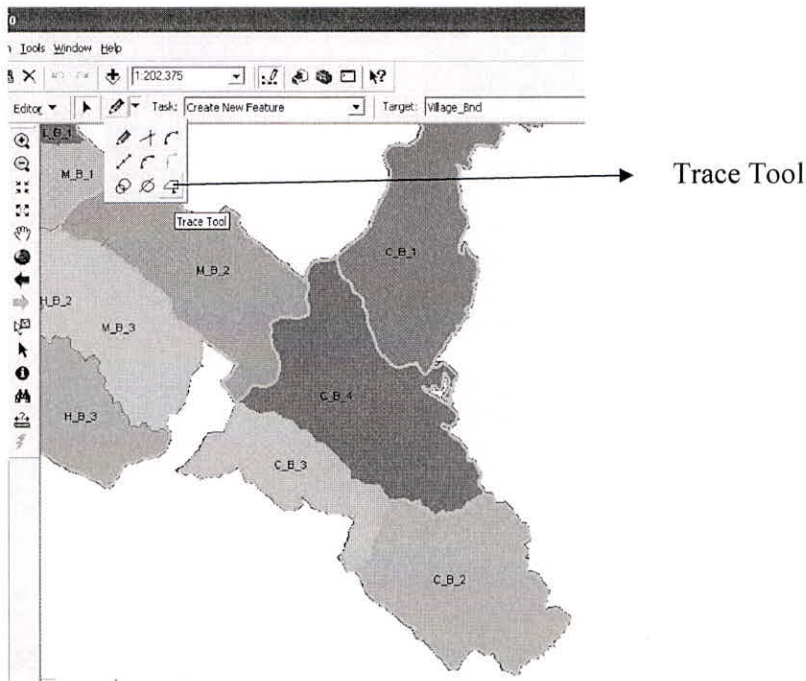


# USING ADDITIONAL TOOLS FOR EDITING


## TRACE TOOL

Trace Tool is used to create segments by tracing over the segments/boundaries of selected features.

1. Click the Editor Toolbar.



2. Select the features that you want to trace. You must select some features before you can start tracing.

3. Click the tool palette dropdown arrow and click the Trace tool .

4. Click on the selected boundary segment to start tracing.

5. Move the mouse over the selected boundary to follow the trace.

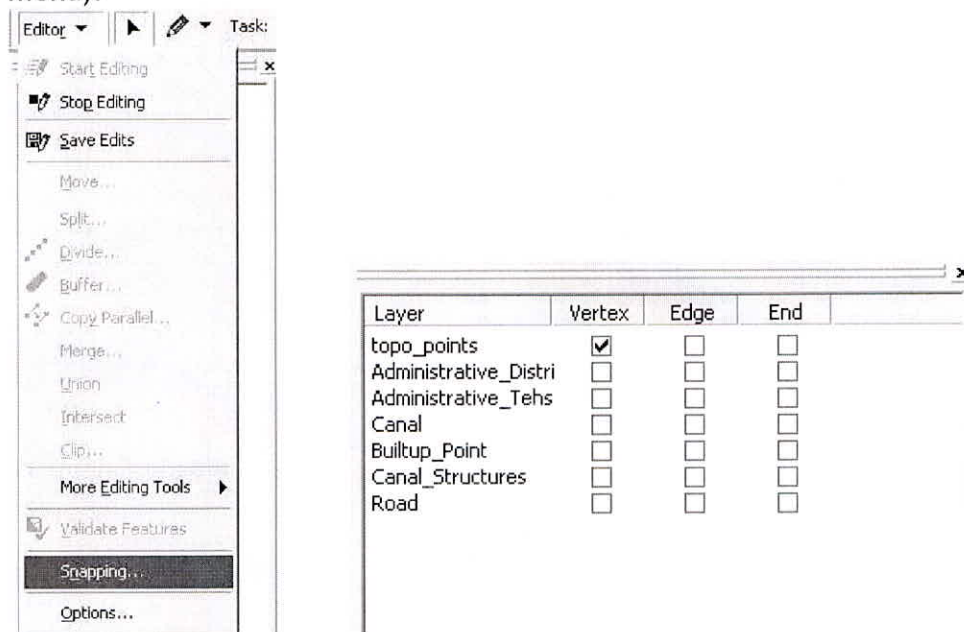
- If you have traced too far or traced the wrong direction, move the mouse backwards over what you have traced.
- If you have clicked to stop the trace, click **Undo** to remove all vertices added during the trace.
- In order to enable the **Trace Tool**, you must have features selected, and target feature should not be of **Point Type**.

- As you are tracing, you can change the selected features by clicking on the Edit tool, changing the selection, and then clicking the Trace tool again.
  - A quick way to cancel a trace is to press the Esc key.
6. When you are finished tracing, you can double-click to finish the sketch.

## SNAPPING

ArcMap can automatically connect (or snap) features placed within a certain distance of each other. The rules specifying which features, and which feature parts, snap to others make up the snapping environment. The distance at which snapping occurs is called the snapping tolerance. In simple words, snapping is useful in cases where we need to connect two intersecting lines from a common vertex. In such a case snapping automatically detects the distance and point to be snapped.

1. From the Editor toolbar, select **Start Editing** and change the **Target:** to the Roads layer.
2. From the Editor dropdown list, select **Snapping** (at the bottom of the menu).



3. The **Snapping Environment** window opens as shown above.
4. The **snapping environment** can help establish exact locations in relation to other features. It can also be used to move a feature to a precise location in relation to another feature. For this exercise we will use the default snap tolerance.


5. In the **Snapping Environment** window, check the box under the column heading **End** for the **Roads** layer to enable end point snapping. Close the **Snapping Environment** window.

6. Make sure **Task:** is set to **Create New Feature** and then select the **Sketch** tool.

7. Edit the **Roads** layer by continuing the tracing on toposheet, as follows:

- Move the cursor (now shaped like a circle with crosshairs) to the beginning (or end) of a **Road Feature**. Notice how the cursor snaps to the end vertex.
- Trace the road by clicking with the left mouse button at every change in shape and intersection with other **Road Features**. Every time you click, a new vertex is added.
- When you have finished, double-click with the left mouse button to stop editing the feature.

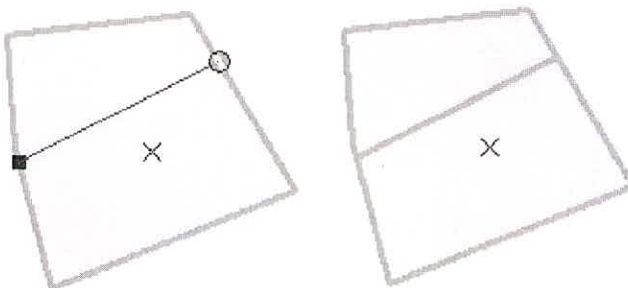
## SPLIT TOOL

Line and Polygon can easily be split in ArcMap. To manually split one line into two, use the **Split Tool** . The line is split at the location where you clicked with the mouse. The attributes of the original line are copied to each of the new lines.

For splitting lines at a specified distance or percentage use the **Split Command** on the Editor menu. It is used when the distance from either the first or last vertex at which you want to split the line, or a certain percentage of the original length is known.



To split polygons, use the **Cut Polygon Features** task. The polygon is split according to a line sketch you create. The attributes of the original feature are copied to each of the new features.

When you are splitting polygons, make sure your sketch cuts completely through the selected polygon.




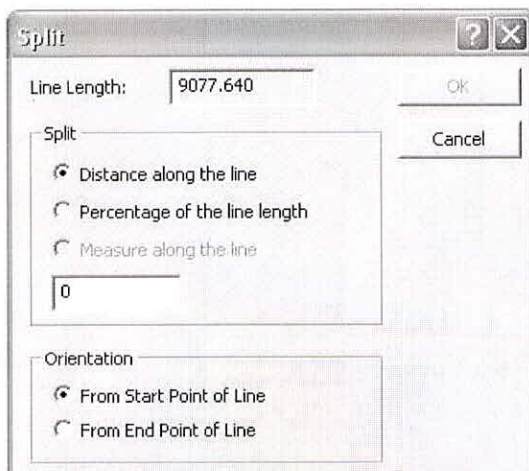
Turning on edge snapping often helps ensure that the cut operation is completed successfully.

## SPLITTING LINES MANUALLY

1. Click the Edit tool .
2. Click the line you want to split.
3. Click the Split tool  on the Editor toolbar.
4. Click where you want to split the line. To split a line at the location where a point feature falls on it, you can apply vertex snapping to the snapping environment and snap the mouse pointer precisely to the point.
5. The line is split into two features.

## SPLITTING LINES AT A SPECIFIED DISTANCE OR PERCENTAGE

1. Click the Edit tool .
2. Click the line you want to split.
3. Click the Editor menu and click Split.
4. Click the first Split option to split the feature at a certain distance or the second Split option to split the feature at a certain percentage of the whole.
5. Type a distance or percentage.



6. Click **From Start Point of Line** if you want to split the feature starting from the first vertex or **From End Point of Line** if you want to split the feature starting from the last vertex.

7. Click **OK**.

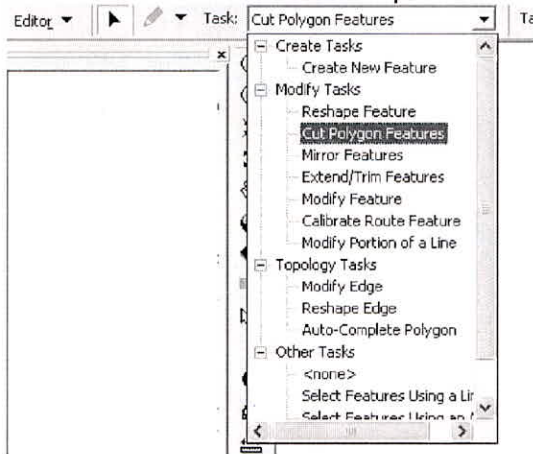
8. The line is split into two features according to the parameters you specified.


## SPLITTING POLYGONS

1. Click the Edit tool .

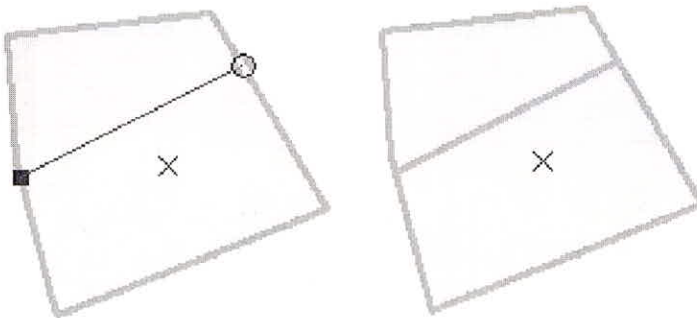
2. Click the polygon you want to split.

3. Click the Current Task dropdown arrow and click **Cut Polygon Features**.



4. Click the tool palette dropdown arrow and click the Sketch tool .

5. Construct a line sketch that cuts the original polygon as desired.




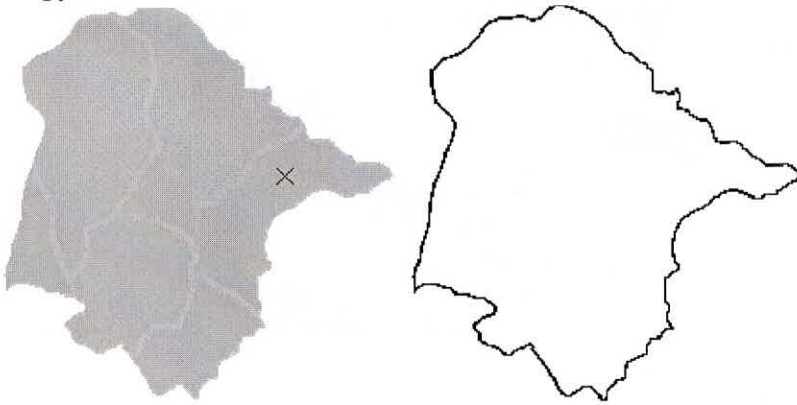
6. Right-click anywhere on the map and click **Finish Sketch**.

7. The polygon is split into two features.

## MERGE TOOL

The Merge command combines features of the same layer into one feature. It however, does not create any new output, rather appends to the original. The features must be from either a line or a polygon layer. The merged feature will contain the attributes of the feature that appears first in the selection order.

