Manual on how to prepare EOO and AOO maps using ArcView GIS

By
Yong, W.S.Y. (wendy@frim.gov.my)
Hamidah, M. (hamidah@frim.my)
Suhaida, M. (suhaida@frim.gov.my)

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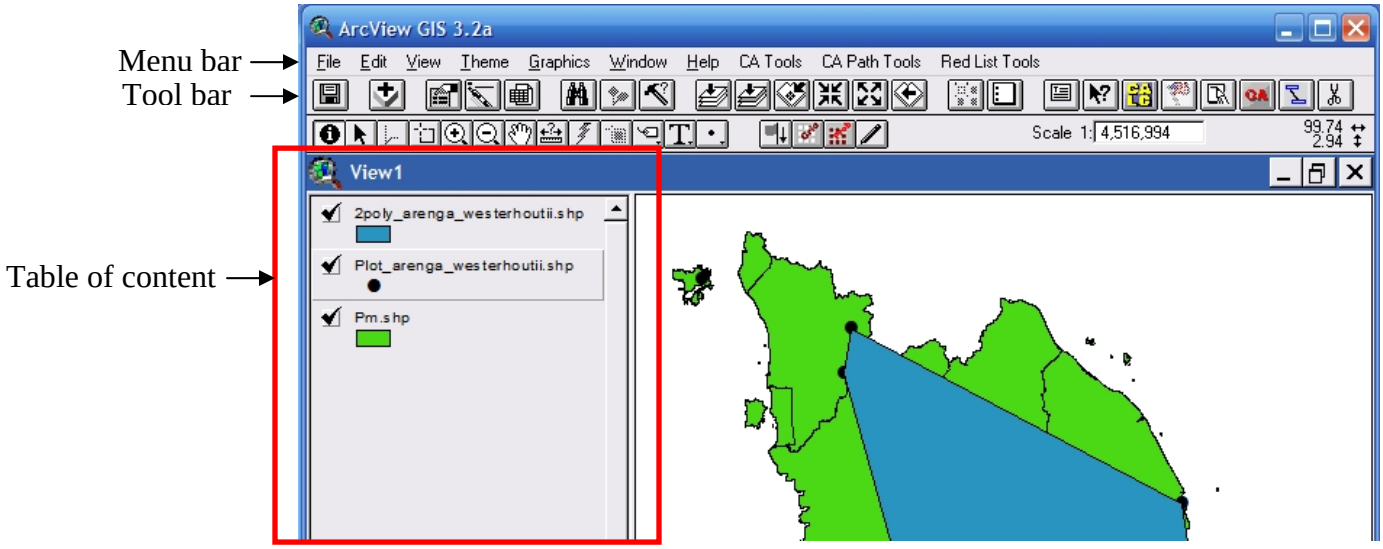
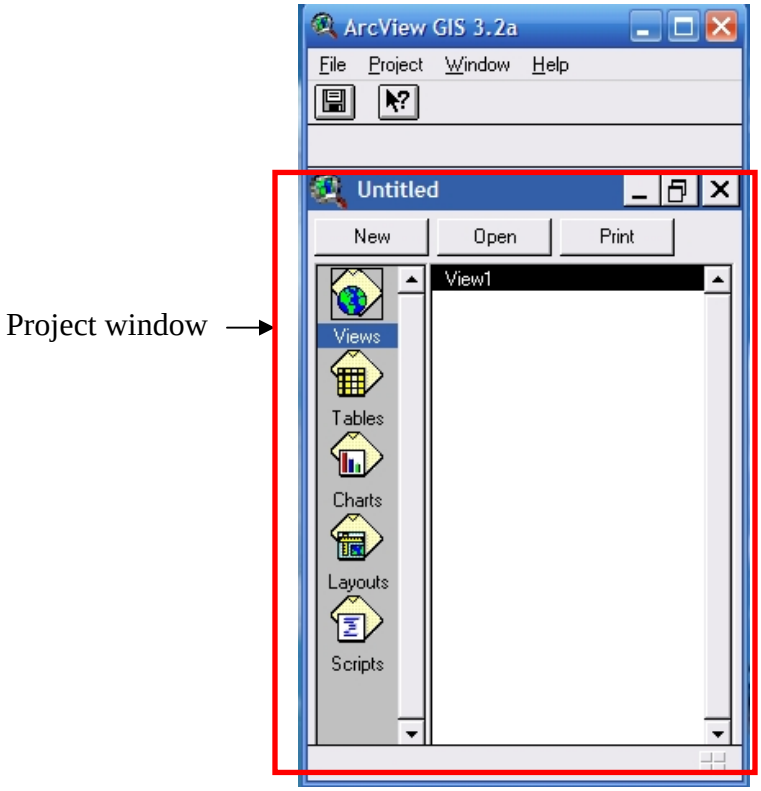
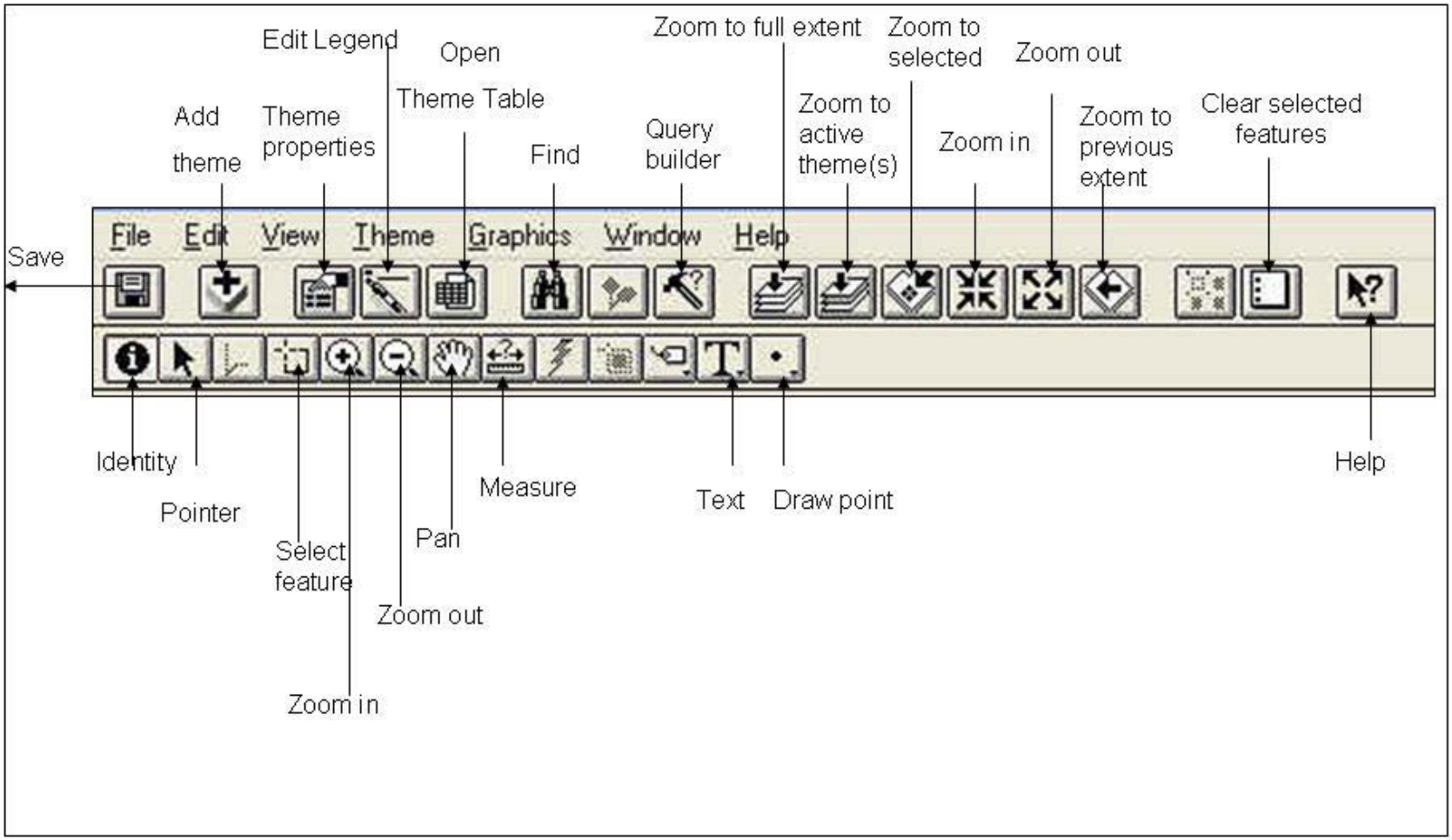
1.0 Introduction to Arcview 3.2 interface

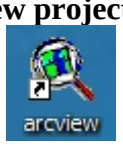




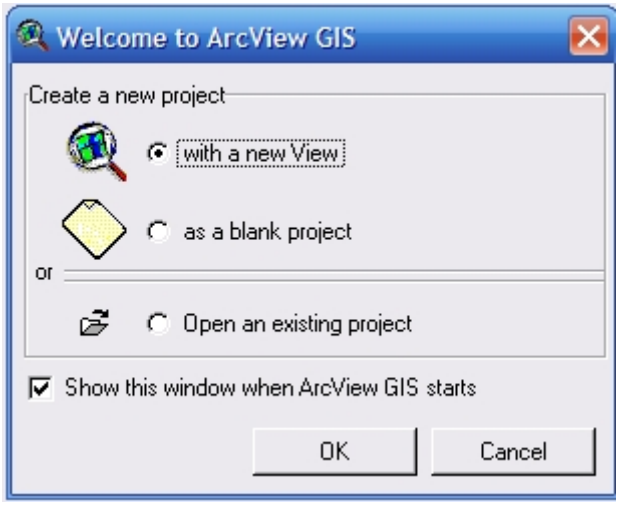

Edit Legend
Open
Zoom to full extent
Zoom to selected
Zoom out
Add theme
Theme properties
Theme Table
Query builder
Find
Zoom to active theme(s)
Zoom in
Zoom to previous extent
Clear selected features
File
Edit
View
Theme
Graphics
Window
Help
Save
Identity
Pointer
Select feature
Zoom in
Zoom out
Pan
Measure
Text
Draw point
Help

2.0 Creating project

2.1 To create new project or open project



1. Double click to open ArcView. A welcome window will appear
2. To create new project, choose “with a new view” or “as a blank project”
   OR
   “Open an existing project”
3. Click OK



2.2 To save and close project

To save project, choose “Save project as” from the File menu or click the Save Project button

To close project, choose “Close All” and “Exit” from the File menu

3.0 Creating a view

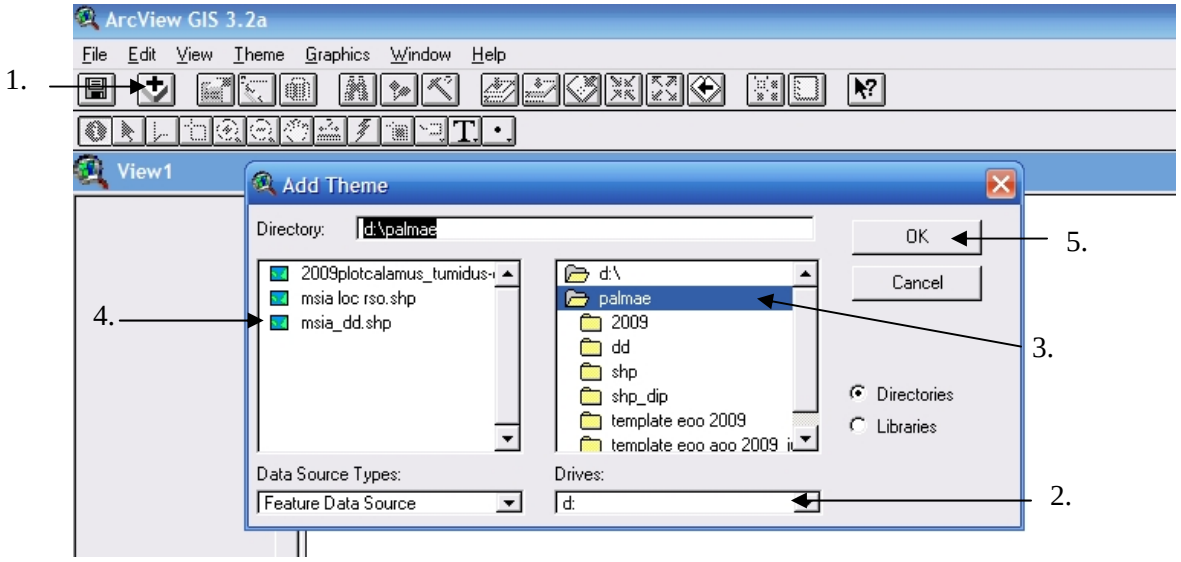
3.1 To create new view

To create a new view, double click the View icon

in the Project Window

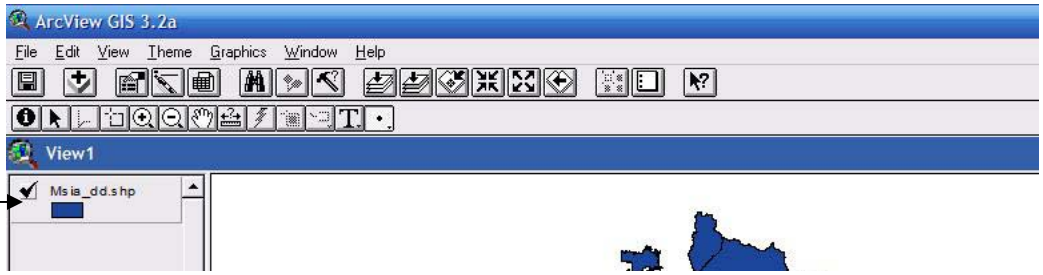
3.2 Adding theme(s) to a view

3.2.1 To add ArcView shapefile(s) to a view



1. Click on the Add Theme button
2. Select the drive in the Drives drop down menu
3. Double click on Directory/Folder to open
4. Click on the theme (.shp) that you want to add to the project. To select more than 1 theme, hold down <SHIFT> and select the themes
5. Click OK
6. Check the box next to the theme's name to turn on the theme

Check the box to turn on the theme.



3.2.2 To plot data with XY coordinates from ArcView

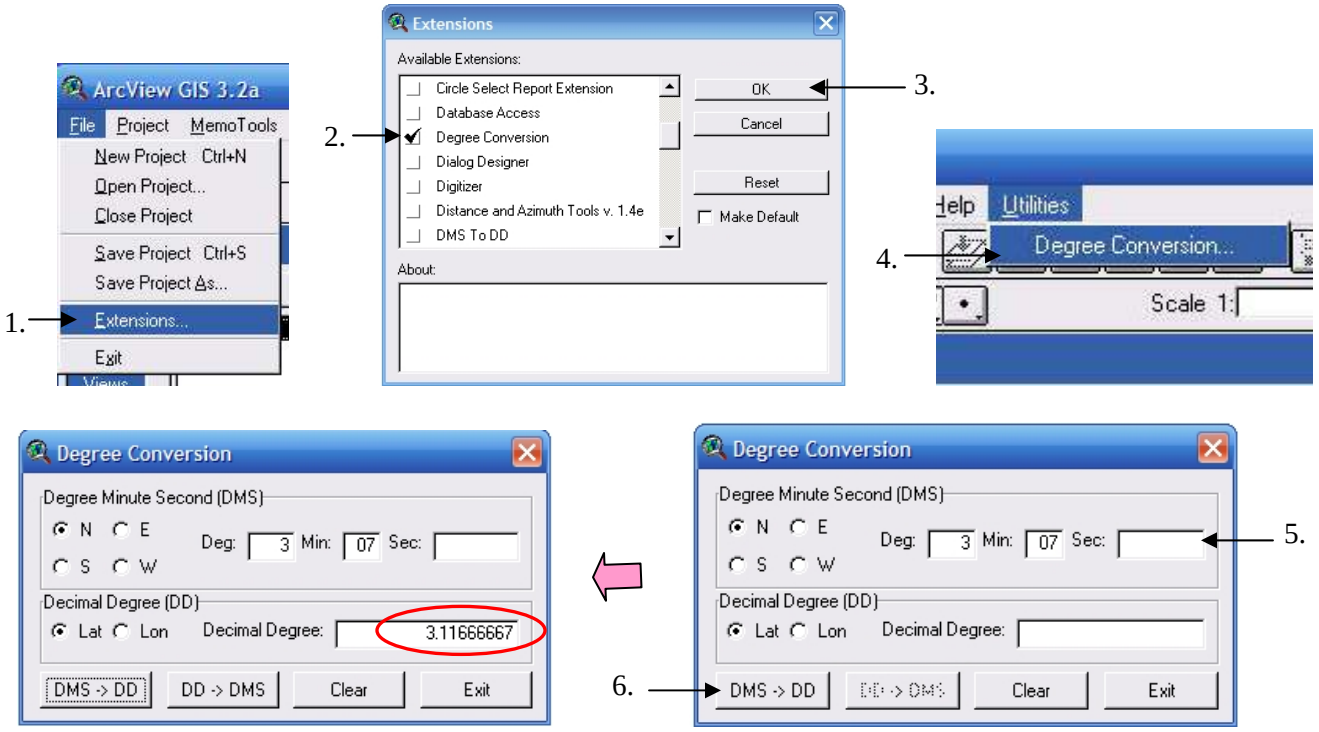
To plot latitude and longitude in ArcView, the latitude and longitude data must be in Decimal Degree (DD). If your data is in Degree minute second, DMS (eg. 100°30'49''), you must first convert them into DD before you can plot them in ArcView.

