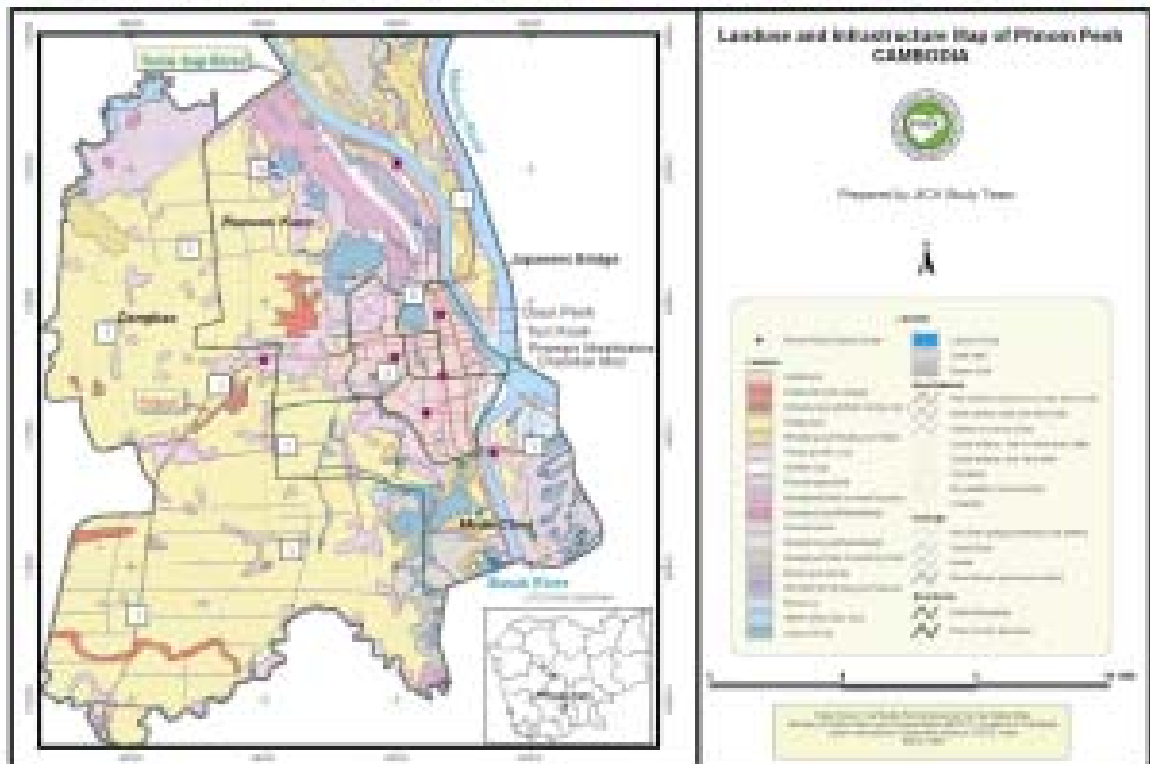


ANNEX III

ARCVIEW OPERATION MANUAL

Introduction to ArcView

with RSP GIS Dataset



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Tables

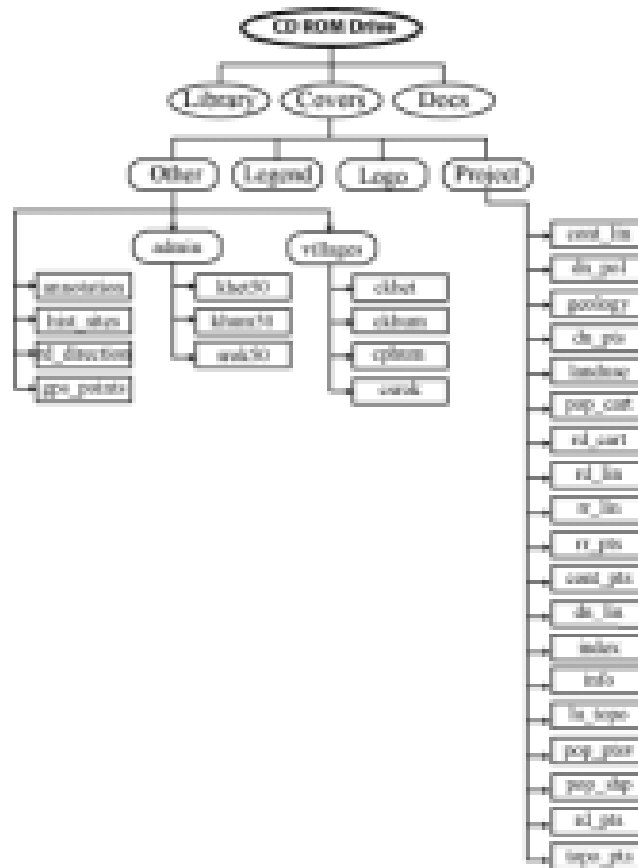
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1. GIS Data Used in This Training Manual

1.1. Work Space Structure

This structure is designed to help the users to find out where all of the JICA's GIS dataset is organized. See the picture below.

Figure 1-1 File Structure



In the CD ROM drive there is a directory “Covers”. In the Covers directory there are three more work spaces and directories: **Project**, **Others** and **Legend**.

- In the Project workspace, you can find all of the JICA GIS data set.
- In the Others workspace, you can find all of others GIS data produced by Ministry of public work and Geographic Department.
- In the Legend directory, you can find all of the legend file (*.dbf) for the GIS data.
- In the Logo directory, you can find the image of PGEC logo.

1.2. Reconnaissance Survey Project (RSP) GIS Data

The followings are the names of RSP GIS database files and their related attributes in Cambodia's populated area. They are in ArcInfo coverage format. For more detail information about the data see appendix A.

Table 1-1 RSP GIS Database Files and Their Related Attributes

No	File Name	Feature	Description	Source Scale
Administrative Data				
1	INDEX	Poly	100K topo index	100k
2	POP_SHP	Poly	Village Boundary	100k
Infrastructure				
3	RD_LIN	Line	Roads	100k
4	RD_CART	Point	Cartographic point data	100k
5	RD_DIRECTION	Point	Road direction along map sheet boundaries	100k
6	RD_PTS	Point	Road's Point Data	100k
7	RR_LIN	Line	Railroads	100K
8	RR_PTS	Point	Railroad related data	100k
9	HIS_SITES	Point	Historical Site	100k
10	TOPO_PTS	Point	Topographic features described as points	100k
11	POP_CART	Point	Infrastructure cartographic point feature	100k
12	POP_PTS	Point	Infrastructure point features	100k
Elevation				
13	CON_LIN	Line	Contour Line	
14	CON_PTS	Point	Spot High	100k
15	GPS_POINT	Point	GPS Points	
Geology				
16	GEOLOGY	Poly	Geology	500k
Land Use/Cover				
17	LANDUSE	Poly	Land Use/Cover 96	100k
18	LU_TOPO	Poly	Land Use 96 Topo	100k
Hydrology				
19	DN_LIN	Line	River	100k
20	DN_POL	Poly	River, Lake	
21	DN_PTS	Point	River Related Data	

1.3. Other GIS Data

The followings are the names of Cambodian GIS database ArcInfo coverage files produced by Geographic Department and their related attributes. For more detail information about the data see appendix B.

Table 1-2 Names of Cambodian GIS Database Arcinfo Coverage Files

No	File Name	Feature	(1) Description	Source Scale
1	CKHET	Point	Provincial Center	50k
2	CSROK	Point	District Center	50k
3	CKHUM	Point	Commune Center	50k
4	CPHUM	Point	Village Center	50k
6	KHET50		Provincial Boundary	50k
7	SROK50	Poly	District Boundary	50k
8	KHUM50	Poly	Commune Boundary	50k

2. Getting Started

2.1. Starting ArcView 3.2

Like other application programs for Windows, to start ArcView we have to follow the instruction below.

There are four steps you have to go:

1. Starting ArcView 3.2,
2. Naming Your Project File,
3. Saving Project File,
4. Opening Existing Project File.

1. *Start > Program > ESRI > ArcView GIS 3.2 > ArcView GIS 3.2*
As directed by this picture:

Figure 2-1

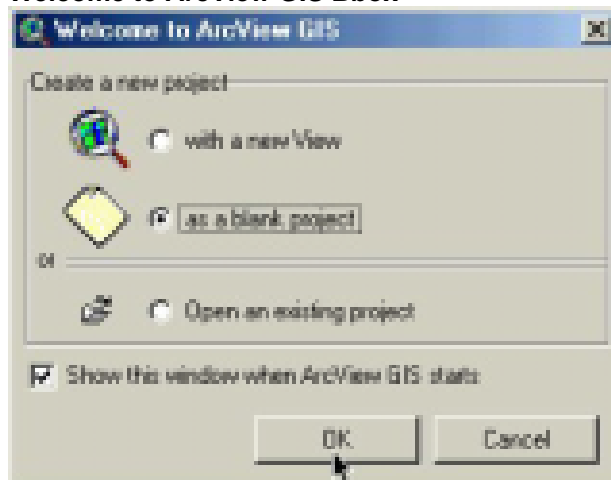
Start ArcView GIS 3.2



Then, the **Welcome to ArcView GIS box** appears as below.