1. Click the **Edit Tool** .
2. Click the features that you want to merge.
- 3.

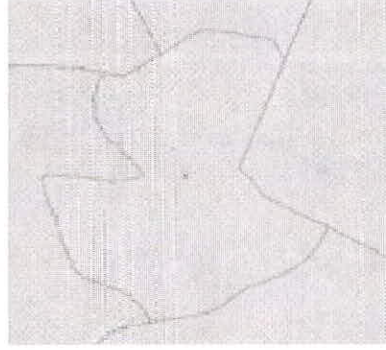
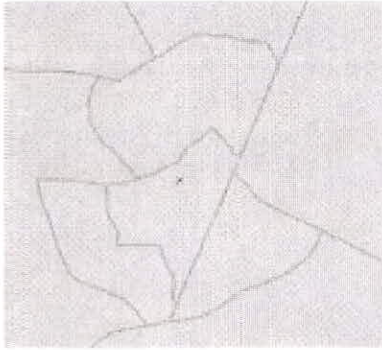


3. Click the **Target Layer** dropdown arrow and click the layer that you want the new feature to belong to.
4. Click the Editor menu and click **Merge**.
5. The selected features are merged into one.

## UNION TOOL

The Union command combines features of the same shape type that may be from different layers into one feature in the Target layer, while maintaining the original features and attributes.

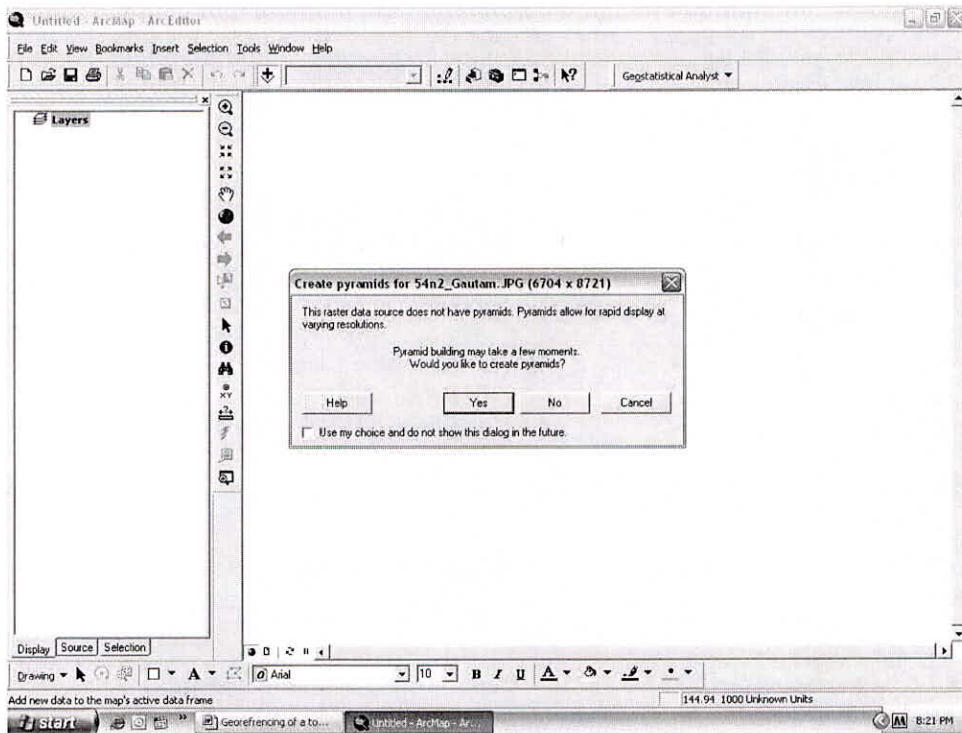
1. Click the Edit tool .
2. Click the features that you want to combine into one.



3. Click the **Target Layer** dropdown arrow and click the layer you want the new feature to belong to.
4. Click the **Editor** menu and click **Union**.
5. The selected features are combined into one.

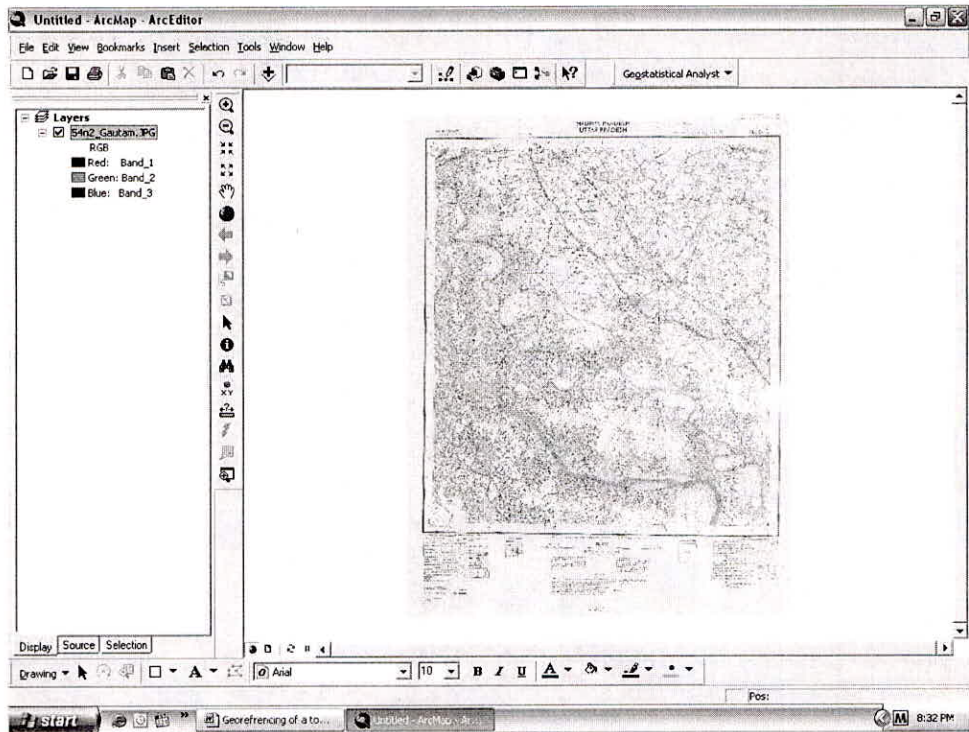
## Georeferencing of a Toposheet

- 1) Open ArcMap, Start>>Program file>>ArcGIS>>ArcMap
- 2) Open toposheet (File format can be \*.bmp, \*.jpeg, \*.tiff etc) in ArcMap, it will ask you to build a pyramid file. Click Ok to built a pyramid file ( Pyramid file is basically used to display raster file rapidly in different zoom level)

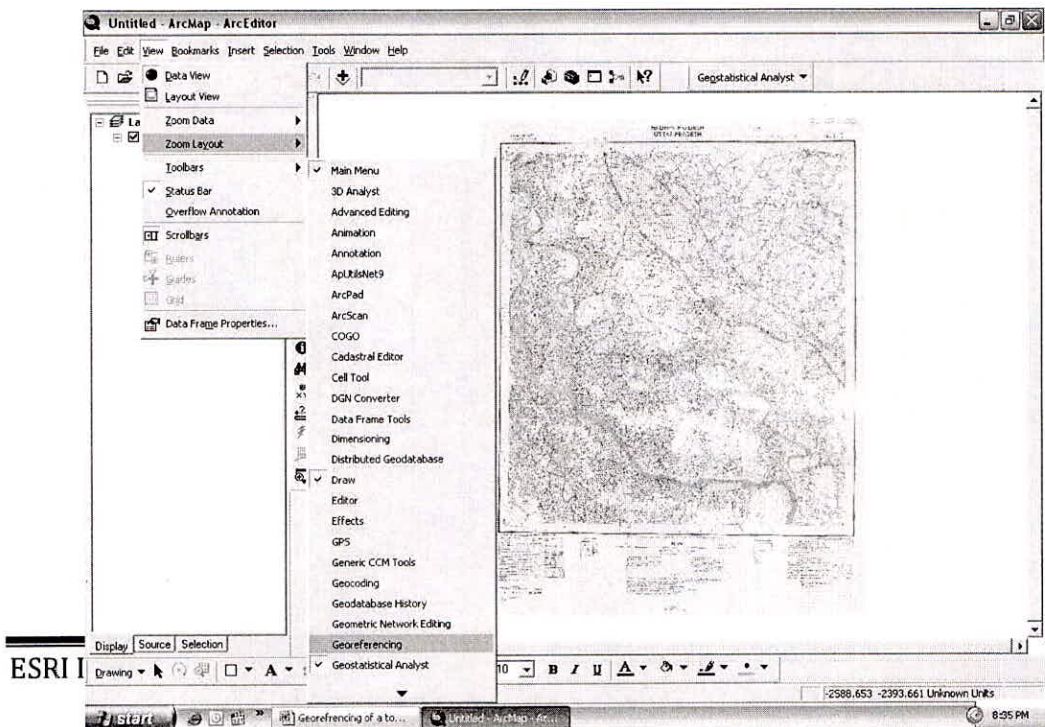




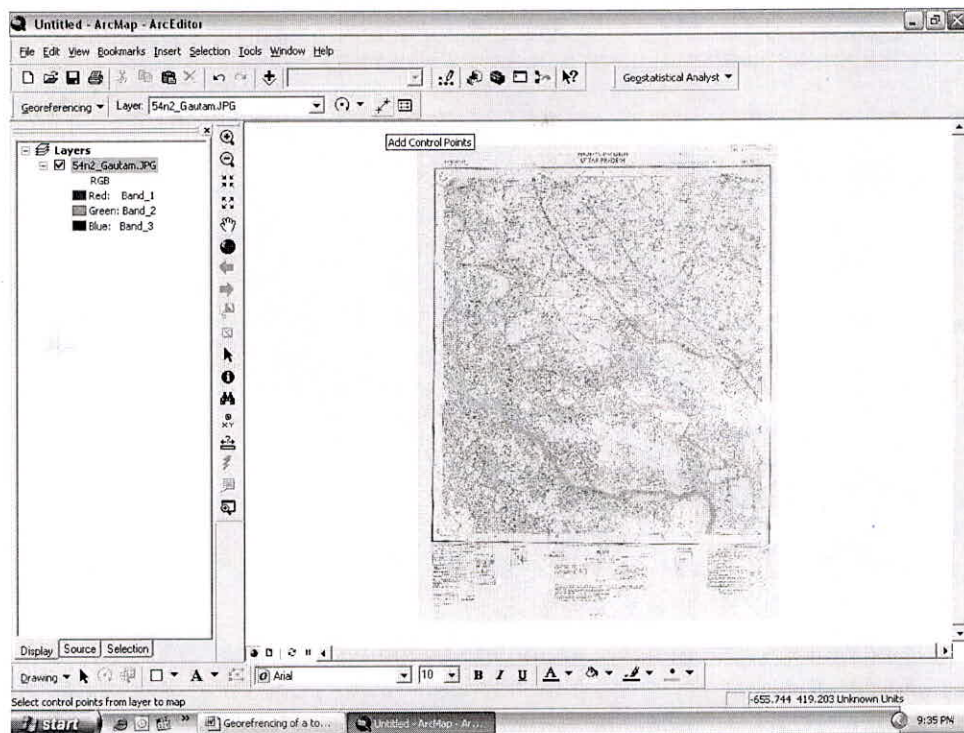
- 3) It will give information that the dataset is having an unknown spatial reference; Click OK to add data in the ArcMap Environment, Data will be added in the ArcMap.



- 4) Open Georeferencing toolbar by, View>>Toolbars>>Georeferencing



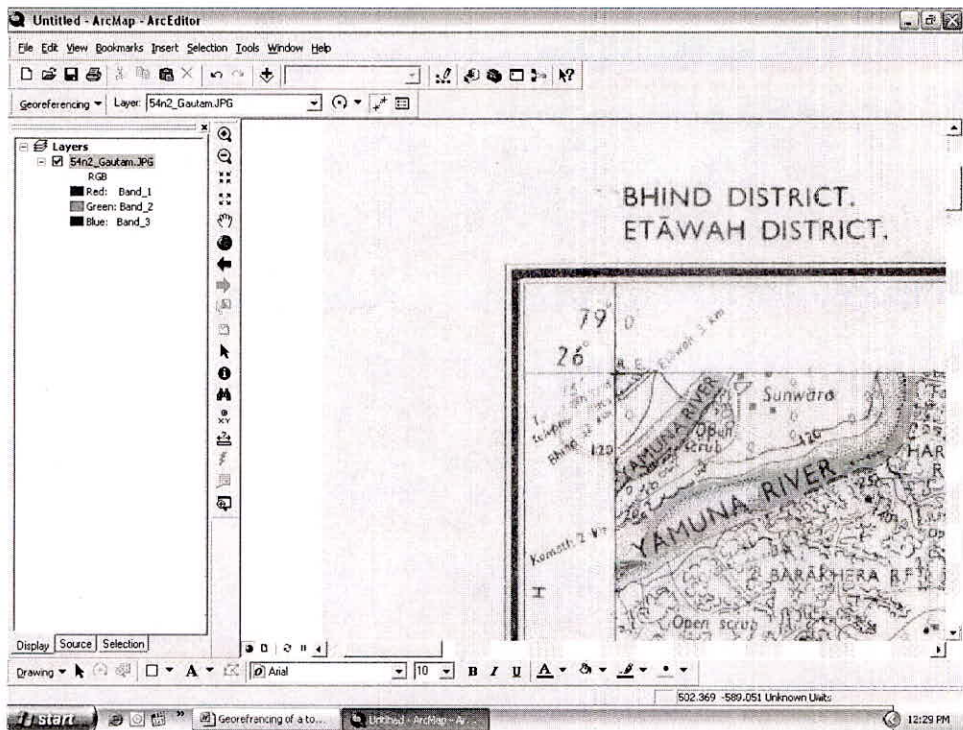
- 5) The toolbar will be activated in the ArcMap. Click on the Add Control Point. The cursor will be changed to the cross hair.



