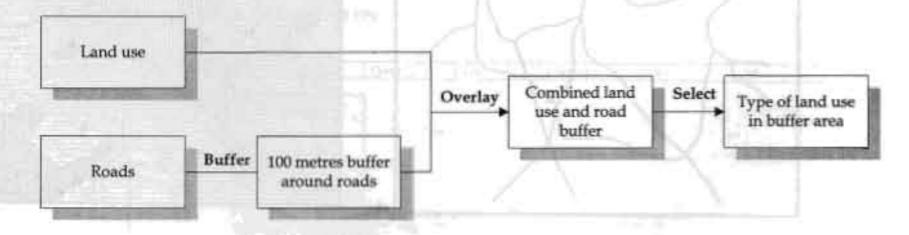


## Using GIS to Solve a Spatial Droblem

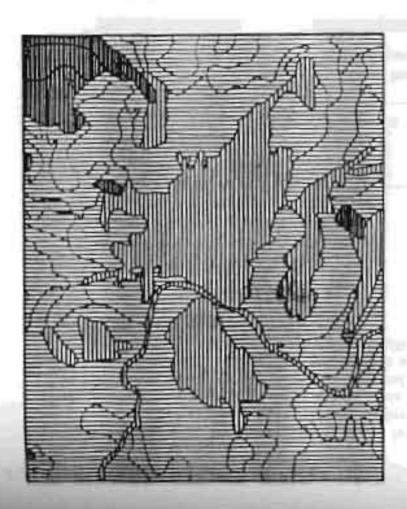
The exercise provides an opportunity to see how GIS can solve a simple spatial analysis problem. In the exercise, we will determine the total area of agricultural land adjoining existing roads. This analysis could be used to determine the rice production lost due to construction or expansion of roads. For this exercise, we will select a rectangular area around the Ring road in Kathmandu Valley. The input land use and road maps, used for analysis, are on a scale of 1:50000 and the Universal Transverse Mercator (UTM) projection. First, we will look at the information on each of these maps. We will then combine the maps and determine the area of agricultural land within 100 metres of the existing roads.

# Geographical Analysis

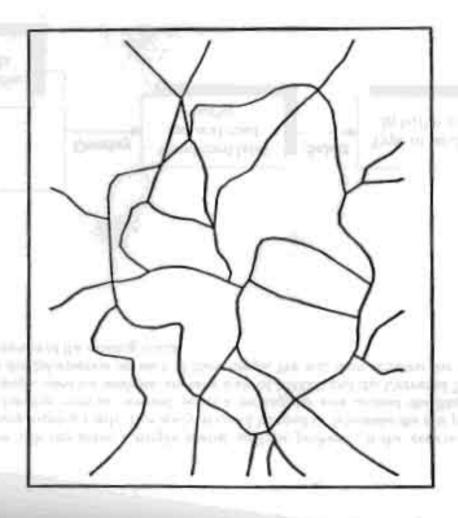


Here is what the maps look like.

Land Use



Roads



Step 1

Start ARC/INFO, and the menu system in the demo workspace

>> C>CD \GISTRN\DATA

>> C, ARC

The [ARC] prompt appears.

Start the menu system and begin this demo;

[ARC] &RUN INTRO.

Step 2

Draw and query the contents of the LANDUSE and ROADS coverages

Choose the DRAW option and select LANDUSE ON

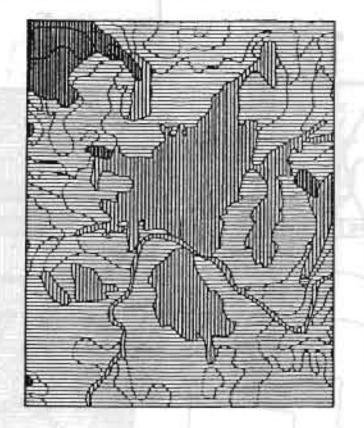
Analysis Draw Label Query List Selection Clear Quit

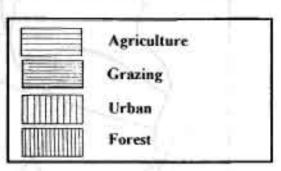
Landusc On Off

Roads On

Landuse	On Off	-
Roads	On	
Rivers	On	
Landcap	On	
Panchaya	On	
Village	On	
Zoom:	On	
PAN	On	
User defined	On	
RETURN		

The display of the LANDUSE coverage will look similar to the figure below:





Each polygon is shaded according to the type of land use. Here is what the shades represent.

