.78	0.81	0.77
	AICc	192.07	188.09	171.03	151.71	137.89	146.06
	ΔAICc	54.18	50.20	33.14	13.82	0.00	8.17
Environment	Green						
	NO_2						
	PM						
	$PM_{2.5}$						
	SO_2						
Economic	Exp-Envir						
	PCDI						
	TVSRC						
	GDPB						
	$GDPB^2$						
	GDPI						
	GDP						
Energy	CARS						
	ELC						
	TEC						
Population	Pop						
	Pop-Den						

(Model 1 included only green cover and NO_2 concentrations (green-only model). Model 2 included predictors of Model 1 and environmental factors (environmental model). Model 3 included predictors of Model 2 and economic factors (economic model). Model 4 included predictors of Model 3 and energy consumption factors (energy model). Model 5 is the full model, including predictors of model 4 and population factors. Predictors are: green cover (Green), NO_2 concentrations (NO_2), Particle matter concentration (PM), Fine particle matter concentration ($PM_{2.5}$), SO_2 concentration, environmental protection expenditure (Exp-Envir, log transformed), per

capita disposable income (PCDI), total retail sales of consumer goods (TVSRC), GDP, GDP of industry (GDPI), GDP of construction (GDPB, $GDPB^2$), car ownership (CARS), total electricity consumption (ELC), total energy consumption (TEC), population (Pop), population density (Pop-Den, log transformed). The factors included in the models are presented with different colors. Pink grids represent environmental factors, light green grids represent economic factors, light blue grids represent energy factors, red grids represent population factors, dark slash grids represent factors excluded from each model.)

Table S5. Model averaging of the final best models within a ΔAICc < 5 (See model 6 in Table S3) for NO_2 removal capacity.

Models		Subset 1	Subset 2	Subset 3	Subset 4
Model parameters	Weight	0.60	0.22	0.12	0.06
	AICc	144.08	146.06	147.27	148.60
	ΔAICc	0.00	1.98	3.19	4.52
Environment	Green				
	NO_2				
	PM				
	$PM_{2.5}$				
	SO_2				
Economic	Exp-Envir				
	PCDI				
	TVSRC				
	GDPB				
	$GDPB^2$				
	GDPI				
	GDP				
Energy	CARS				
	ELC				
	TEC				
Population	Pop				
	Pop-Den				

(The factors included in the models are presented with different colors. Check abbreviations and colors in Table S3.)

Table S6 The scores of explanatory factors on the principal components

		PC1	PC2	PC3
Components	Eigenvalue	7.053	2.293	2.080
	Proportion Explained	0.504	0.164	0.149
	Cumulative	0.504	0.668	0.816
Scores of factors	Absorb NO_2	-0.933	0.787	-0.622
	GDP	1.511	-0.228	-0.083
	Population	1.459	0.375	0.025

	TVSRC	1.543	-0.077	-0.019
	GDP-I	0.909	0.798	-0.335
	GDP-B	1.366	-0.126	0.086
	Pop-Den	0.808	-0.968	0.603
	Exp-env	0.670	0.836	-0.582
	PCDI	1.024	-1.104	-0.257
	TEC	1.047	0.812	-0.328
	ELC	1.517	0.351	-0.166
	CARS	1.563	-0.045	0.116
	SO_2	0.048	0.693	1.413
	PM	0.167	0.621	1.411

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