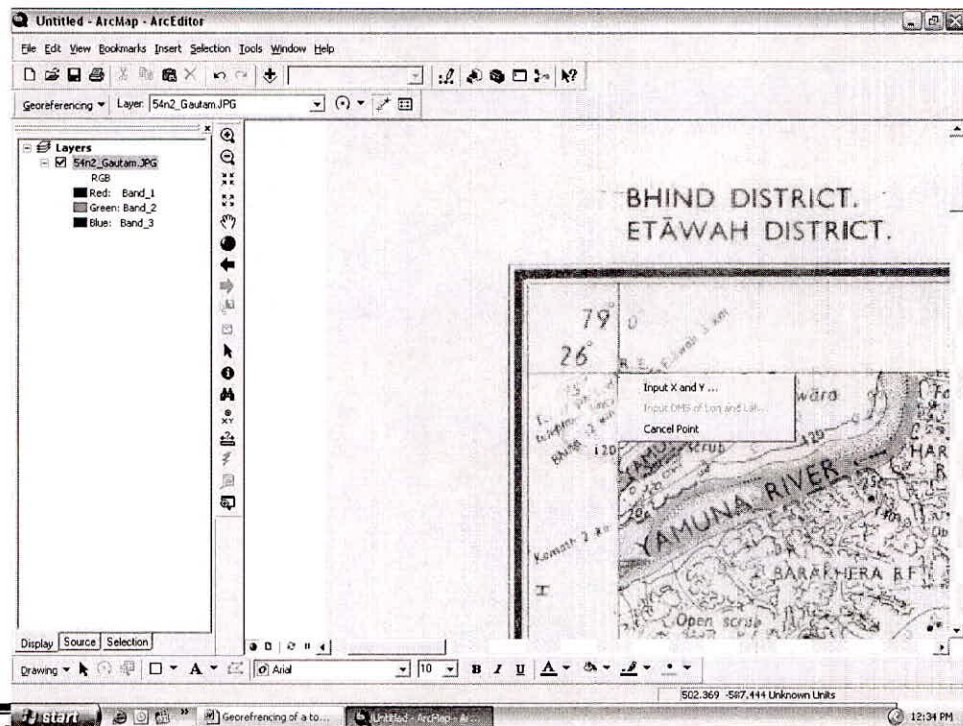
- 6) Zoom into the upper left region in the toposheet (as shown).

Note: In ArcMap value of DMS have to be changed into the DD by the following formula

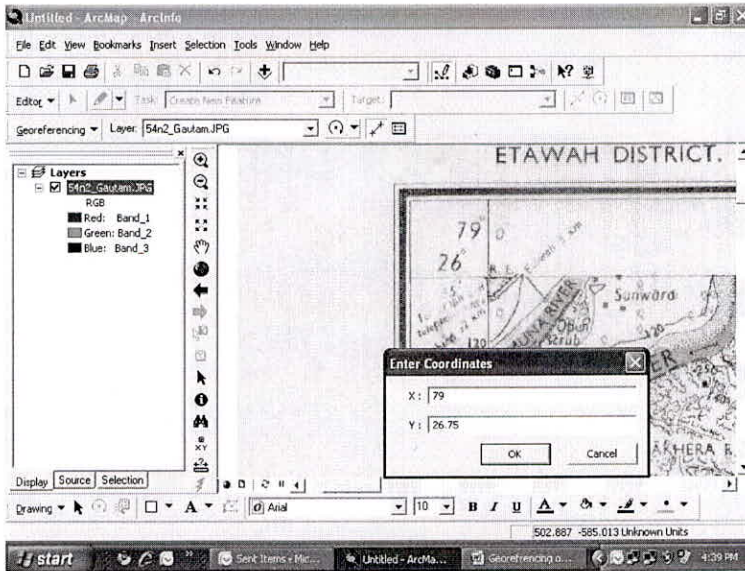
$$DD = \text{Degree} + \text{Minutes}/60 + \text{Seconds}/3600$$



- 7) Click on the add control point option in the Georeferencing toolbar. Left click on the cross hair then immediately right click to add X (Long) , Y (Lat) values for the point

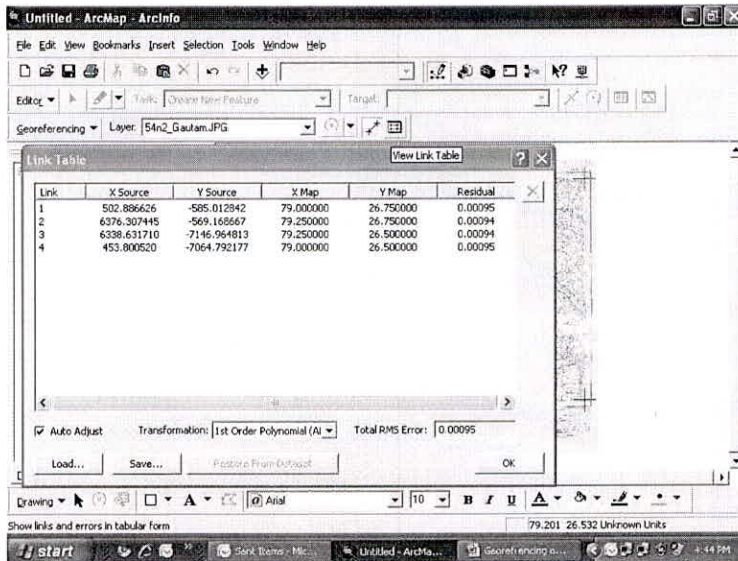


In this case values are as below  
 X = 79.00 (Long)  
 Y = 26.75 (Latitude)



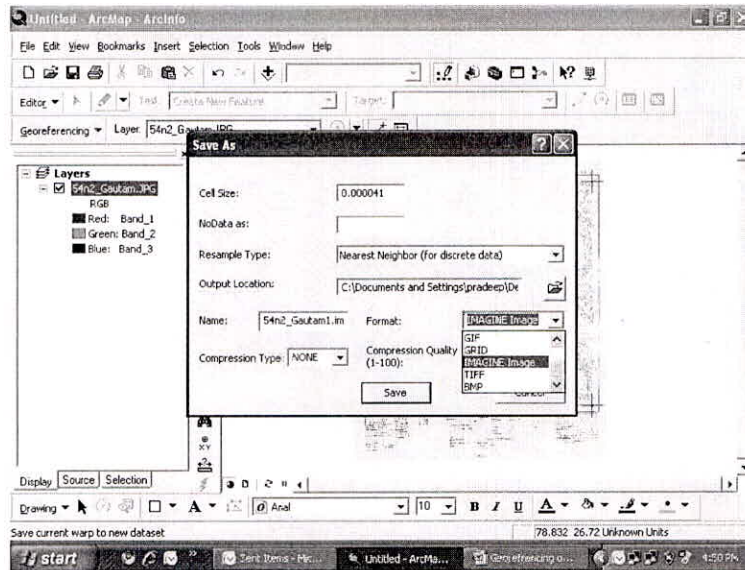
Click Ok. Then similarly put rest of the three values (On each corner).

8) After putting all values, click on the view link table to know about the RMS error.

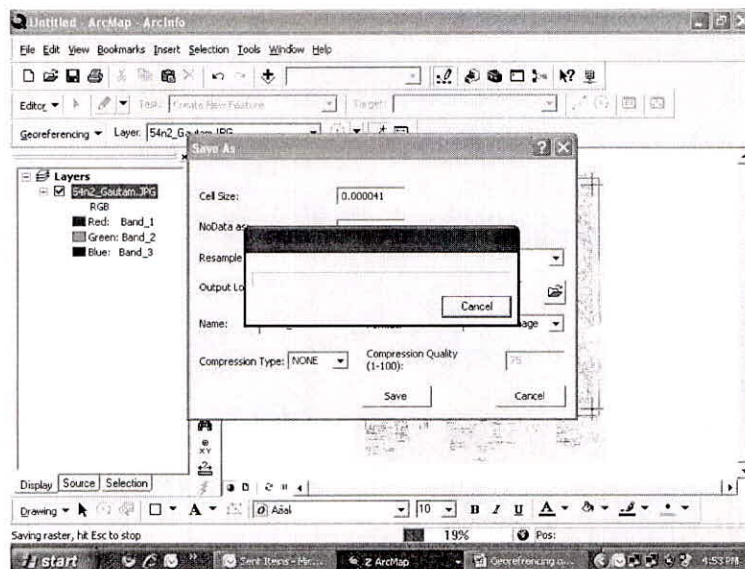


Click Ok to close the link table. Now image can be rectified.

9) Click on Georeferencing Toolbar>> Rectify. A window will appear

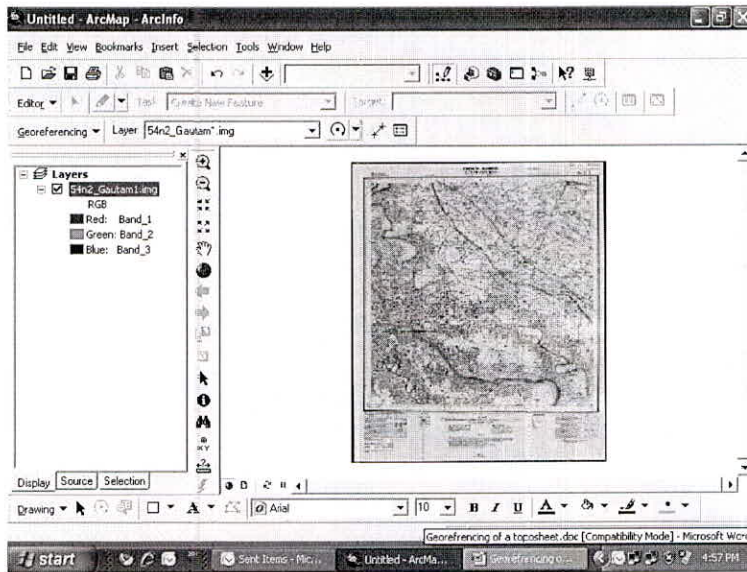


From the format drop down, file format can be selected. Click on save for the rectification



Click on File>>New for the empty document ( workspace).

10) Add file, File>>Add data (navigate to the location where data have been saved.) Select the file and click on Add to open file.



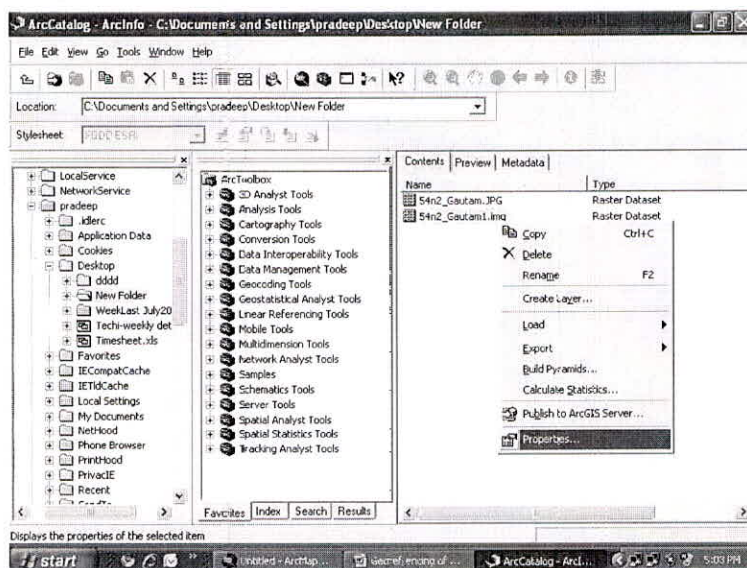
Now opened data is in Degree Decimal, (check on the status bar)

Close ArcMap.