#### Select QUERY and choose the LANDUSE option

Aralysis	Draw	Label	Query	List	Selection	Clear	Quit
			Roads Rivers Landcap Panchaya Village	TYPE TYPE			
			RETURN				

Move the crosshairs over one of the polygons and press the left mouse button or the enter key on the keyboard. The attributes of the polygon are displayed. Move the crosshairs over one of the lines and press the enter key to quit.

Here are the codes for all the land use types.

TYPE	LUCODE
Agriculture	2
Grazing	3
Urban	4
Forest	5

To select and draw only the agriculture polygons, first clear the screen.

Vralysis	Draw	Label	Query	List	Selection	Clear	Quit
elect CLE	AR from the menu	to erase the scree	n. Query	List	Selection	Clear	Quit
					Choose features Switch features Clear features RETURN		

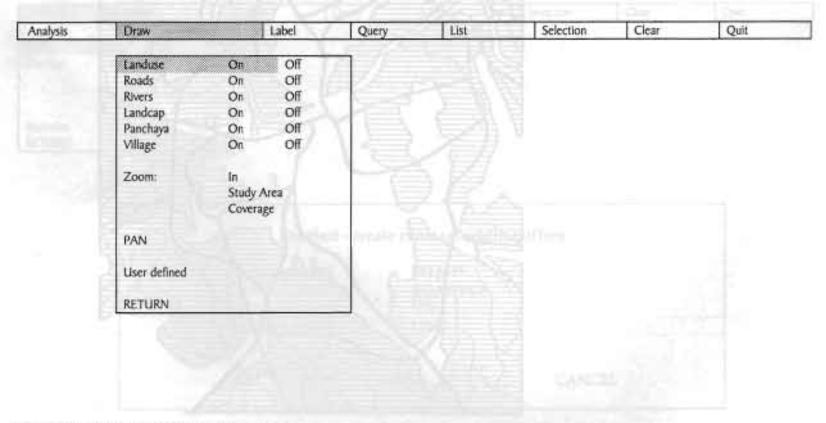
Choose SELECTION, then Choose features.

	Reselect - select a set of coverage features					
	[coverage] [feature class]	1	LANDUSE POLY			
OK		MENU		CANCEL		

Now in the next menu that appears, enter LUCODE =2. Press <ENTER> to start the selection process.

LANDUSE polys: 53 of 71 selected.

Now the agriculture polygons are selected. To draw them, select the DRAW option and then choose LANDUSE ON.



Only the agriculture polygons are drawn.

Now draw the roads.

Choose DRAW again, and then ROADS ON

The display of agricultural land areas and the roads will look similar to the figure below.



Before proceeding to the next step, select CLEAR to clear the display.



Create a 100-metre buffer area around the roads.

Select ANALYSIS and choose BUFFER.

Analysis	Draw	Label	Query	List	Selection	Clear	Quit
Buffer							
Overlay:	Union						
2010/04/1	Intersect	The State of the					
	identify						
Statistics		1-6					
RETURN							
			_				1
		Resele	ect - create	e constant width	buffers		7
					buffers		
		[input coverage	2]	: ROADS	buffers		
		[input coverage [feature class	e] s]	: ROADS	buffers		
		[input coverage [feature class [buffer distance	e] 5] e]	: ROADS : ROADBUF : 100			
		[input coverage [feature class	e] 5] e]	: ROADS	buffers	T HOUSE	
		[input coverage [feature class [buffer distance	e] 5] e]	: ROADS : ROADBUF : 100		11000	
		[input coverage [feature class [buffer distance [buffer feature	e] 5] 6]	: ROADS : ROADBUF : 100 : LINE			
		[input coverage [feature class [buffer distance	e] 5] 6]	: ROADS : ROADBUF : 100			

After you've filled out the form correctly, press the **OK** button.

When the buffer is finished, the main menu appears.

Now display the buffer area.

To draw buffer around roads, select USER DEFINED from the DRAW column.

Analysis	Draw	-	Label	Query	List	Selection	Clear	Qui
	Landuse	On	Off	-				
	Roads	On						
	Rivers	On	Off Off Off Off	J. 100				
	Landcap	On	Off					
	Panchaya	On.	Off	The same of				
	Village	On	Off					
	Zoom	In		1 6				
		Study	Area	100				
		Cove	rage	11-5-5				
				41.3				
	PAN			100				
	User defined							
	MENT ON C			MIEXTE				
	RETLIRN	_	-					

Fill in the form below to draw the outline of the buffer area polygon.