Figure 2-2

Welcome to ArcView GIS Bbox



2. Choose **as a blank project** option, and click **OK** button. ArcView Starts with **untitled project window** as shown below:

Figure 2-3 Name a Project



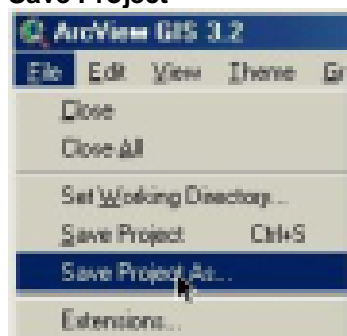
With untitled window open means that you have already created an ArcView project file. But you have not yet given any name to it. OK, let give it a name.

2.2. Naming Your Project File

With the window still selected:

1. Choose **File > Save Project As...** (See the picture below)

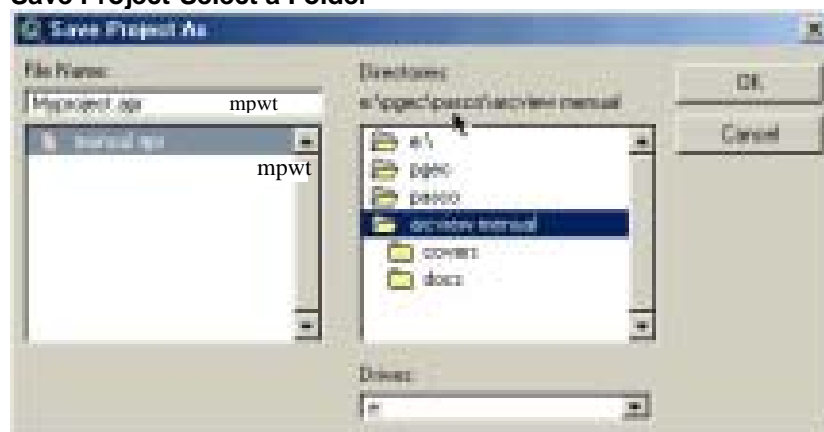
Figure 2-4 Save Project



Then, ArcView wants to know:

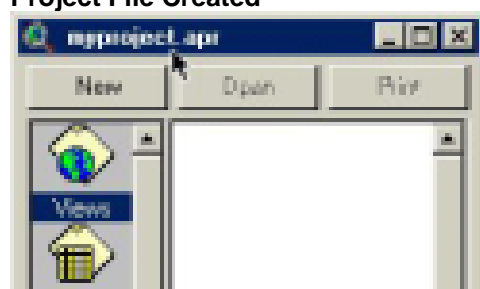
- Where you intend to keep the file?
 - What name you willing to give to the file?
2. Brows to your desire location, for example as shown below I choose:
e:\mpwt\pasco\arcview manual,
 3. In the file name option type "Myproject.apr"
 4. OK

Figure 2-5 Save Project-Select a Folder



The **Untitled** on the top-left of the window now changes to “myproject.apr”. This means that you have successfully created your ArcView project file with the name of “myproject.apr”. See figure below:

Figure 2-6 Project File Created



2.3. Saving Project File

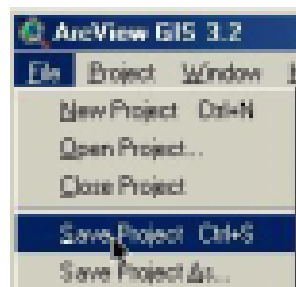
In ArcView, you can save the work you do on any project component by saving the project that contains it. When you resume work on the component, it will be in the same state it was in the last time you saved.

You can save at any time during a session. When you save a project, you save the work you've done on all the components to which you've made changes. If you haven't saved the project, Arc View will prompt you for a name. Also, if you close the project or quit Arc View and you've made any changes, ArcView will prompt you if you want to save the project.

1. To save your work to the same project

From the File menu > Save Project or press CTRL+S. See the picture below.

Figure 2-7 Saving Project File



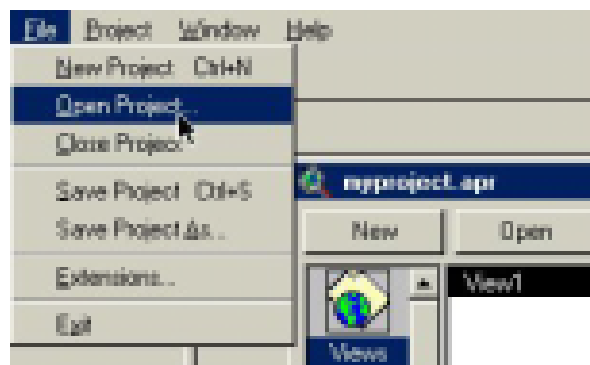
2. To save your work to a project with a different name
 1. Make the Project window active.
 2. From the File menu choose Save Project As.
 3. In the dialog box that appears, navigate to where you want to save the project and enter the project name.

2.4. Opening Existing Project File

When you open an ArcView project, you open one ArcView project file that contains references to the geographic data and external tables as well as the views, layouts, charts, scripts, and other components that make up the project.

From the File menu, > Open Project. See picture below.

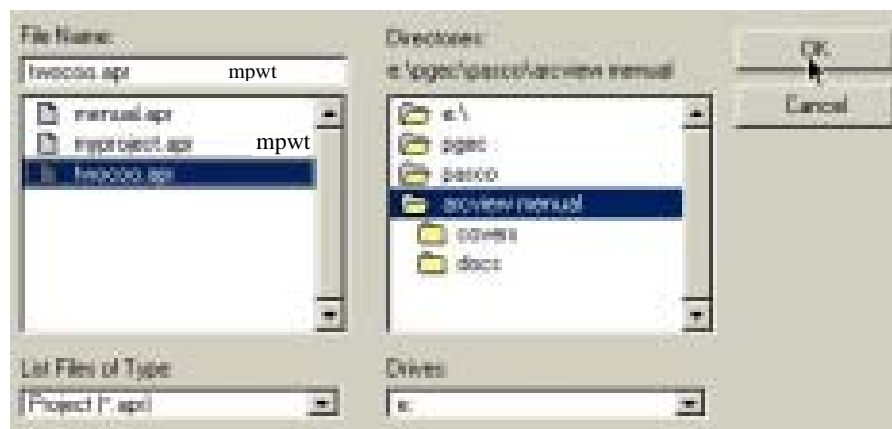
Figure 2-8 Opening Existing Project File



Then, the location dialog box appears prompting you for a project file name and its location directory.

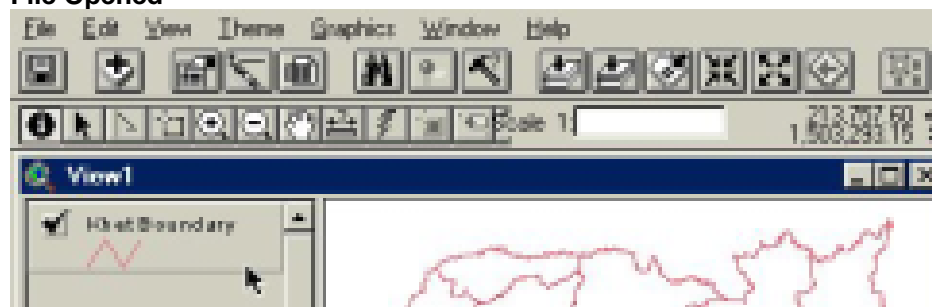
For example, you are going to open “twocoo.apr” project file stored in e:\mpwt\pasco\arcview manual directory. To do this follow the instruction in the picture below.

Figure 2-9 Selecting an Existing Project File



The project opens showing “View1” and “Khet Boundary” theme in it as shown in the picture below.