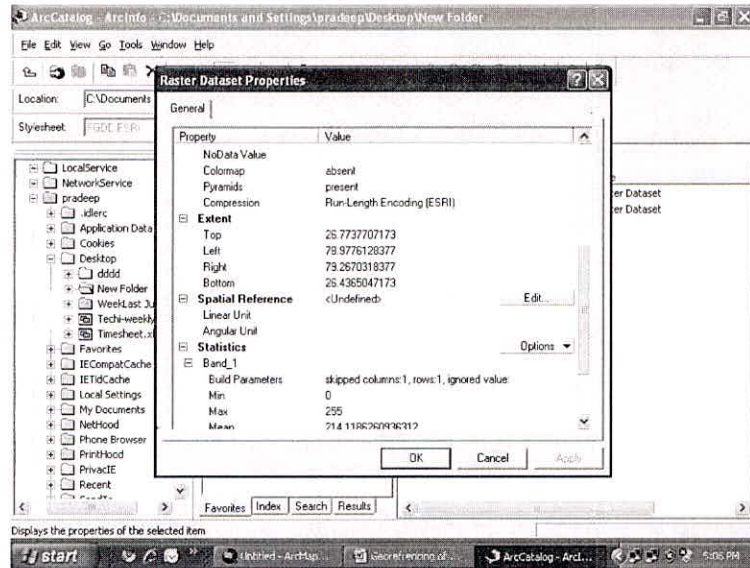
### Assign Projection system to the rectified data

11) Open ArcCatalog, navigate to the location where rectified data have been stored.

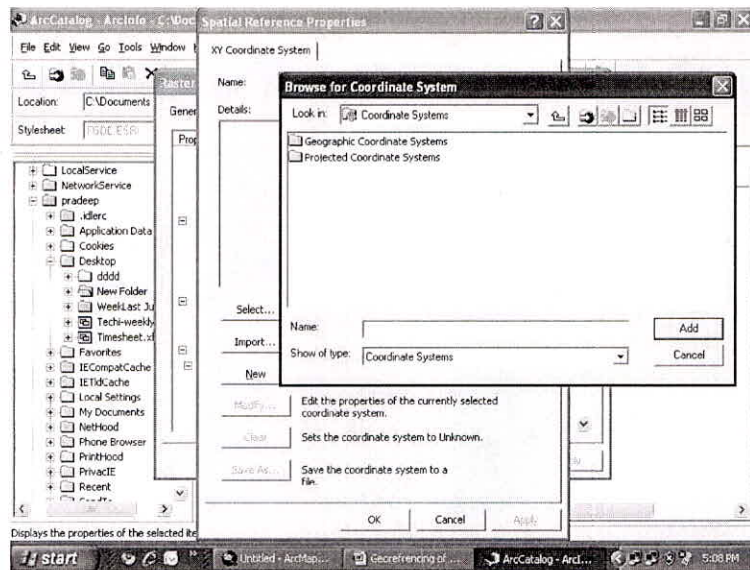
12) Right click on the Image, Click on Properties



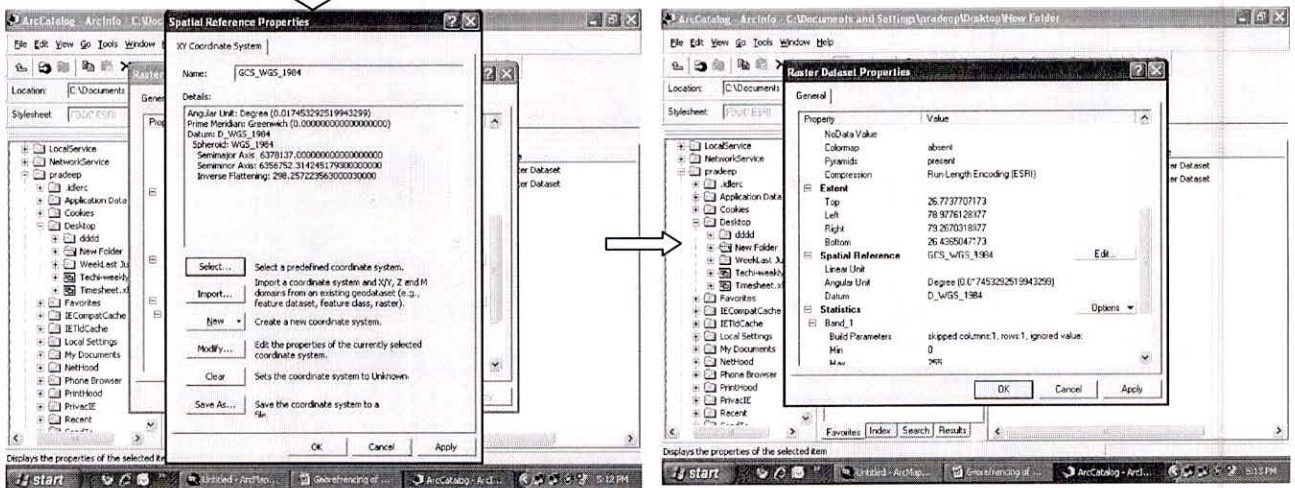
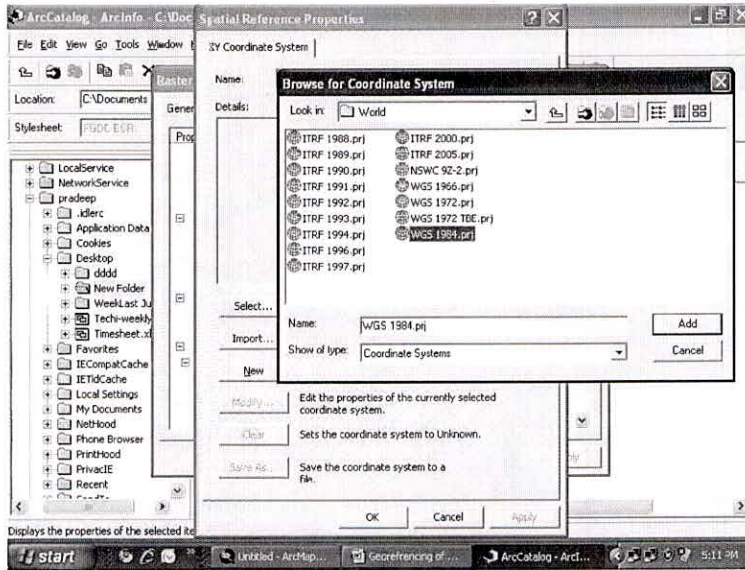
13) Property window will be opened, look for the spatial reference, click on the Edit button.



14) Spatial Reference window will appear, click on Select button for the coordinate system option.



For assigning CS, Double click on Geographic CS>>World>>WGS 1984



Click on Apply>>OK.

This way Coordinate system will be assigned to the Toposheet.

The Projection in this case is GCS-WGS 1984

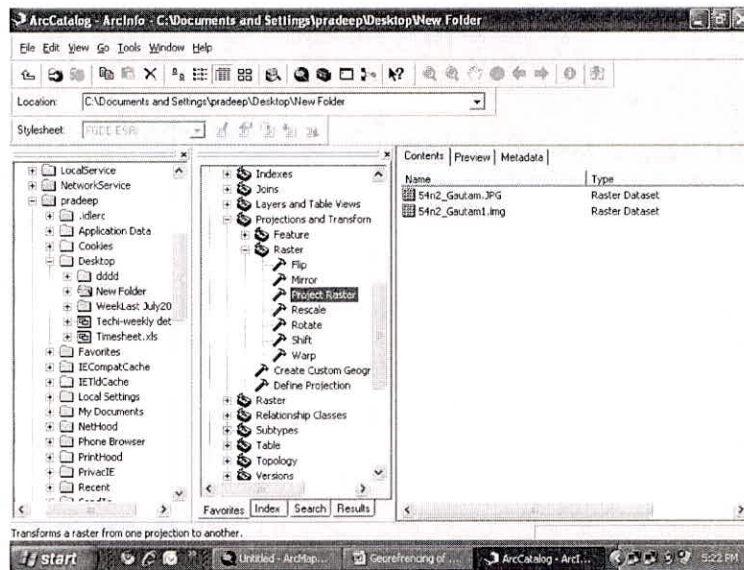


## Re-projection (Project) of the Raster Dataset

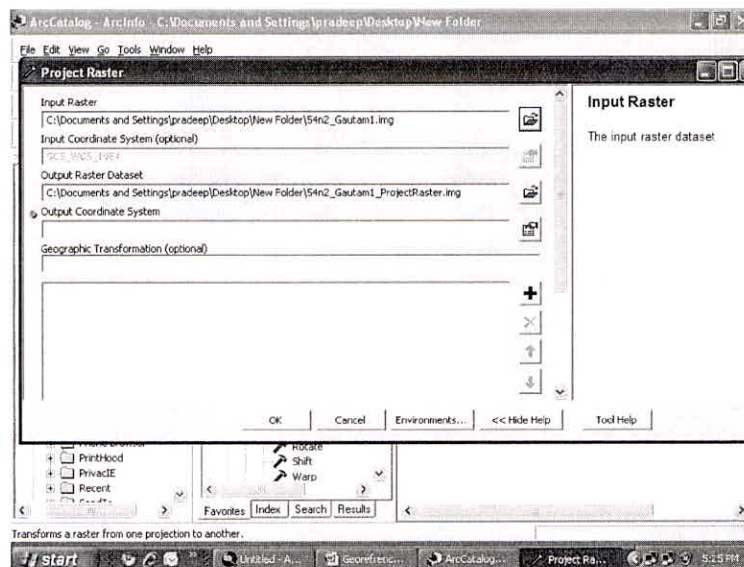
15) To Project a raster, open ArcToolBox in ArcMap (or in ArcCatalog)

16) Navigate in ArcToolbox for the Project Raster Tool

Data Management Tools >> Projection and Transformation >> Raster >> Project Raster



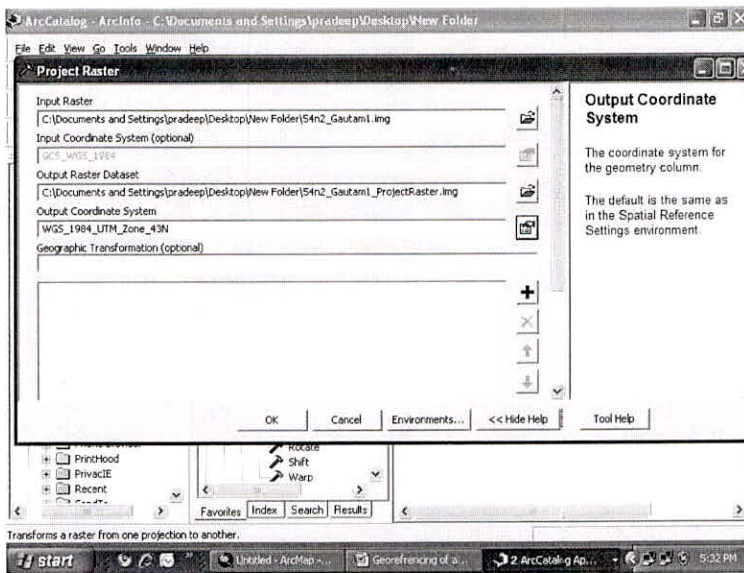
Double click on the Tool for its execution.



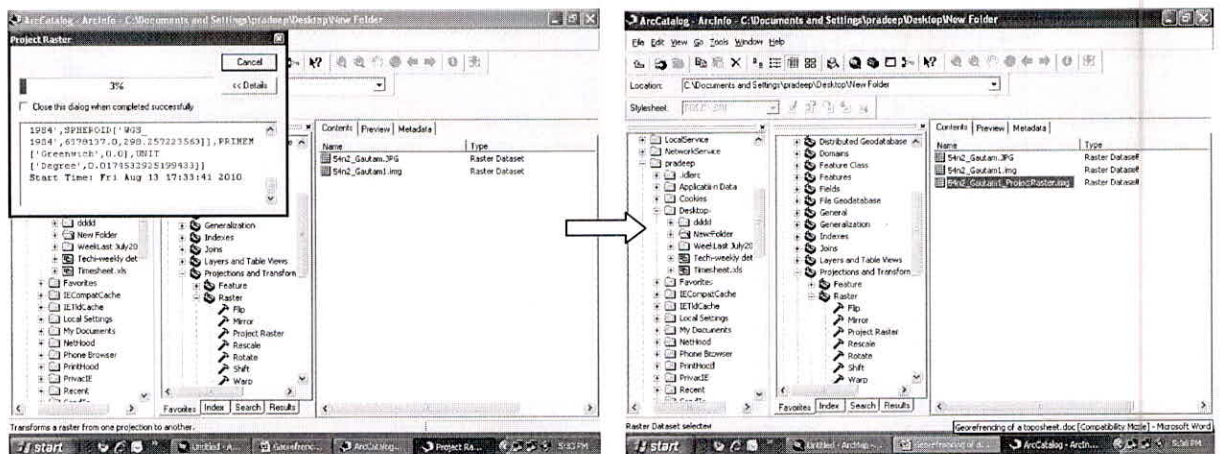
Define parameter I/O.