Convert DMS to DD by using Degree converter extension

Example: Convert 3.07 N, 113.16 E in Degree minute unit (DM) into DD

1. From menu File, choose Extension
2. Check the check box next to Degree Conversion

3. Click OK to load the Degree Conversion extension
4. Choose Degree Conversion from the Utilities menu
5. Enter the latitude to the Deg: and Min:
6. Click DMS -> DD as shown in the figures below



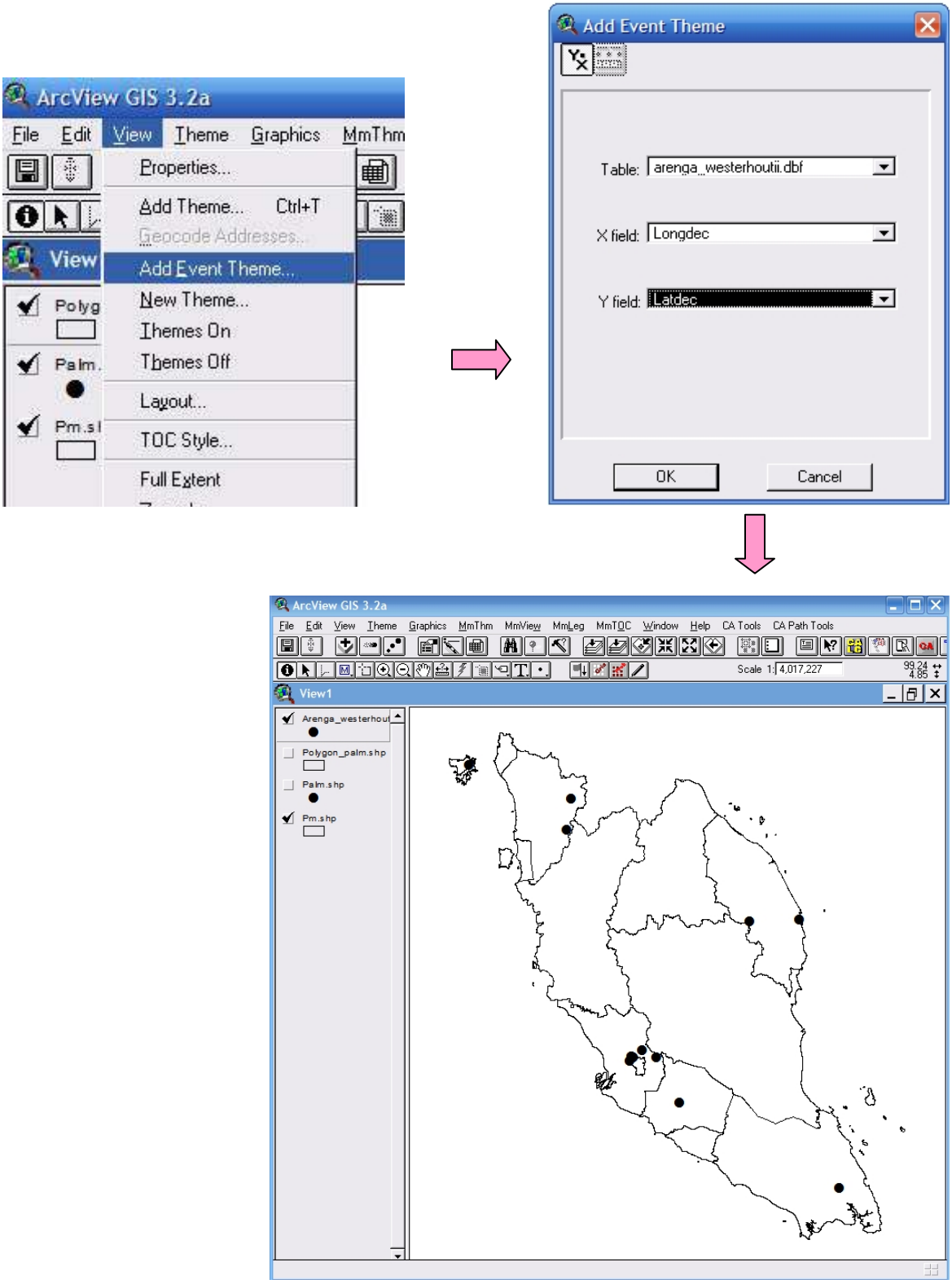
To plot data with XY coordinates from Arcview

i.) You will have to add the table to the project first before you can plot them in the view. To do so please follow these steps:

1. Open Project Window
2. Choose Add Table from the Project Window
3. Choose Drives and Directories that contain the Dbase file you want
4. Choose the file type
5. Click the name of the shape file that you want to add then click OK (or double click on the file name)

ii) Now, you are ready to plot the data in the view. To do so, follow these steps:

1. Click on the View in Project Window
2. Choose the view that you want to add the data to and double click to open the view
3. Choose Add Event Theme from the View menu
4. Select the table that you want to add in from the Table drop down list
5. Choose the appropriate field from the X field drop list (example: longdec or X_coord)
6. Choose the appropriate field from the Y field drop list (example: latdec or Y_coord)
7. Click OK
8. Turn on the new theme by checking the box. Each unique location in the table will be represented by a point as shown in the figure below

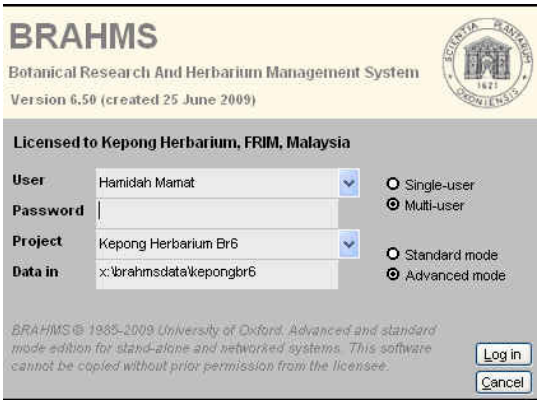

ArcView GIS 3.2a
File Edit View Theme Graphics MmThm
Properties...
Add Theme... Ctrl+T
Geocode Addresses...
Add Event Theme...
New Theme...
Themes On
Themes Off
Layout...
TOC Style...
Full Extent
View
Polyg
Palm
Pm.sl
Add Event Theme
Table: arenga_westerhoutii.dbf
X field: Longdec
Y field: Latdec
OK
Cancel
ArcView GIS 3.2a
File Edit View Theme Graphics MmThm MmView MmLeg MmTOC Window Help CA Tools CA Path Tools
Scale 1: 4,017,227
View1
Arenga_westerhout
Polygon_palm.shp
Palm.shp
Pm.shp

3.2.3 To plot map data with XY coordinates from Brahms

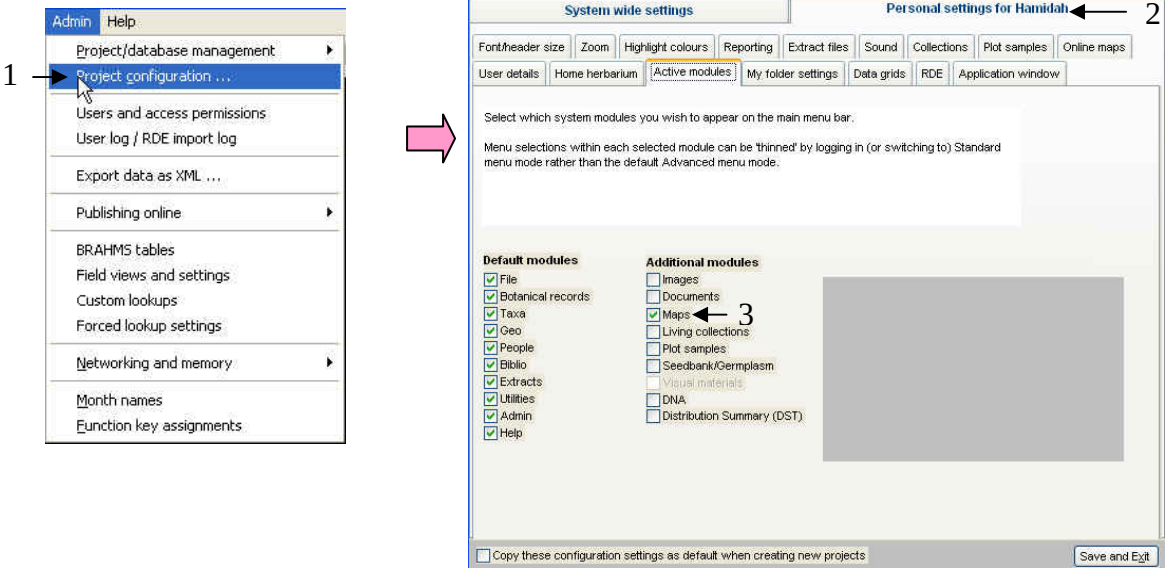
When you have dataset with Latitude and longitude in DM and not in DD format, you can use Brahms to convert the LAT LONG fields from DM to DD format by using the Create map option. ArcView then will use this created map file to plot the data in View.

i) Log in Brahms

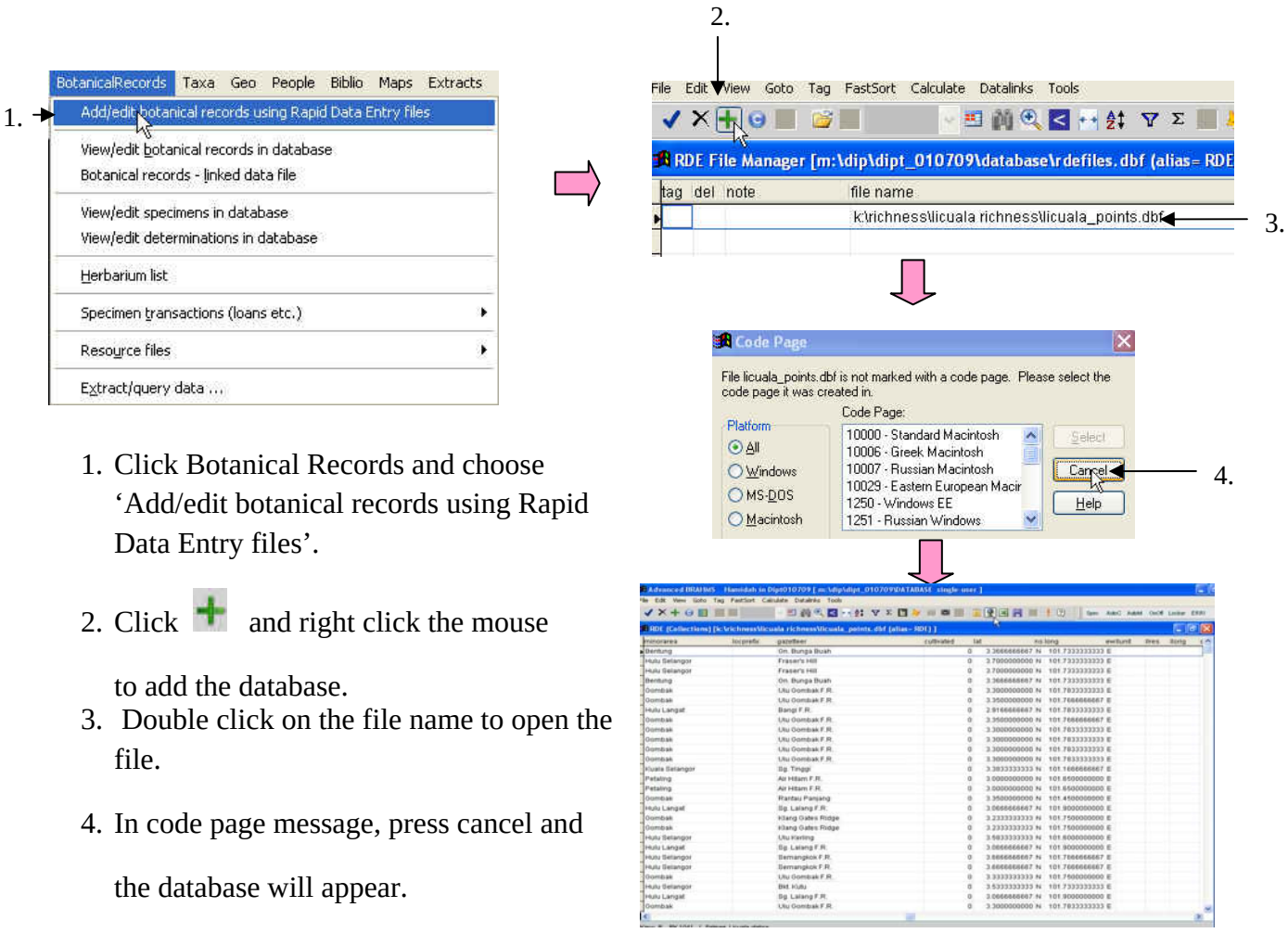
1. Double click to open BRAHMS
2. Enter user name and password in BRAHMS main menu to login



ii) Activate the Maps module in BRAHMS



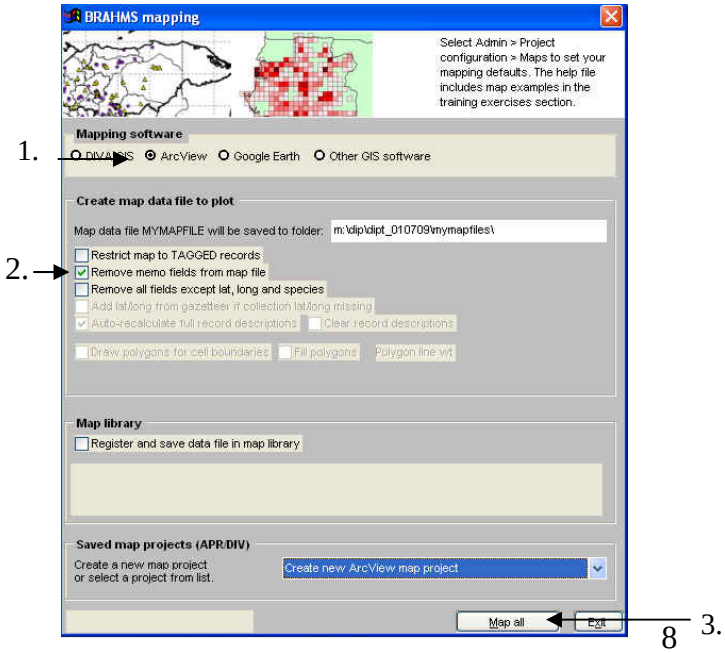
iii) Add data to RDE File Manager



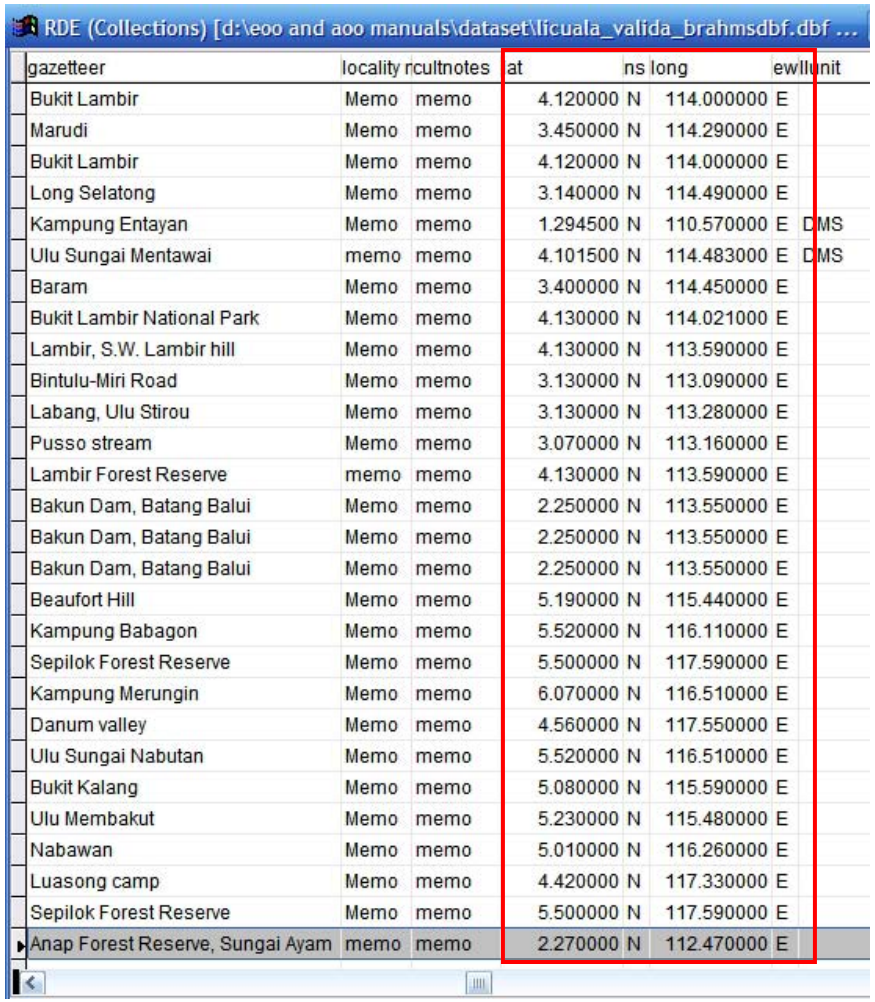
1. Click Botanical Records and choose 'Add/edit botanical records using Rapid Data Entry files'.
2. Click and right click the mouse to add the database.
3. Double click on the file name to open the file.
4. In code page message, press cancel and the database will appear.