Figure 2-10 File Opened



3. Data Type Used in ArcView

3.1. Geographic Data

Geographic data are real world features represented by points, lines and polygons. The followings are the data ArcView can use:

- ArcView Shape Files (*.SHP)
- ArcInfo Coverages (PC or Workstation or Unix)
- AutoCAD (*.DWG) and Microstation (*.DGN) CAD Drawing
- *.DXF files

3.2. Attribute Data

ArcView can read tabular data from:

- dBase files (*.DBF)
- Database Servers such as ORACLE, INGRES, SYBASE, INFORMIX etc.
- INFO tables (Workstation of UNIC ArcInfo tabular data)
- Comma or tab delimited ASCII files

3.3. Image Data

ArcView supports variety of raster data such as Image data including satellite imagery, aerial photographs, and other remotely sensed or scanned data. Supported formats include:

- BSQ, BIL, BIP, JPG, BMP etc.
- SUN raster files
- TIFF, TIFF LZW compressed, and GeoTIFF,
- Erdas (.LAN)
- Edas Imagine Image (*.img)
- Image catalog
- Run length compressed formats

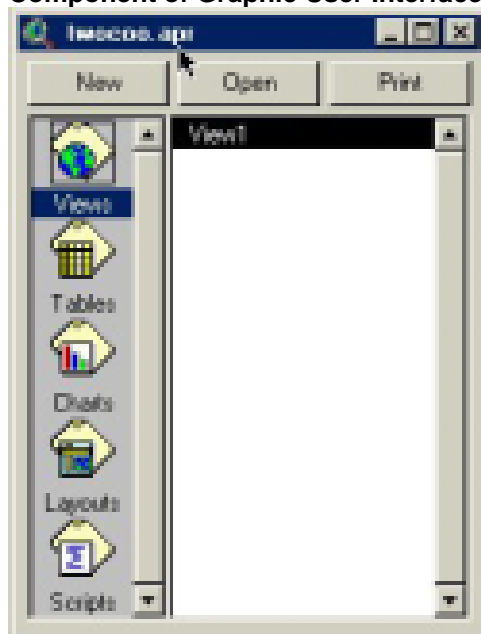
3.4. Grid Data

- ArcInfo Grid
- ASCII raster file format
- Binary raster file format
- USGS DEM format
- US DMA Digital Terrain Elevation Data (DTED)

4. Component of Graphic User Interface (GUI or Project Window)

The ArcView GUI represents a working project at a time and can be open once at a time. GUI consists of different components: View, Table, Chart, Layout, Scrip, and Others. Below is an example of a GUI with a project file “twocoo.apr” showing all of its components.

Figure 4-1 Component of Graphic User Interface



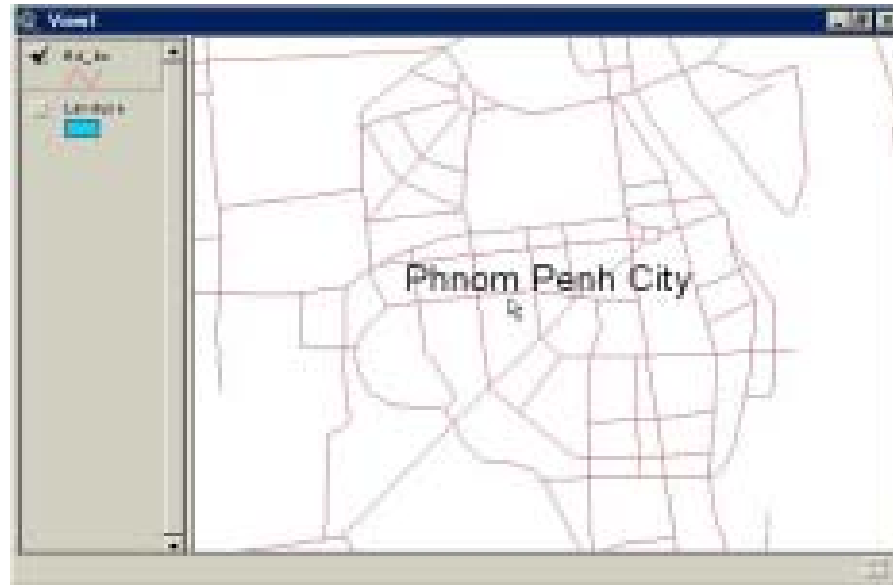
4.1. Project

Project file as indicated by mouse pointer above is ASCII file with extension (*.apr). With ArcView, a project file can be open only one at a time and consists of Views, Tables, Charts, Layouts, Scripts, and others.

4.2. View

A view is spatial information representation environment and can contain any number of themes as points, lines, polygons and images. Below is an example of a view with Rd_lin and Landuse themes.

Figure 4-2 View



4.3. Table

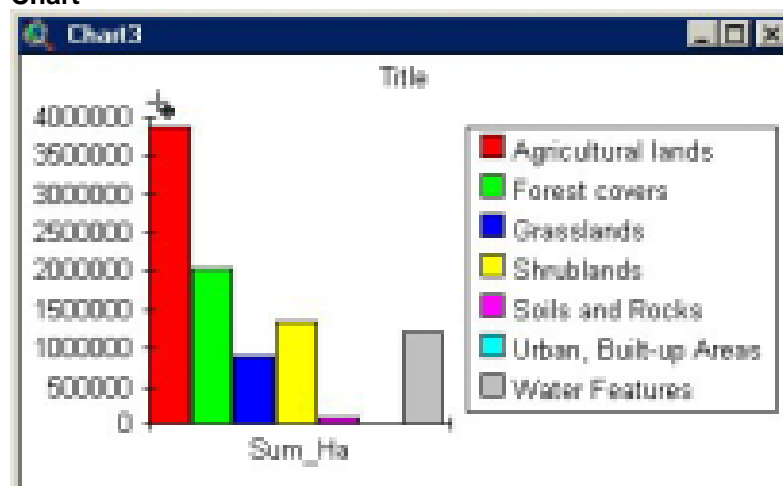
A table is tabular data representation environment. Table contains descriptive information about a specific entity. Below is an example of an ArcView Project's table.

Figure 4-3 Table

Category	Count	Sum_Area
Agricultural lands	7595	3875651.8300
Forest covers	2518	2045016.3300
Grasslands	5047	889575.6500
Shrublands	4952	1340223.1300
Soils and Rocks	451	98545.2800
Urban, Built-up Areas	128	12027.4000
Water Features	4335	1213278.6800

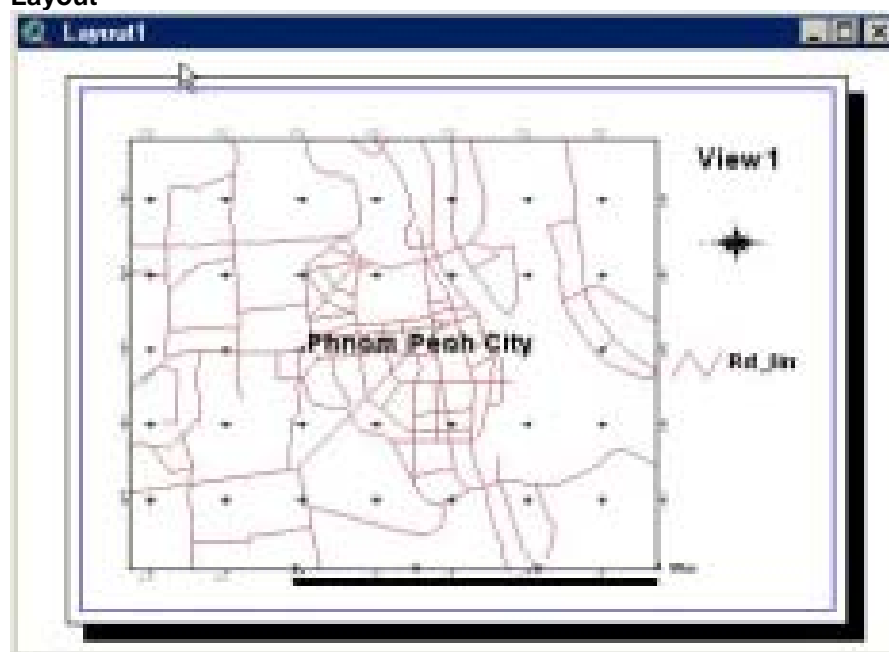
4.4. Chart

Charts provide graphic representation of summarized tabular data. Charts can also query data from the table by which it was built. Six chart types are available: line, bar, column, xy scatter, area and pie. Below is an example of ArcView bar chart.

Figure 4-4 Chart

4.5. Layout

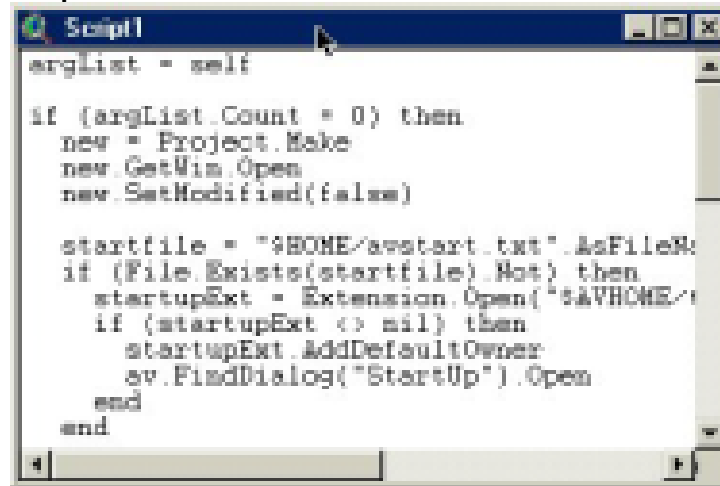
The layout document is used to combine all other documents (views, tables, chats, and others) into an output document usually a hard copy map. Below is an example of a layout with Phnom Penh road theme and other graphical representation.