For output Projection system click on the Tool .

Again Click on Select >> Projected CS >> UTM >> WGS 1984 >> WGS 1984 UTM Zone 43N (As this data belongs to that region)



Click on OK to execute the Tool.



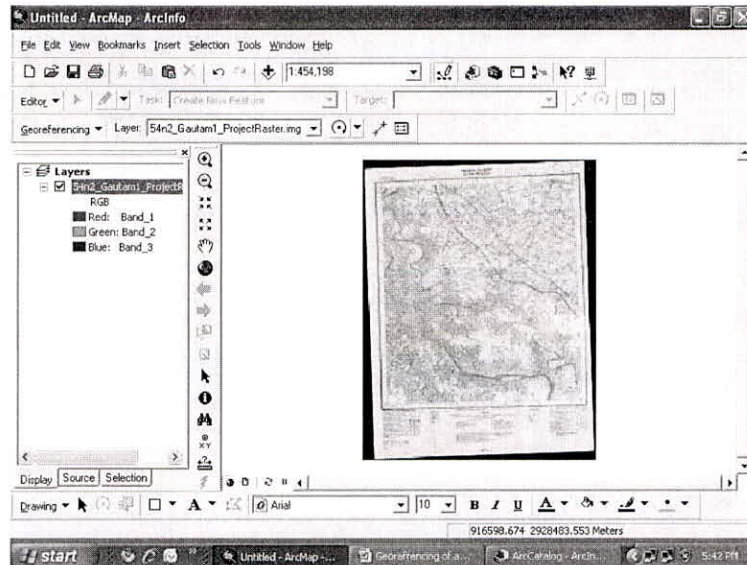
The new file will be created.

Note: Same procedure can be applied to Project (Re-project) a vector data.

In ToolBox Navigate for the following tool

Data Management Tools >> Projection and Transformation >> Feature >> Project

17) Now open the raster data in ArcMap (created using step-16). Check the units of the Map in the Status Bar. It will be in meters.



### **Vector Data format in ArcGIS Desktop**

In ArcGIS Desktop data can be digitized in three forms

a) Shapefile: A shapefile is a digital vector storage format for storing geometric location and associated attribute information. Shapefile doesn't store topological information.

Mandatory files:

- .shp — shape format; the feature geometry itself
- .shx — shape index format; a positional index of the feature geometry to allow seeking forwards and backwards quickly
- .dbf — attribute format; columnar attributes for each shape, in dBase IV format

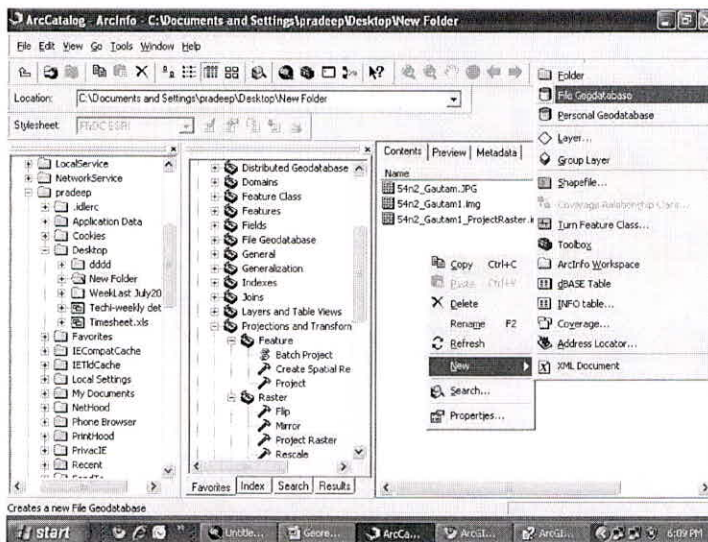
Optional files:

- .prj — projection format; the coordinate system and projection information, a plain text file describing the projection using well-known text format
  - .sbn and .sbx — a spatial index of the features
- b) Personal Geodatabase : Stored in Access. 2 GB size limit, but effective size is 250 to 500 MB per geodatabase. Windows only. Supports a single editor and a few readers, extension is \*.mdb
- c) File Geodatabase: Stored in a file folder. Storage up to 1 TB per dataset. cross platform (OS). Supports a single editor and a few readers, extension is \*.gdb

**Note: Although Coverage is ESRI file format but data creation and editing can only be done in ArcInfo workstation license.**

### Digitization of the Features

- 18) Open ArcCatalog, Navigate to the folder where data have to be created.  
Right click >> New >> File Geodatabase



Name it, ex: Dehradun.gdb

## **Feature Class and Feature Dataset**

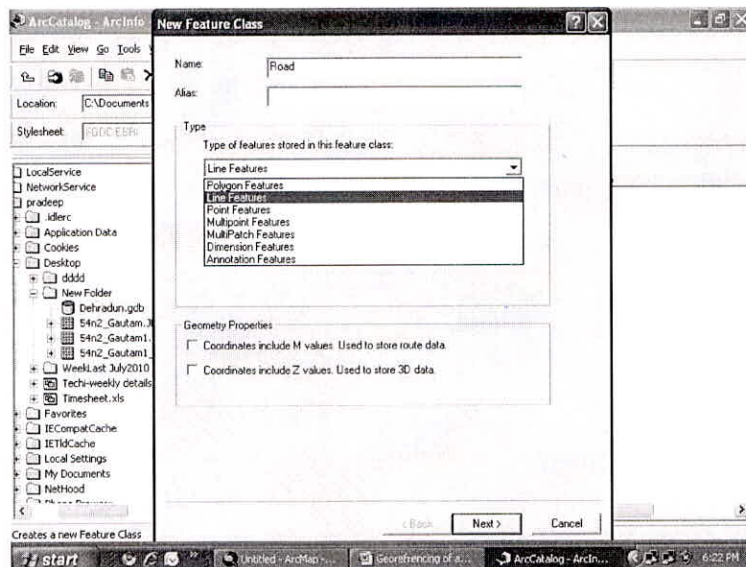
**Feature Class (FC):** It is a collection of features having similar geometry, common attribute table and a common projection system. (Ex: Building FC—Collection of polygon geometry type)

**Feature Dataset (FD):** It is a collection of features having different geometry and they fall in a common geographic area. (Ex. Dehradun FD: Road FC, Building FC, Location FC etc)

19) Double click the database to open,

Right Click >> New >> Feature Class.

A window wizard will appear,



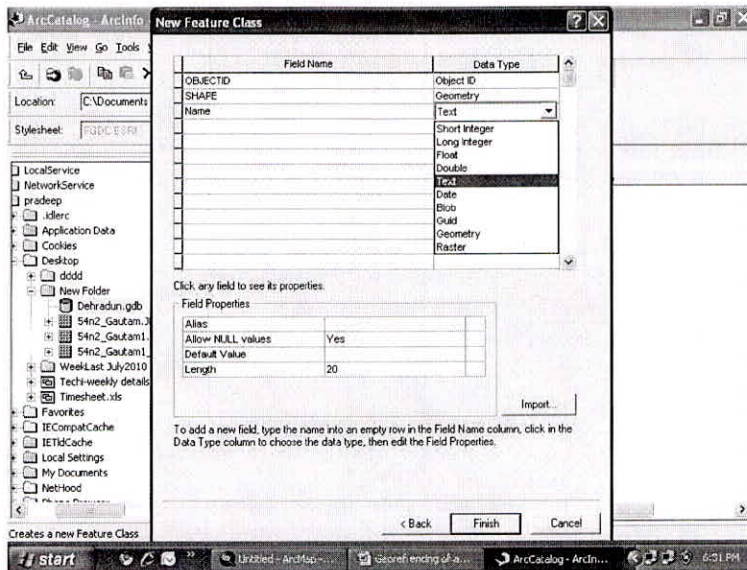
Fill Name; Select its geometry type; click on Next. (In this case Name : Road, Type: Line Feature)

Click on Import to select the Coordinate System (CS).

Navigate to the file which was created in Step-16 (projection information will be imported by this way)

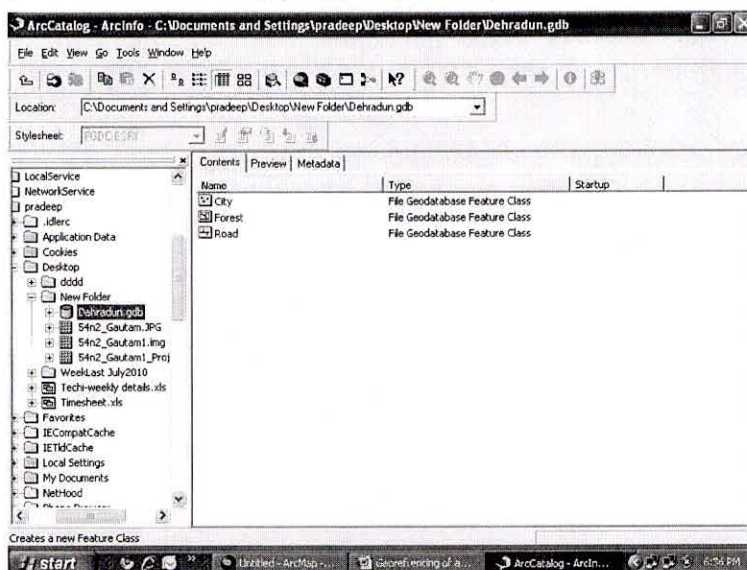
Click on next, leave as default click next, next,

Add a field like shown below, with text data type



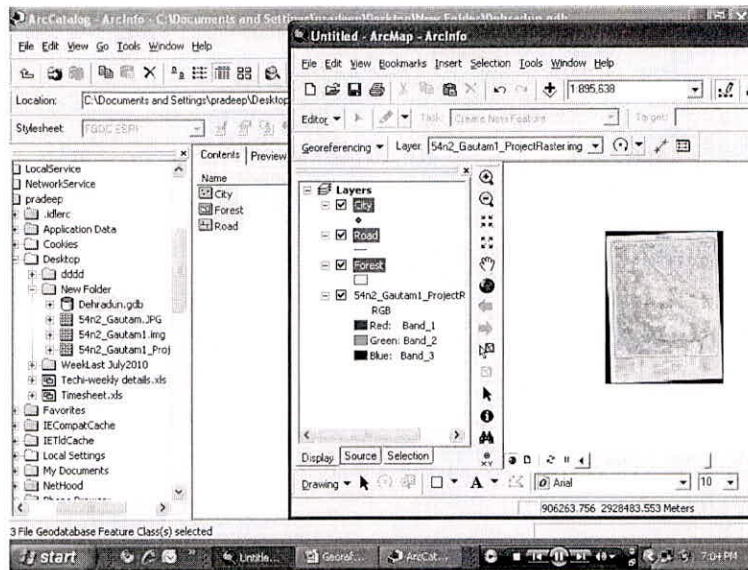
Click on Finish. A file will be created.

Similarly create files having polygon (Forest) and point (City) geometry.




20) Open ArcMap, add above data

File >> Add Data or Select all data in ArcCatalog then Drag and Drop data from ArcCatalog to ArcMap





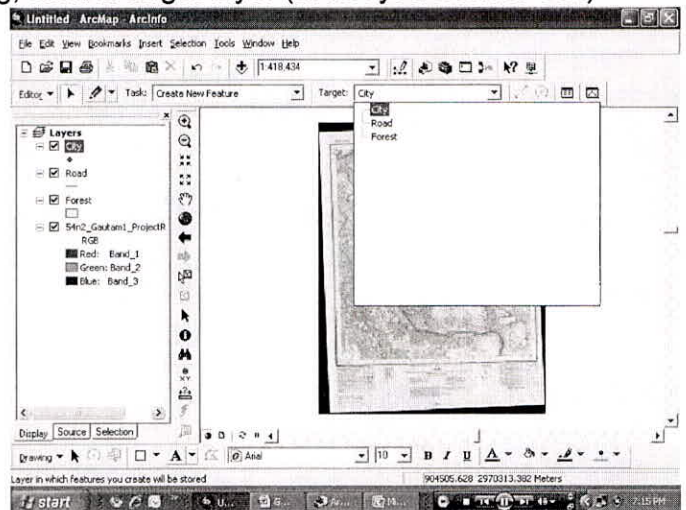
21) To start editing (digitization); add editor toolbar in ArcMap by View >>

Toolbar >> Editor or click on  icon.