Draw a user specified coverage with a specified symbol

<coverage>

ROADBUF

[symbol]

: 1

<feature to draw>

OUTLINES

OK

MENU

CANCEL

Press the OK button.

To view the attributes for the buffer polygons, choose LIST and then USER DEFINED.

Analysis	Draw	Label	Query	List	Selection	Clear	Quit
				Attributes	Landuse Roads River Landcap Panchaya Village User defined		

Fill in the form below with the coverage name as ROADBUF and feature class as POLY to display the attributes.

Display item values for the specified coverage

[coverage] : ROABUF
[feature class] : POLY
(item) :
(item) :
OK MENU CANCEL

Press the OK button to view the attributes.

\$RECNO	AREA	PERIMETER	ROADBUF	ROADBUF_ID	INSIDE
1	5359674E+08	88988.1600	1	0	1
2	18316940.0000	177013.9000	2	1	100
3	3663801.0000	10565,6300	3	2	1
4	9629993.0000	16837.9600	4	3	1
5	154748,6000	2216.9650	5	4	1
6	1743105.0000	5567.6010	6	5	1
7	1284580.0000	7813,0810	patronet su <b>y</b> in service	6	1
8	2800595.0000	7482.5050	8	7	1
9	3304787.0000	7689.3590	9	8	1
10	5213054.0000	10844.6300	10	9	1
11	5545882.0000	4963.2200	11	10	1
12	694351.2000	5280.3910	12	- 11	1
13	1244905.0000	4714.3490	13	12	1

Press the <ENTER> key or click the mouse. Before proceeding to the next step,

-								_
Analysis	Draw	Label	Query	List	Selection	Clear	Quit	

select CLEAR to clear the display.

Step 4

### Overlay LANDUSE and ROADBUF using the UNION command and display the results

Analysis	Draw	Labei	Query	List	Selection	Clear	Quit	
Buffer		-1						
Overlay:	Union							
G-1/4 P	Intersect							
Statistics RETURN		(D)(						

Select ANALYSIS from the menu, then select OVERLAY: Union

Fill in the form below to create composite coverage LANDBUF from the two input coverages LANDUSE AND ROADBUF.

Union - spatially join two polygon coverages using union operation

[input coverage]

LANDUSE ROADBUF

[union coverage] [output coverage]

LANDBUF

OK

MENU

CANCEL

Press the OK button to execute the form.

When the menu reappears, the UNION is complete and the new LANDBUF coverage has been created. To display the results of the Union operation, first draw the LANDUSE coverage.

Select DRAW and LANDUSE ON.

Highlight the area of interest, using a solid shade pattern, and 'white out' those areas outside the 100-metre road buffer. To do this, select those polygons that lie outside the buffer (all polygons that have a value of 1 for the item INSIDE).

Choose SELECTION, then CHOOSE FEATURES.

Fill in the form as shown.

Press the OK button.

Reselect select a set of coverage features

[coverage]

LANDBUF

[feature class] : POLY

OK

MENU

CANCEL

In the next menu that appears, enter the selection criterion.

Logical expression

INSIDE = 1

Press the <ENTER> key to start the selection process. A message appears:

LANDBUF polys 170 of 275 selected.

Now, shade these polygons.

Fill in the form as shown.

Draw a user-specified coverage with a specified symbol

[coverage]

: LANDBUF

[symbol]

: 1

[feature to draw]

SHADES

OK

MENU

CANCEL

Press the OK button to shade the polygons outside the buffer.

You can clearly see all the land-use types within the 100-metre buffer. Now highlight the buffer by drawing the ROADBUF coverage.

Select Draw, then choose User defined. Fill in the form as shown.

Date and the season because the

## Draw a user-specified coverage with a specified symbol

[coverage]

ROADBUF

[symbol]

: 2

[feature to draw]

OUTLINES

OK

MENU

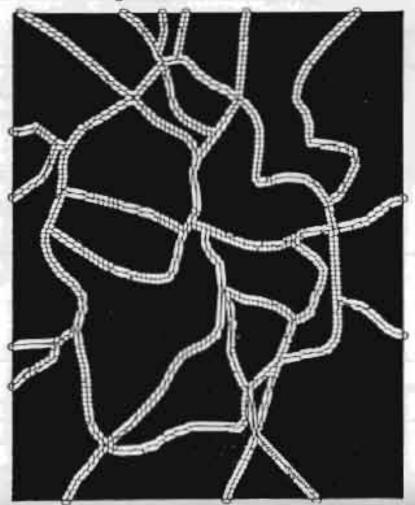
CANCEL

Press the OK button to draw the road buffer. Finally, draw the road network.