Figure 4-5 Layout

4.6. Scrip

ArcView Scrip windows are for writing and display Avenue scripts that customize the ArcView user interface or perform user-designed tasks. With Avenue you can modify the appearance of ArcView, create new programs, make complex tasks, and communicate with other applications such as ArcInfo, a relational database manager of a spreadsheet. Below is an example of an Avenue script window.

Figure 4-6 Script



5. Creating Your View

You have already created a project file "myproject.apr". Now open it again. You will get a project window like the one below. There are seven steps develop in the section:

1. Creating a View,
2. Adding Theme to a View,
3. Setting a View Property,
4. Setting a Theme Property,
5. Querying a Theme by Mouse,
6. Querying a Theme by Query Builder,
7. Converting to new shape file (*.shp).

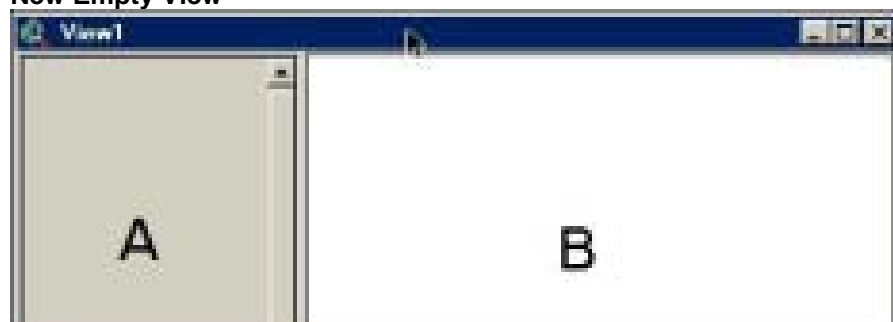
5.1. Creating a New View

On the project window, highlight the views object and then click on New button. See the picture below.

Figure 5-1 Creating a New View



A new empty view appears as shown in the picture below.

Figure 5-2 New Empty View

The view consists of two parts: Table Of Content (TOC) and Graphic Display panel.

In the picture below:

- A: TOC in the view for storing a list of theme in the view.
- B: Graphic display panel for displaying spatial data of the themes stored in the TOC.

5.2. Adding Theme to a View

One you have the view open, the next step is to add themes to the view. The picture below is showing how to add ArcInfo coverage “Rd_lin” located in ...\\Covers\\Project directory (see Work Space Structure above) as a theme in the view.

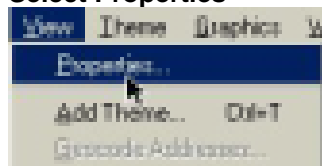
1. *Click the Add Theme button as shown in the picture below, the add theme dialog box appears.*

Figure 5-3 Adding Theme to a View

2. *In the Data Source Types option, choose Feature Data Source.*
3. *Navigate to the directory that contains the ARC/INFO coverage “Rd_lin” located ...\\covers\\project (see Work Space Structure above).*
4. *Click on the “Rd_lin” coverage to highlight it.*
5. *Click OK.*

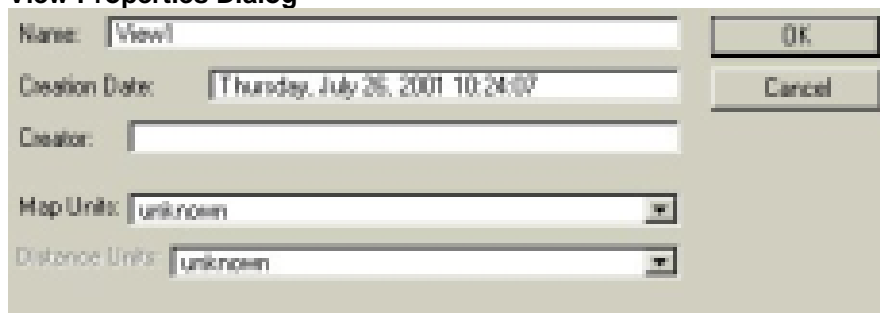
Figure 5-5 Adding a Sample Theme to a View

Figure 5-6 Select Properties



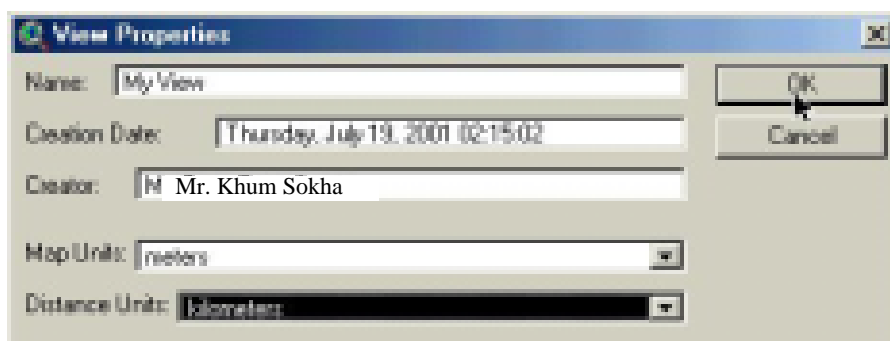
The View Properties dialog is displayed. See the picture below.

Figure 5-7 View Properties Dialog



2. To change a view's name, Creator name, Map Unit, Distance Unit of your view fill in the box as shown below.

Figure 5-8 View Properties, Options



3. Click OK.

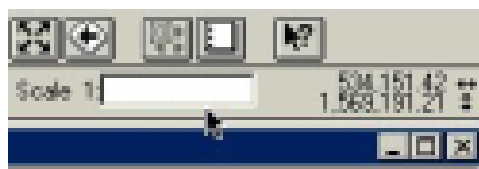
Note

Setting map units : This lets you specify the units of the coordinates of the view's display area.

Setting distance units: This lets you specify the units in which dimensions and measurements related to the view will be displayed.

After the View Property set up was completed, the Name of the View changed from "View1" to "My View" and the Scale box changed from 1: to 1:8,257,261. See the pictures below.

Figure 5-9 View Name Changed

Figure 5-10 Scale Box Changed (before and after)
Before

After



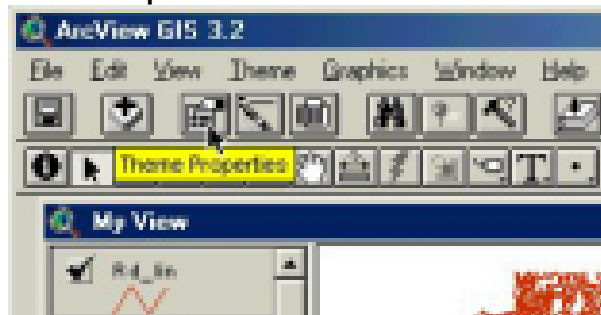
5.4. Setting a Theme Property

By setting theme properties you can control various characteristics such as the theme's name in the view's TOC, what the theme contains, how it is displayed in the view, etc. The properties you can set depend on the type of data source the theme is based on. Theme properties can be set and changed at any time.

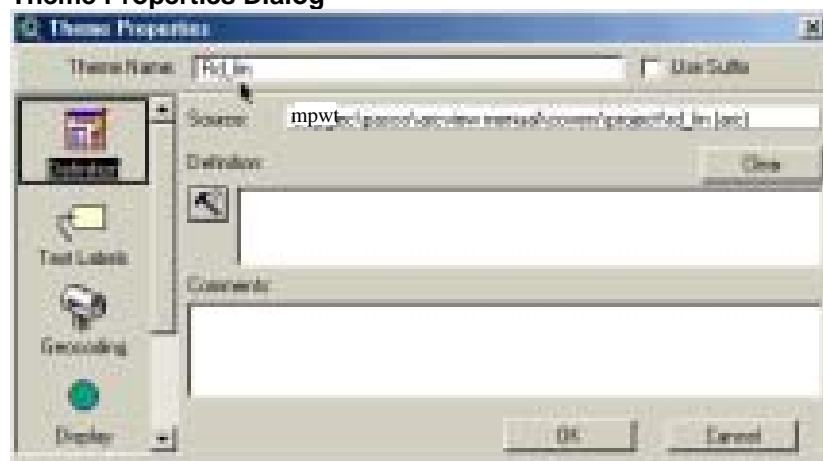
This tutorial will show you how to change the theme name by using theme property. We will change the name from "Rd_lin" to "Road Network".