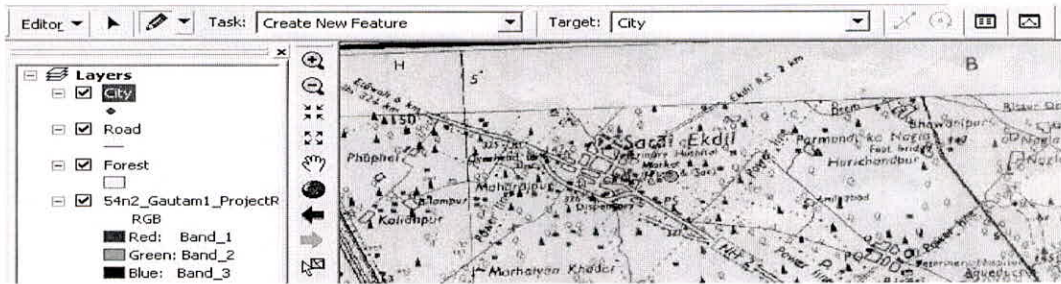
22) Click Editor >> Start Editing; set the target layer (which you want to edit)

Select Create New Features from task option.

Click on sketch tool to start edit  mouse will be changed into cross hair 



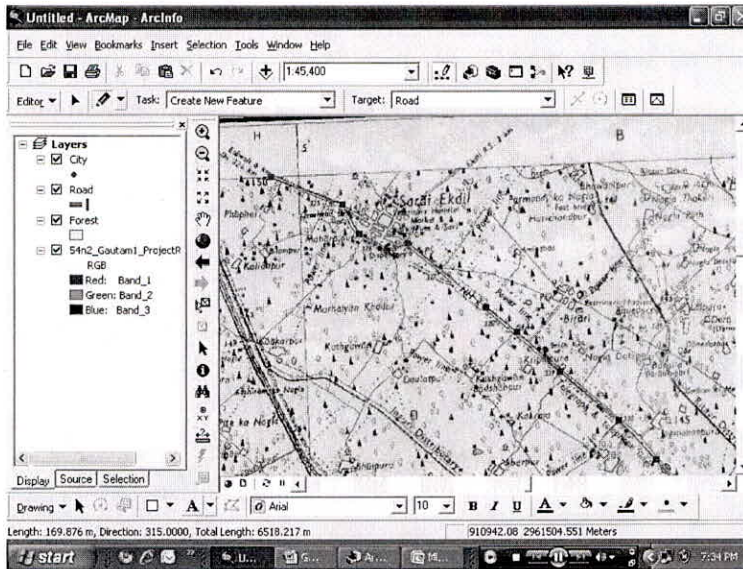
23) Zoom into the place where you want to digitize,



Depending on the target layer sketch tool will behave as per geometry.

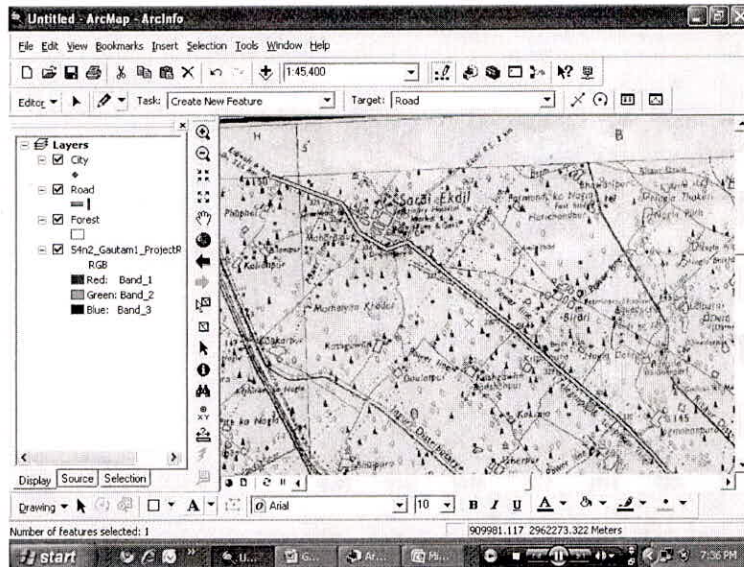
Layer	Sketch Tool
City	Point
Road	Line
Forest	Polygon


Click on the desired location to put a vertex (incase of line/polygon).



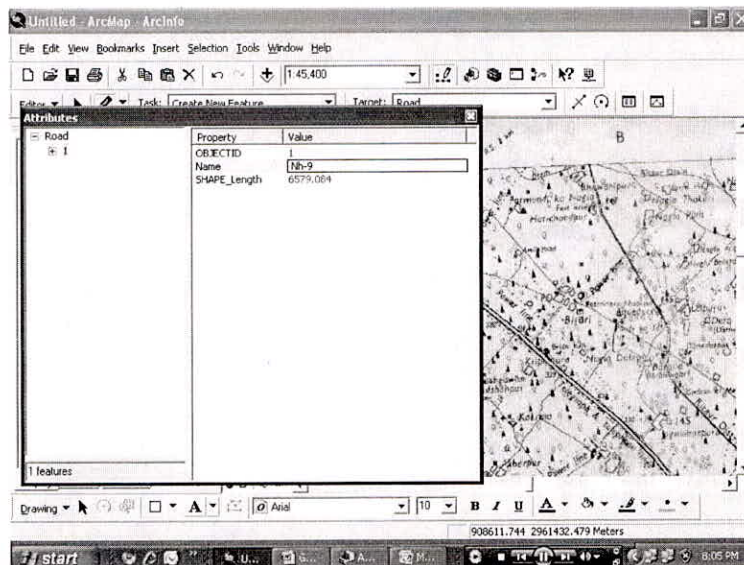
When you want to stop the digitization double click or Press F2 from keyboard.





To fill attribute in the digitized feature, click  icon present in the editor toolbar.

A window will appear fill attribute as per your requirement.

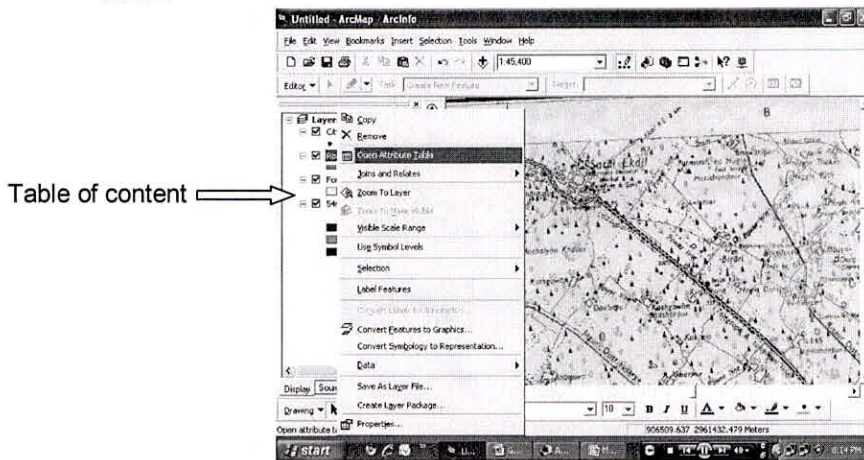


To save edits click on Editor >> Save Edits. Data will be saved.

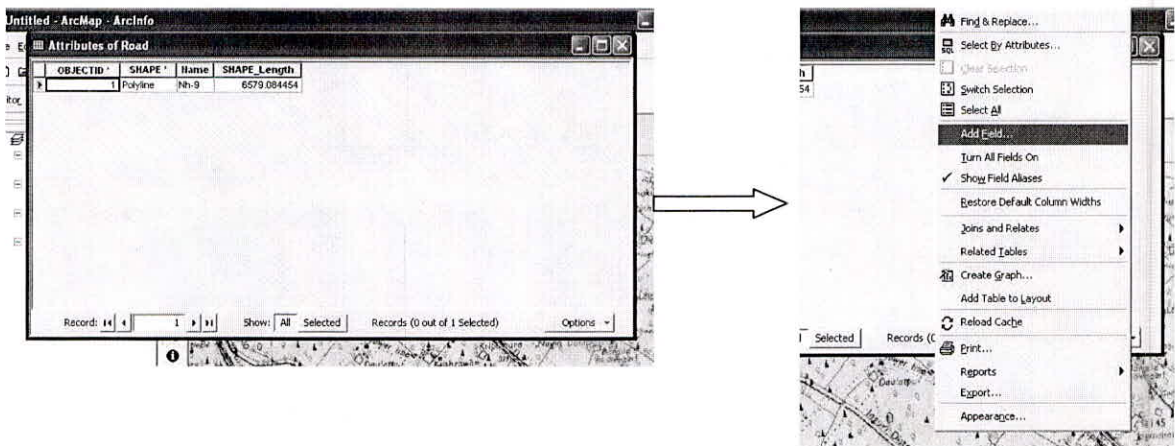
### **Adding a field (Column) in the existing data**

This can be done only when we are outside the editing mode. If you are in editing mode Click on Editor >> Stop Editing.

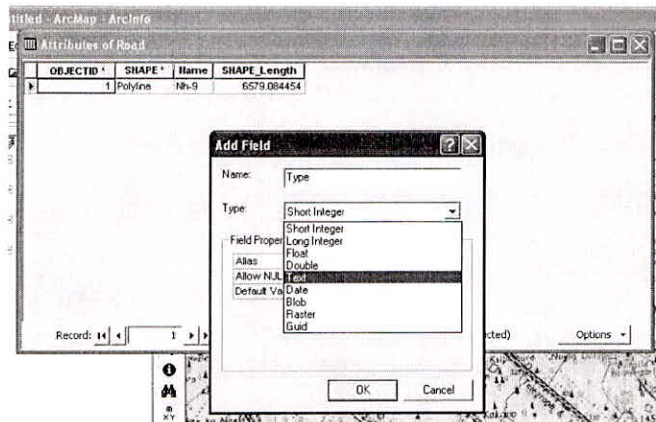
Now Right click on Layer in the Table of Content (TOC) >> Open attribute table.



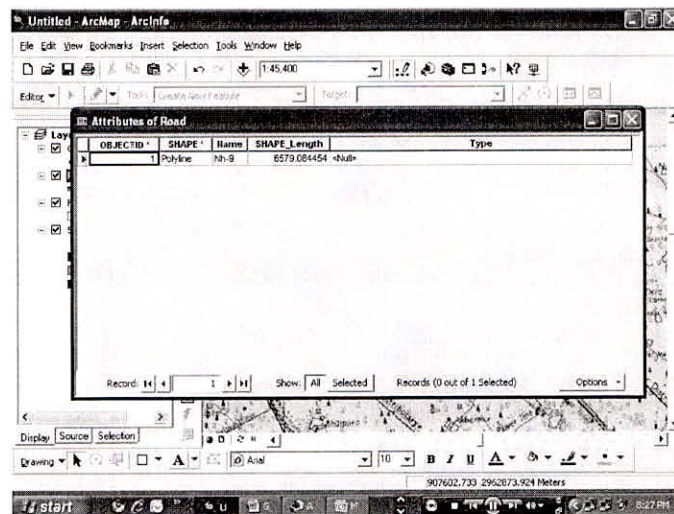
Click on Option, then Add Field



Give name to the field and type of the data.



A new field is added into the existing table.




