

Chapter 5 Change in Land-use and Land Cover

Land-use and land cover from 1992 to 1998

The land-use and land cover changes from 1992 to 1998 were analysed using the data derived from the aerial photographs. The changes are summarised in Table 5 and shown in Map 19. Overall the area of agricultural land was reduced from 55% to 44% of the municipal total (a loss of 20% of the 1992 area), while the urban area increased from 10% to 21% of the municipal total (an increase of more than 100%). Forest land increased slightly from 23% to 26% of the municipal total, while the areas of recreation, industry, and mining showed slight decreases.

TYPE	1992		1998		Change	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
Urban areas:						
High density (HD) residential area	80	4.5	94	5.3	14	0.8
Medium density (MD) residential area	29	1.6	65	3.6	36	2.0
Low density (LD) residential area	63	3.5	215	12.0	151	8.5
Agricultural land:						
Steep (> 15°, Sslope)	323	18.1	305	17.1	-18	-1.0
Medium slope (> 15°, Mslope)	76	4.2	42	2.4	-34	-1.9
Flat cultivated (< 7°, FC) land	580	32.5	451	25.2	-129	-7.2
Institution	52	2.9	57	3.2	5	0.3
Forest	418	23.4	467	26.1	49	2.7
Horticulture Research Centre (HRC)	21	1.1	21	1.1	0	0.0
Water	18	1.0	20	1.1	2	0.1
Stadium	5	0.3	5	0.3	0	0.0
Recreation	19	1.1		0.0	-19	-1.1
Industry	21	1.2	9	0.5	-12	-0.7
Plantation	20	1.1	13	0.7	-7	-0.4
Mining	31	1.7		0.0	-31	-1.7
Others	31	1.7	24	1.3	-7	-0.4
Total	1787	100.0	1787	100.0		

There was a significant increase in low and medium density residential areas, which indicates the rapid urban growth in the municipality. The changes in high density areas were more in terms of building structures than in spatial expansion. Where there is no land available for further expansion, new buildings are constructed with more floors. The construction of such buildings is affecting the architectural harmony of the core area (Figure 33). The urban growth pattern is discussed in more detail in the following sections.



Figure 33: Building structures are changing in the high density core area

Table 6 shows the detailed land-use and land cover change analysis in the form of a matrix showing the change from one type of use to another. Flat cultivated (FC) land has been converted to low density (LD), medium density (MD), and some high density (HD) residential areas. Steep slope cultivated land and medium slope cultivated land have been converted to low density (LD) residential areas. Some steep, medium, and flat slope agricultural land have been converted to forest as have some recreational areas and other types of land use/cover.

Table 6: Land use and land cover change matrix, 1992 - 1998

		1998																
		HD	MD	LD	Sslope	Mslope	FC	Inst	Forest	HRC	Water	Stadium	Industry	Plantation	Others	Area (ha)	Percent	
1992	HD	80	0	0	0	0	0	0	0	0	0	0	0	0	0	80	4.5	
	MD	5	24	0	0	0	0	0	0	0	0	0	0	0	0	29	1.6	
	LD	0	0	63	0	0	0	0	0	0	0	0	0	0	0	63	3.5	
	Sslope	1	0	32	270	0	0	3	14	0	0	0	0	0	4	323	18.1	
	Mslope	0	0	26	2	40	0	0	9	0	0	0	0	0	0	76	4.2	
	FC	6	40	85	9	0	432	0	10	0	2	0	2	0	3	580	32.5	
	Institution	0	0	0	0	0	0	52	0	0	0	0	0	0	0	52	2.9	
	Forest	0	0	8	2	2	2	0	403	0	0	0	0	0	1	418	23.4	
	HRC	0	0	0	0	0	0	0	0	21	0	0	0	0	0	21	1.1	
	Water	0	0	0	0	0	0	0	0	0	17	0	0	0	1	18	1.0	
	Stadium	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0.3	
	Recreation	0	0	0	0	0	0	1	18	0	0	0	0	0	0	19	1.1	
	Industry	0	0	0	2	0	12	0	0	0	0	0	7	0	0	21	1.2	
	Plantation	0	1	0	0	0	0	0	1	0	1	0	0	13	4	20	1.1	
	Mining	0	0	0	31	0	0	0	0	0	0	0	0	0	0	31	1.7	
	Others	2	0	1	0	0	6	1	11	0	0	0	0	0	11	31	1.7	
	Area (ha)		94	65	215	305	42	451	57	466	21	20	5	9	13	24	1787	
																1787		
Percent		5.2	3.7	12.0	17.1	2.4	25.3	3.2	26.1	1.1	1.1	0.3	0.5	0.7	1.3	100.0	100.0	



Figure 34: Flat cultivated land being converted to residential use

Urban growth analysis

Map 20 shows a more detailed analysis of the urban growth pattern with the new areas of low, medium, and high density housing added between 1992 and 1998. There was significant urbanisation within the municipality, with low density residential areas accounting for approximately three-quarters of the total urban growth (Table 7 and Figure 34).

The major land use classes contributing to urban growth are shown in Table 8 and Map 21. In all three classes of residential area, growth has resulted mainly from conversion of flat cultivated land (Figure 35).

Table 7: Urban growth types

Urban growth type	Total growth	All major roads (%)	Surfaced roads (%)
Percentage of all growth	100	79	49
High density	7	7	17
Medium density	20	15	23
Low density	74	77	60

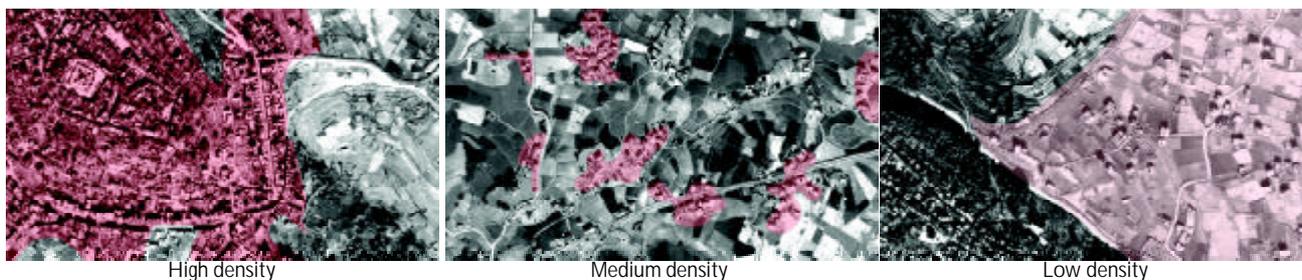


Figure 35: Urban growth patterns overlaid on IKONOS (1m PAN) image, 2001



Figure 36: Flat cultivated land within 100m of major roads is being converted to residential use

Urban density type	Contributing class	Growth (ha)	% of total
High		13.4	6.5
	Steep slope cult. land	0.6	4.5
	Medium slope cult. land	4.6	34.3
	Flat cult. land	6.2	46.3
	Forest	0.1	0.7
	Other	1.9	14.2
Medium		40.3	19.7
	Steep slope cult. land	0.1	0.2
	Flat cult. land	40.2	99.8
Low		151.3	73.8
	Steep slope cult. land	31.6	20.9
	Medium slope cult. land	26.1	17.2
	Flat cult. land	85.2	56.2
	Forest	7.8	5.2
	Other	0.7	0.5

Urban growth versus accessibility

Roads are a major factor contributing to urban growth. Growth patterns depend on the distance from various types of road. To understand the nature of Kirtipur's growth pattern, the nature and pattern of urban growth within 100m of major roads was analysed in more detail (Map 22). About 79% of all growth took place within 100m of major roads (i.e. motorable surfaced and gravel roads), and 49% within 100m of surfaced roads (Table 7 and Figure 36). The proportion of high and medium density growth compared with low density growth was markedly higher near surfaced roads.

The major land use classes contributing to urban growth within 100m of surfaced roads are shown in Table 9. Flat cultivated land has been the main land type diverted to urban growth near to roads and almost the only type near to surfaced roads. Medium slope and steep cultivated land has been converted to a small extent close to gravel roads. The differences probably reflect the positioning of the roads.

Contributing classes	High density		Medium density		Low density	
	All major roads	Surfaced roads	All major roads	Surfaced roads	All major roads	Surfaced roads
Flat cultivated land	48	54	100	100	60	90
Medium slope cultivated land	34	-	-	-	16	6
Steep slope cultivated land	5	6	-	-	19	2
Medium dense residential area	-	26	-	-	-	-
Others	13	14	-	-	5	2
Total	100	100	100	100	100	100

The trend indicates that in the future agricultural land, especially flat land, within 100m of surfaced or gravel roads has a high chance of being developed for settlement (Map 23). Figure 37 shows a typical example of such areas.

