

Chapter 1 Thinking Spatially

What's going around you?

Floods in Kathmandu. It's been raining too much!

This year's monsoon has brought more rain than usual to the country and even in Kathmandu there have been a number of floods (Figure 1.1). The effects of haphazard urban growth are revealed in the form of loss of public property and poor quality of life in areas where residential housing has been built without consideration of the area's suitability. The increasing population and the scarcity of land mean that people are building houses on farms and lowland.



Source: Nepalnews.com

Although the Bagmati and the Bishnumati are the two major rivers flowing through the Kathmandu valley, it is the Tukucha and Samakhushi rivers that give trouble more frequently since their banks have been heavily encroached by large buildings and squatter settlements.

Seeing this story, a person, who is familiar with Kathmandu, can visualise the scenario. He knows these problem areas, how these localities look and the types of houses that are prevalent in these areas. This is called a mental map. It is

generated from information stored consciously or unconsciously in a person's brain over the years. However, mental maps are not sufficient if we want to understand the problem in more detail or if we want to carry out remedial work in these areas. Therefore, planners, engineers and construction workers make use of maps and drawings to guide them around the area.

To find the areas that are most likely to be effected by floods, let's demarcate the area within 150 metres of these rivers (Figures 1.2 and 1.3). This buffer area can be considered as the flood-prone zone. Now, if we want to make plans to improve the situation, we need to involve local bodies such as the ward offices. We should identify the stakeholders; these are the wards falling in these flood-prone areas and the households that are likely to be affected by flooding. For this, we need to identify the wards and then the households that lie within the buffer zone (Figures 1.4 and 1.5).

What we have done is to look at rivers, wards and households, and relate them based on their locations. This is called spatial reasoning. For this, we use maps or spatial information.

Figure 1.1
Flooded streets in
Kathmandu



Figure 1.2
Kathmandu valley from space with rivers overlay



Figure 1.3
Area within 150 m of Tukucha and Samakhushi rivers



Figure 1.4
Wards that are intersected by the buffer zone



Figure 1.5
List of households within the buffer zone



Figure 1.6
Kathmandu valley

Buying a new house

People from all over Nepal migrate to Kathmandu valley looking for jobs (Figure 1.6). After some time, they think of buying a piece of land and building a house; after all, everyone has a dream of making a beautiful house. However, there are many constraints to overcome before this dream can come true.

The first thing is to find a suitable land. With the rapid urban expansion in the valley, it is becoming more difficult to find good places for living. People have their preferences but there

are common issues that need to be considered.

The land should be close enough to basic infrastructure such as roads, water and electricity supplies. In Kathmandu, facilities such as water and electricity are dependent on accessibility to roads. Figure 1.7 shows the area within 500 m of major roads.