iv. Create map file from Brahms

1. Click and BRAHMS mapping window will appear as below



1. Check the ArcView check box
2. Check Remove memo fields from map file check box
3. Click Map all. Brahms will create a map file with LAT and LONG fields converted to DD format as shown in the figure below



RDE (Collections) [d:\eoo and aoo manuals\dataset\licuala_valida_brahmsdbf.dbf ...

gazetteer	locality	rcultnotes	at	ns	long	ew	llunit
Bukit Lambir	Memo	memo	4.120000	N	114.000000	E	
Marudi	Memo	memo	3.450000	N	114.290000	E	
Bukit Lambir	Memo	memo	4.120000	N	114.000000	E	
Long Selatong	Memo	memo	3.140000	N	114.490000	E	
Kampung Entayan	Memo	memo	1.294500	N	110.570000	E	DMS
Ulu Sungai Mentawai	memo	memo	4.101500	N	114.483000	E	DMS
Baram	Memo	memo	3.400000	N	114.450000	E	
Bukit Lambir National Park	Memo	memo	4.130000	N	114.021000	E	
Lambir, S.W. Lambir hill	Memo	memo	4.130000	N	113.590000	E	
Bintulu-Miri Road	Memo	memo	3.130000	N	113.090000	E	
Labang, Ulu Stirou	Memo	memo	3.130000	N	113.280000	E	
Pusso stream	Memo	memo	3.070000	N	113.160000	E	
Lambir Forest Reserve	memo	memo	4.130000	N	113.590000	E	
Bakun Dam, Batang Balui	Memo	memo	2.250000	N	113.550000	E	
Bakun Dam, Batang Balui	Memo	memo	2.250000	N	113.550000	E	
Bakun Dam, Batang Balui	Memo	memo	2.250000	N	113.550000	E	
Beaufort Hill	Memo	memo	5.190000	N	115.440000	E	
Kampung Babagon	Memo	memo	5.520000	N	116.110000	E	
Sepilok Forest Reserve	Memo	memo	5.500000	N	117.590000	E	
Kampung Merungin	Memo	memo	6.070000	N	116.510000	E	
Danum valley	Memo	memo	4.560000	N	117.550000	E	
Ulu Sungai Nabutan	Memo	memo	5.520000	N	116.510000	E	
Bukit Kalang	Memo	memo	5.080000	N	115.590000	E	
Ulu Membakut	Memo	memo	5.230000	N	115.480000	E	
Nabawan	Memo	memo	5.010000	N	116.260000	E	
Luasong camp	Memo	memo	4.420000	N	117.330000	E	
Sepilok Forest Reserve	Memo	memo	5.500000	N	117.590000	E	
Anap Forest Reserve, Sungai Ayam	memo	memo	2.270000	N	112.470000	E	

Lat Long fields in Degree minute format (DM)

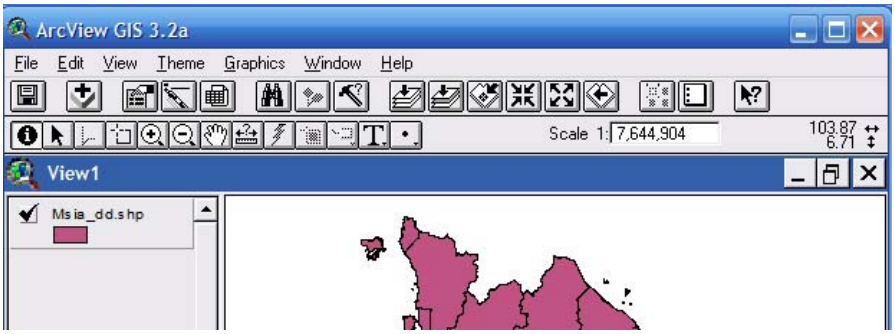
e.dbf

Gazetteer	Lat	Ns	Long	Ew
Bukit Lambir	4.200000	N	114.000000	E
Marudi	3.750000	N	114.483333	E
Bukit Lambir	4.200000	N	114.000000	E
Long Selatong	3.233333	N	114.816667	E
Kampung Entayan	1.495833	N	110.950000	E
Ulu Sungai Mentawai	4.170833	N	114.808333	E
Baram	3.666667	N	114.750000	E
Bukit Lambir National Park	4.216667	N	114.035000	E
Lambir, S.W. Lambir hill	4.216667	N	113.983333	E
Bintulu-Miri Road	3.216667	N	113.150000	E
Labang, Ulu Stirou	3.216667	N	113.466667	E
Pusso stream	3.116667	N	113.266667	E
Lambir Forest Reserve	4.216667	N	113.983333	E
Bakun Dam, Batang Balui	2.416667	N	113.916667	E
Bakun Dam, Batang Balui	2.416667	N	113.916667	E
Bakun Dam, Batang Balui	2.416667	N	113.916667	E
Beaufort Hill	5.316667	N	115.733333	E
Kampung Babagon	5.866667	N	116.183333	E
Sepilok Forest Reserve	5.833333	N	117.983333	E
Kampung Merungin	6.116667	N	116.850000	E
Danum valley	4.933333	N	117.916667	E
Ulu Sungai Nabutan	5.866667	N	116.850000	E
Bukit Kalang	5.133333	N	115.983333	E
Ulu Membakut	5.383333	N	115.800000	E
Nabawan	5.016667	N	116.433333	E
Luasong camp	4.700000	N	117.550000	E
Sepilok Forest Reserve	5.833333	N	117.983333	E
Anap Forest Reserve, Sungai	2.450000	N	112.783333	E

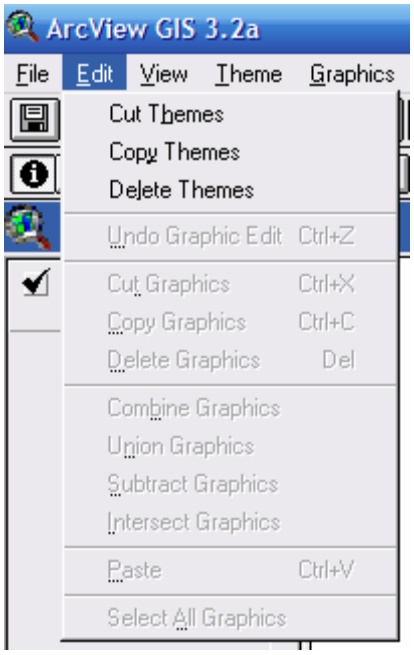
Lat Long fields in Decimal Degree format (DD)

3.3 Turning theme on and off

Check the box to turn on the theme. Uncheck the box to turn it off



3.4 Cutting, copying and pasting theme



3.4.1 To delete theme(s) from a view

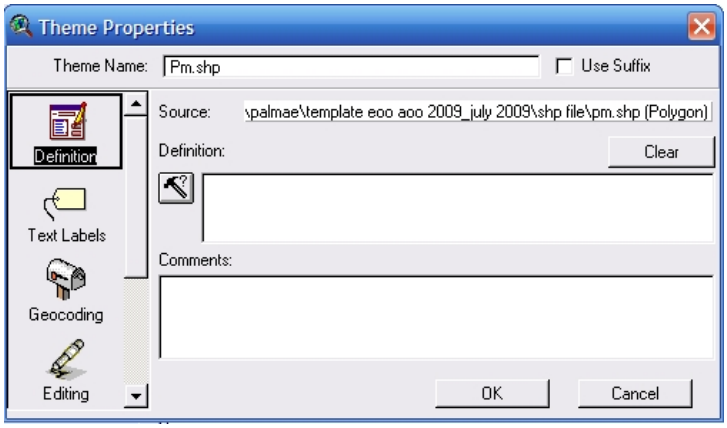
1. Click on the theme(s) that you want to delete in the View's Table of contents to make the theme active
2. Choose Delete Themes from the Edit menu

3.4.2 To cut or copy and paste theme(s)

1. Click on the theme(s) in the View's Table of contents to make the theme active
2. Choose Copy/Cut Theme from the Edit menu
3. Choose Paste Theme from the Edit Menu to paste it or you can press <Cltr> V to paste

To select more than one theme, hold down the SHIFT key and select the themes that you want to cut/delete/copy.

3.5 To change a theme's name



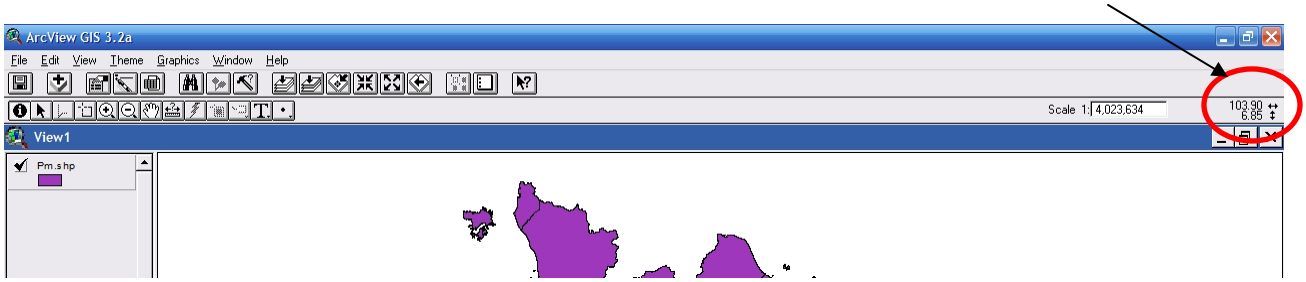
1. Click on the theme in the View's Table of contents to make the theme active
2. Choose Properties from Theme menu **or** click on
3. Type in the new name in the Theme Name text box
4. Click Ok

3.6 To change the name of a view

1. Select Properties from the View menu to display the View Properties dialog
2. Type in new name in the Name textbox
3. Click OK

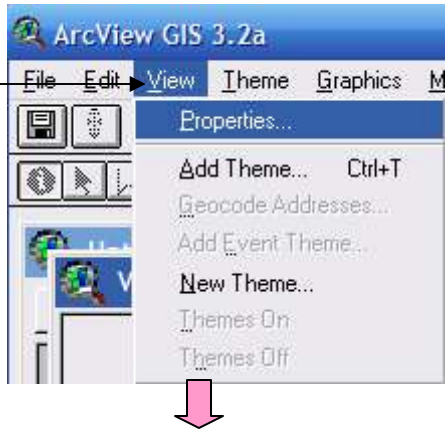
3.7 To choose view map projection

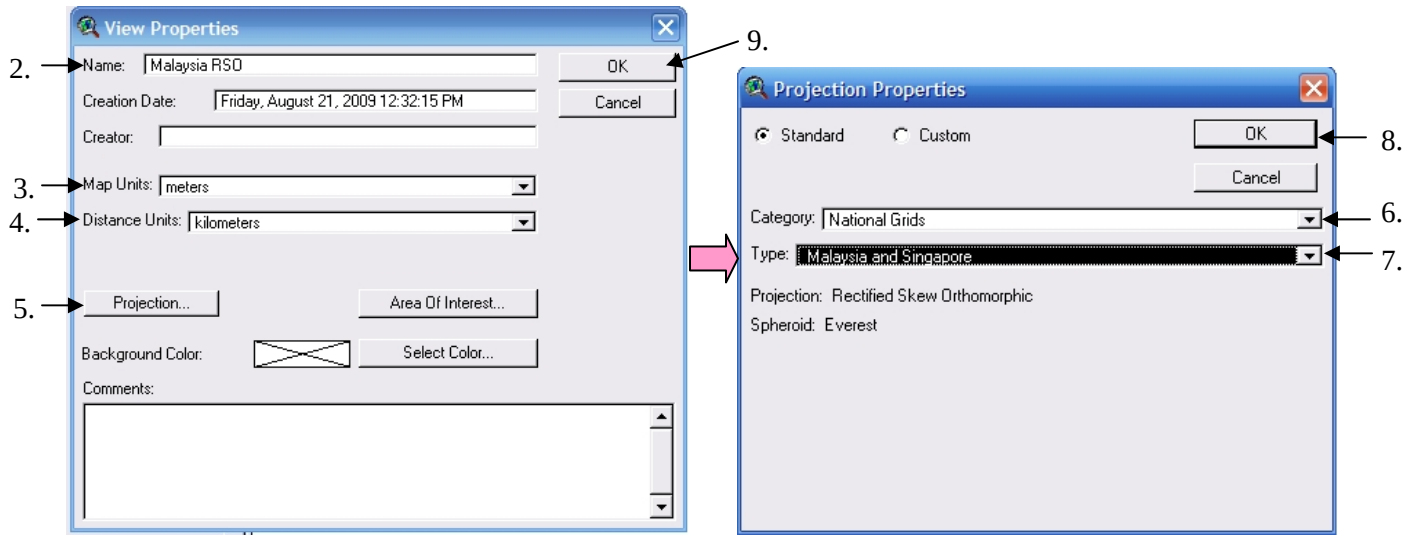
View in Decimal degree (DD) – not projected unit



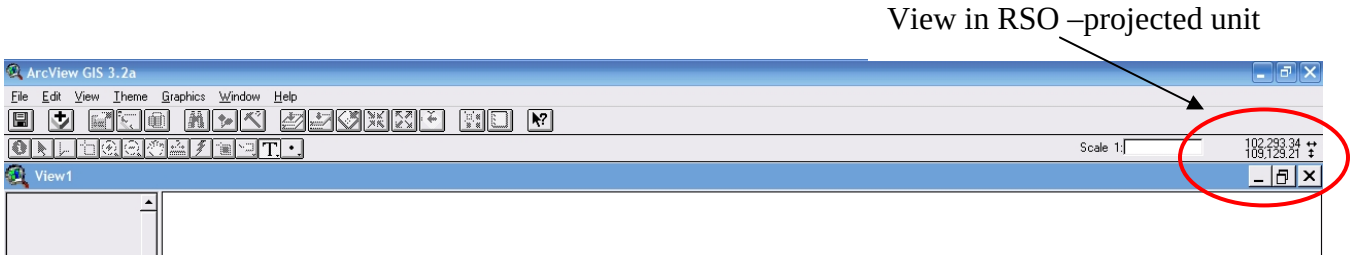
Decimal degree (DD) is a geographic coordinate system which is not projected. If the map do not require high level of locational accuracy, and you are not going to perform any queries based on location or distance, you do not need to transform your data to a projected coordinate system. However, in our training we need to get precise measurement of distance and area, so we have to transform the data to a projected coordinate. Projected coordinate system for Malaysia is Rectified Skew Orthomorphic (RSO). To convert the view in non-projected DD into RSO projection, follow these steps.

1.





1. Select Properties from the View menu to display the View Properties dialog box
2. Rename View1 to Malaysia RSO in the Name textbox
3. Select 'meters' from Map Unit drop menu
4. Select 'kilometers' from the Distance Units drop menu
5. Click on Projection to display the Projection Properties dialog
6. Select 'National Grids' from the Category drop menu
7. Select 'Malaysia and Singapore' from the Type drop menu
8. Click OK on the Projection Properties dialog and View Properties dialog. Now the view is projected in RSO as shown in the figure below.