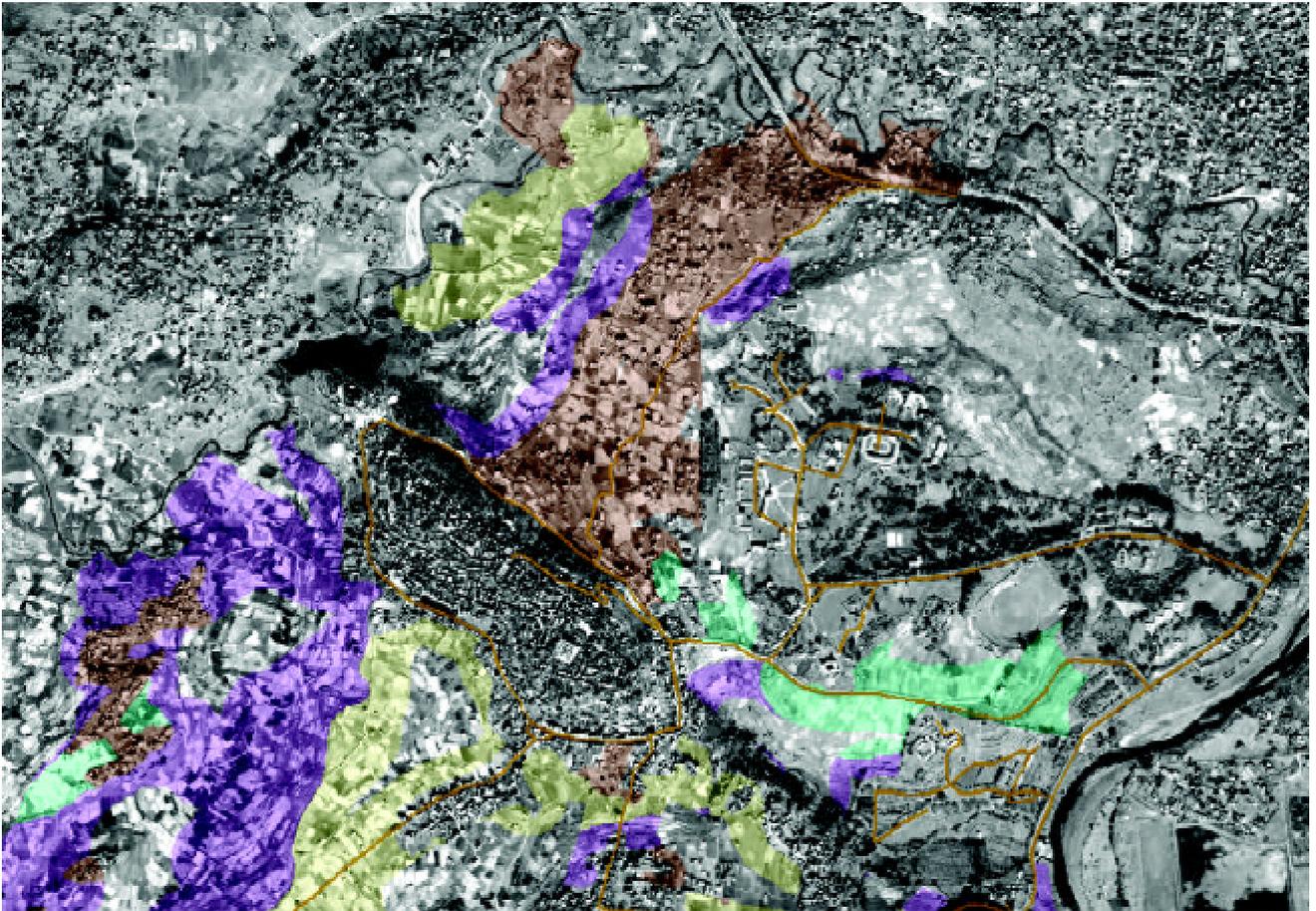


Figure 37: Areas with a high potential of being diverted to residential use