Select Draw, then choose Roads on.

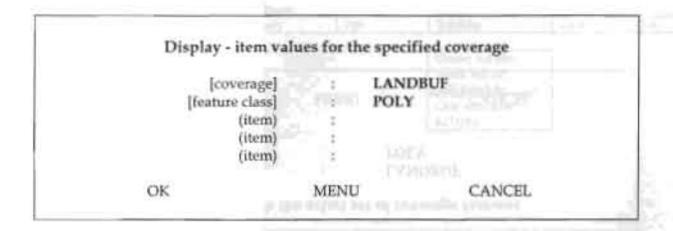
Sealer Drive, Sales

The display should look similar to the figure below.



Select List, then choose User defined.

Fill in the form as shown.



Press the OK button.

Notice how the polygons have attributes from both the LANDUSE and the ROADBUF coverages, including LUCODE and INSIDE, respectively. Next, find the total area of agricultural land within 100 metres of the roads.

# Step 5

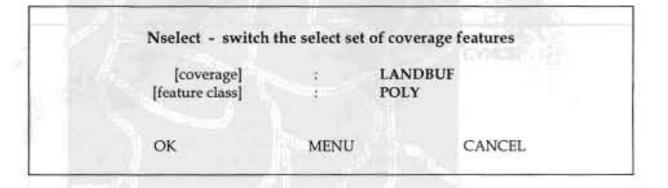
Generate statistics for the analysis

Select those polygons that are inside the buffer.

Choose Selection, then Switch features.

Analysis	Draw	Label	Query	List	Selection	Clear	Quit
					Choose features		
					Switch features		
					Clear features	0.0	
					Save Selection RETURN	4	

Fill in the form menu as shown.



Press the OK button to switch the selected set of polygons.

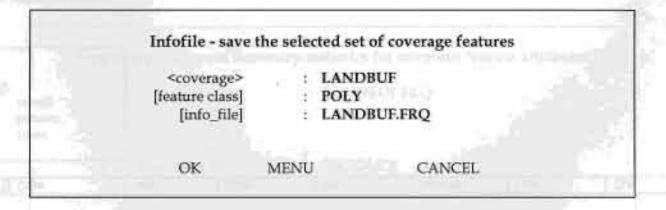
LANDBUF polys: 105 of 275 selected.

Only polygons with the buffer are selected. Save these selected features on a file on which statistical analysis is to be performed.

Choose SELECTION, then SAVE SELECTIONS.

Analysis	Draw	Label	Query	List	Selection	Clear	Quit
					Choose features Switch features Save Selection Clear selections RETURN		

Fill in the form menu as shown.



Press the OK button.

Now, calculate the total area of each land use type within the 100-metre road buffer.

Select ANALYSIS, then choose STATISTICS.

Analysis	Draw	Label	Query	List	Selection	Clear	Quit
Buffer Overlay:	200	7 7					
Overlay:	Union Intersect	1 5					
Statistics	Identify	lines	In Elizabeth				
Measure RETURN		F		PASSES			

Fill in the form menu as shown.

[input file]	: LANDBUF.FRQ
(item) (item)	
[summary item]	: AREA

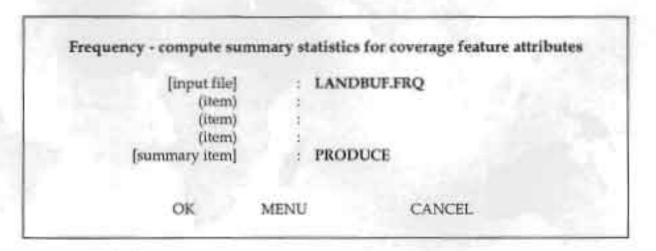
Press the OK button to execute the form.

Now, calculate the total rice production lost within the 100-metre road buffer.

Select Analysis, then choose Statistics.

Analysis	Draw	Label	Query	List	Selection	Clear	Quit	_
N. Flor								
Buffer Overlay:	******							
Overtay:	Union							
	Intersect							
	Identify	-100						
Statistics		7-69-12						
Measure								
RETURN								

Pill in the form menu as shown.



Press the OK button to execute the form.

The calculation was been all more of much limit the type within the 199 received builty by the calculation of the first time to the calculation of the first time.

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