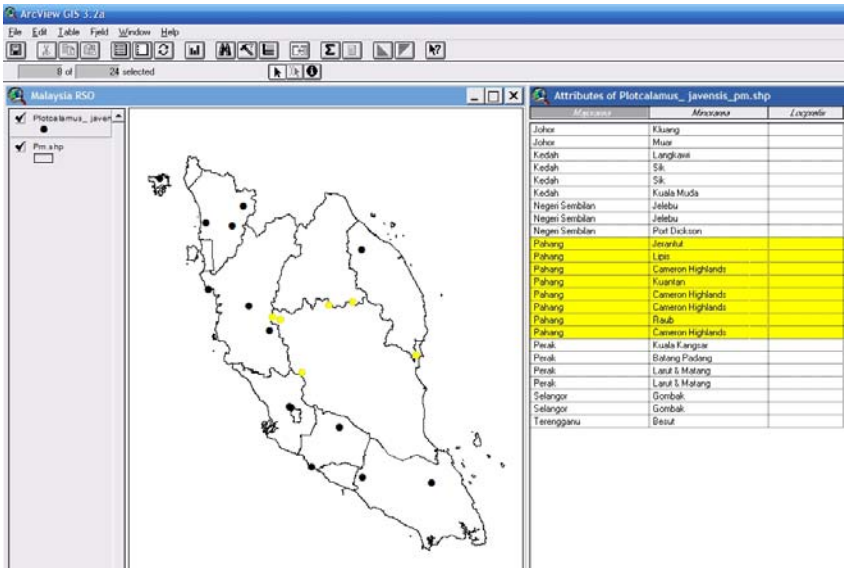
3.8 Selecting features on a view

3.8.1 Selecting feature with a mouse

1. Click on the theme in the View's Table of Contents that have the feature you wish to select.
2. Click the Select Feature then click on the feature(s) (points/polygon/lines) that you wish to select. Or you can drag a selection box over the features. Selected features will be highlighted in yellow.

3.8.2 Selecting features by selecting records in a theme's table

1. Click on the theme in View's Table of Contents that have the feature(s) you wish to select
2. Click the Open Theme Table button
3. Click on the Select button . Click on the record(s) that you wish to select. To select more than one record, hold down SHIFT and select the records. Selected records will be highlighted in the Table and View as shown in the figure



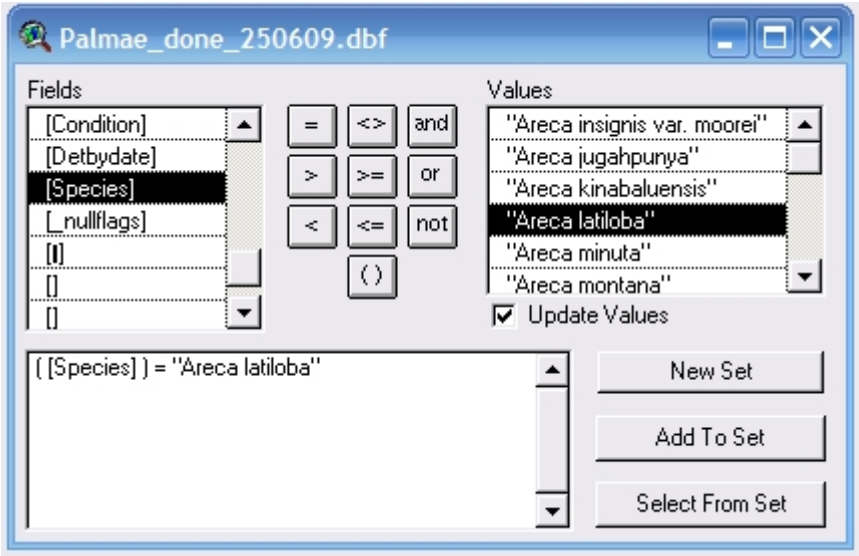
3.8.3 Selecting features using a Query Builder

Selecting feature using one criterion

1. Click on the theme in the View's Table of Contents that contain the feature you wish to select
2. Click on the Query Builder button

   Example: Select *Areca latiloba* specimens from the family of Palmae dataset

3. Double click on [Species] from the Field list
4. Click and double click on "Areca latiloba"
5. Click New Set



Refine query to the selected set

You can refine your query to the set selected. For example, you want to refine your selection to *Areca latiloba* specimens from Pahang from the set of *Areca latiloba* that you have selected earlier.

1. Double click [Majorarea] from the Fields list
2. Click and double click on "Pahang"
3. Click Select From Set. Now, you will have only specimen from Pahang highlighted in the View and Table

Add query to the selected set

You can also add query to the selected set. For example, you can add collection from Selangor to the selected set Pahang Areca latiloba.

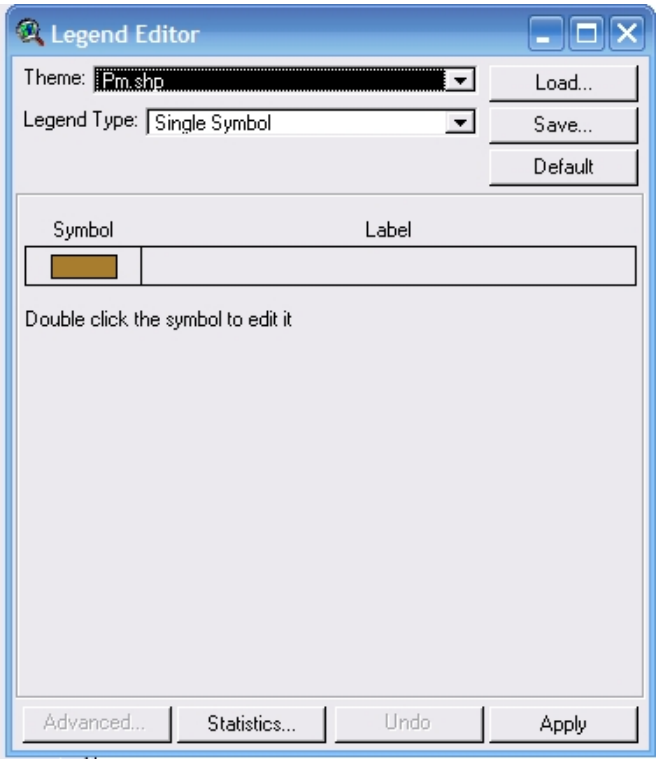
1. Double click [Majorarea] from the Fields list
2. Click and double click on "Selangor".
3. Click Add To Set. So, Now you will have all the specimens of *Areca latiloba* from Pahang and Selangor highlighted in the View and Table

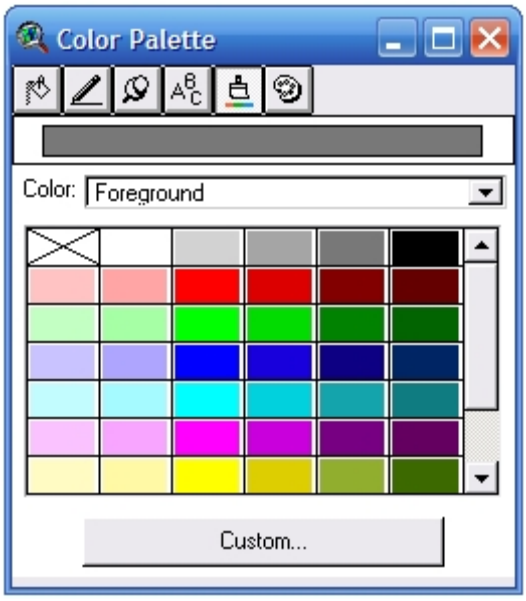
3.9 Clear selected features on a view

Click Clear Selected Features button to deselect all selected feature in active theme

4.0 Choosing color and symbols

4.1 Change theme's colour or symbol

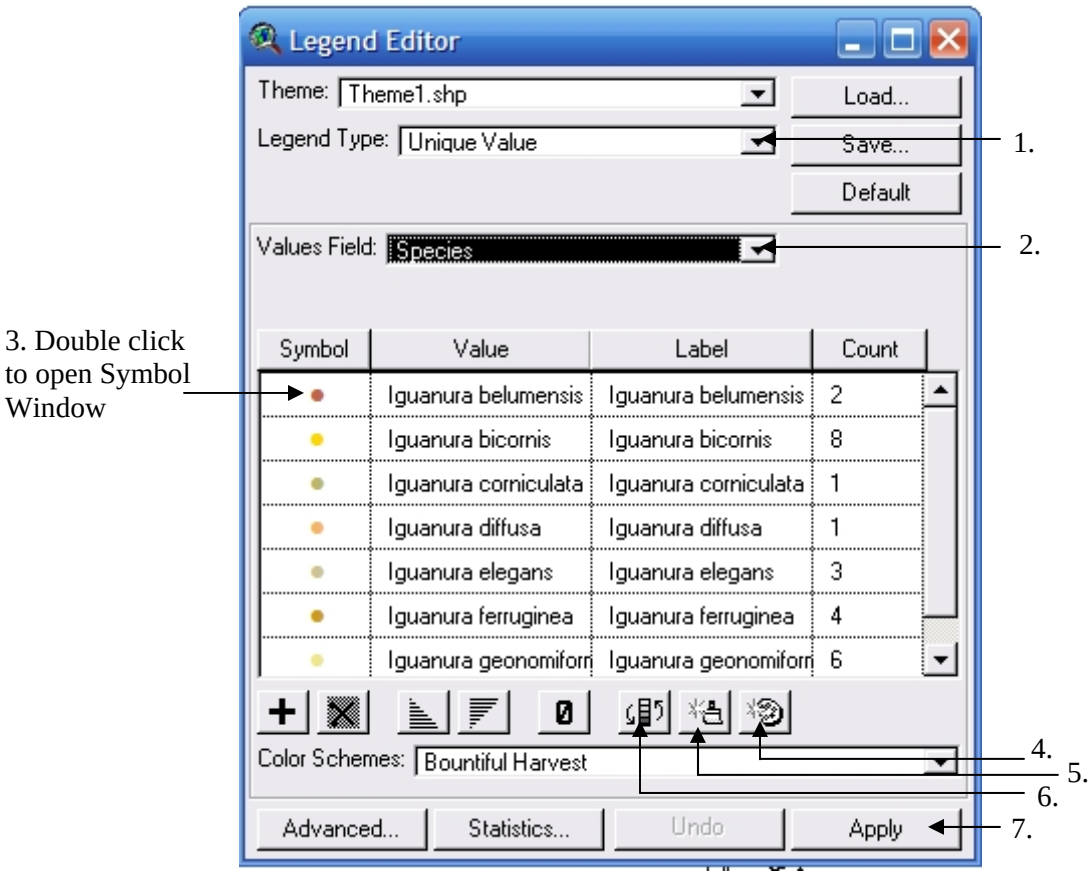




1. Double click on the Theme in the Table of Contents to open the Legend editor dialog
2. Double click the symbol to open Symbol Window
3. Click on Color Palette button to select colour or Marker Palette to select symbol
4. Click Apply

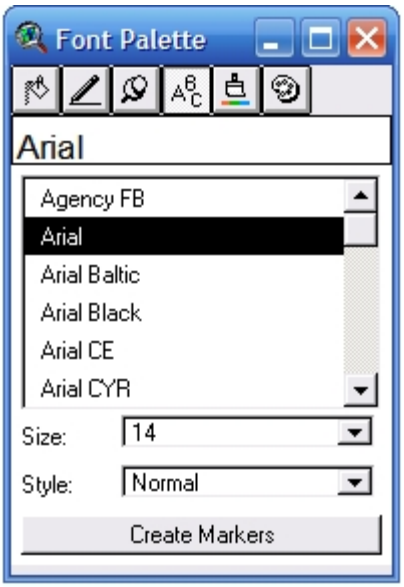
4.2 Classify data

1. Double click on the theme in the View's Table of contents to open legend editor. Select Unique value from the pull down list to display features based on defined attribute
2. Select Value Field from the drop down list. Example: Species
3. To edit specific symbol, double click on the symbol to display the palette window
4. To change the colour randomly, click on the button
5. To change pattern randomly, click on the button
6. To flip the order of the colour, click on button
7. Click Apply



5.0 Labeling

5.1 Setting text font, size, style and colour



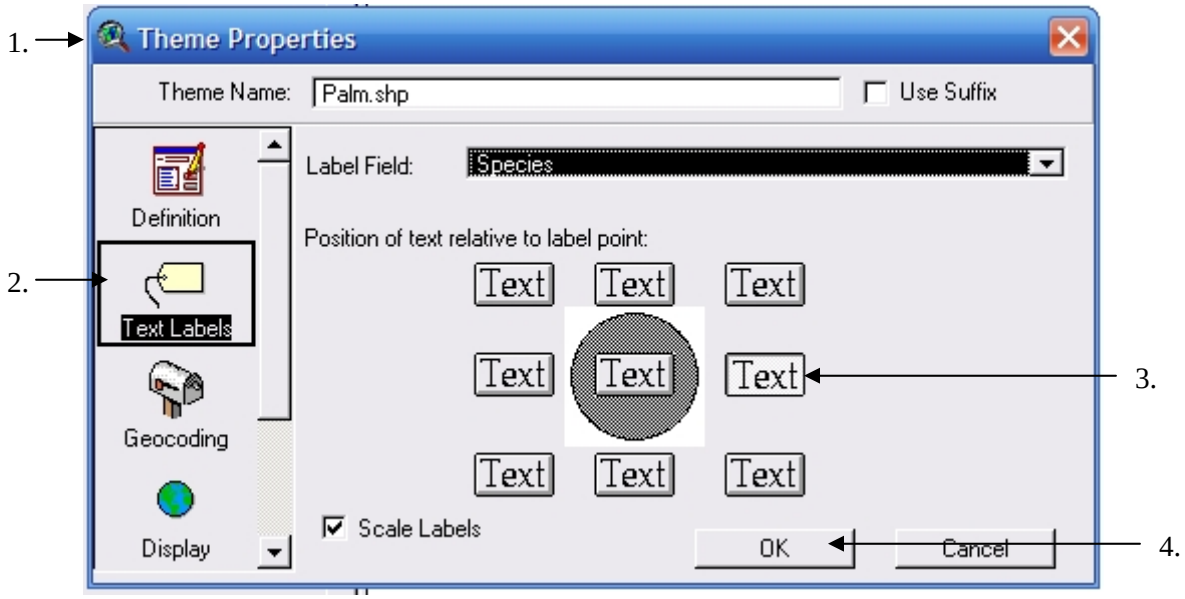
5.1.1 To set text font, size, style and colour before you create the label

1. Select Show Symbol Window from the Window menu
2. Click Text Palette to select font type, size and style; and to select colour

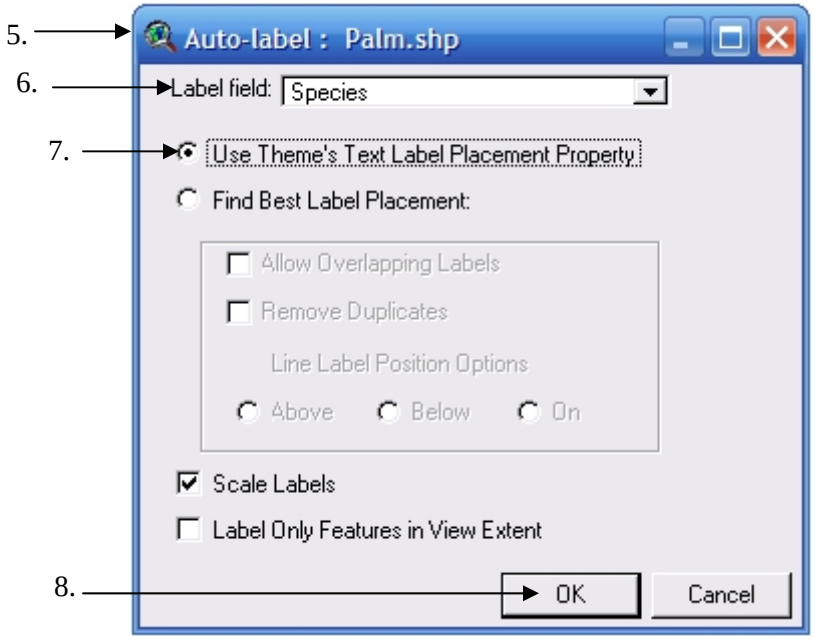
5.1.2 To set text font, size, style and colour after the label(s) is created

1. Use pointer tool to select label(s) that you wish to change the setting
2. Select Show Symbol Window from the Window menu
3. Click Text Palette to select font type, size and style; and to select colour

5.2 Auto-labeling



1. You can set the position of the text label before you create the labels. Choose Theme Properties from Theme menu to display the Theme properties dialog
2. Click the Text Labels
3. Choose the position of the label that you want
4. Click OK