1. Click on the theme in the TOC to make it active.
2. Click the Theme Properties button as shown in the picture below.

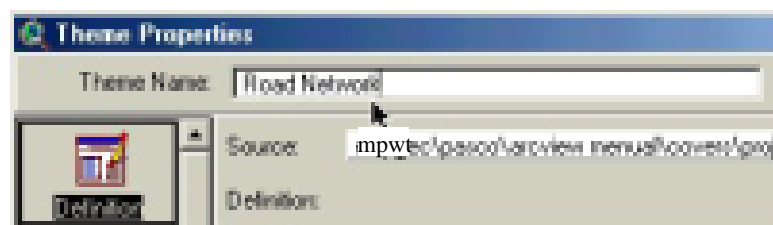
Figure 5-11 Theme Properties Button



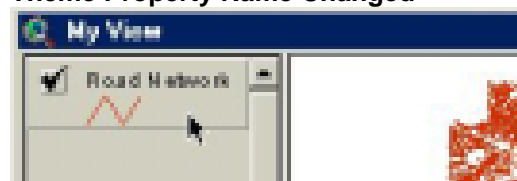
The theme properties dialog box appears

Figure 5-12 Theme Properties Dialog

3. Fill in the Theme Name box as shown below
4. When you have finished, press OK.

Figure 5-13 Theme Properties

The theme name changed to “Road Network”.

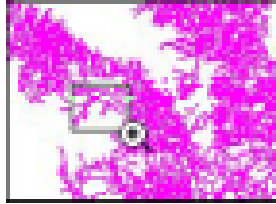
Figure 5-14 Theme Property Name Changed

5.5. Querying a Theme by Mouse

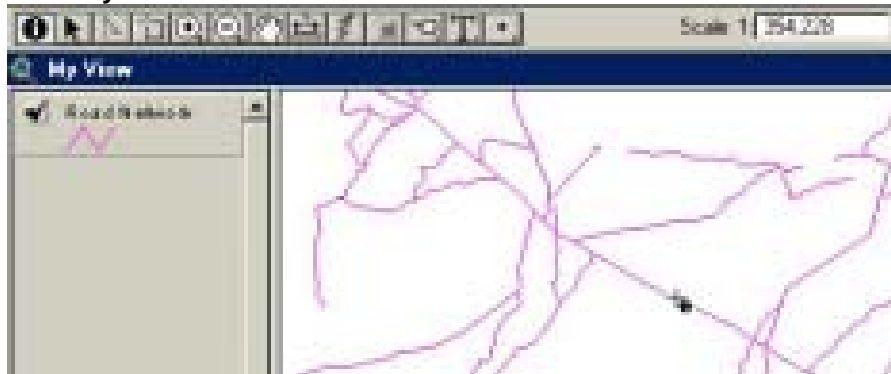
Each theme in a view has a table storing attributes about the geographic features it contains. A theme's attribute table has one record for each feature in the theme. Querying a theme by mouse is to let you use your mouse pointer to click on a feature of one theme to get its associated record displayed.

In this tutor, we will show you how to use mouse pointer to query our Road Network.

In order to see the result of query clearly, we need to zoom the Road Network theme to get a closer look. Use the zoom tool to zoom in the theme as shown below.

Figure 5-15 Querying a Theme (Mouse)

After this we get

Figure 5-16 Query Result

Use Identify tool (the one with i icon) to click on one of the Road Network feature as shown above.

This is what we get

Figure 5-17 Query Result (Road Network Feature)

1: Road Network - Cart us	
Shape	PolyLine
Fnode#	8477
Tnode#	8540
Lpoly#	0
Rpoly#	0
Length	5640.63824
Rd_lin#	3757
Rd_linid	543
Code	6
Describe	Cart track

5.6. Querying a Theme by Query Builder

One of main methods to perform feature selection can be accomplished with an SQL (Structured Query Language) expression using theme's attribute table fields, value and logical expression.

In this tutor, we will use the Query Builder tool to select all roads in the network with "All weather, hart surface road, two or more lanes wide" characteristic.

1. Click on Zoom to Active theme button to display the entire road network theme, as shown in the picture below.

Figure 5-18 Querying a Theme (Query Builder)



2. Use the zoom in tool to get net road network view as shown in the picture below.

Figure 5-19 Using Zoom



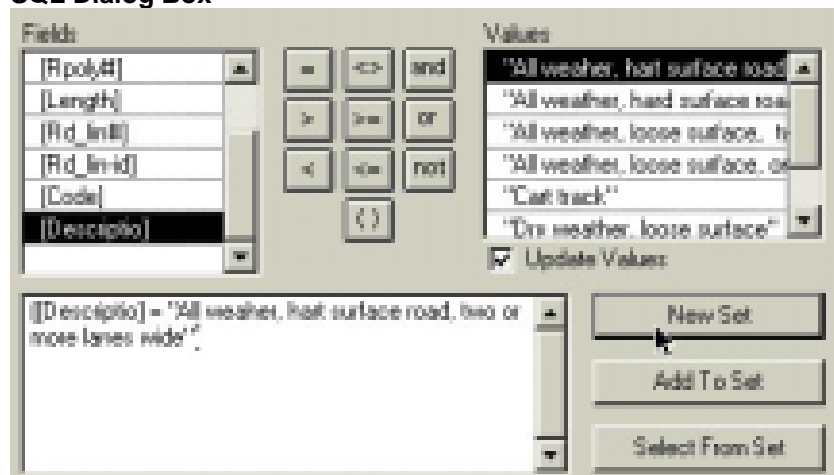
3. Click on the Query Builder Button

Figure 5-20 Click on the Query Builder Button



The SQL dialog box appears

Figure 5-21 SQL Dialog Box



Build the expression as shown above by double click on [Descripto], click on "=" and double click on "All weather, hart surface road, two or more lanes wide".

4. Click *New Set*.

All roads with that characteristic are selected with red color

Figure 5-22 Roads Selected



5.7. Converting to new shape file (*.shp)

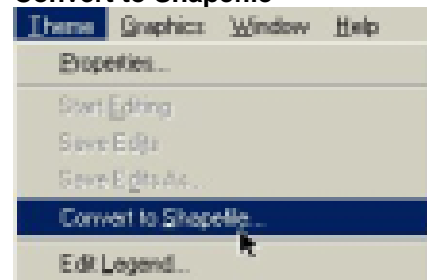
The thing is we want to get the selected roads above to be stored in separate theme. In order to do this we have to convert the selected roads into a new theme “Major Roads”.

With the road network theme still activated:

1. Click on *Theme Menu > Convert to Shapefile*.

Figure 5-23

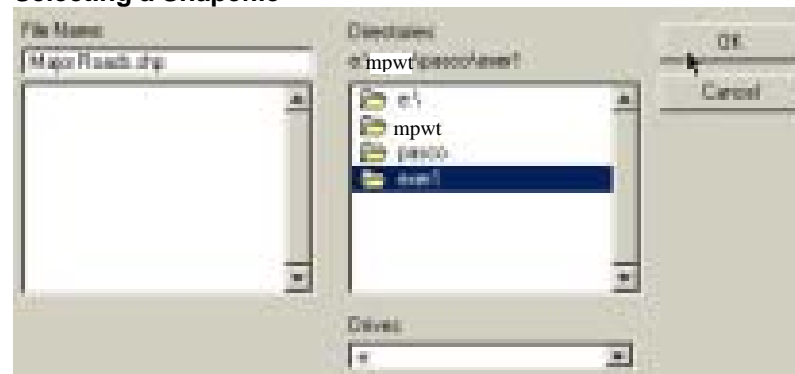
Convert to Shapefile



The dialog box appears asking for location and name of the new shape file going to be created.

Choose a directory in your hard disk for the location and **Major Road.shp** for the file name

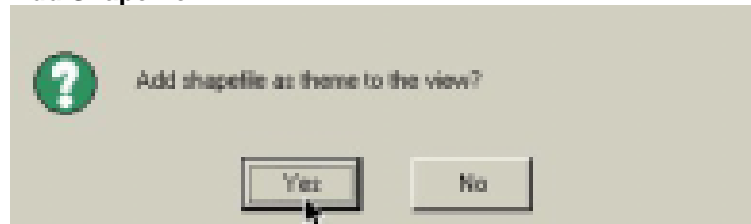
Figure 5-24 Selecting a Shapefile



2. Click *OK*.

The box below appears prompting whether you want to add the new theme to the view or not?

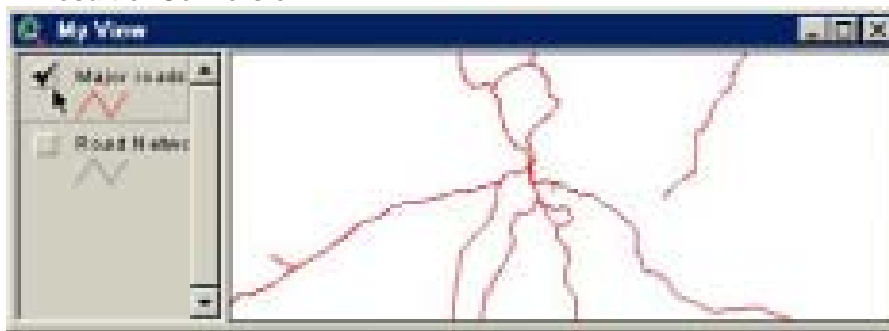
Figure 5-25 Add Shapefile



3. Click Yes to proceed it.

The result of the selection is shown in this picture

Figure 5-26 Result of Conversion



5.8. Summary

With this chapter you are able to:

1. Create your ArcView project file
2. Add new view to the project file
3. Rename the view document
4. Set up the Unit Distance, Map Distance and Scale of your view document
5. Add new theme to the view
6. Renaming your theme's name
7. Use zoom tool
8. Query your theme
9. Building condition to select features of theme
10. Convert the selected features to new theme.