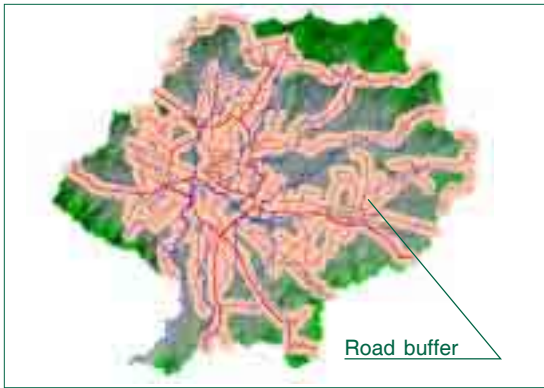


Figure 1.7
Area within 500 m of major roads

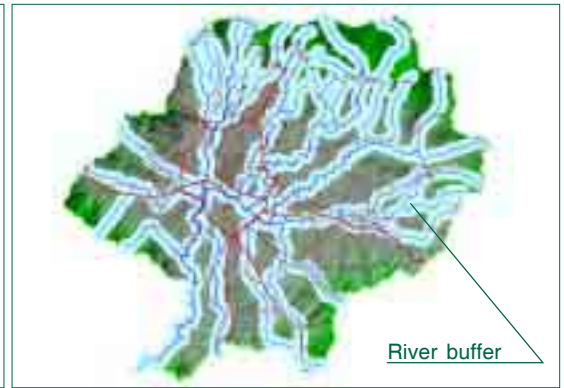


Figure 1.8
Area at least 500 m from major rivers



Figure 1.9
Areas with steep slopes

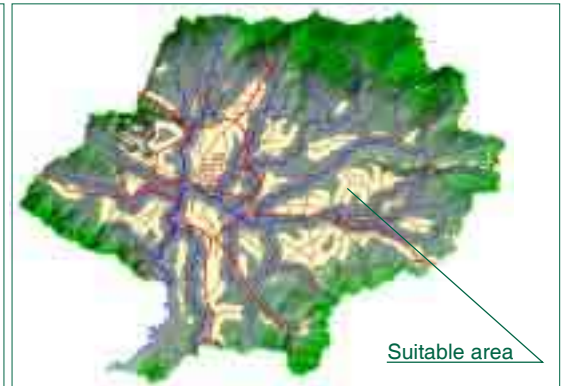


Figure 1.10
Area suitable for building

We have already seen that there are places in the heart of the Kathmandu valley that are frequently affected by floods. Figure 1.8 shows the area at least 500 m from major rivers.

Also, the land should be safe from natural hazards such as landslides that occur on steep slopes. The area that has a slope greater than 10 degrees is shown in Figure 1.9. This land would not be suitable for building purposes.

Excluding all land that is not suitable because of road, river or slope criteria, we find the area that is suitable for residence building (Figure 1.10).

We have used information based on geographic features—rivers, roads and slope—and their relationships to solve our problem.

Let's have a broader outlook

So far, we have discussed our desire to build a house and the need for improvements in the urban environment of Kathmandu valley. However, what is the scenario if we look at the country as a whole? We know that there is a lot to be done in all sectors and all regions of the country to improve the livelihoods of the people. However, with our limited resources it is not possible

to meet all the needs at once. Then, how do we identify the most pressing needs?

Table 1.11: Ratio of females to males in the literate population of 15 years and above