5. Choose Auto-label from Theme Menu
6. Choose the field that you want to label from the Label field list, so the label will be arranged accordingly to what you have set in the Theme's properties earlier
7. Choose Use Theme's Text Label Placement Property
8. Click OK

5.3 Deleting labels and shapes

5.3.1 To delete label and shape using pointer tool

1. Use pointer tool to select label(s) that you wish to delete
2. Select Delete Graphics from Edit Menu or press <Delete> on the keyboard

5.3.1 To delete all label and shapes

1. Choose Select All Graphic from the Edit menu
2. Select Delete Graphics from Edit Menu or press <Delete> on the keyboard

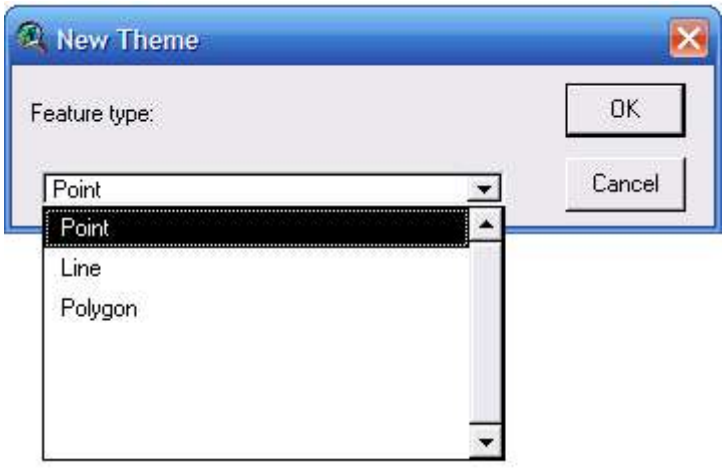
5.3.2 To delete label associated with active theme (which is created using Auto-label)

Choose Remove Labels from Theme menu

6.0 Creating and editing theme

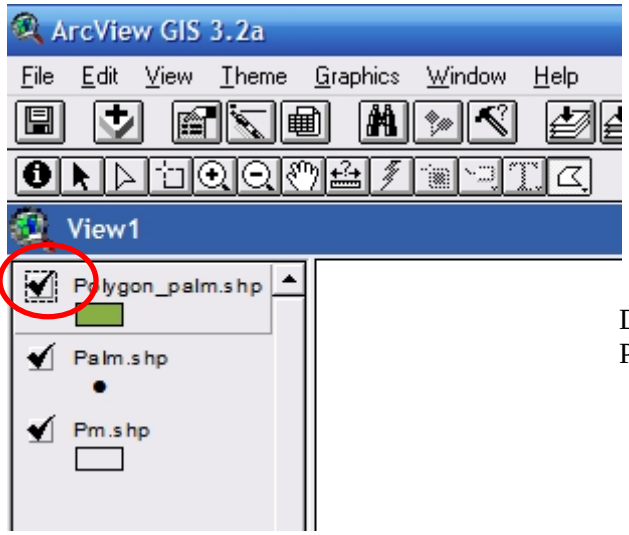
6.1 Creating new theme in a view

There are 3 types of GIS data; point, line and polygon. Each data type represents the real world data. For example, we use point data type to represent trees locations, line to represent pipe line and polygon to represent parcel.

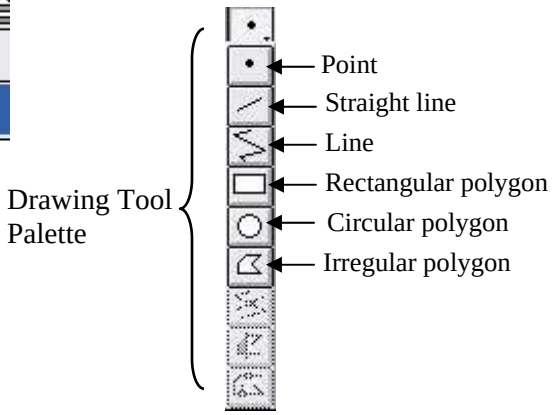


Let's try to create a convex hull polygon of a palm species by following these steps:

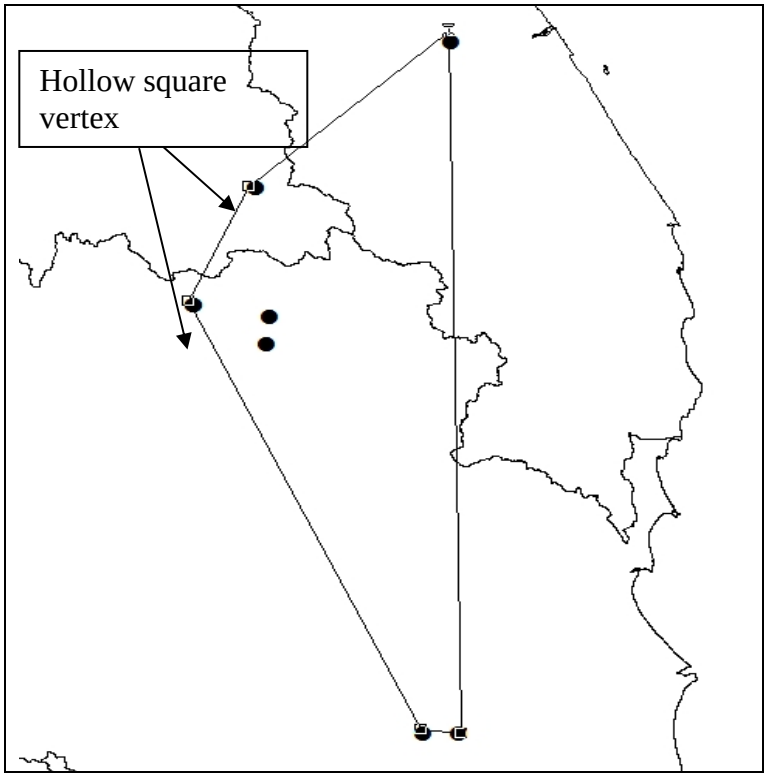
1. Choose New Theme from the View menu
2. Choose Feature Type that you wish to create
3. Specify the folder where you want to save the new theme
4. Rename the default file
5. Click OK
6. Click on the Drawing Tool Palette and choose Irregular polygon button
7. Left click on the point where you want to start then click once on every point that forming the boundary of the polygon.
8. Double click on the final point to end



Dashed line around the check box shows that the theme is in editing mode



6.2 Editing polygon theme



Make sure the theme you want to edit is in Editing mode, if not choose **Start editing** from Theme menu.

6.2.1 To reshape the polygon

1. Click on the Vertex Edit Tool
2. Place the cursor on the hollow square vertex that you want to move, hold down the left mouse button and drag the vertex to new position.

6.2.1 To add new vertex

1. Click on the Vertex Edit Tool
2. Move the cursor to the position on the line where you want to add the new vertex.

After finish editing, choose **Stop Editing** from Theme menu, and click YES to save edits.

7.0 Laying out maps

7.1 Creating and setup new layout

7.1.1 Layout Properties

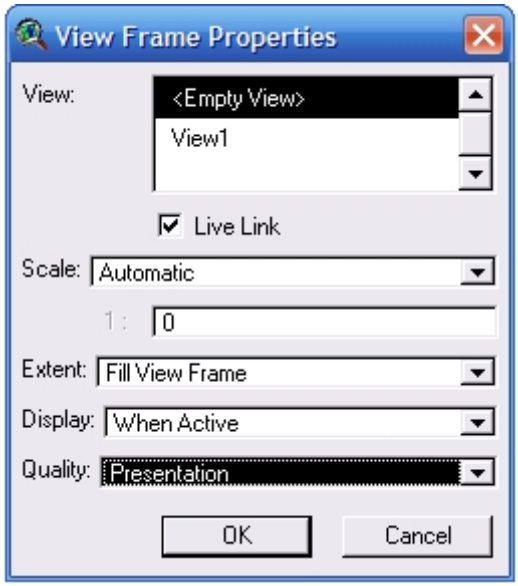
1. Double click on the Layout icon in the Project Window

. A new layout will appear Choose Properties from the Layout menu
2. Rename Layout
3. Uncheck the Snap to Grid check box
4. Click OK

7.1.2 Page setup for new layout

1. Choose Page Setup from the Layout Menu
2. Set Page size and orientation
3. Set Output Resolution to High
4. Click OK

7.2 Adding a view to a layout



1. Click on the View Frame tool
2. Draw a box on the layout to add a view frame and it will display the View Frame Properties Dialog
3. Select View that contain the features
4. Check the Live Link check box
5. Choose scale
6. Click OK

7.3 Adding a legend to a layout

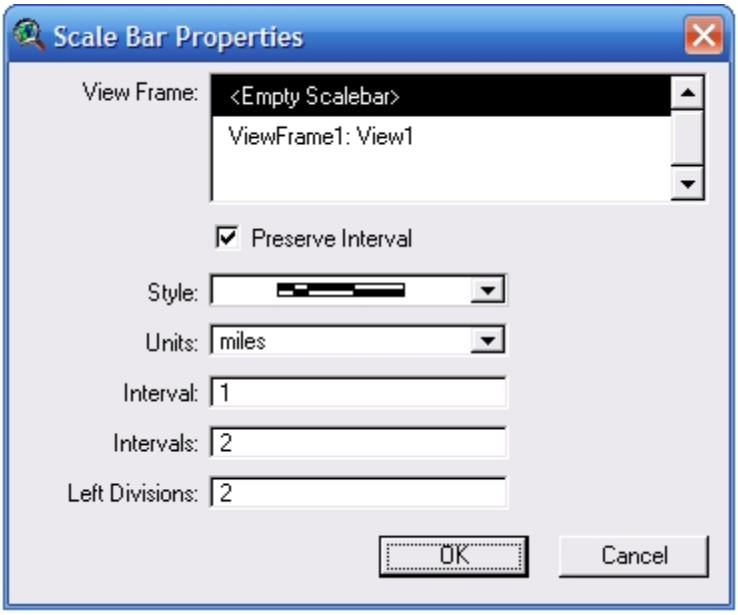
1. Click on Legend View tool
2. Draw a box on the layout to add a Legend view frame, a Legend Frame Properties dialog will appear
3. Select the View that the Legend is associated with
4. Click OK

7.4 Adding a title to layout

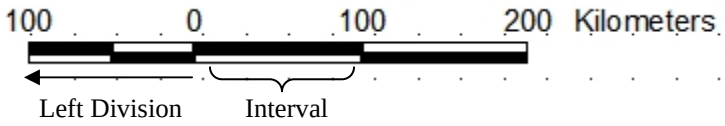
1. Click on the Text tool
2. Bring the cursor to where you want to put the text
3. Type text in the text box and click OK

7.5 Adding scale bar to a layout

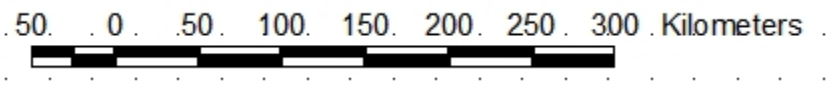
1. Click on the Scale Bar View tool
2. Bring the cursor to position where you want to put the scale bar and drag a box of the size/length that you want the scale bar to be, Scale Bar Properties Dialog will appear
3. Select the View Frame associated with the scale bar
4. Select the style, set the units, interval, intervals and left divisions
5. Click OK. You can resize the scale bar by dragging the corner using mouse



Examples:



Interval: 100
Intervals: 2
Left Divisions: 2



Interval: 50
Intervals: 6
Left Divisions: 2

Interval: 100
Intervals: 2
Left Divisions: 0

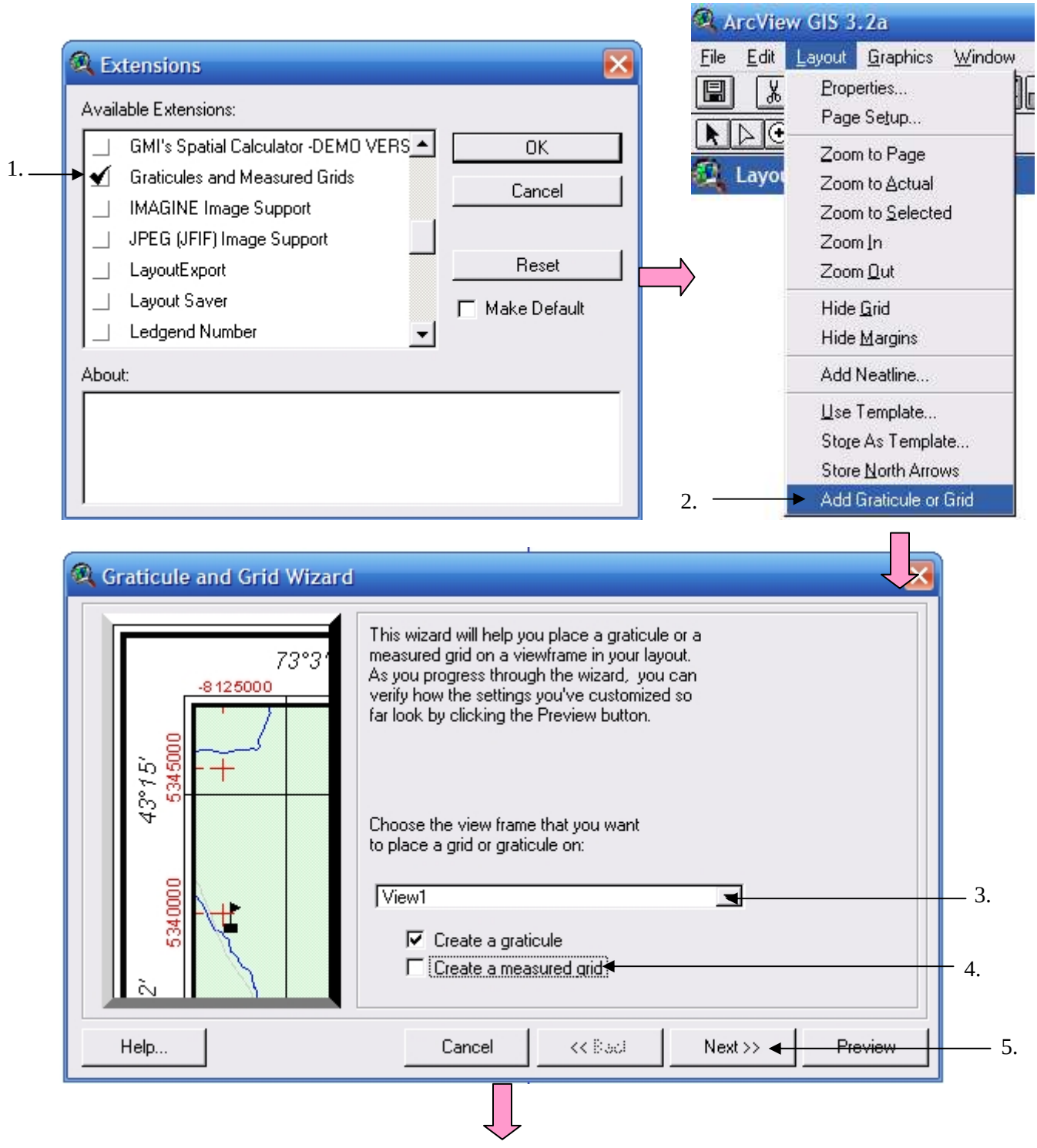
7.6 Adding a north arrow to a layout

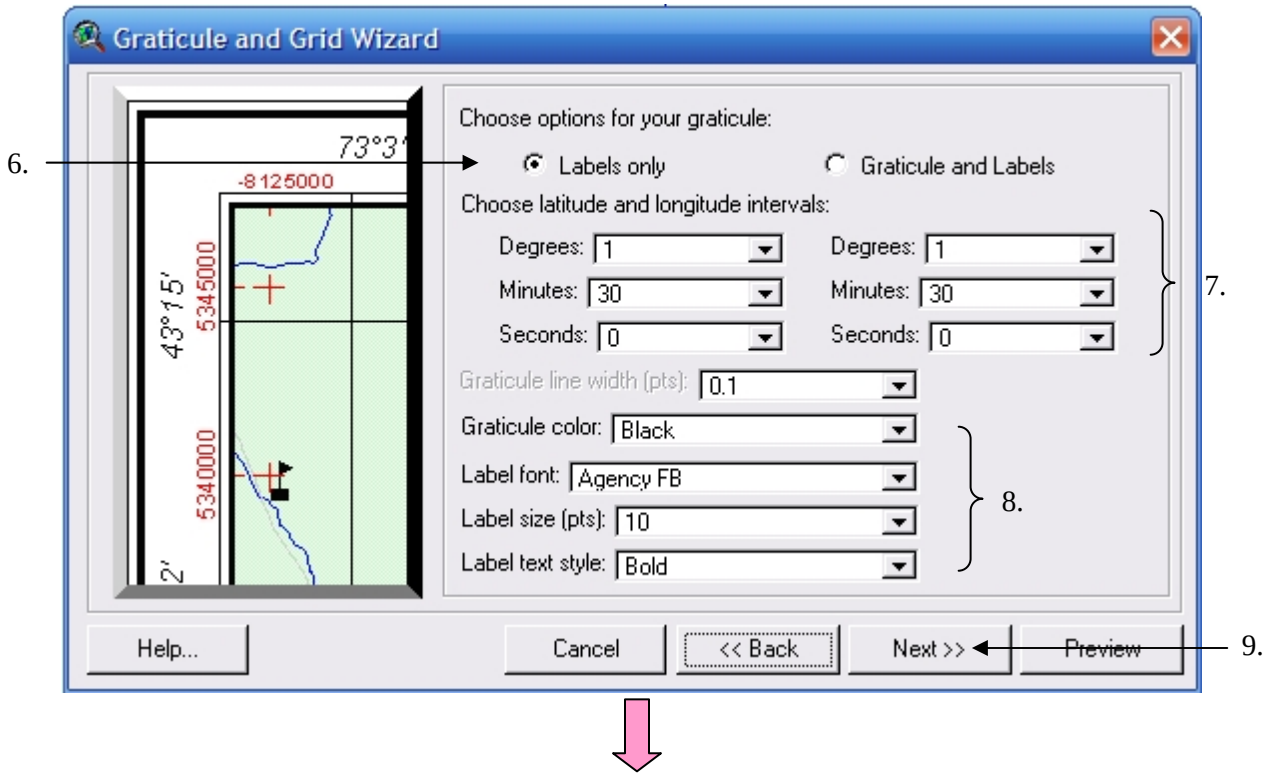
1. Click on the North Arrow tool
2. Bring the cursor to position where you want to put the north arrow and drag a box of a size/length that you want the scale bar to be, a North Arrow Manager Dialog will appear
3. Choose the design/type Arrow that you want
4. Click OK. You can resize the scale bar by dragging the corner using mouse