5.9. Exercise 1

Create a project file "exercise1.apr" and save it in a directory in your hard disk.

1. Add new view “Land use/cover” to the project,
2. Add new theme “Landuse” to the View from, ...Covers\Project directory (see Work Space Structure above),
3. Set up the scale of your view,
4. Using Query builder to select only water body from the Landuse theme,
5. Convert the selected features to a new theme.

The result of that will look more or less like:

Figure 5-27 Exercise 1 (Land Use)



6. Clipping Your Interested Area

As can be seen above, the whole since of RSP GIS data is too large to display on any computer screen. In order to make it easier to work with we have to clip it into a small portion using provincial or district boundary.

ArcView provides **Geo-processing** tool enabling GIS users to abstract GIS data in any region of interest.

We will abstract Phnom Penh boundary from Khet50 theme, with which we will abstract Landuse, Road Network, Drainage, Phnom Penh district boundary and Phnom Penh district centers.

We have summarized this procedure into three steps:

1. Adding your theme data into a View and selecting boundary of your interested area,
2. Loading Geo-processing Wizard Extension,
3. Running Geo-Processing Wizard Function.

6.2. Adding Your Theme Data into a View and Selecting Boundary of Your Interested Area

1. Create a View “Clipping Place”,
2. Add Themes Srok50 and Khet50 from ...\\Admin directory (see Work Space Structure above)
3. Add Themes Lanuse, Dn_lin and Rd_lin from ...\\Project directory
4. With Khet50 theme activated, use the selection tool to select Phnom Penh area as shown in the picture below.

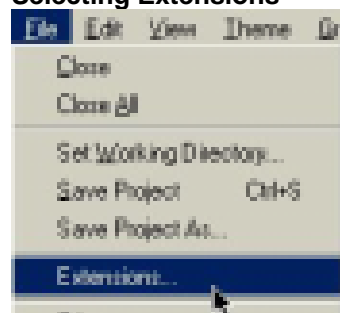
Figure 6-1 Clipping Place



6.3. Loading Geo-processing Wizard Extension

1. Choose File Menu > Extension

Figure 6-2 Selecting Extensions



The Available Extension box appears

Figure 6-3 Available Extensions



2. Check on the Geoprocessing
3. Click OK

6.4. Running Geo-Processing Wizard

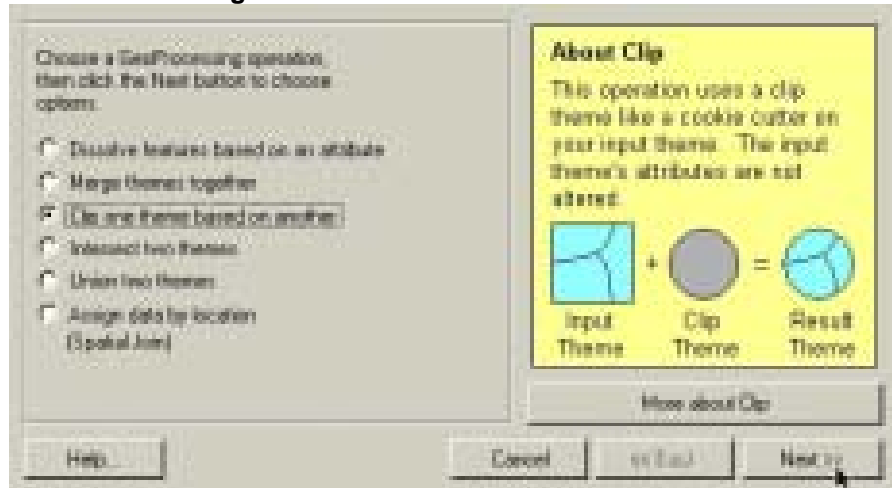
Choose View Menu > GeoProcessing Wizard

Figure 6-4 GeoProcessing Wizard



The Geo-processing Box appears

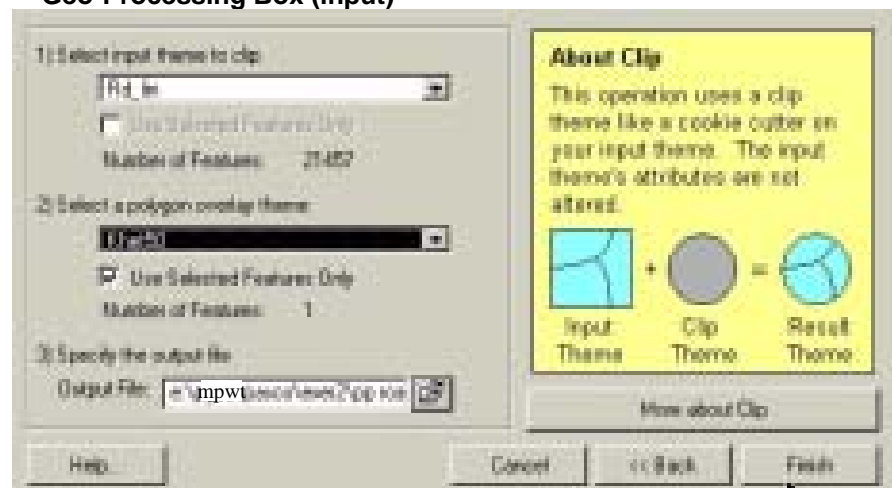
Figure 6-5 Geo-Processing Box



- Choose Clip one theme based on another
- Click Next to go to the next step

The Next dialog box appears prompting for three inputs

Figure 6-6 Geo-Processing Box (input)



Fill in the boxes:

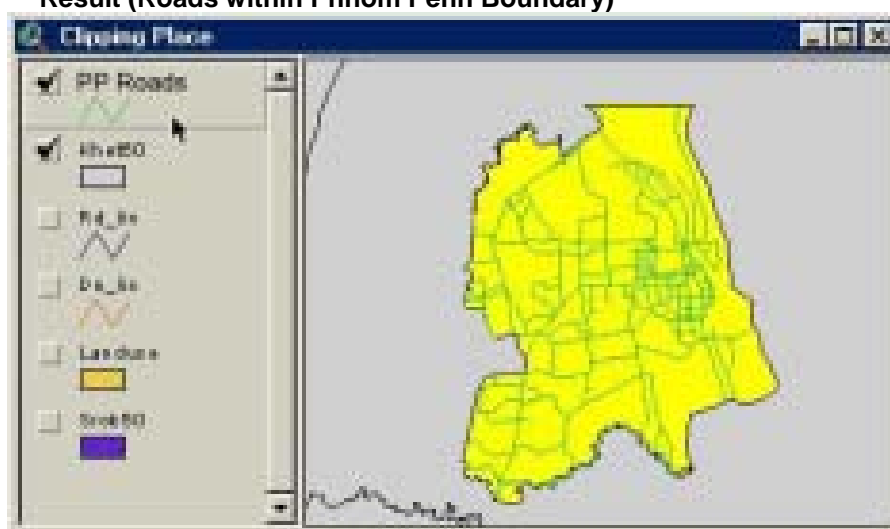
1. Rd_lin
2. Khet50
3. ...\\Your Directory\\PP Roads

Click Finish to proceed it.

After the processing finished, we will get only the roads within Phnom Penh boundary.

The Result Showing only Roads within Phnom Penh Boundary

Figure 6-7 Result (Roads within Phnom Penh Boundary)



6.5. Summary

With this chapter you are able to:

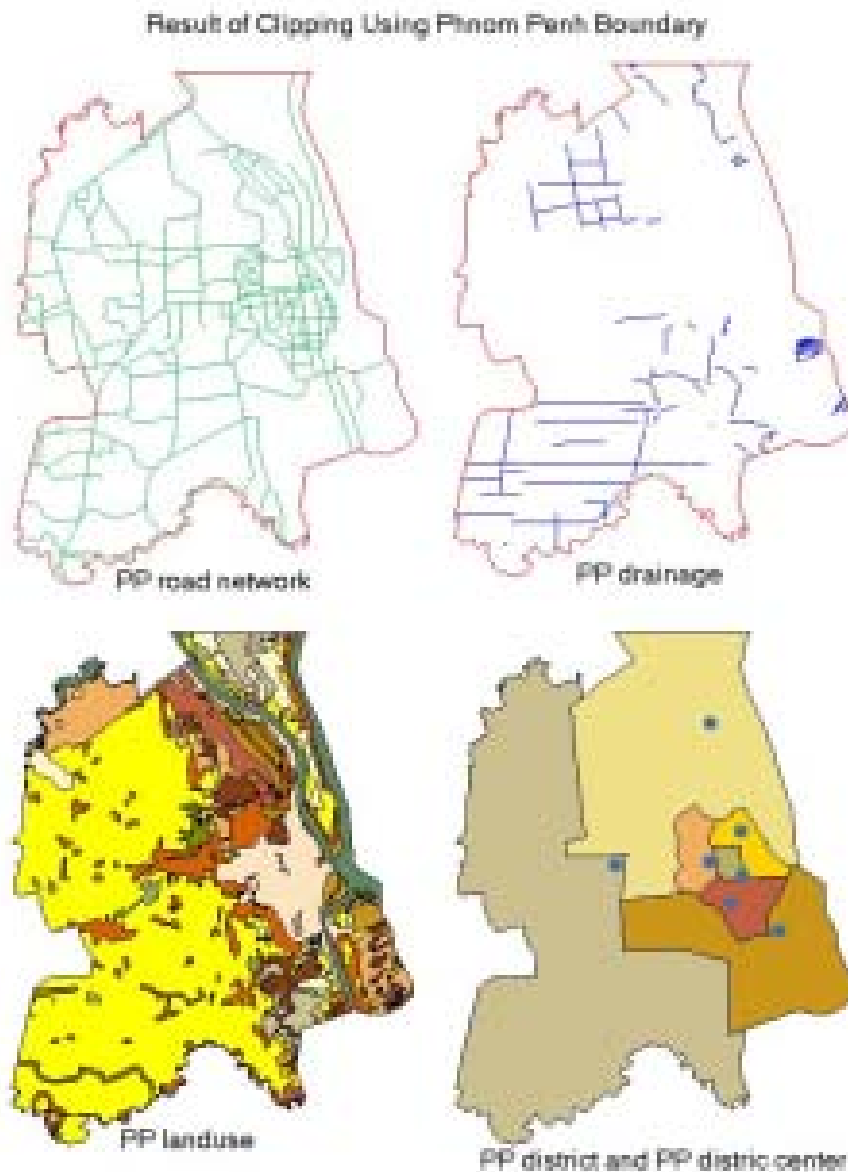
1. Add ArcView extension into your working project.
2. Use clip function in the geoprocessing extension
3. Clip RSP GIS data using boundary of your interested area (Phnom Penh Boundary).

6.6. Exercise 2

1. Create Phnom Penh boundary from Khet50 theme and name it as PP Boundary.
2. Clip Dn_lin, Landuse, Srok50 and Csrok using Phnom Penh boundary and name theme PP drainage, PP landuse, PP srok and PP district center accordingly. Store the resulting themes in your hard disk directory .

The results of that will look more or less like the ones below:

Figure 6-8 Result of Clipping Using Phnom Penh Boundary



7. Shading Your Theme with Legend Editor

So far, we have Phnom Penh GIS data:

1. Phnom Boundary,
2. PP district center,
3. PP district,
4. PP road network,
5. PP drainage,
6. PP landuse.

Now it is time to symbolize them. Symbolizing is to differentiate all map features in your theme using different patterns and color. There are four steps in symbolizing your themes.

1. Loading Legend Editor,
2. Choosing line or fill field symbols (for line or for polygon themes) from your pen or fill palettes,

3. Choosing color for your lines or fill symbols from color palettes,
4. Applying the shaded symbols to your themes,
5. Saving your legend,

7.1. Loading Legend Editor

One of several ways to access legend editor tool is to click on the Edit Legend button with the theme activated (in this case, Road Network activated) as shown below.

Figure 7-1

Edit Legend



Note

Themes Menu > Edit Legend

or

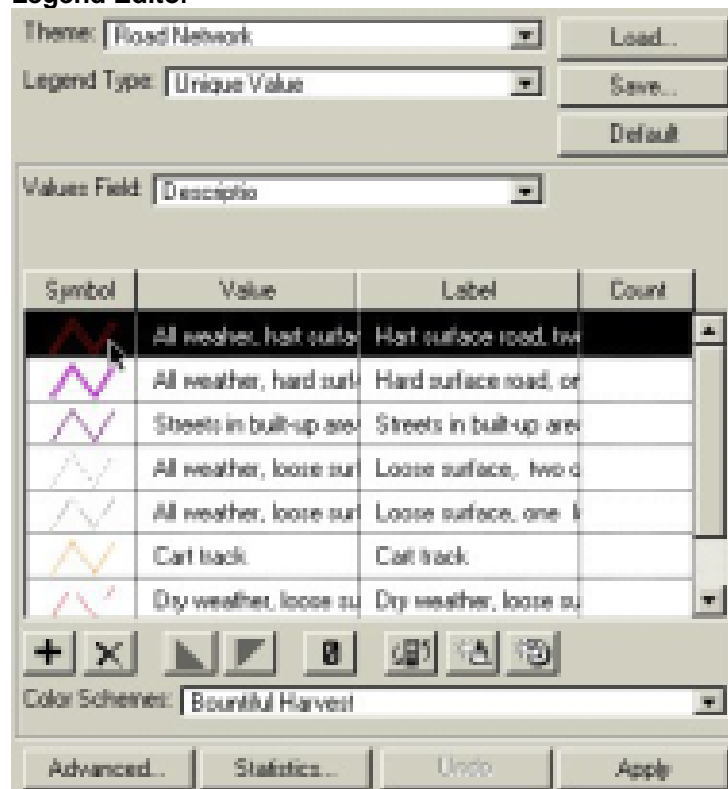
Double click on the theme listed in TOC

Can also bring up the Legend Editor

The **Legend Editor** for Road Network theme appears

Figure 7-2

Legend Editor



- Make sure that in the Theme box is **Road Network**,
- Choose **Unique Value** from Legend Type,
- Choose **Descriptio** from Values Field

You can see different road features displayed according to their characteristics.

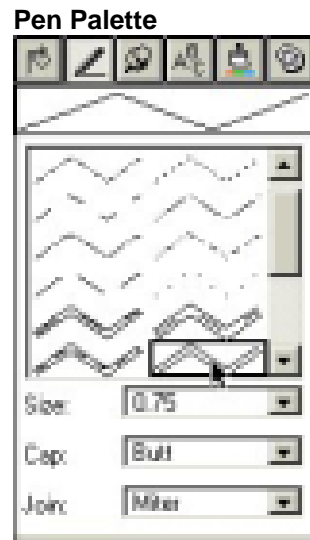
7.2. Choosing Line Symbols from Pen Palette

In order to assign line pattern from the Pen Palette we have to:

1. Double click on a pattern in the symbol column (indicated by mouse pointer i
2. n the picture above) to bring up the **Pen Palette**.

The Pen Palette appears

Figure 7-3



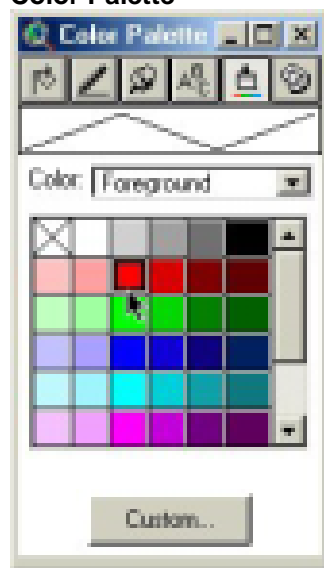
3. Choose one of the patterns shown in the picture above.
4. From the Size scroll box choose 0.75
5. Click on the color palette button to switch to color palette (See the picture below),

Figure 7-4

Color Palette Selection Button



The color palette appears

Figure 7-5 Color Palette

6. Click on the red color in the Color Palette to apply the red color to the selected pattern.
7. Continue to do like this until you get all of the road features changed like the ones in the legend editor above.

7.3. Applying the Shaded Symbol to Your Theme

In order to apply these pattern to your road theme you have to:

Click on the Apply Button as shown in the picture below.

Figure 7-6 Applying the Shaded Symbol

In the View you can see the change as shown in this picture

Figure 7-7 Applying the Shaded Symbol (Result)



7.4. Saving Your Legend

Once you have finished editing the symbol, you have to save the changes you made by:

1. *Clicking on the Save Button (See the picture below) in the Legend Editor box.*

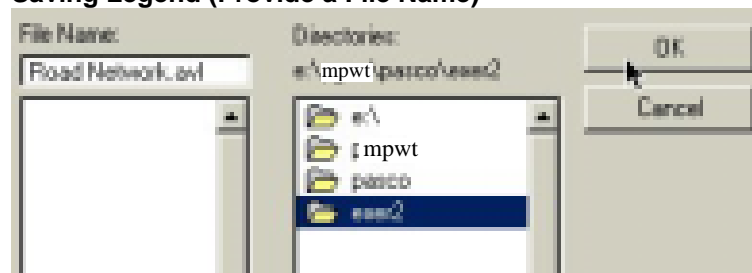
Figure 7-8

Saving Legend

Symbol	Value	Label	Count
	All weather, hart surface	Allweather, hart surface	72

2. Then provide the file name (*Road Network.avl*, we suggested) and Location (your hard disk directory, in this case we choose *..\Exer2*). See the picture below.