West			Intermediate			East		
Local	Province	Ratio	Local	Province	Ratio	Local	Province	Ratio
1	1	100	1	1	100	1	1	100
2	2	100	2	2	100	2	2	100
3	3	100	3	3	100	3	3	100
4	4	100	4	4	100	4	4	100
5	5	100	5	5	100	5	5	100
6	6	100	6	6	100	6	6	100
7	7	100	7	7	100	7	7	100
8	8	100	8	8	100	8	8	100
9	9	100	9	9	100	9	9	100
10	10	100	10	10	100	10	10	100
11	11	100	11	11	100	11	11	100
12	12	100	12	12	100	12	12	100
13	13	100	13	13	100	13	13	100
14	14	100	14	14	100	14	14	100
15	15	100	15	15	100	15	15	100
16	16	100	16	16	100	16	16	100
17	17	100	17	17	100	17	17	100
18	18	100	18	18	100	18	18	100
19	19	100	19	19	100	19	19	100
20	20	100	20	20	100	20	20	100
21	21	100	21	21	100	21	21	100
22	22	100	22	22	100	22	22	100
23	23	100	23	23	100	23	23	100
24	24	100	24	24	100	24	24	100
25	25	100	25	25	100	25	25	100
26	26	100	26	26	100	26	26	100
27	27	100	27	27	100	27	27	100
28	28	100	28	28	100	28	28	100
29	29	100	29	29	100	29	29	100
30	30	100	30	30	100	30	30	100
31	31	100	31	31	100	31	31	100
32	32	100	32	32	100	32	32	100
33	33	100	33	33	100	33	33	100
34	34	100	34	34	100	34	34	100
35	35	100	35	35	100	35	35	100
36	36	100	36	36	100	36	36	100
37	37	100	37	37	100	37	37	100
38	38	100	38	38	100	38	38	100
39	39	100	39	39	100	39	39	100
40	40	100	40	40	100	40	40	100
41	41	100	41	41	100	41	41	100
42	42	100	42	42	100	42	42	100
43	43	100	43	43	100	43	43	100
44	44	100	44	44	100	44	44	100
45	45	100	45	45	100	45	45	100
46	46	100	46	46	100	46	46	100
47	47	100	47	47	100	47	47	100
48	48	100	48	48	100	48	48	100
49	49	100	49	49	100	49	49	100
50	50	100	50	50	100	50	50	100
51	51	100	51	51	100	51	51	100
52	52	100	52	52	100	52	52	100
53	53	100	53	53	100	53	53	100
54	54	100	54	54	100	54	54	100
55	55	100	55	55	100	55	55	100
56	56	100	56	56	100	56	56	100
57	57	100	57	57	100	57	57	100
58	58	100	58	58	100	58	58	100
59	59	100	59	59	100	59	59	100
60	60	100	60	60	100	60	60	100
61	61	100	61	61	100	61	61	100
62	62	100	62	62	100	62	62	100
63	63	100	63	63	100	63	63	100
64	64	100	64	64	100	64	64	100
65	65	100	65	65	100	65	65	100
66	66	100	66	66	100	66	66	100
67	67	100	67	67	100	67	67	100
68	68	100	68	68	100	68	68	100
69	69	100	69	69	100	69	69	100
70	70	100	70	70	100	70	70	100
71	71	100	71	71	100	71	71	100
72	72	100	72	72	100	72	72	100
73	73	100	73	73	100	73	73	100
74	74	100	74	74	100	74	74	100
75	75	100	75	75	100	75	75	100
76	76	100	76	76	100	76	76	100
77	77	100	77	77	100	77	77	100
78	78	100	78	78	100	78	78	100
79	79	100	79	79	100	79	79	100
80	80	100	80	80	100	80	80	100
81	81	100	81	81	100	81	81	100
82	82	100	82	82	100	82	82	100
83	83	100	83	83	100	83	83	100
84	84	100	84	84	100	84	84	100
85	85	100	85	85	100	85	85	100
86	86	100	86	86	100	86	86	100
87	87	100	87	87	100	87	87	100
88	88	100	88	88	100	88	88	100
89	89	100	89	89	100	89	89	100
90	90	100	90	90	100	90	90	100
91	91	100	91	91	100	91	91	100
92	92	100	92	92	100	92	92	100
93	93	100	93	93	100	93	93	100
94	94	100	94	94	100	94	94	100
95	95	100	95	95	100	95	95	100
96	96	100	96	96	100	96	96	100
97	97	100	97	97	100	97	97	100
98	98	100	98	98	100	98	98	100
99	99	100	99	99	100	99	99	100
100	100	100	100	100	100	100	100	100

Figure 1.11
Data in tables

To make decisions for national priorities and plans, many data are collected and presented in tables. There are huge volumes of such publications. For example, the ratio of females to males among the literate population of 15 years and above looks like Figure 1.11.

Now, let us plot these figures on a map and see how it looks (Figure 1.12).

Similarly, we can look at the indices for poverty and deprivation, women's empowerment, socioeconomic and infrastructural development in Nepal on a map (Figures 1.13, 1.14 and 1.15).



Figure 1.12
Gender imbalance ratio in literacy status



Figure 1.13
Poverty and deprivation index



Figure 1.14
Women's empowerment index



Figure 1.15
Socioeconomic and infrastructural development index

We can see that when we plot values on a map, things become clearer and it is easier to make decisions. In this example, we can see that the situation in the far western region is the poorest in all indices. Therefore, greater focus is needed on development in this region.

What we see here is that when we add a spatial or geographic component to our analysis, we have a better picture of the real-world scenario. This is often called spatial thinking. It gives us better insight of our problems and allows us to make better decisions.

The use of computerised information systems is a growing part of our everyday life. GIS is one such system that uses the power of computers to answer questions related to location by arranging and displaying data about places in a variety of ways such as maps, charts and tables. In the following chapters, we will discuss more about maps, mapping and GIS.