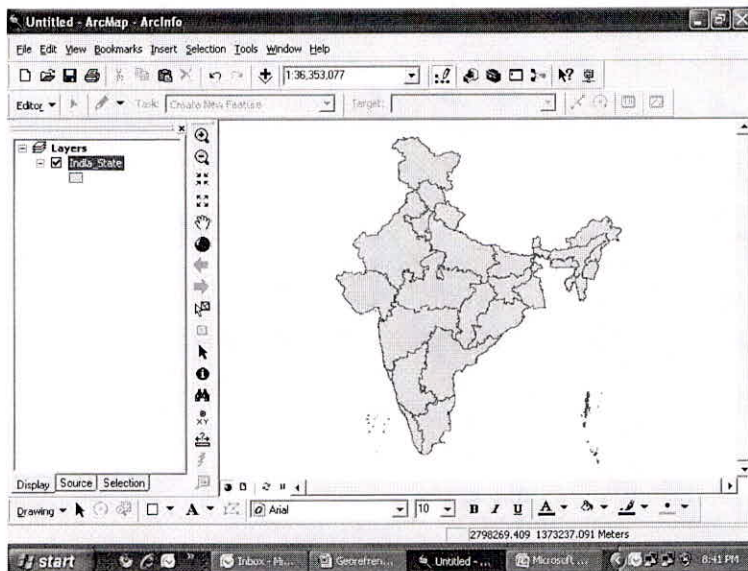
Similar type of steps can be followed to digitize the data (eg: Forest and City)

## **Labeling and Annotation**

*Label: Descriptive text placed next to the feature, they are dynamic (change their position when panning and zooming done on them), they are handled as group wise (color of individual label can't not be changed), stored in .mxd document, feature linked*

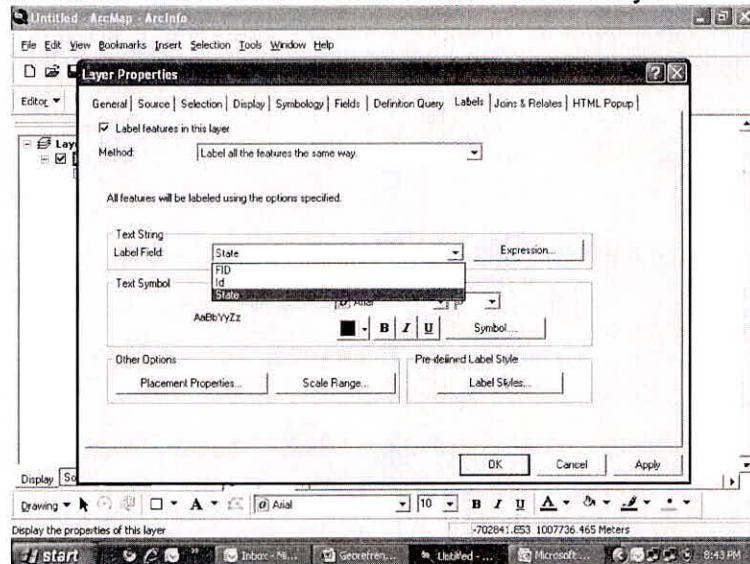
*Annotation: They are static, can be handled individually, can be store either in .mxd or in geodatabase, can or can not be feature linked*

24) Launch ArcMap, add data by clicking icon 



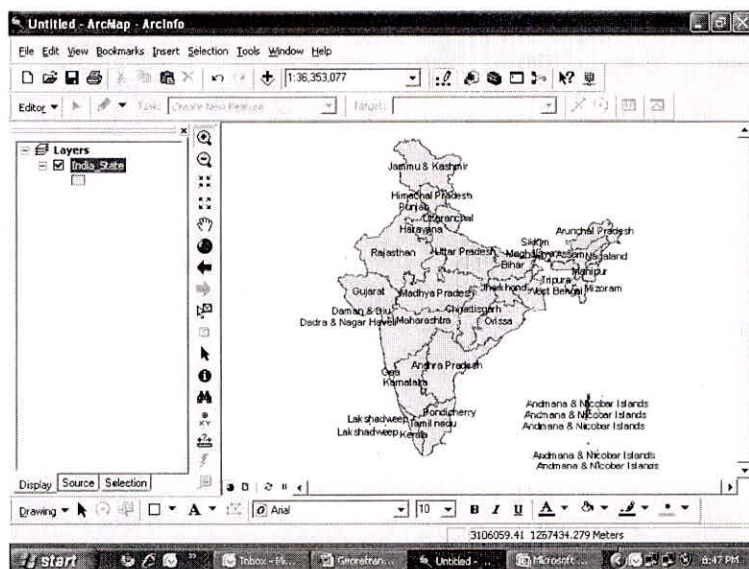
25) Right Click on Layer in TOC >> Properties >. Label

Click on the check Box to activate Label feature in this layer.



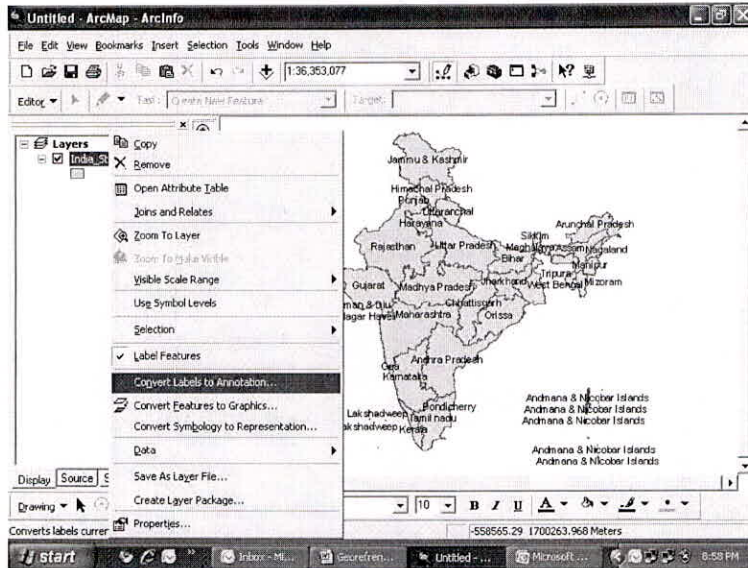
Select the label field as per your requirement (as shown in the above fig), click apply and OK.

Feature will be labeled in the display area.

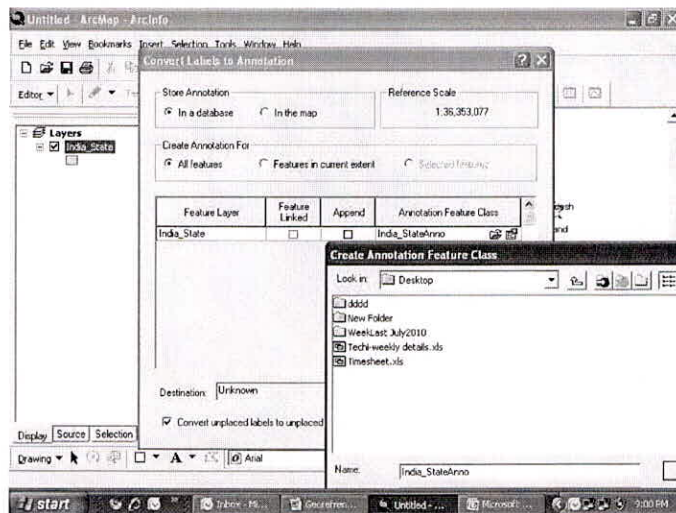


## Conversion from Label to Annotation

26) Right click on the layer in TOC >> Convert from Label to Annotation

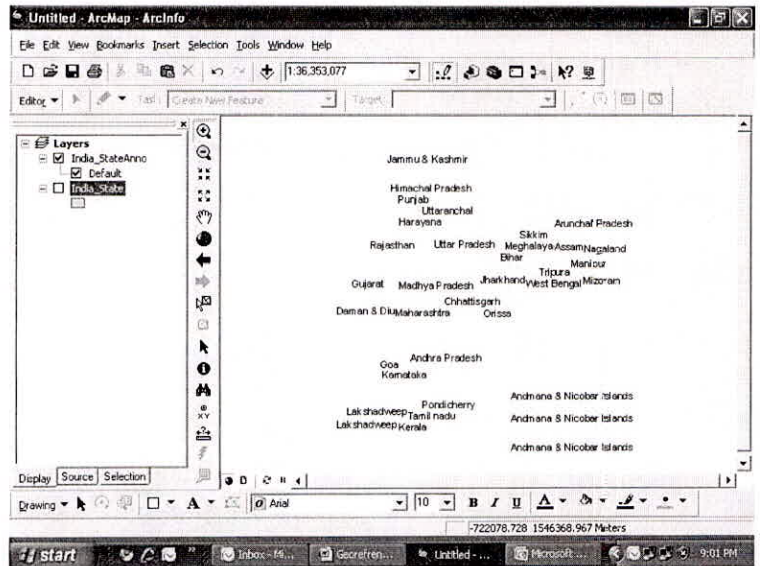


27) A window will be opened, give parameter and geodatabase location where Annotation will be stored



Click on convert.

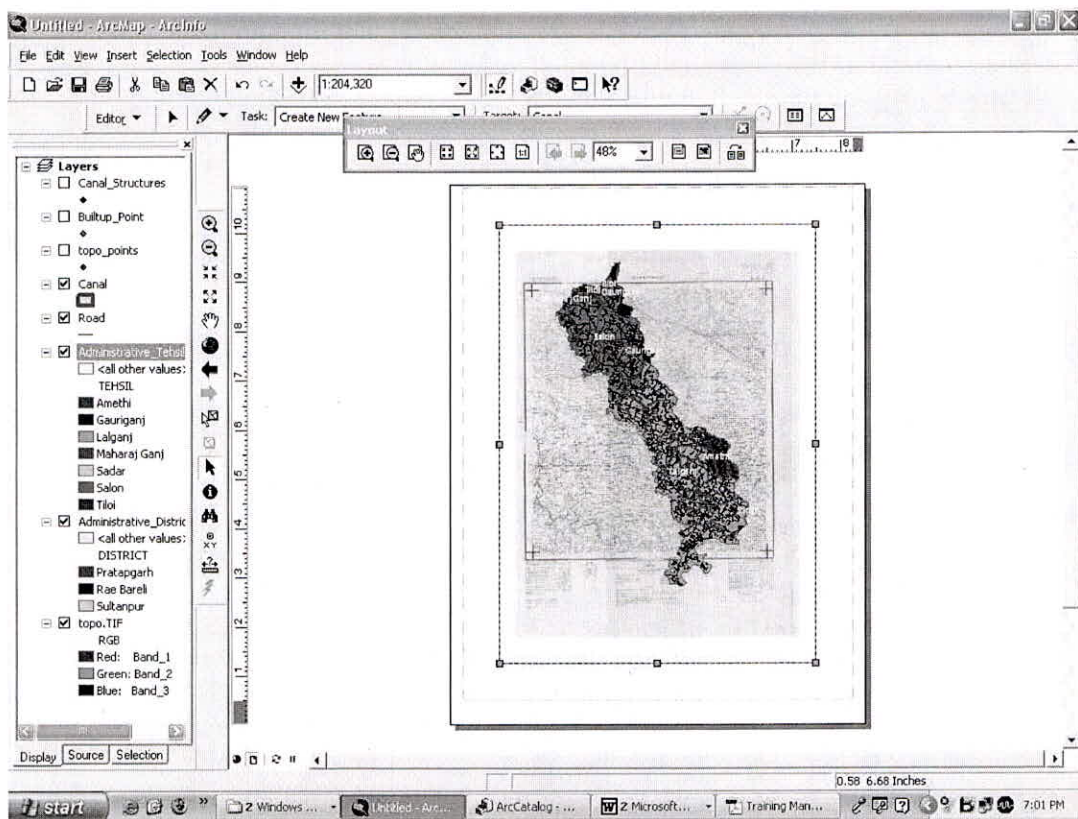
The converted Annotation will be stored as a feature class in the geodatabase, which can be accessible as and when require.



# Presenting Data

## Switching to layout view

- Click the View menu.
- Click Layout View. The ArcMap window displays the entire map.



## How to add map elements

### Adding a North arrow

1. Click the Insert menu and click North Arrow.



2. Click a North arrow.
3. Click OK.
4. Click and drag the North arrow into place on your map.
5. Optionally, resize the North arrow by clicking and dragging a selection handle.

### **Adding a scale bar**

1. Click the Insert menu and click Scale Bar.
2. Click a scale bar.
3. Optionally, click Properties to modify the scale bar's properties.
4. Click OK.
5. Click and drag the scale bar into place on your map.
6. Optionally, resize the text on the scale bar by clicking and dragging a selection handle.

### **Adding scale text**

1. Click the Insert menu and click Scale Text.
2. Click a sample of the style of scale text to add to the map.
3. Optionally, click Properties to customize the scale text.
4. Click OK.
5. Click and drag the scale text into position on your map.
6. Optionally, set a specific font size for the scale text by choosing a font size from the font size dropdown list on the Draw toolbar.

### **Adding a legend**

1. Click the Insert menu and click Legend.
2. The Legend Wizard appears. If this wizard doesn't appear, wizards have been turned off. When wizards have been turned off, a default legend will be immediately added to your layout. You can double-click this legend to change its properties. If you'd prefer to use the Legend Wizard when you insert a legend, you need to turn wizards back on again: Choose Options from the Tools menu and in the dialog that appears choose the Application tab and check the 'Show wizards when available' box.
3. By default, all the layers on the map will appear as legend items in the legend. To remove a legend item, click it, then click the left arrow button.
4. Use the Up and Down arrow buttons to order the legend items.
5. Click Next.
6. Type a title for the legend.
7. Set the text color, font, and size as desired.
8. Click Next.
9. Click the Border dropdown arrow and click a border.
10. Click the Background dropdown arrow and click a background.
11. Click the Drop Shadow dropdown arrow and click a drop shadow.

12. Click Next.
13. Click a Legend Item in the list to modify the symbol patch.
14. Set the Patch properties as desired.
15. Click Next.
16. Set the spacing between legend elements by typing a value into the appropriate box.
17. Click Finish.

## Changing the patches in a legend

1. Right-click the legend on the map and click Properties.
2. Click the Legend tab.
3. Click the dropdown arrow to select a new patch shape.
4. Click OK.

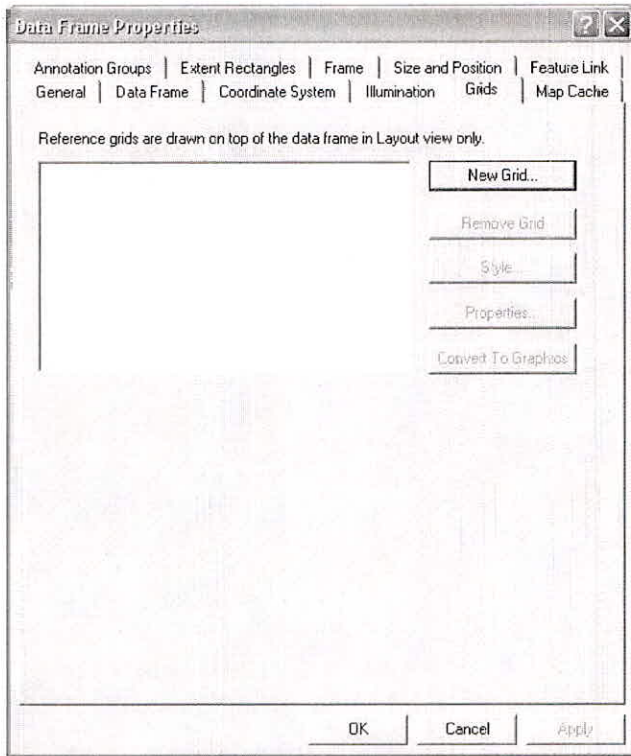
## Changing the items in a legend

1. Right-click the legend on the map and click Properties.
2. Click the Items tab.
3. Click a legend item in the Legend Items list.
4. Click the up and down arrows to move the item up or down in the legend.
5. Optionally, click Style and change the item's style in the legend.
6. Optionally, check Place in new column to place the item in a new column.
7. Optionally, change the number of columns for the selected legend item by clicking the up and down arrow keys.
8. Optionally, remove an item from the legend by clicking it and clicking the left arrow key.
9. Click OK.

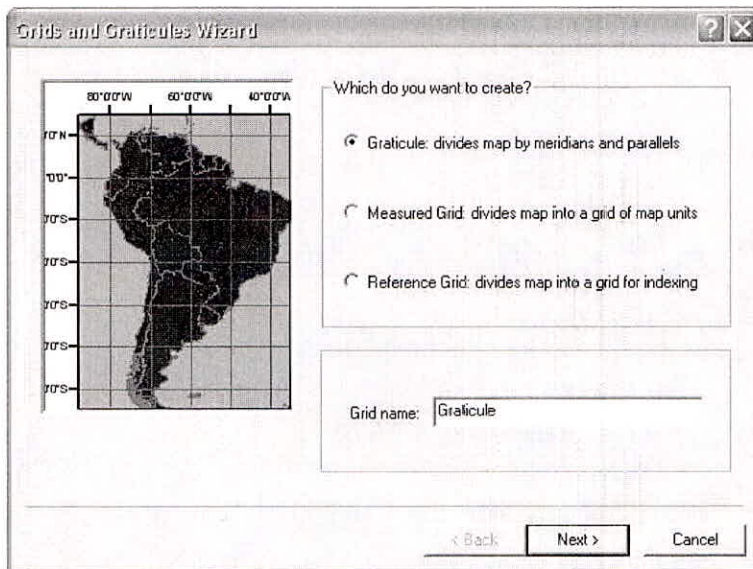
## HOW TO ADD GRIDLINES

Gridlines can be added and viewed only on Layout View. In Data View they shall not be visible.

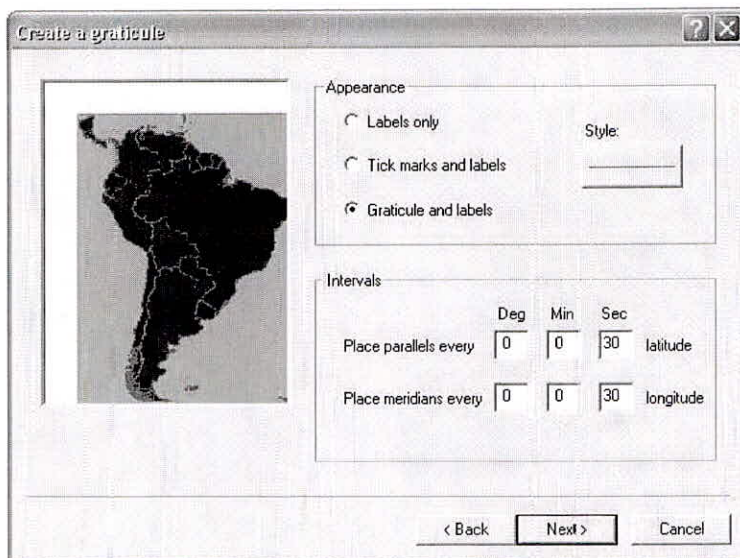
1. Click the **View** menu and click **Data Frame** Properties.
2. Click the **Grids** Tab.
3. Click the **New Grid** button.



4. Select **Graticules** and click **Next** to continue.



5. Click **Graticules** and **Labels**. Type the degree interval for which the grid is to be drawn. **Type Deg 0, Min 5, Sec 0 and Deg 0, Min 5, Sec 0** in respective fields of Parallels and Meridians.

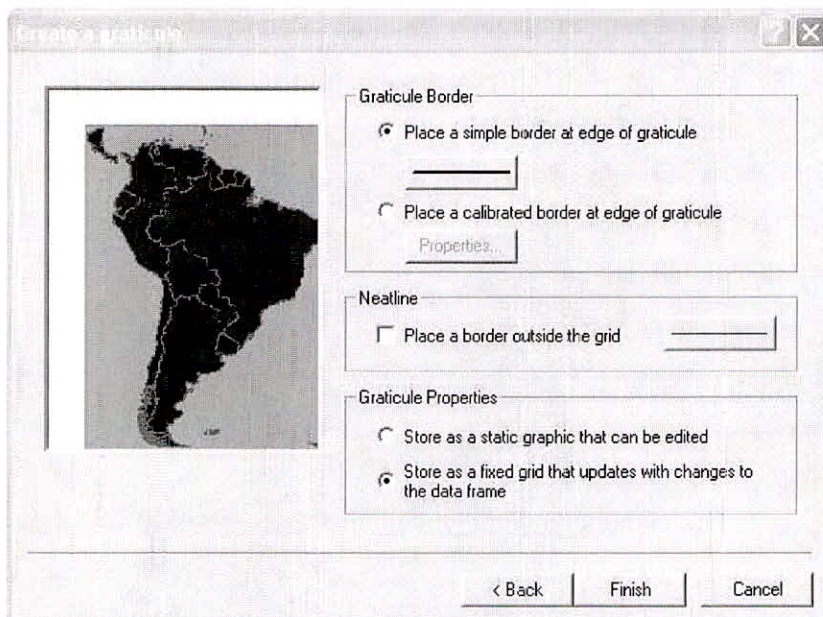


6. Click Next to continue.

7. Select Line Styles, if you need to change the appearance of the Grid. Click **Next** to continue.

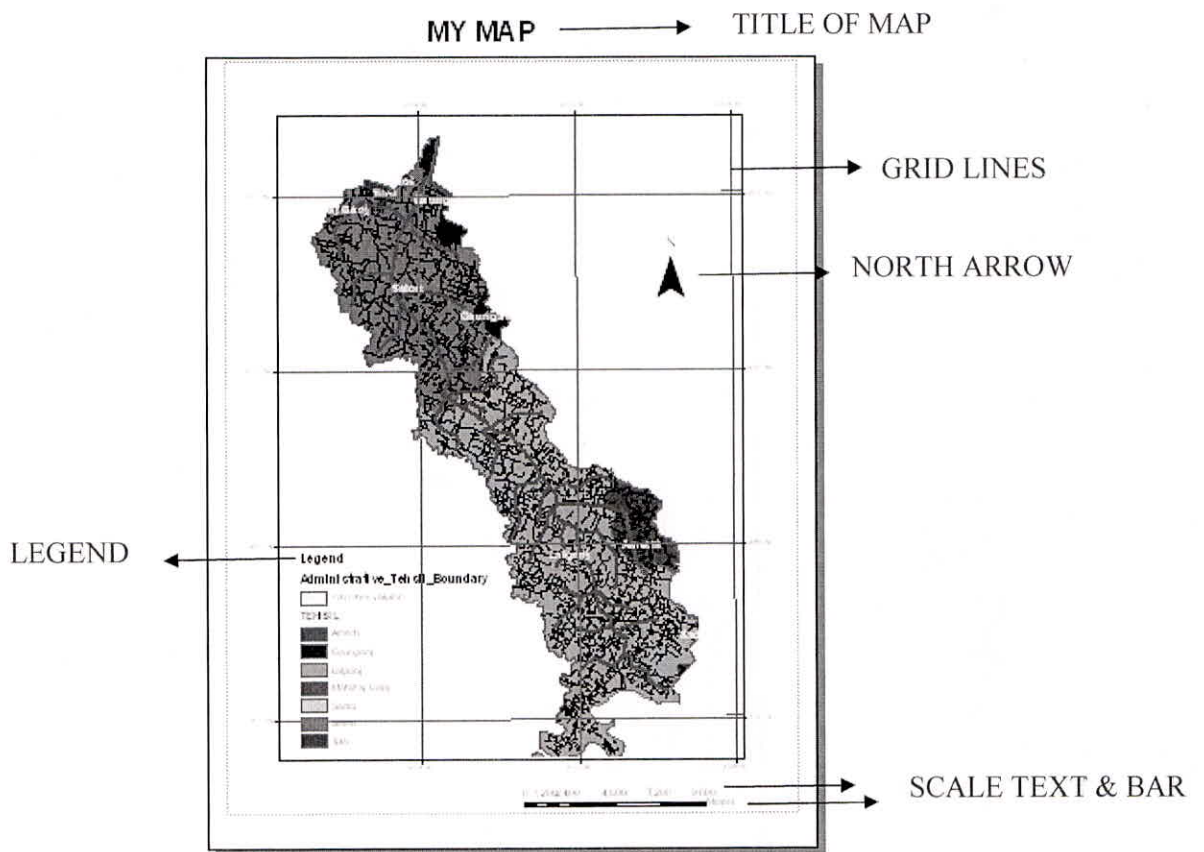
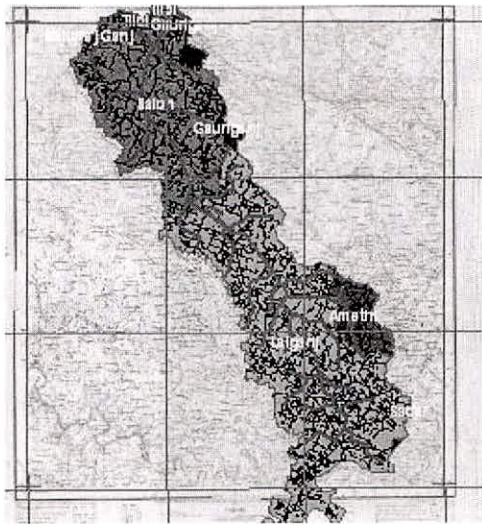
8. Click Next to continue, look around different options if required.

9. Click Finish to continue.



10. Click **APPLY and OK** to Data Frame Properties dialog box.

11. The Map shows the **GRID** on Layout View.



## How to print a scene

1. Click the Print button.
2. Optionally, click Setup.
3. Optionally, click the dropdown arrow to select a printer.
4. Optionally, click the dropdown arrow to select a page size.
5. Optionally, click Portrait or Landscape to select the page orientation.
6. Optionally, click the dropdown arrow to select a printer engine.
7. Optionally, click OK.
8. Click OK on the Print dialog box.