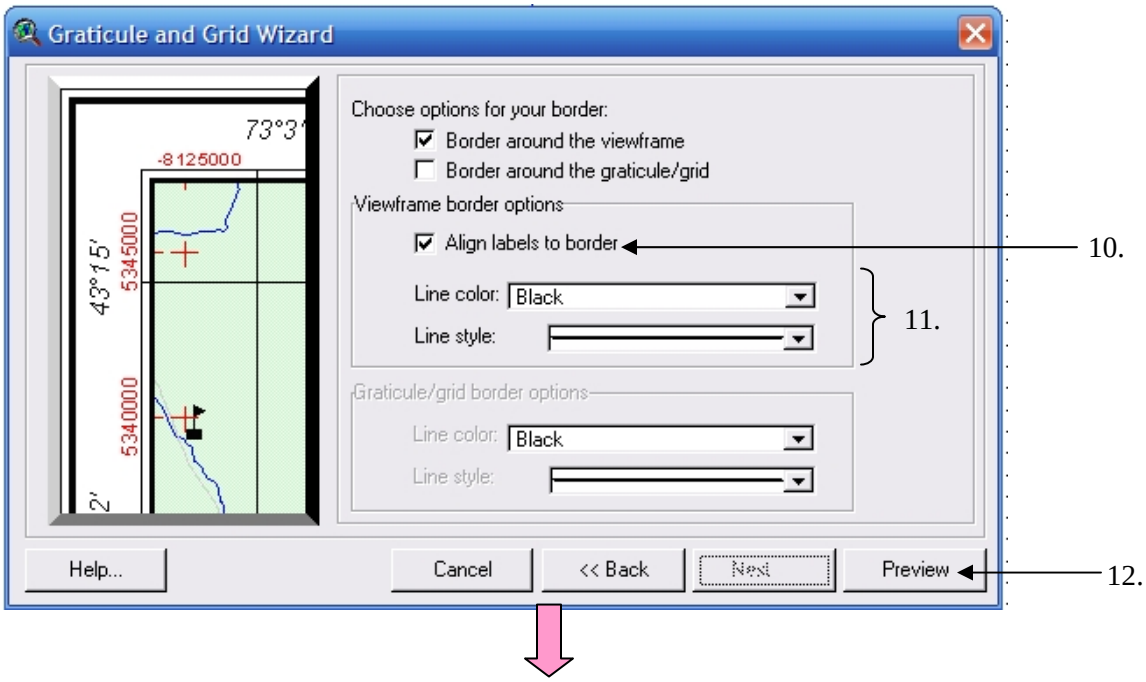
7.7 Adding Graticule and measure grid

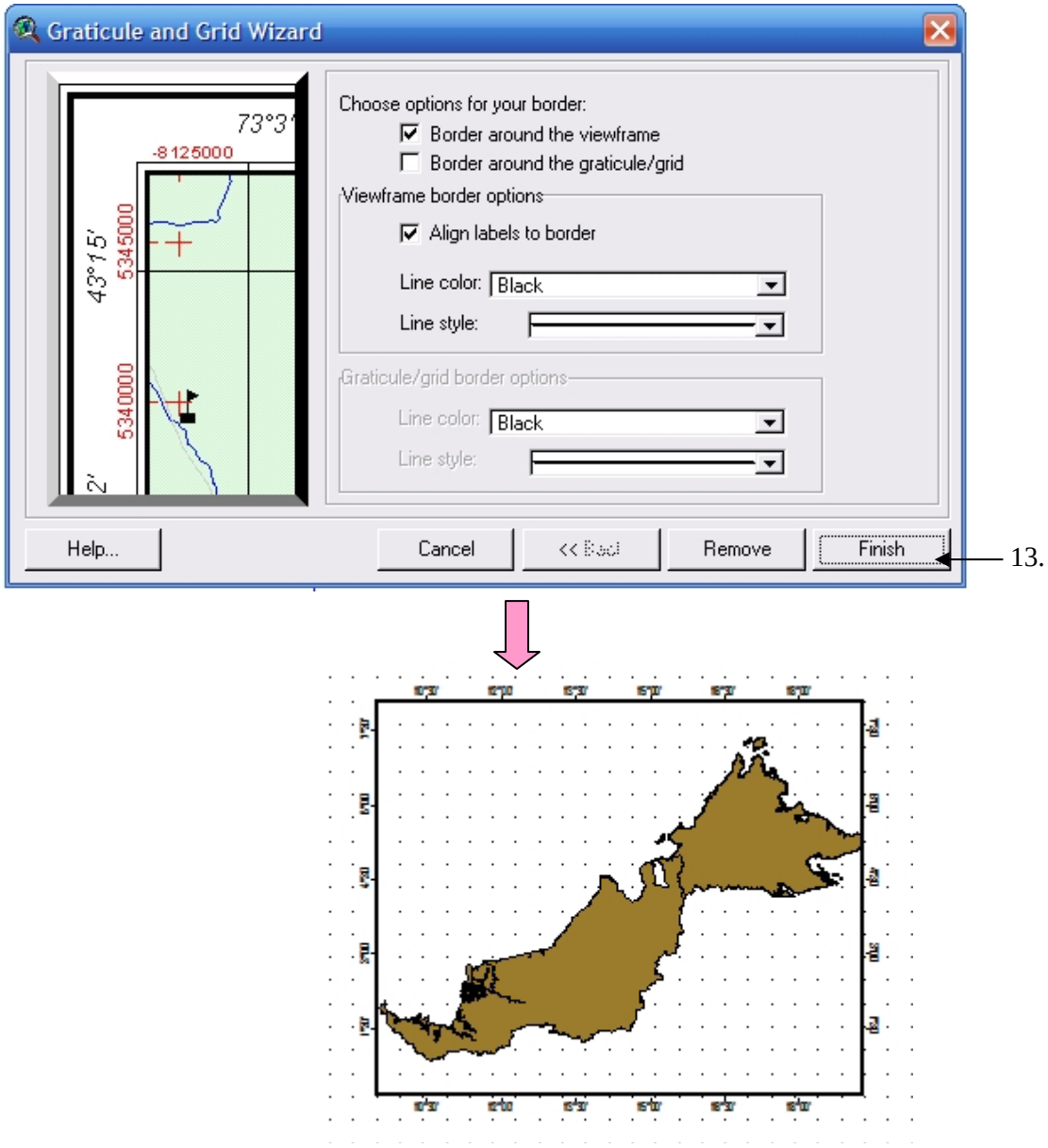
1. Load the Graticule and measure grid extension to the project
2. Choose Add Graticule or Grid from the Layout menu
3. Select the view frame that you want to add the Graticule on from the drop list
4. Uncheck the Create a measured grid if you want to create Graticule only.
5. Click Next
6. Choose Labels only from the Graticule option
7. Choose/set the latitude and longitude interval
8. Choose the Graticule colour, Label text font type, size and style

9. Click Next
10. Check the Align labels to border check box
11. Choose the line colour and style
12. Click preview to display the Graticule on the map
13. Click finish




Graticule and Grid Wizard
Choose options for your graticule:
Labels only
Graticule and Labels
Choose latitude and longitude intervals:
Degrees: 1
Minutes: 30
Seconds: 0
Degrees: 1
Minutes: 30
Seconds: 0
Graticule line width (pts): 0.1
Graticule color: Black
Label font: Agency FB
Label size (pts): 10
Label text style: Bold
Help...
Cancel
<< Back
Next >>
Preview
6.
7.
8.
9.

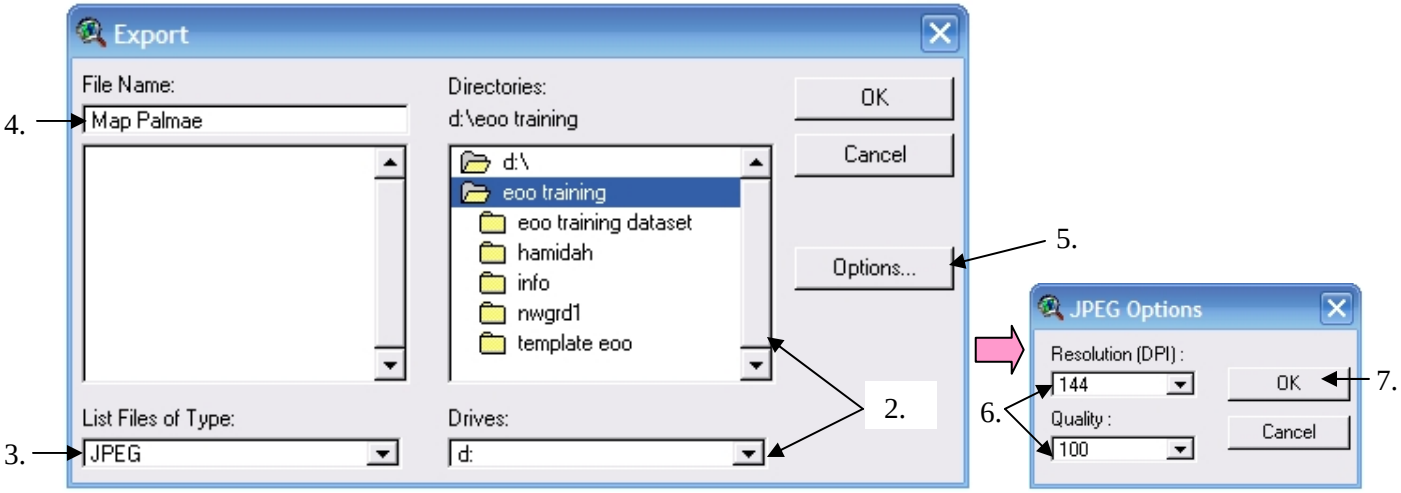

Graticule and Grid Wizard
Choose options for your border:
Border around the viewframe
Border around the graticule/grid
Viewframe border options
Align labels to border
Line color: Black
Line style:
Graticule/grid border options
Line color: Black
Line style:
Help...
Cancel
<< Back
Next
Preview
10.
11.
12.



7.8 Export layout

Layout can be saved in jpeg, bitmap format etc. To do so, please follow these steps:

1. Choose Export from the File Menu. An Export dialog will appear.
2. Choose the Drives and Directory where you want to save the layout
3. Select the file type
4. Type in file name
5. Click on Options
6. Set JPEG option to maximum for Resolution (DPI): 144 and Quality:100
7. Click OK in JPEG options and Export dialog

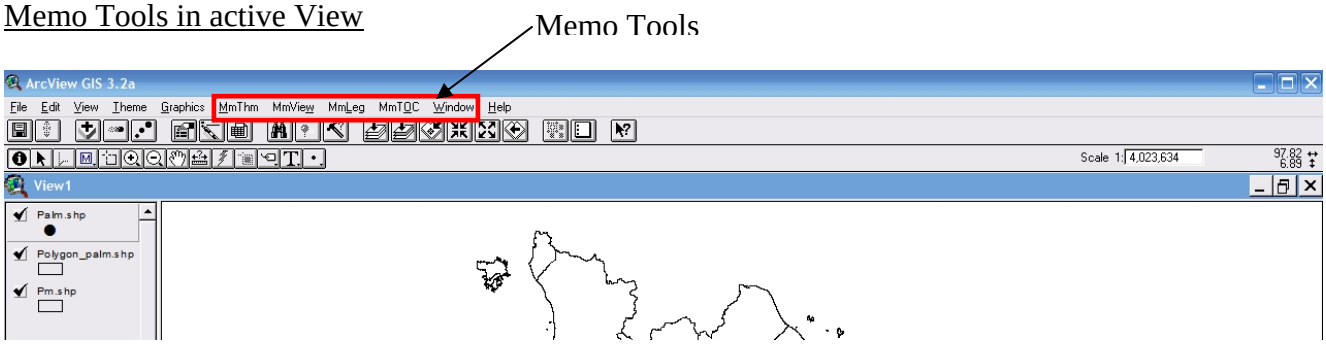


7.9 Duplicating layout using Memo Tools extension (Hill, B. 2008. Memo Tools 6.5. Available at http://arcscripts.esri.com)

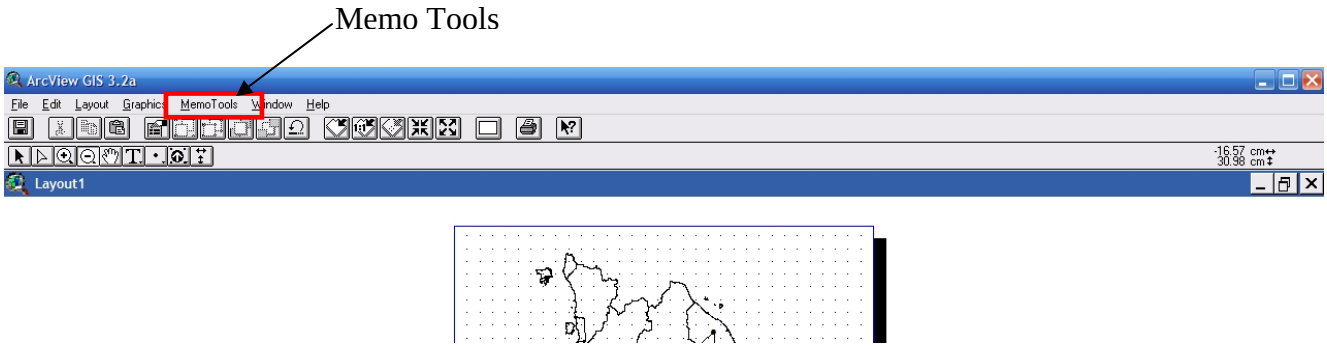
7. 9.1 To install the Memo Tools Extension.