Figure 7-9 Saving Legend (Provide a File Name)



3. Click *OK*.

Once you have done this, mean you have already save you Road Network Legend to the file “Road Network.avl in your directory.

7.5. Summary

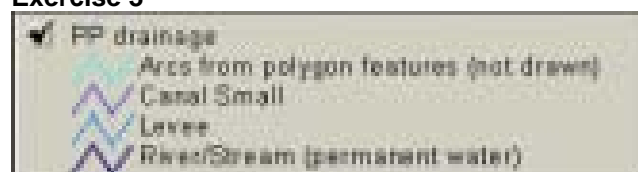
With this chapter you are able to:

1. Symbolizing your themes based on their attributes,
2. Saving your legend,
3. Loading your legend.

7.6. Exercise 3

1. Symbolize your PP drainage, PP landuse, PP srok and PP district center themes in such away its legends look like the ones below.
2. Save you legends into Exercise 3 as drainage.avl, landuse.avl, srok.avl and district center.avl.

Figure 7-10 Exercise 3

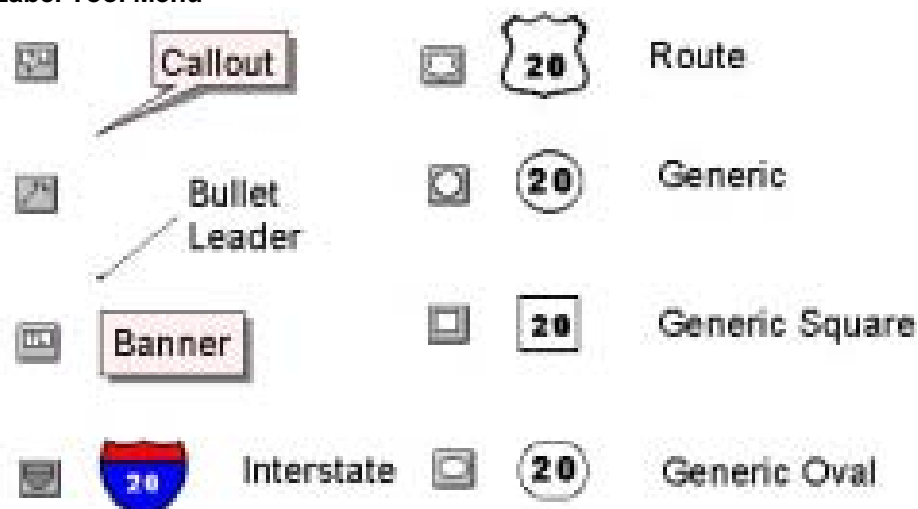




8. Labeling the Theme Features

ArcView has a variety of ways to place labels on a view or layout. Labels get their text from an attribute in a theme. The following diagram shows the tools and examples of the kind of label they add to a view or layout:

Figure 8-1 Label Tool Menu



ArcView has two ways for you to label the features in your themes.

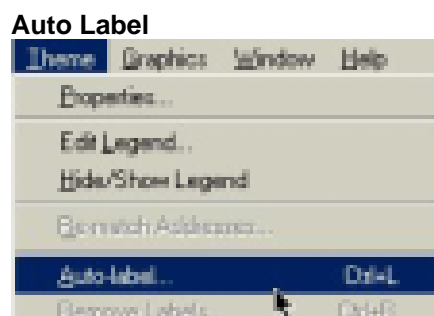
1. Auto-labeling
2. Manual Labeling
 - 2.1. Setting Up Label Property
 - 2.2. Using Label Tools

We will demonstrate this section using Srok Attribute (district name field) in the PP District theme.

8.1. Auto-labeling

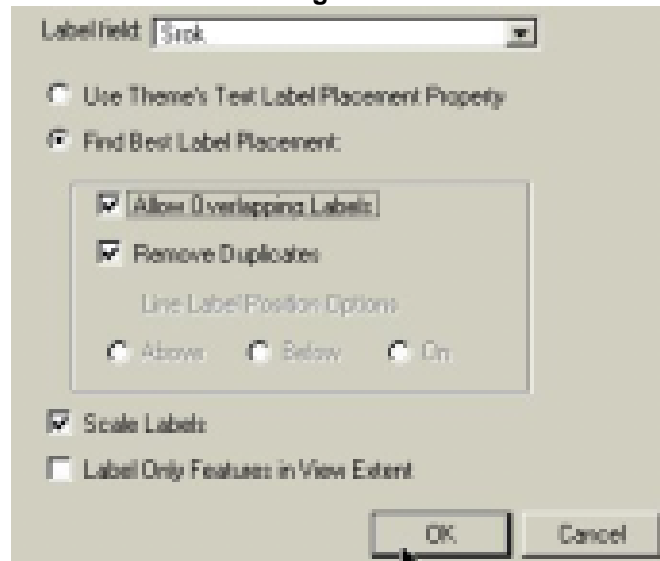
1. Make PP District theme active,
2. From the Theme menu choose Auto-label to open the Auto-label dialog box.

Figure 8-2



3. From here you can set the preferences for labeling:

Figure 8-3 Preferences for Labeling



4. Click OK.

This picture showing the result of Auto-Labeling

Figure 8-4 Result of Auto-Labeling



8.2. Manual Labeling

You can use the tools in the Label tool menu (see picture above) to label features by clicking on them. By using the Text Labels Theme Property, you can designate a field in your theme's attribute table as the label field.

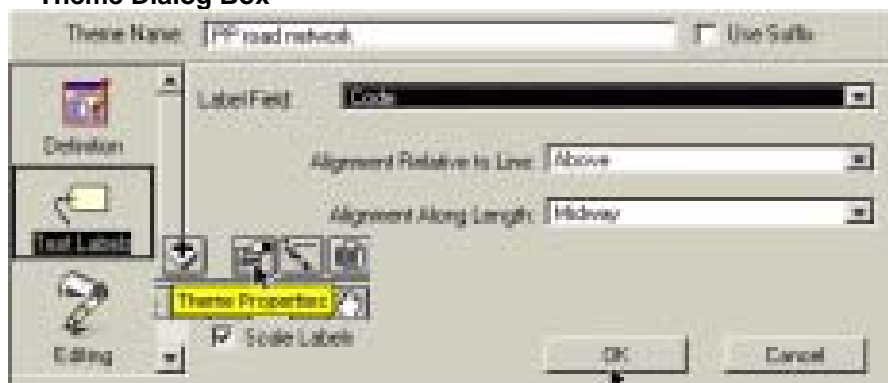
In the instruction we will label PP Road Network them with its Code field as label field.

The instruction is as below:

8.2.1. Setting Up Label Property

1. Make the PP Road Network theme active
2. Click on the Theme Properties button (see picture below). The Theme dialog box displays with PP Road Network as Theme Name as below.

Figure 8-5 Theme Dialog Box

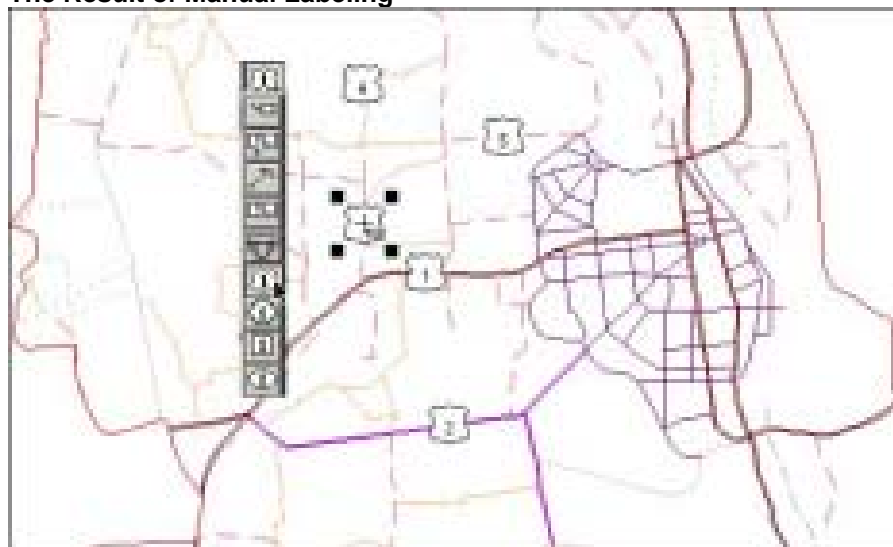


3. Choose *Text Label* option,
4. Choose *Code* as *Label Field*,
5. Click *OK*.

8.2.2. Using Label Tools

1. Select a *Label* tool (see picture below)
2. Click on the road feature you want to label. The label appears where you clicked.

Figure 8-6 The Result of Manual Labeling



8.3. Summary

With this chapter you are able to:

1. Automatically label your theme based on an attribute,
2. Manually label your theme based on an attribute.

8.4. Exercise 4

Use Manual-labeling method to label road network and district center themes based on **Code** and **Srok** attributes respectively to look like the ones below: