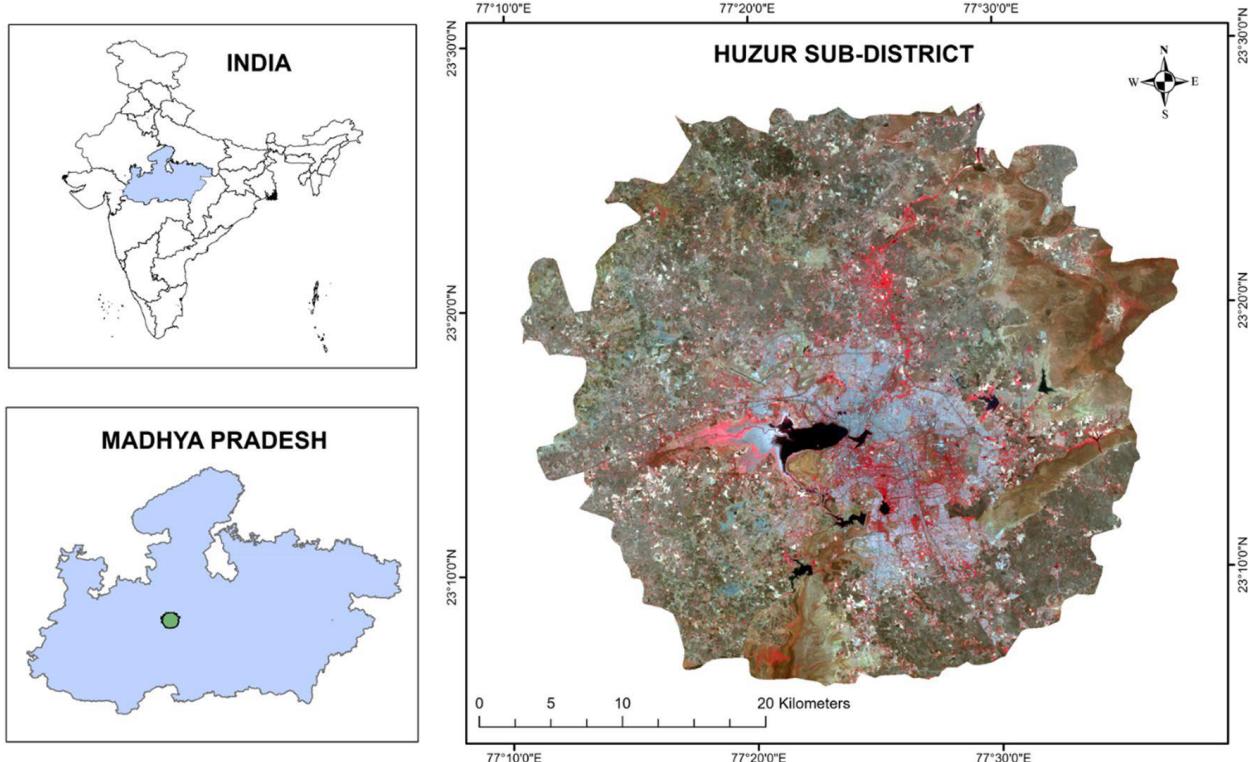


Fig. 1 Location map of the Bhopal City in Hazur Tehsil



Monthly Mean Temperature Profile Over Bhopal City

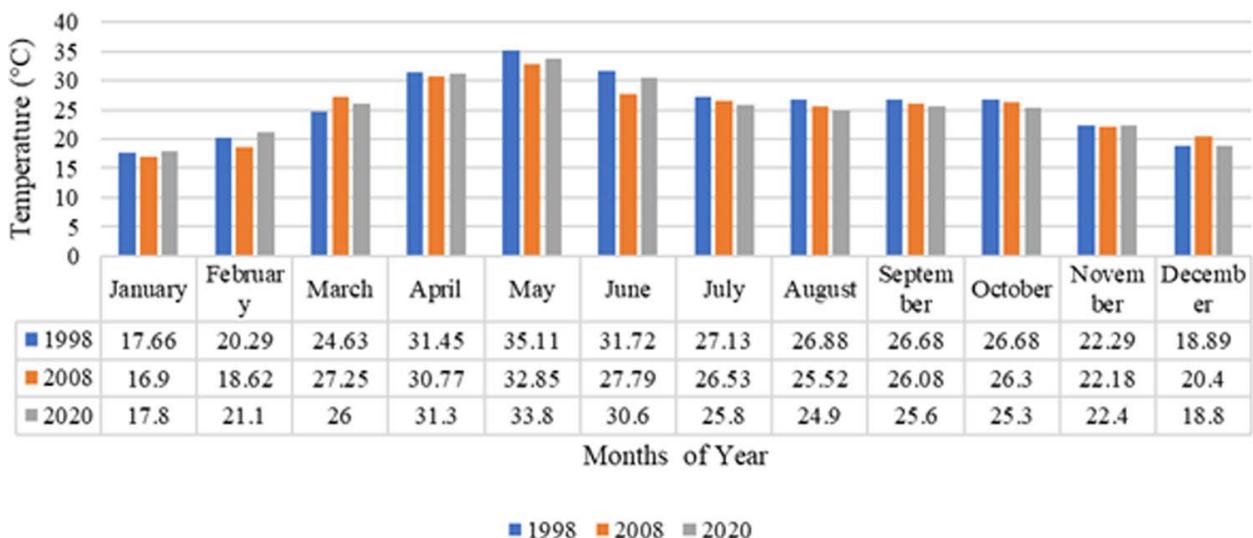


Fig. 3 Wind rose profile over the Bhopal city for May 2020

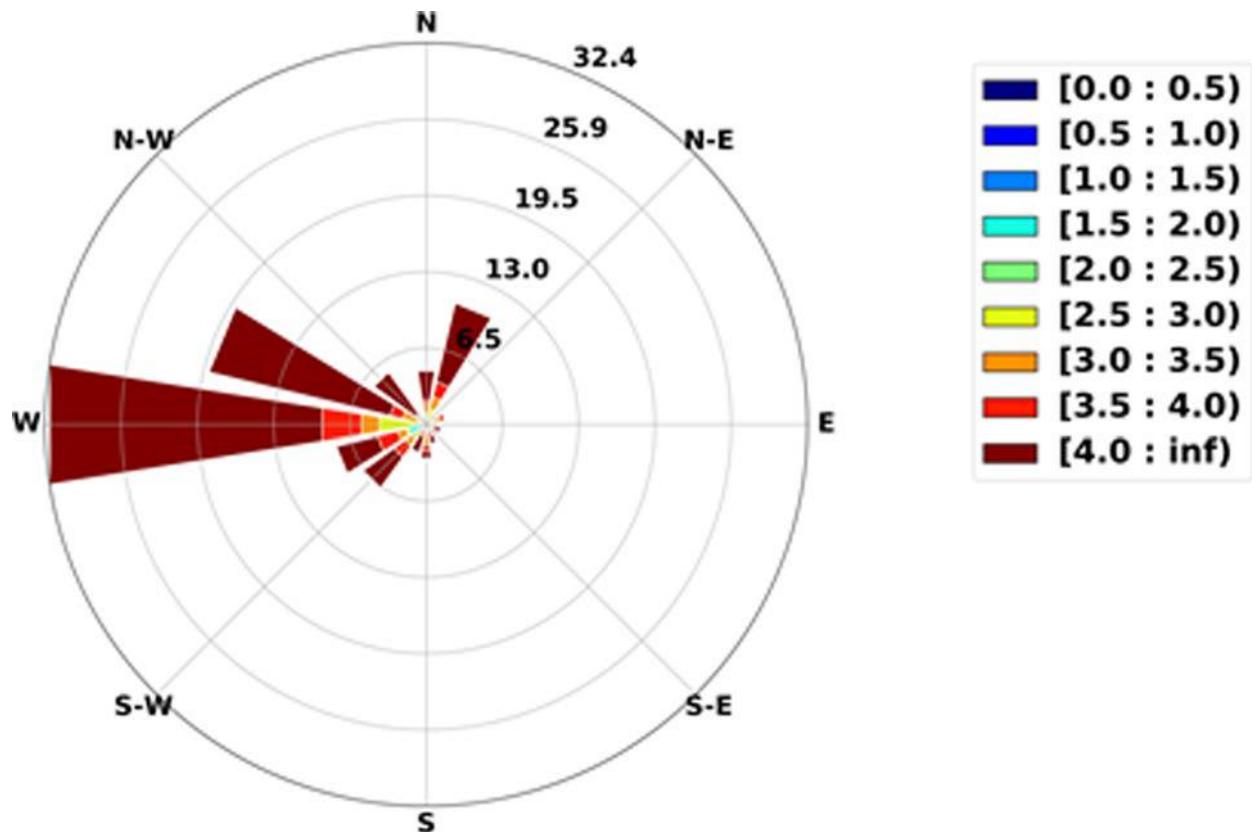
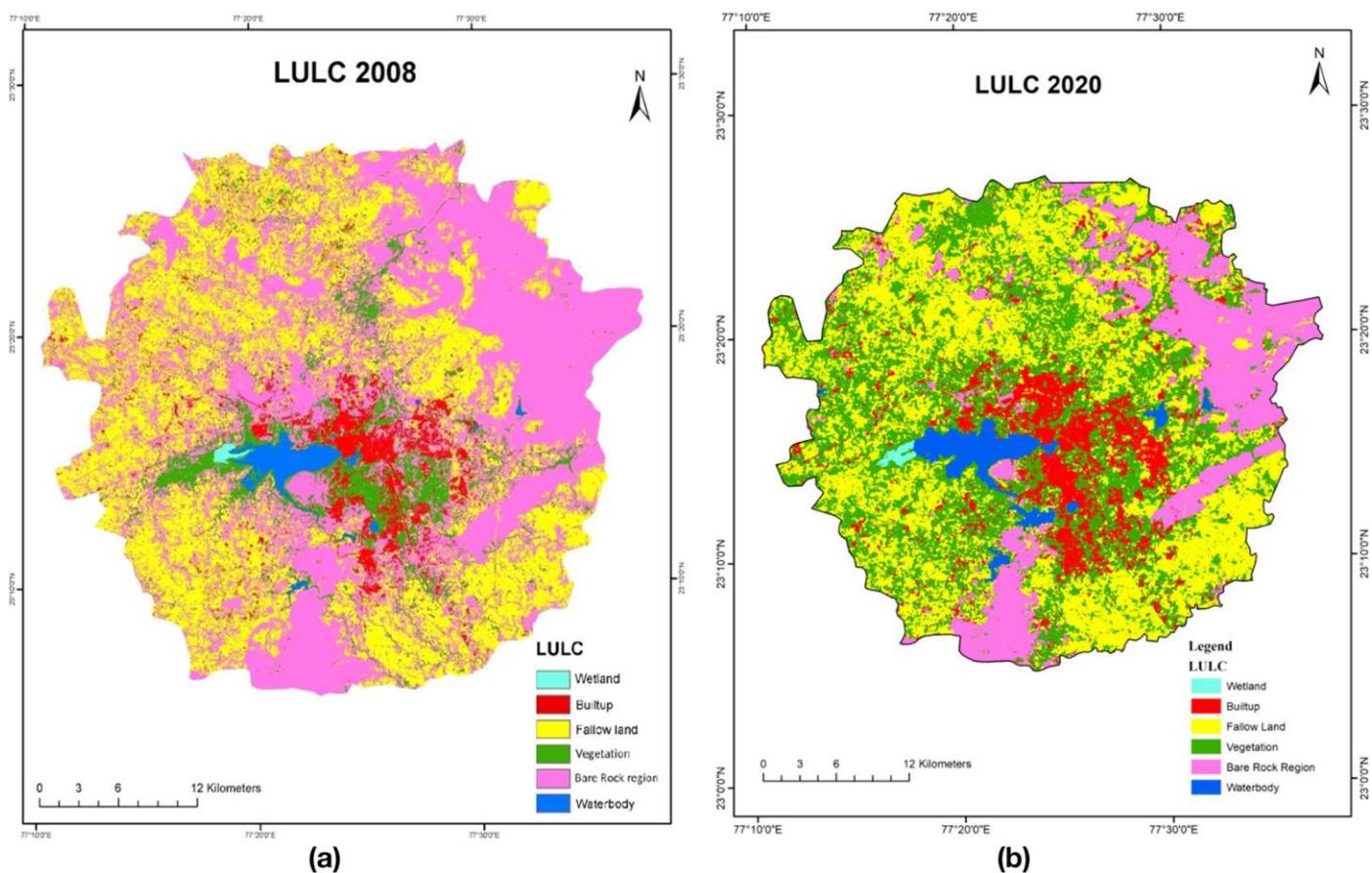


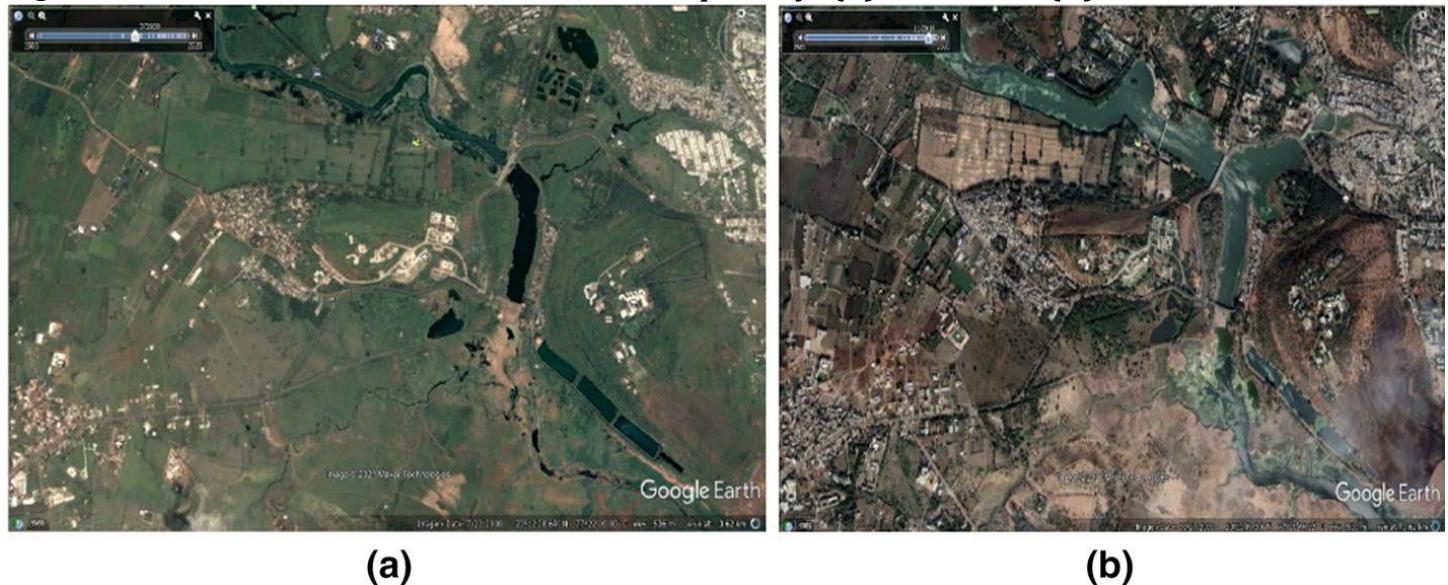
Fig. 5 LULC of Bhopal city and its surrounding for the year, a 2008 and b 2020

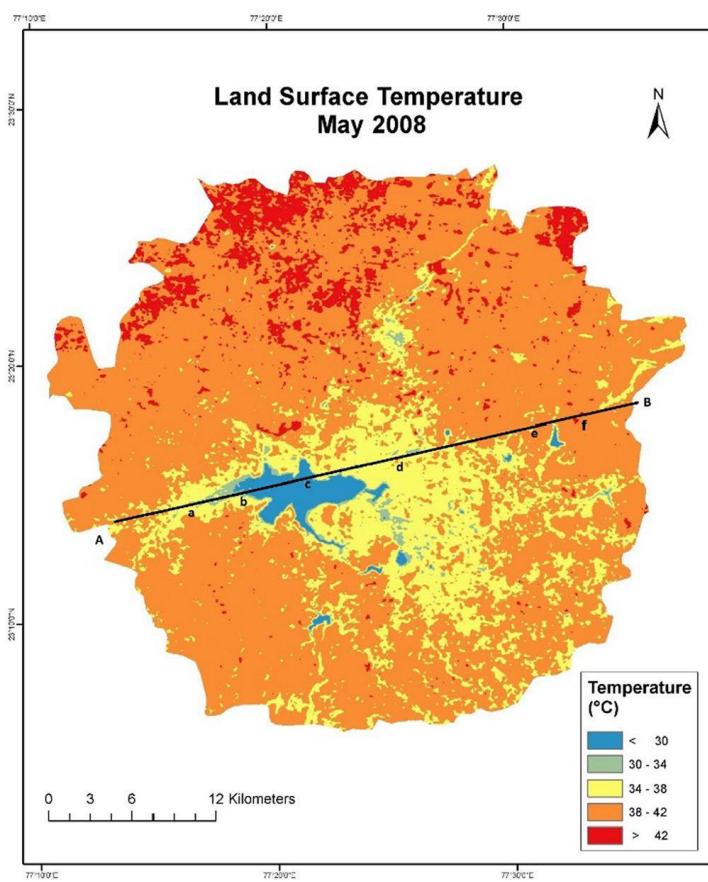


LULC	2008		2020		Change (2008–2020)	
	km ²	%	km ²	%	km ²	%
Wetland	11.9	0.90	9.12	0.68	- 2.71	- 0.66
Built-up land	163.48	12.33	330.22	24.90	166.74	12.57
Waterbody	25.57	1.93	37.45	2.82	11.88	0.90
Bare Rocky	570.92	43.06	261.03	19.68	- 309.89	- 22.92
Fallow land	439.54	33.15	362.08	27.31	- 77.46	- 5.84
Vegetation	114.59	8.64	326.1	24.59	211.51	15.95
Total area	1326		1326			

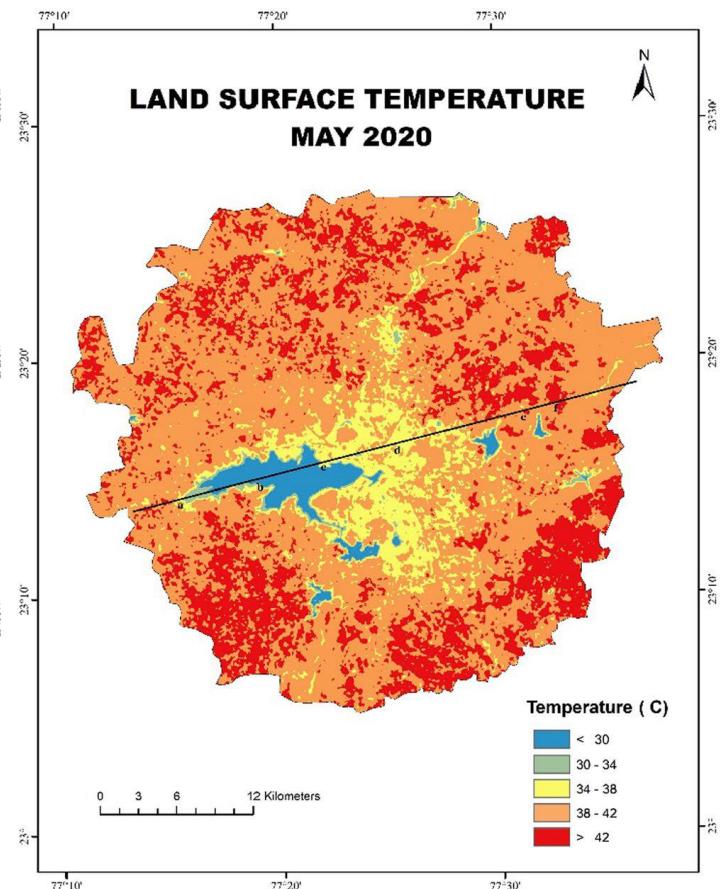
Table 3 Land use/land cover change dynamics in 2008 and 2020

Fig. 6 Increase of wetland area over the Bhopal city, (a) 2008 and (b) 2020



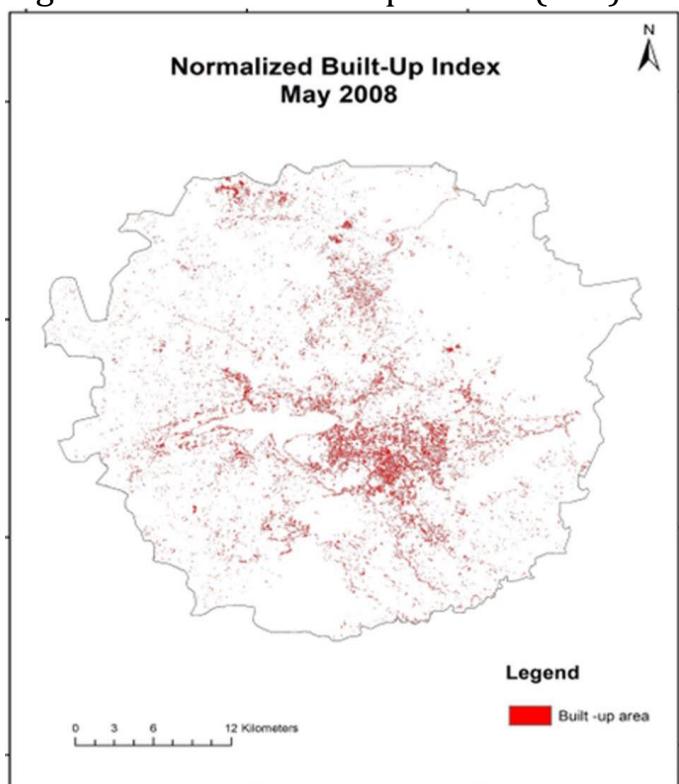


(a)

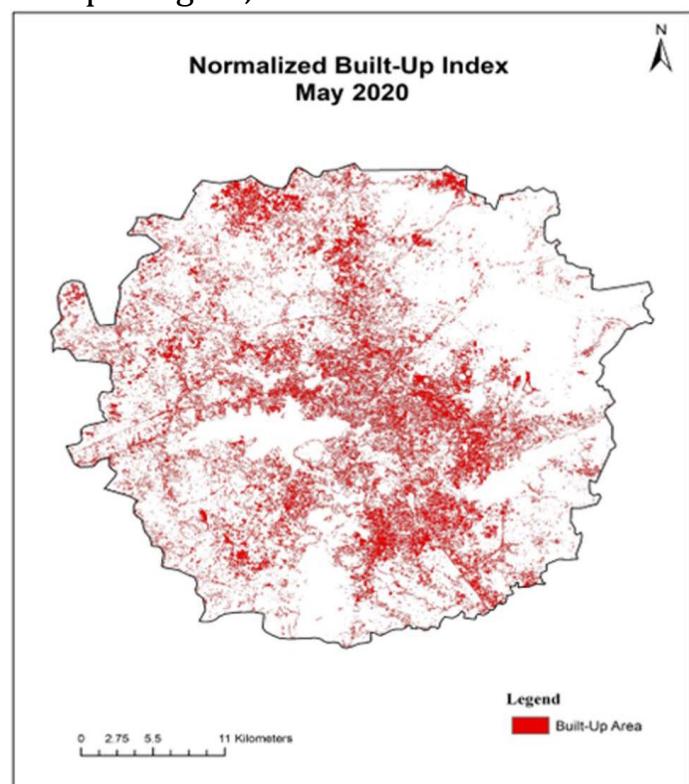


(b)

Fig. 7 Land Surface Temperature (LST) over the Bhopal region, a. 2008 and b. 2020

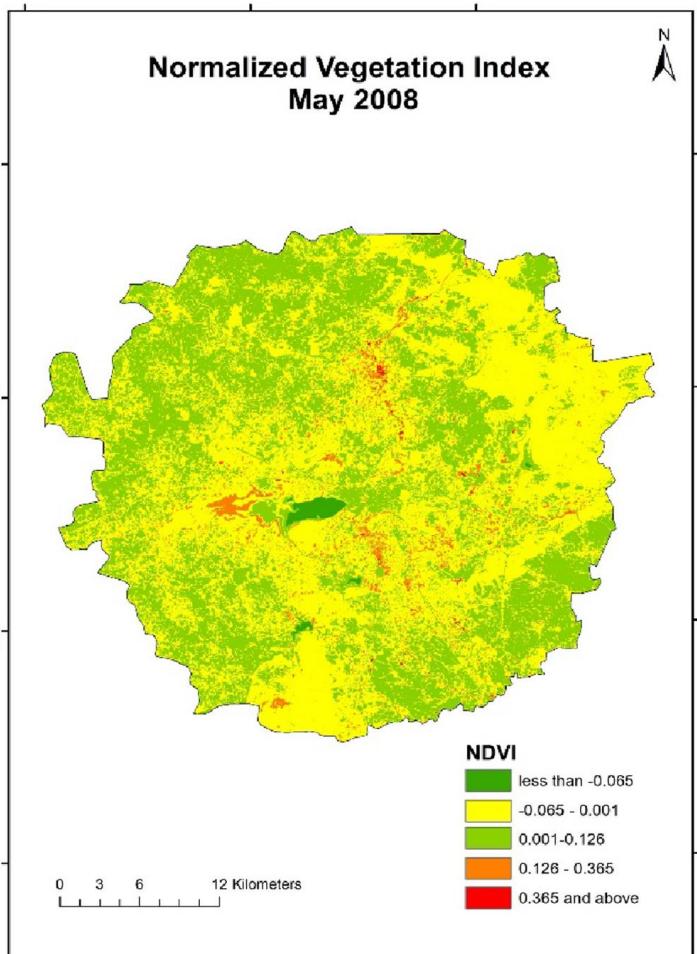


A1

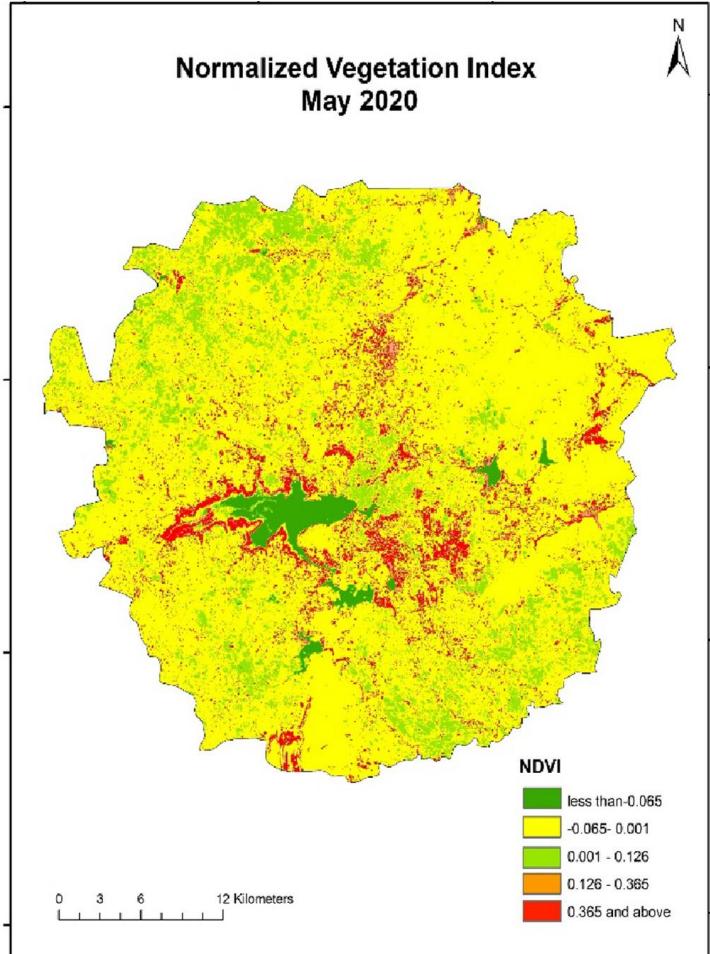


A2

Fig. 8 Change in NDBI over Bhopal region (A) and (B) degree of association for 2008 and 2020

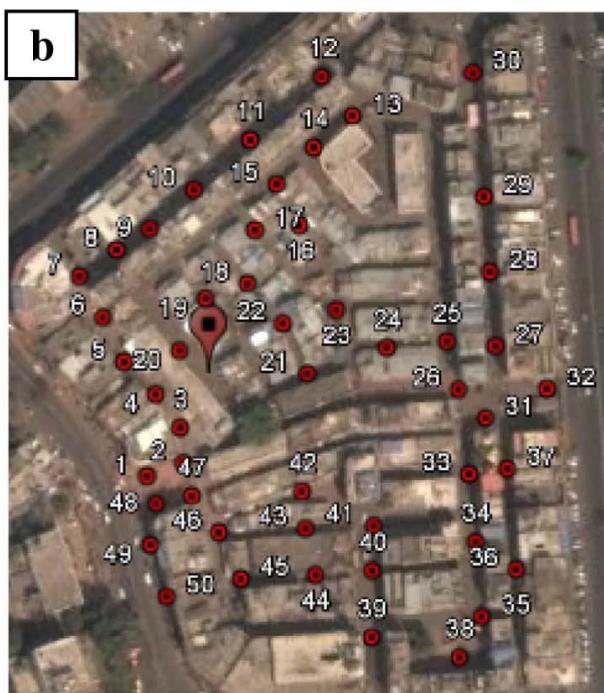
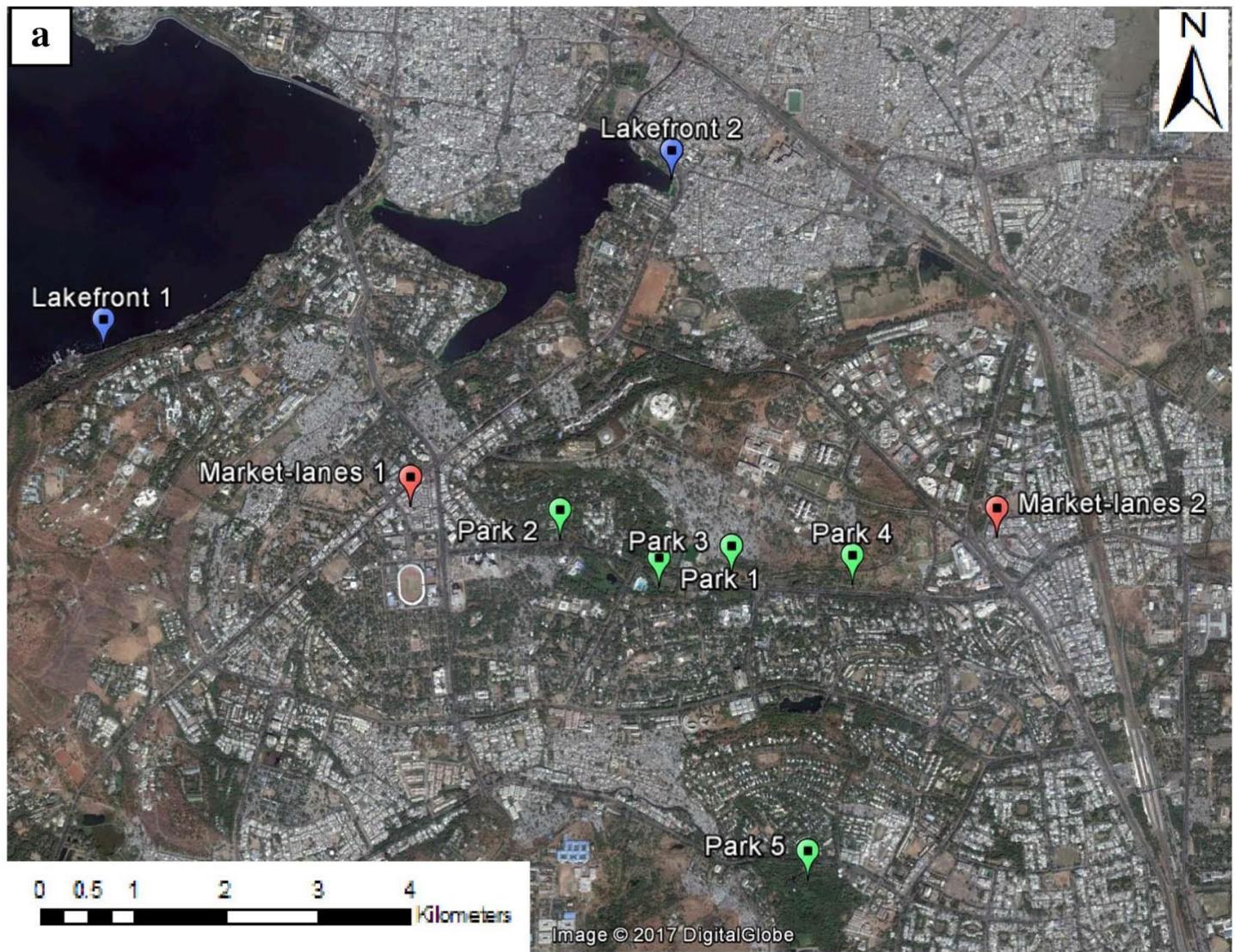


A1



A2

Fig. 9 Change in NDVI over Bhopal region (A) and (B) degree of association for 2008 and 2020



(A) Map of survey locations. (B) Measurement points (> 10 m apart) in lanes of one of the markets. (C) Measurement points (> 10 m apart) in one of the parks

Table 1

Thermal perception classification for (Sub) tropical region (°C).

Source: Lin and Matzarakis, 2008

Thermal perception	Thermal perception classification for tropical region (°C)
Very cold	< 14
Cold	14–18
Cool	18–22
Slightly cool	22–26
Neutral	26–30
Slightly warm	30–34
Warm	34–38
Hot	38–42
Very hot	> 42

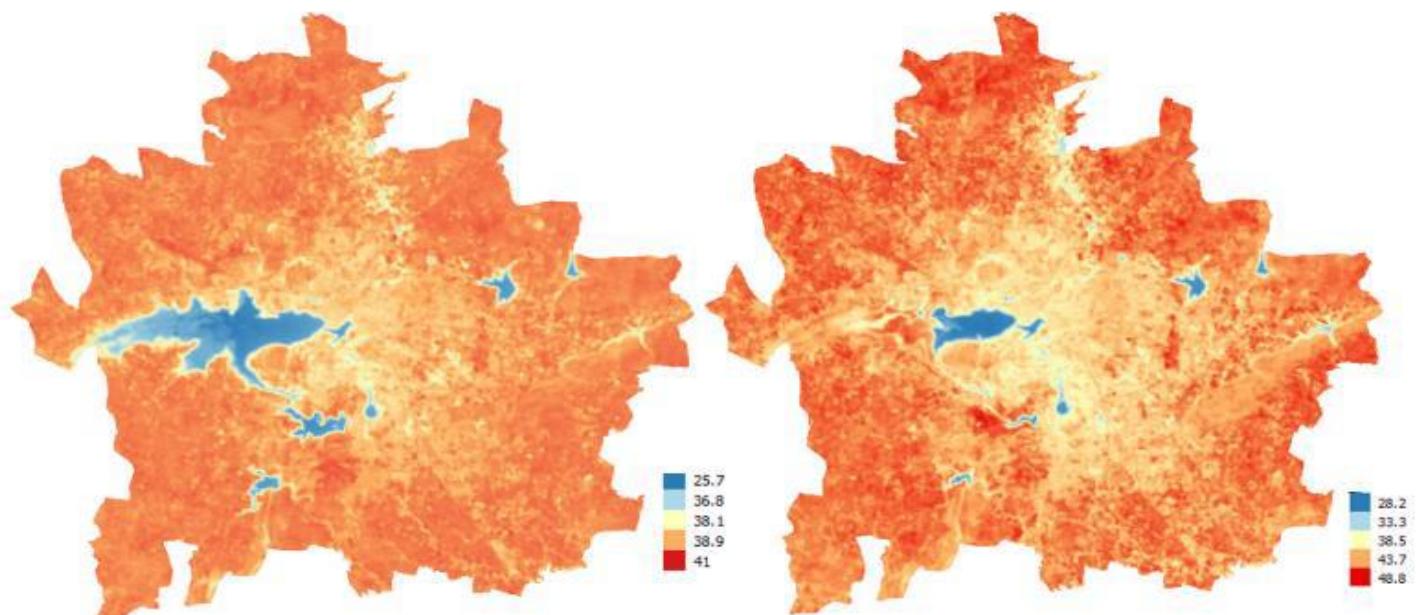


Figure 3 Left: LST in 2014 Right: LST in 2019



Figure 5 Reduction in the upper lake area Left: June 2014 Right: June 2019

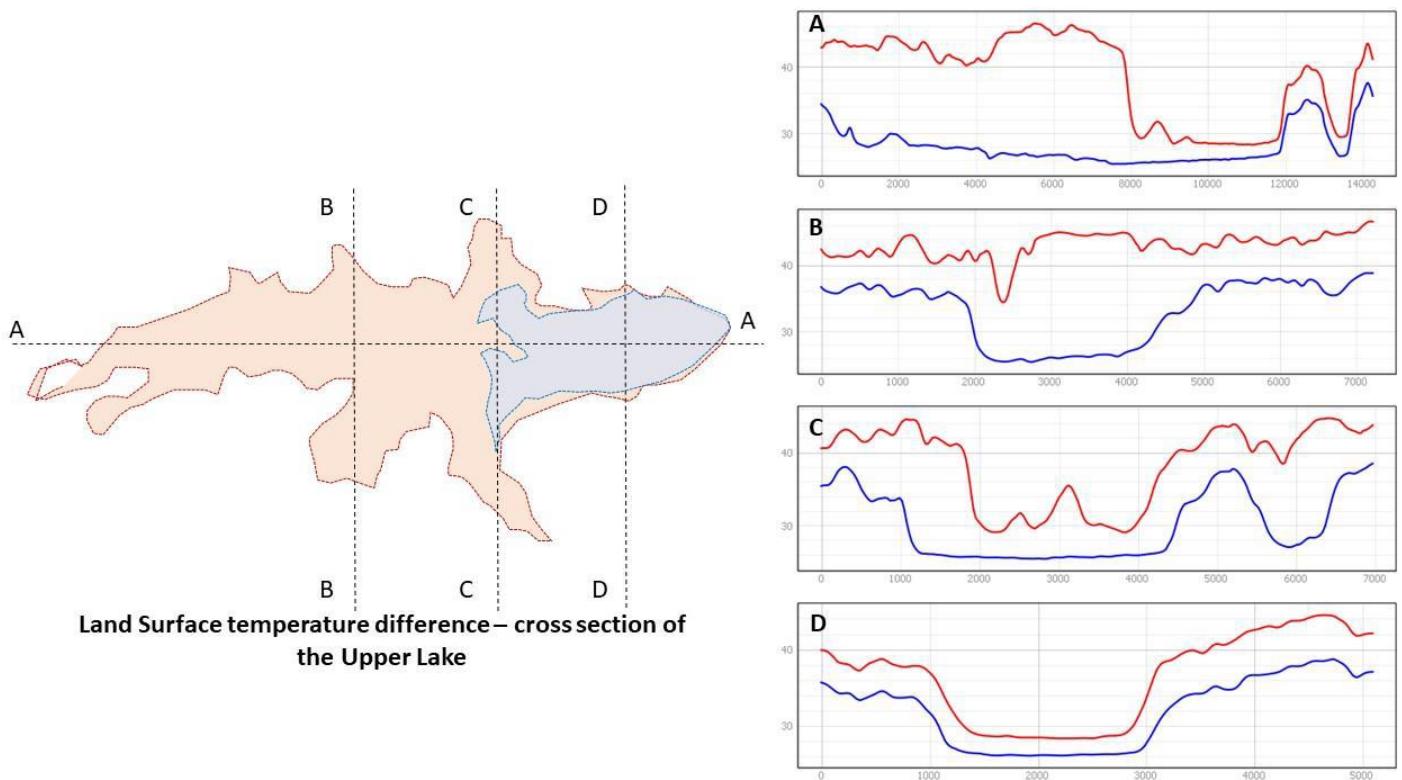


Figure 6 LST distribution across cross-sections

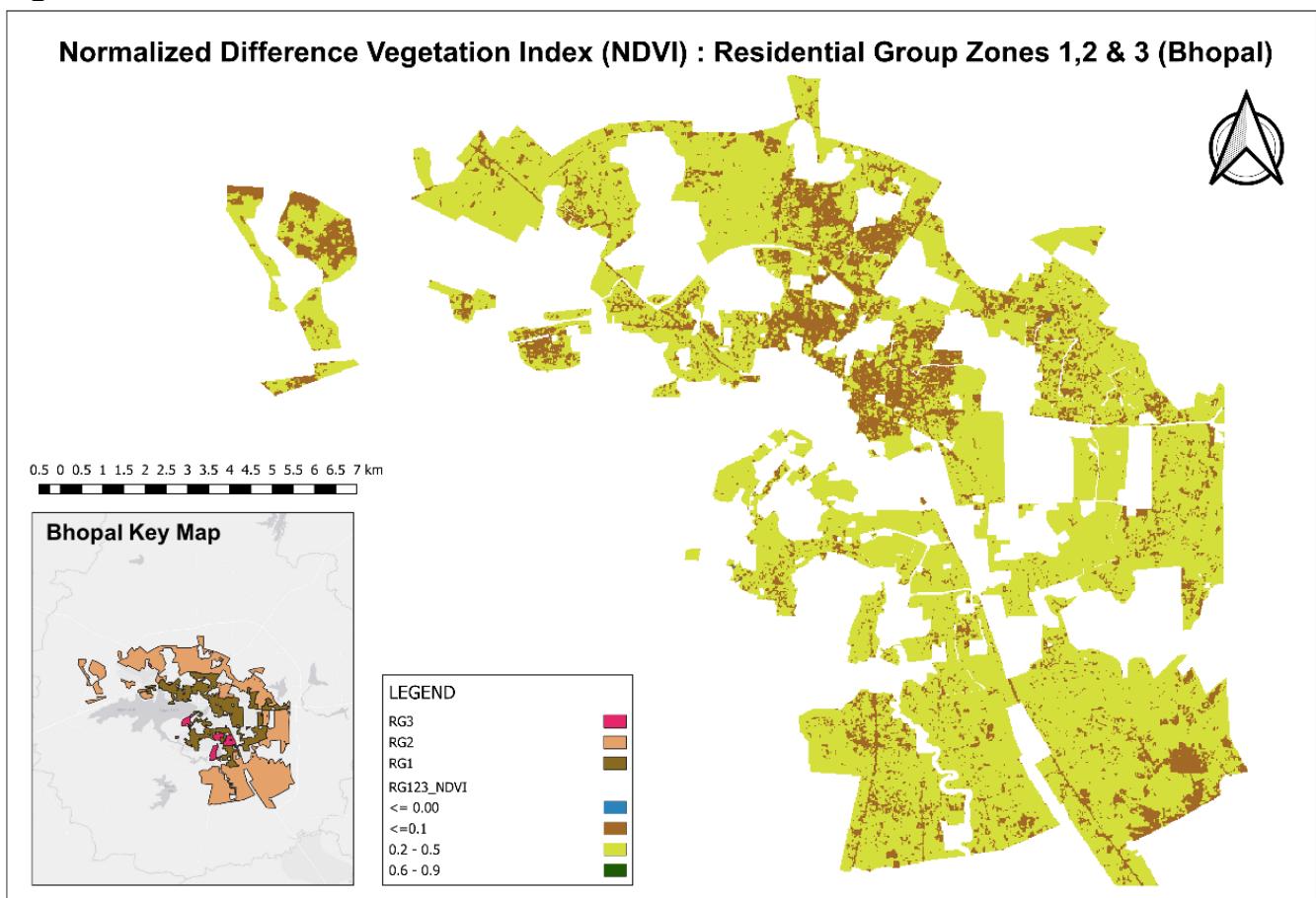


Figure 7: Normalized Difference Vegetation Index (NDVI) of RG- 1,2 &3

VALUE	SIGNIFICANCE
0 or less	Water bodies and wetlands
0.1 or less	Areas of barren rock, sand, or snow
0.2 to 0.5	sparse vegetation, including grasslands and shrubs, or senescent crops
0.6 to 0.9	Dense vegetation (found in temperate and tropical forests or crops at their peak growth stage)

Table 1: Classification of NDVI, source: (USGS 2019)

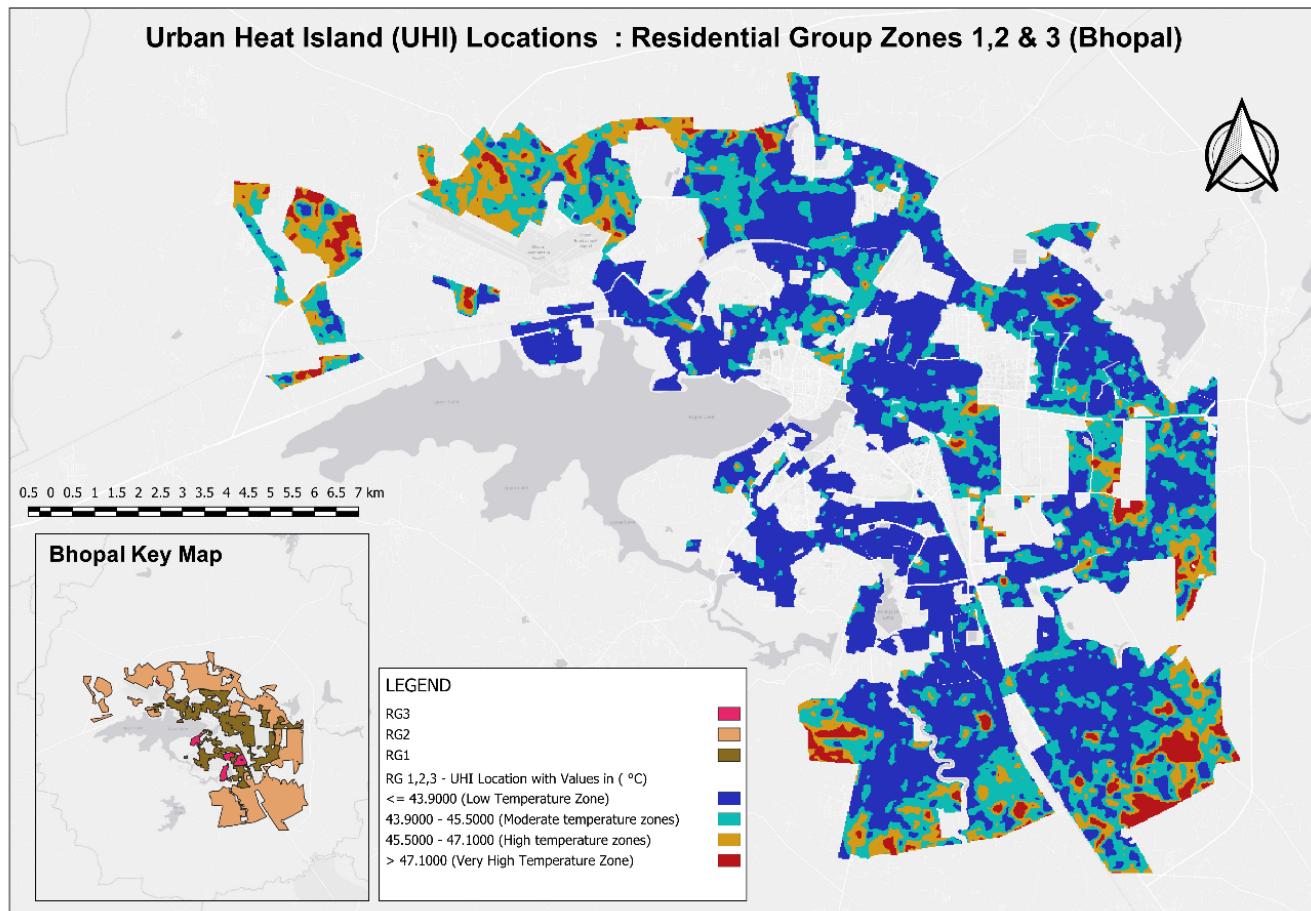


Figure 10: Urban Heat Island (UHI) Locations of RG-1, 2, &3

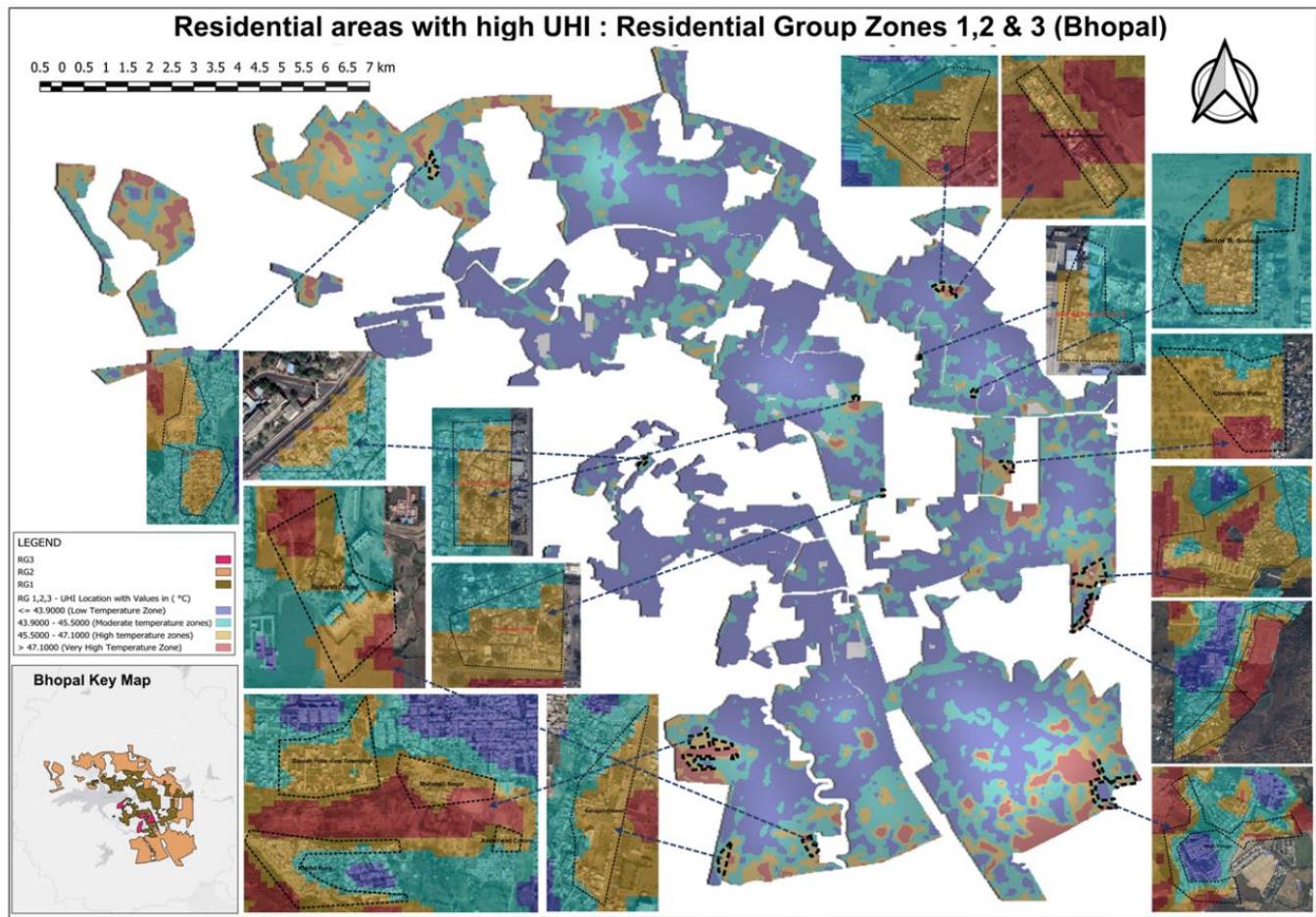


Figure 11: Residential areas with high UHI in RG zone-1, 2 & 3.

ID	NAME	RG	WAR D No	UHI Zone	Dense Built-up	Poor Vegetation	Dark Roof	Low Albedo Surfaces	Vehicular Congestion	Near Industrial Area
1	Banganga Slums	1	24	High Temperature zone	✓	✓	✓	✓		
2	Slum Area, Anna nagar	1	59	High Temperature zone	✓	✓	✓	✓	✓	
3	Neeraja Nagar Phase 2	1	66	High Temperature zone		✓	✓	✓		✓
4	Roopnagar Slums	1	70	High Temperature zone	✓	✓	✓	✓	✓	
5	BDA colony	2	60	High Temperature Zone		✓		✓		
6	Chandmari , Piplani	2	63	High Temperature Zone	✓	✓	✓	✓		✓
7	Gandhi Nagar	2	1	High Temperature Zone	✓	✓	✓	✓		
8	Amrawad Khurd village	2	60	High Temperature Zone		✓	✓	✓		
9	Sector B, Sonagiri	2	67	High Temperature Zone	✓	✓	✓	✓		
10	Aashirwad Colony	2	80	High Temperature Zone	✓	✓	✓	✓		
11	Danish Hills view Township	2	80	High Temperature Zone		✓				
12	Mahabali Nagar	2	80	High Temperature Zone	✓	✓	✓	✓		
13	Bairagarh Chichali	2	81	High Temperature Zone	✓	✓	✓	✓		
14	Kanha Kunj	2	81	High Temperature Zone	✓	✓	✓	✓		
15	Rajharsh Colony	2	83	High Temperature Zone		✓	✓			
16	Bagli Village	2	85	High Temperature Zone		✓		✓		
17	Sharda Nagar, Ayodhya Nagar	2	68	High Temperature Zone	✓	✓	✓	✓	✓	
18	Sector- A, Ayodhya Nagar	2	68	Very High Temperature Zone		✓	✓	✓		

Residential areas with high temperature zones UHI in RG zone-1 & 2

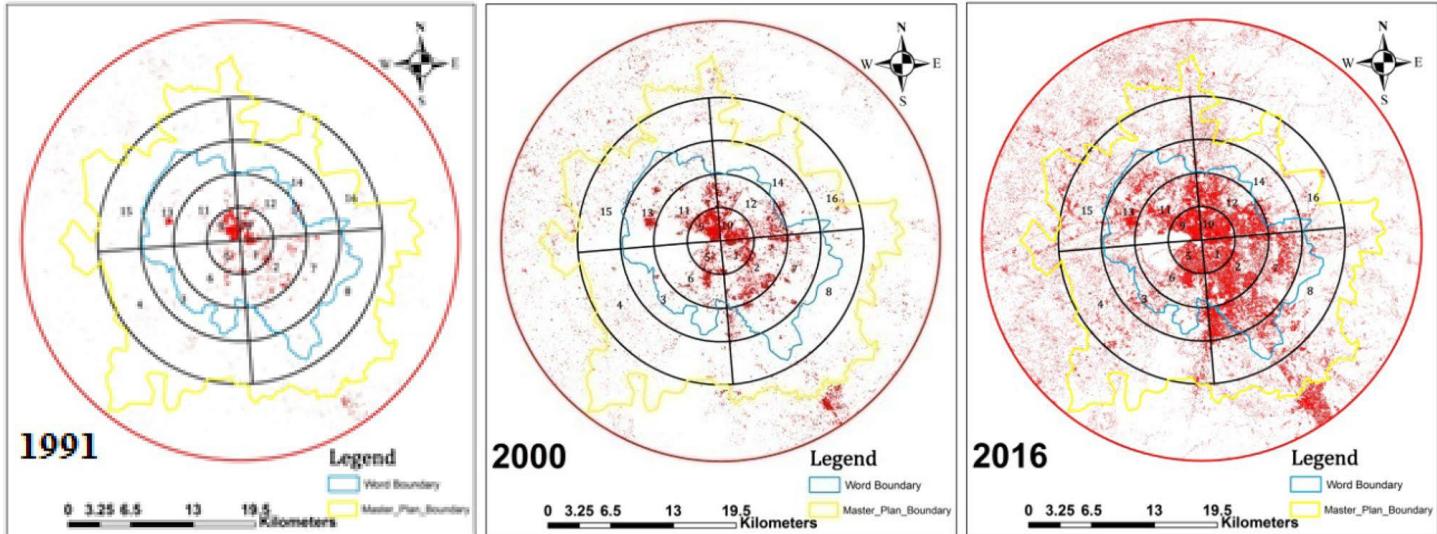


Fig. 3 Classified images of different time point, showing urban expansions

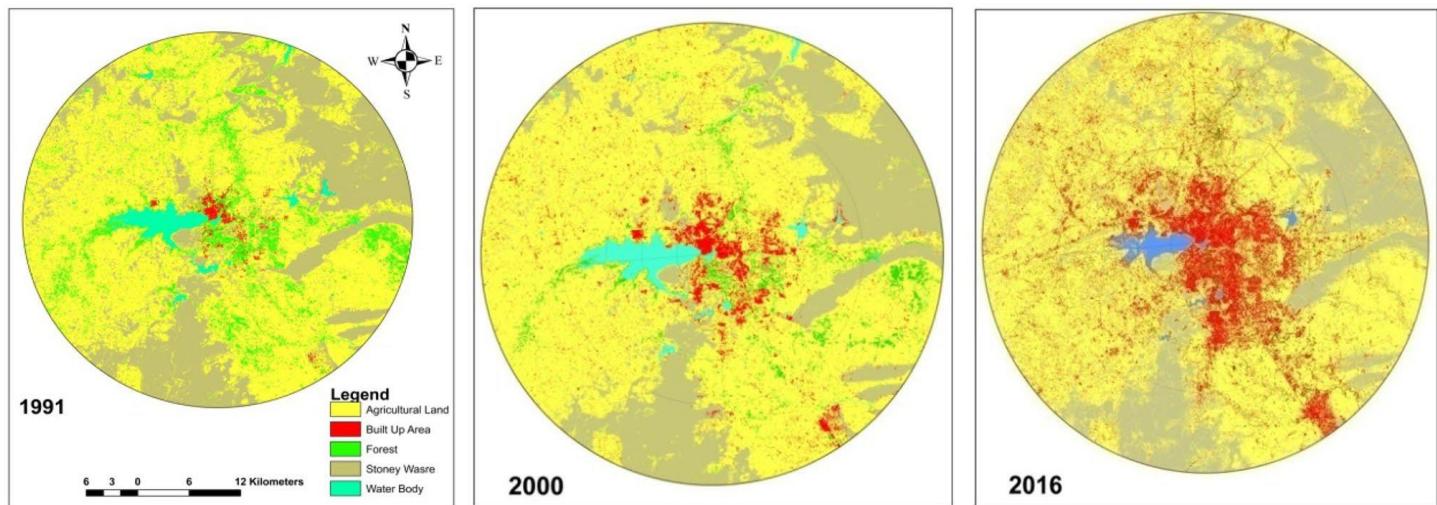


Fig. 6 Land-use/land-cover map of Bhopal city

Table 6 Temporal changes of area of different LULC classes. Source: Computed by au

Land-use class	1991		2000		2016	
	km ²	(%)	km ²	(%)	km ²	(%)
Built-up area	15.8	0.97	66.98	4.12	184.5	11.35
Agricultural land	963.88	59.31	934.27	57.49	866.27	53.30
Forest land	117.83	7.25	100.54	6.19	61.6	3.79
Water bodies	35.28	2.17	33.16	2.04	26.14	1.61
Stony waste	492.35	30.30	490.19	30.16	486.63	29.94
Total	1625.14	100	1625.14	100	1625.14	100.00

Composition of total HCF