1. Copy the Memo_Tools.avx into the C:\ESRI\AV_GIS30\ARCVIEW\EXT32
2. In the project, choose Extensions from the File Menu
3. Check the Memo Tools 6.5 check box
4. Click Ok. Menus from Menu Tools 6.5 will be added to View, Table and Layout menu bar as shown in the figures below

Memo Tools in active View

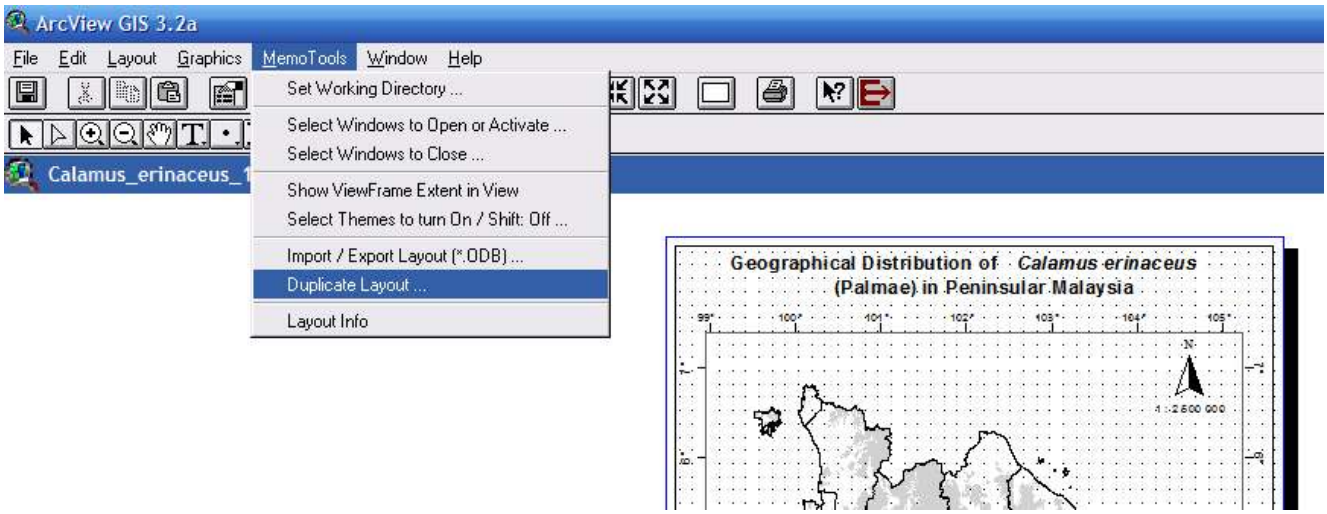


Memo Tools in active Layout



7.9.2 To duplicate Layout

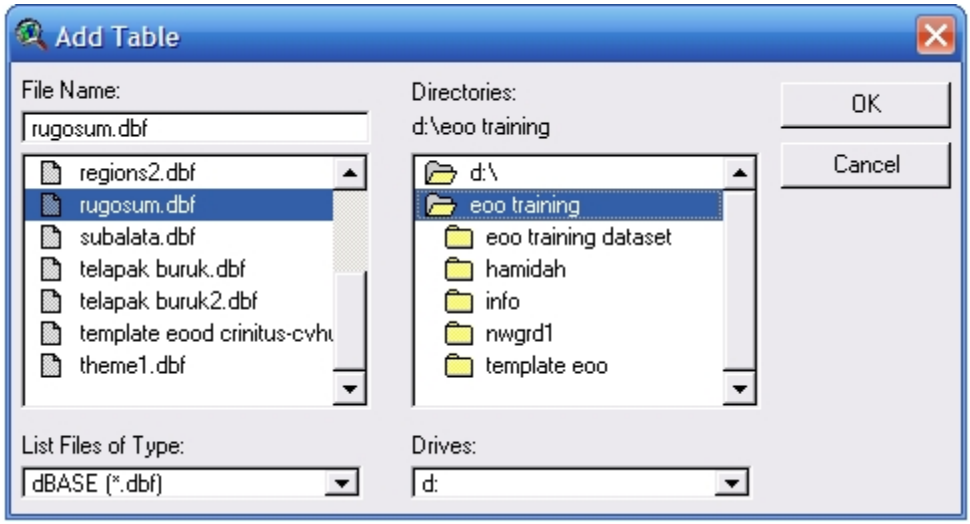
1. Open the layout that you wish to duplicate/copy
2. Choose Duplicate Layout from Memo Tools menu
3. Enter name for the copy of the layout
4. Click OK



8.0 Working with tabular data

8.1 Adding table (.dbf) to a project

1. Open Project Window and click on tables
2. Choose Add Table from the Project Window
3. Choose Drives and Directories that contain the Dbase file that you want
4. Choose the file type
5. Choose the file name that you want to add and click OK (or Double click on the file name)



8.2 Querying a table

8.2.1 Finding a record in a table

1. Click the Find button
2. Type in attribute that you want to find (eg. Fraser's Hill)
3. Click OK. The records contain the word Fraser's Hill will be highlighted in the Table as shown in the figure below

Brahms	Species	Majorarea	Minorarea	Gazetteer	Lat	Long	Lat_dms	Long_dms	Y_coord	X_coord
145400	Syzygium rugosum var. cordatu	Kelantan	Kuala Krai	G. Stong Utara F.R., G. Stong	5.1900	101.5700	5 19	101 57	5.31667	101.95000
145401	Syzygium rugosum var. cordatu	Kelantan	Kuala Krai	G. Stong Utara F.R., G. Stong	5.1900	101.5700	5 19	101 57	5.31667	101.95000
145399	Syzygium rugosum var. cordatu	Terengganu	Dungun	Taman Negara, G. Mandi Angi	4.4100	102.5100	4 41	102 51	4.68333	102.85000
145402	Syzygium rugosum var. cordatu	Pahang	Raub	Fraser's Hill	3.4300	101.4500	3 43	101 45	3.71667	101.75000

8.2.2 Selecting record(s) in a table

There are few ways that we can use to select record(s) in a table:

1. Using Select tool to select record in a table. To select more than one records, hold <SHIFT> and drag/click on the records
2. Using Find to select particular records (Please refer to 8.2.1)
3. Using Query Builder (Please refer to 3.8.3)
4. Selecting records in a Table by selecting feature in the View (Please refer to 3.8.1)

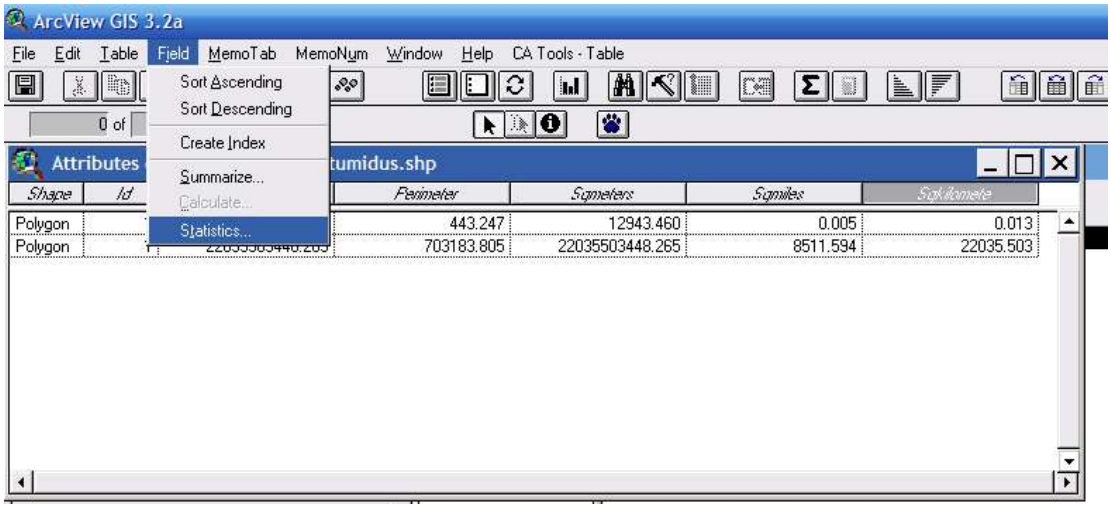
8.2.3 To display selected record(s) on top of the table

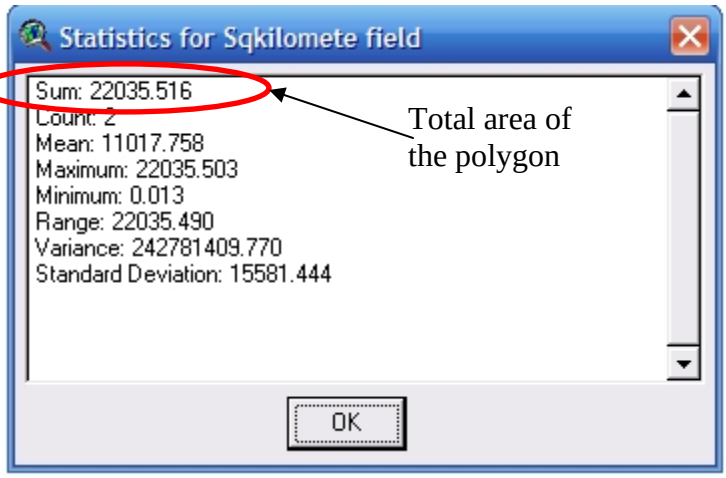
Click Promote button to display selected record(s) on the top of table.

8.2.4 Getting statistic about a table

For example, you want to know the total area of a polygon. To do so, please follow these steps:

1. Click on the polygon theme (eg. polygon_calamus_tumidus) to activate it
2. Click on to open the theme's attribute table
3. Click on the field SqKilometers (since we want to know the total area in km^2)
4. Choose Statistic from Field menu to generate the report. The value next to the word Sum is the total area

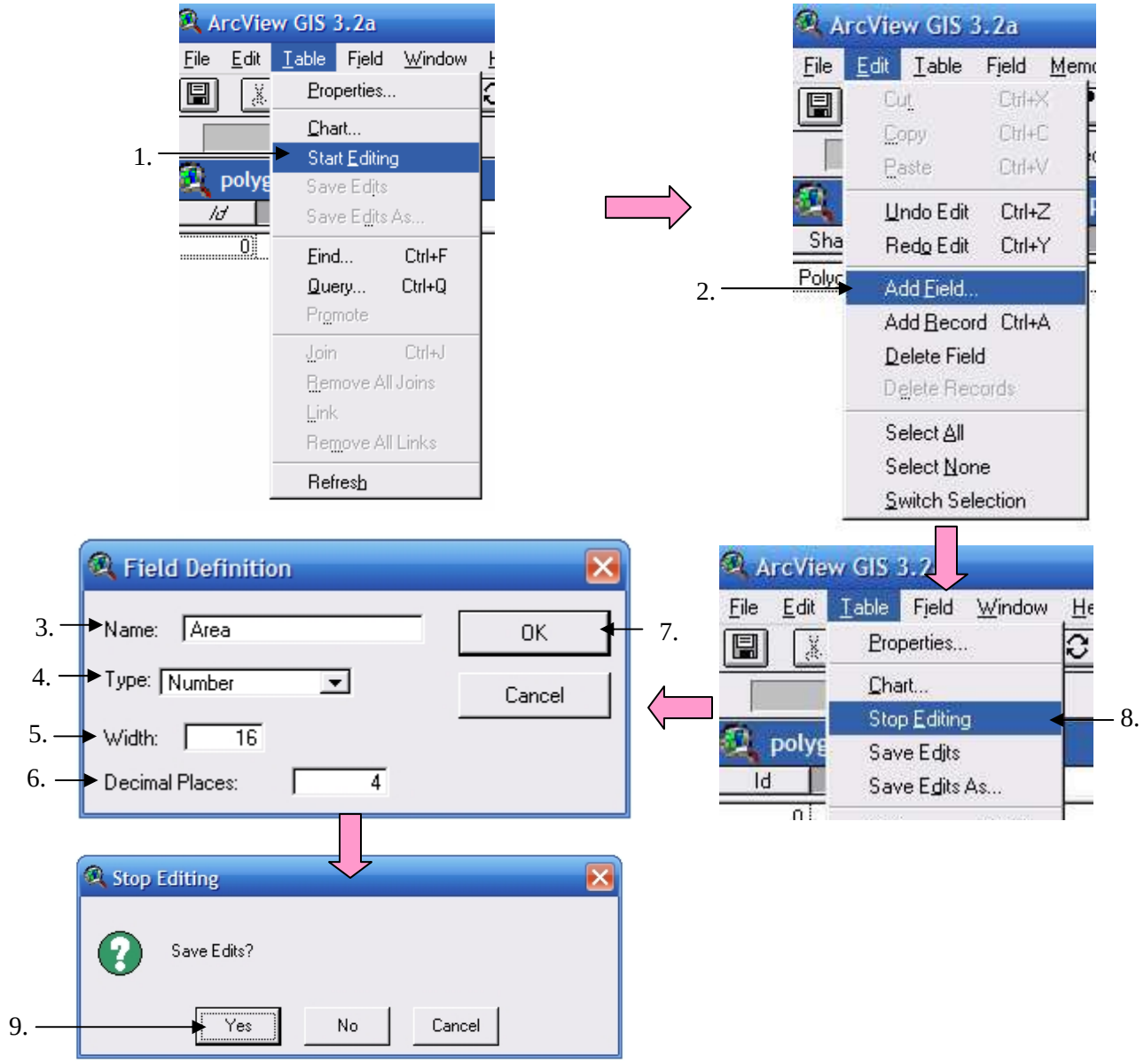




8.3 Editing table

8.3.1 Adding and deleting field in a table

1. Select Start Editing from the Table menu to make the table editable
2. Choose Add Field from the Edit menu
3. Enter the name of the field
4. Choose the type of the field
5. Set the width of the field
6. Set the decimal places, if the field is for number
7. Click OK
8. Select Stop Editing from the Table menu
9. Click Yes to save edits



8.3.2 Deleting field in a table

1. Select Start Editing from the Table menu to make the table editable
2. Click on the field name that you want to delete
3. Choose Delete Field from the Edit menu
4. Select Stop Editing from the Table menu
5. Click Yes to save edits

8.3.3 Adding and deleting record in a table

Before start adding/deleting records, Select Start Editing from the Table menu to make the table editable

1. To add new record(s). Choose Add Record from the Edit Menu
2. To delete record, select the record that you want to delete. Then choose Delete Record from the Edit menu

8.3.4 Editing values in a table

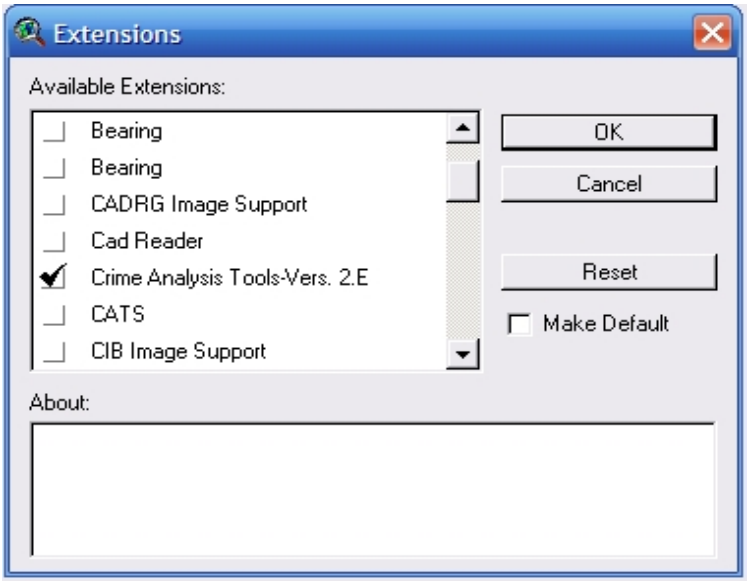
1. Choose Start Editing from Table menu
2. Click on Edit tool and bring the cursor to the field that you want to edit
3. Type in new value
4. To confirm and save the changes, choose Stop Editing from Table menu and save edits

9. 0 Extensions

Extensions are tools that provide additional function to ArcView.

9.1 Installing new extension

To install new extension to ArcView, copy the extension file (.avx) into C:\ESRI\AV_GIS30\ARCVIEW\EXT32



9.2 To add extension to a project

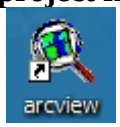
1. Open project
2. Choose Extension from the File menu
3. Select extension(s) that you want to add/load to the project.
4. Click OK. You will see new menu(s) from the extension on the Menu Bar

Tutorial: Preparing dataset and creating species distribution, EOO and AOO map for Malaysia Plant Red List Assessment by using Arcview 3.2

This tutorial will guide you on how to prepare the dataset and to create species distribution, EOO and AOO map for Malaysia Plant Red List Assessment. In this tutorial, you will:

1. Create new project from the project template
2. Fill in latitude and longitude to the gazetteer field
3. Classify data (Herbarium specimen, Voucher specimen, Literature and *Ex situ* collection)
4. Add base map of Sabah and Sarawak to project and change the colour to be used in the display
5. Plot species distribution and convert it into shape file
6. Change the symbol/colour and size of the points
7. Create a convex hull polygon
8. Clip polygon (if the polygon is crossing the sea or country boundary)
9. Label the points
10. Create map and map design
11. Calculate the area of the convex hull polygon and add the result to the excel data sheet and map
12. Calculate the forest cover within its convex hull polygon and add the result to the excel data sheet and map
13. Calculate AOO using CATS extension and add the result to the excel data sheet and map layout

1. Create new project from the project template



1. Double click to open ArcView
2. Choose Open an existing project in the ‘Welcome to ArcView GIS’ window
3. Click OK
4. Navigate to folder ‘EOO and AOO workshop 2009’
5. Double click at Malaysian_Redlist_template.apr to open the project
6. Choose Save Project As from File menu
7. Select the folder ‘EOO and AOO workshop 2009’
8. Name the new project as ‘Training EOO’
9. Click OK

There are 3 views in the project template. The description of each view is as shown in the table below:

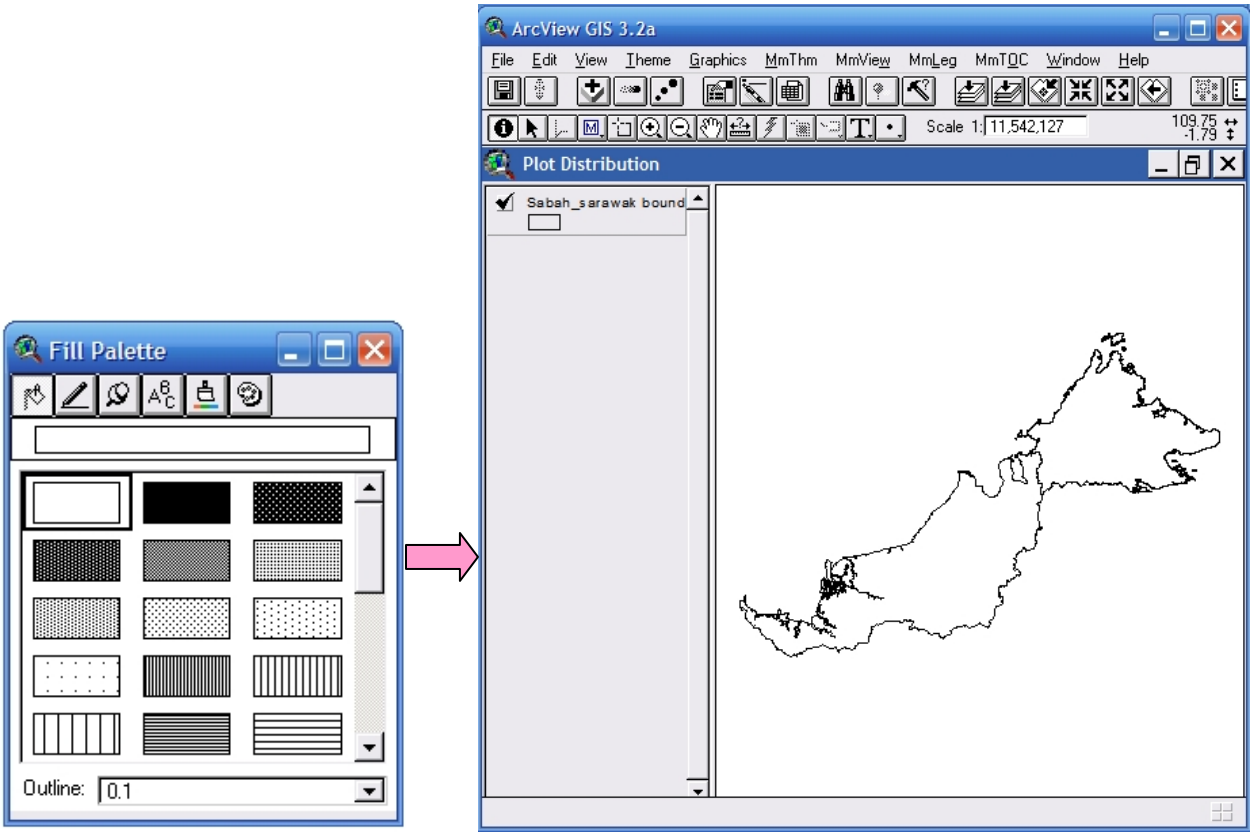
	View	**Projection**	**Description**
a.	Plot Distribution	Decimal degree (DD)	To plot species distribution and to create convex hull polygon
b.	Calculate	RSO	To calculate area of convex hull polygon (EOO) and forest cover within its convex hull polygon
c.	Redlist Assessment	Decimal degree (DD)	To calculate AOO using CAT extension

2. Add base map of Sabah and Sarawak to project and change the colour to be used in the display

1. Add theme called 'Sabah_sarawak boundary' to Plot Distribution, Calculate and Redlist Assessment views.
2. Add theme on forest cover to the Calculate view (if any)
3. Click on Save button to save project

Then, change the colour of the 'Sabah_sarawak boundary' theme from solid to "no fill". To do so,

1. Double click on Sabah_sarawak boundary.shp to open the Legend Editor dialog
2. Double click on the symbol to open the Symbol Window
3. Click on the Fill palette button
4. Select the "no fill" option
5. Click Apply on the Legend Editor dialog. You will get a view look like the figure below



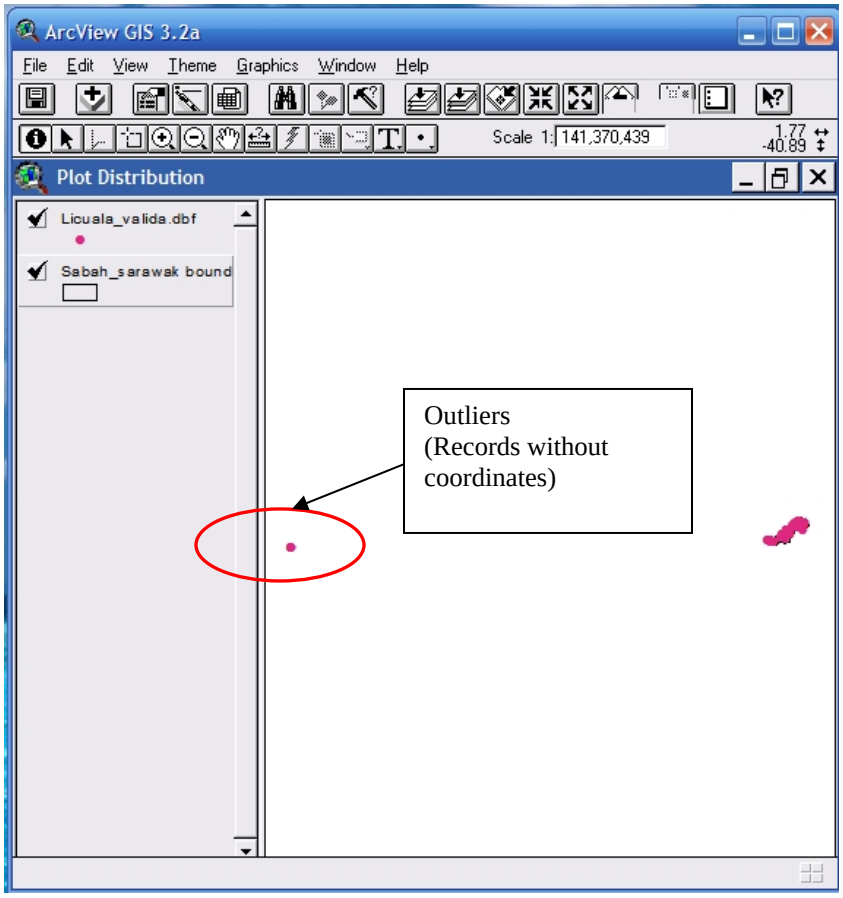
3. Fill in latitude and longitude to the gazetteer field

Add Licuala valida.dbf to the project, to do so:

1. Click on Table in Project Window
2. Click Add
3. Navigate to the Folder 'EOO and AOO workshop 2009'
4. Select Licuala valida.dbf and Click OK. Double click the Licuala valida from the Layout window to open the table

Now, you are ready to plot the records in the view. To do so, please follow these steps:

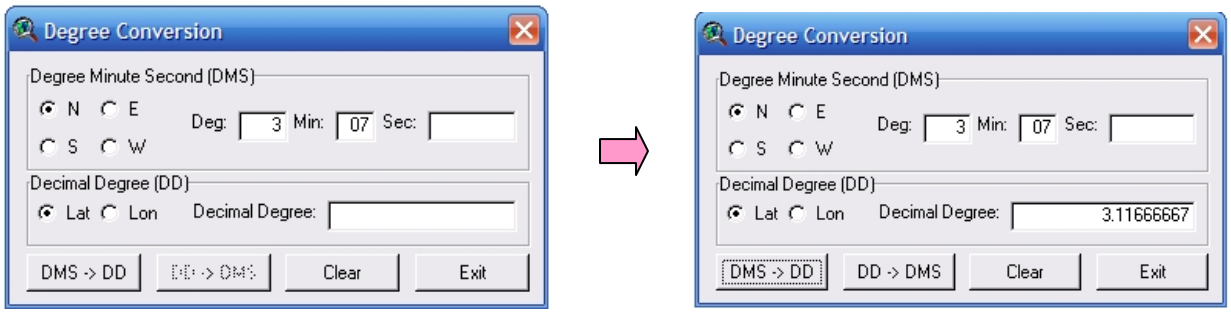
1. Choose Add Event Theme from the View menu
2. Select table that you want to add in from the Table drop list
3. Choose Longdec for X field
4. Choose Latdec for Y field
5. Click OK
6. Turn on the new theme by checking the box. Each location in table will be represented by a point. For record(s) without coordinate, it will appear as outlier as circled in the figure below.



Now, try fill in the latitude and longitude to the Table as below:

Gazetteer	Latitude (deg.min)	Longitude (deg.min)
Pusso stream	3.07	113.16
Ulu Membakut	5.23	115.48

7. Make the table editable
8. Enter the latitude and longitude to the Pusso Stream (Please refer to 8.3.4)
9. Convert latitude to DD unit. To do so, Load the Degree Conversion extension then select Degree Conversion from the Utilities menu. Enter the latitude to the Deg: and Min: then click DMS -> DD. Copy the result to the latdec field in the table
10. Repeat step 2-3 for Ulu Membakut



Note: If you have large dataset with lat & long in DM and not DD, you can plot the data in Arcview from Brahms (Please refer to 3.2.3)

4. Classify data (Herbarium specimen, Voucher specimen, Literature and *Ex situ* collection)

You have to classify your data into the 4 categories mentioned above. Please refer to 8.3.1 and 8.3.4 on how to edit table.

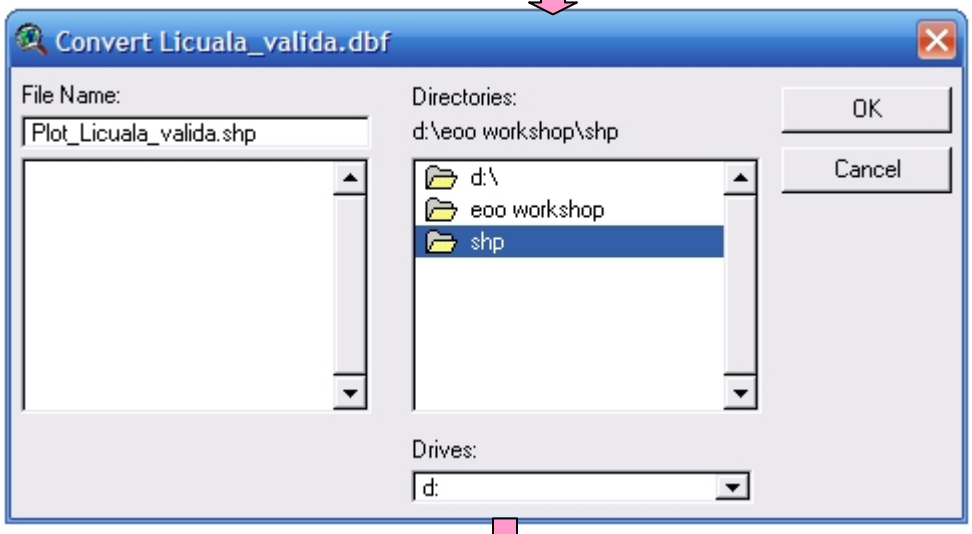
5. Plot species distribution

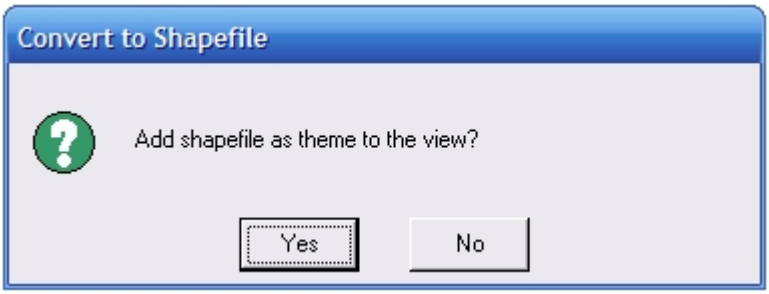
Add your table the project and plot the data in the view Please refer to 3.2.2 and 3.2.3 on how to plot data in ArcView

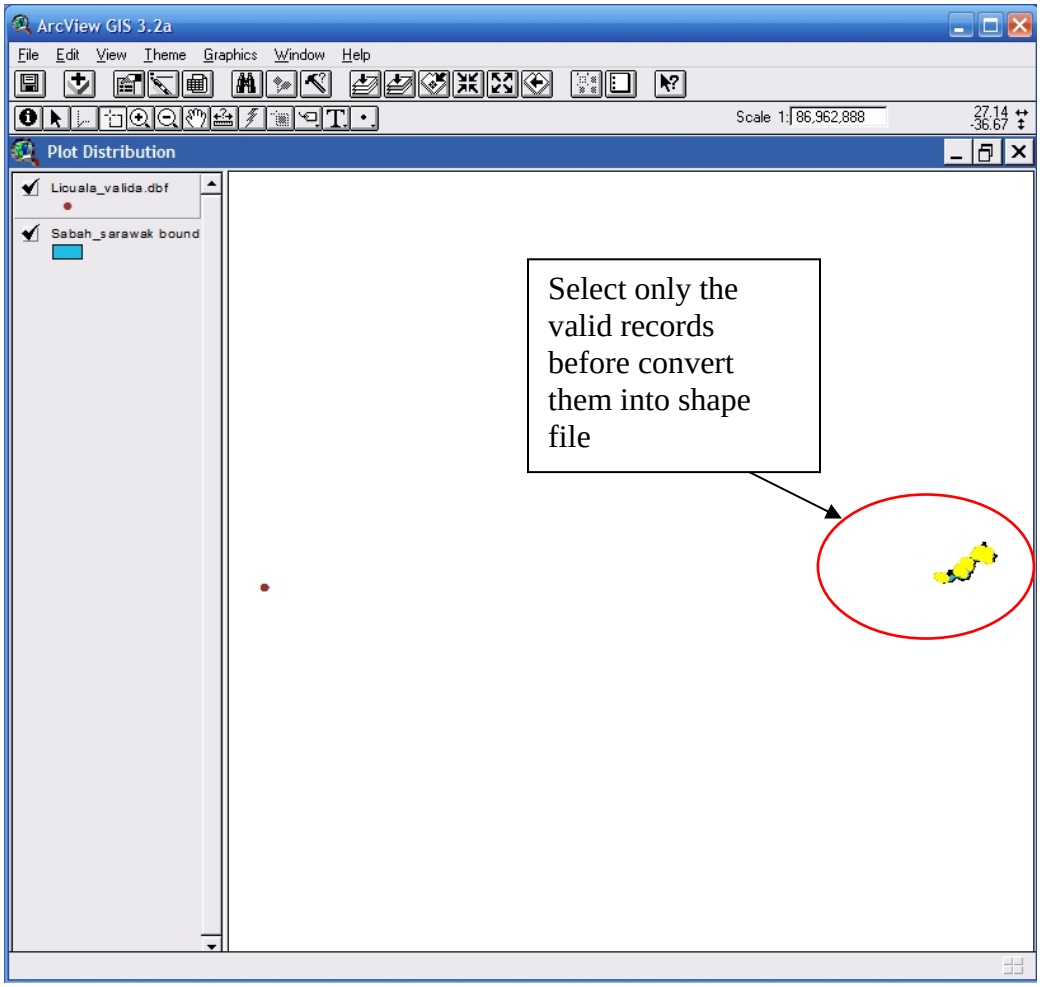
6. Convert the theme into shape file

Now, you have to convert the Licuala_valida.dbf into shape file. This is because to create polygon and to calculate AOO using CATS, the theme has to be in shape file. To convert theme to shape file:

1. Click on the Licuala_valida.dbf theme to make it active
2. Choose Convert to Shapefile from the Theme menu. (If there is any outlier, you have to select valid record by using Select tool before you make the conversion, as shown in the figure.
3. Choose directory where to save the theme shape file
4. Name the shape file as Plot_licuala_valida
5. Click OK
6. Turn on the Plot_licuala_valida.shp theme
7. Click on the Zoom to Full Extent button to view all feature in the view







7. Change the symbol/colour and size of the points

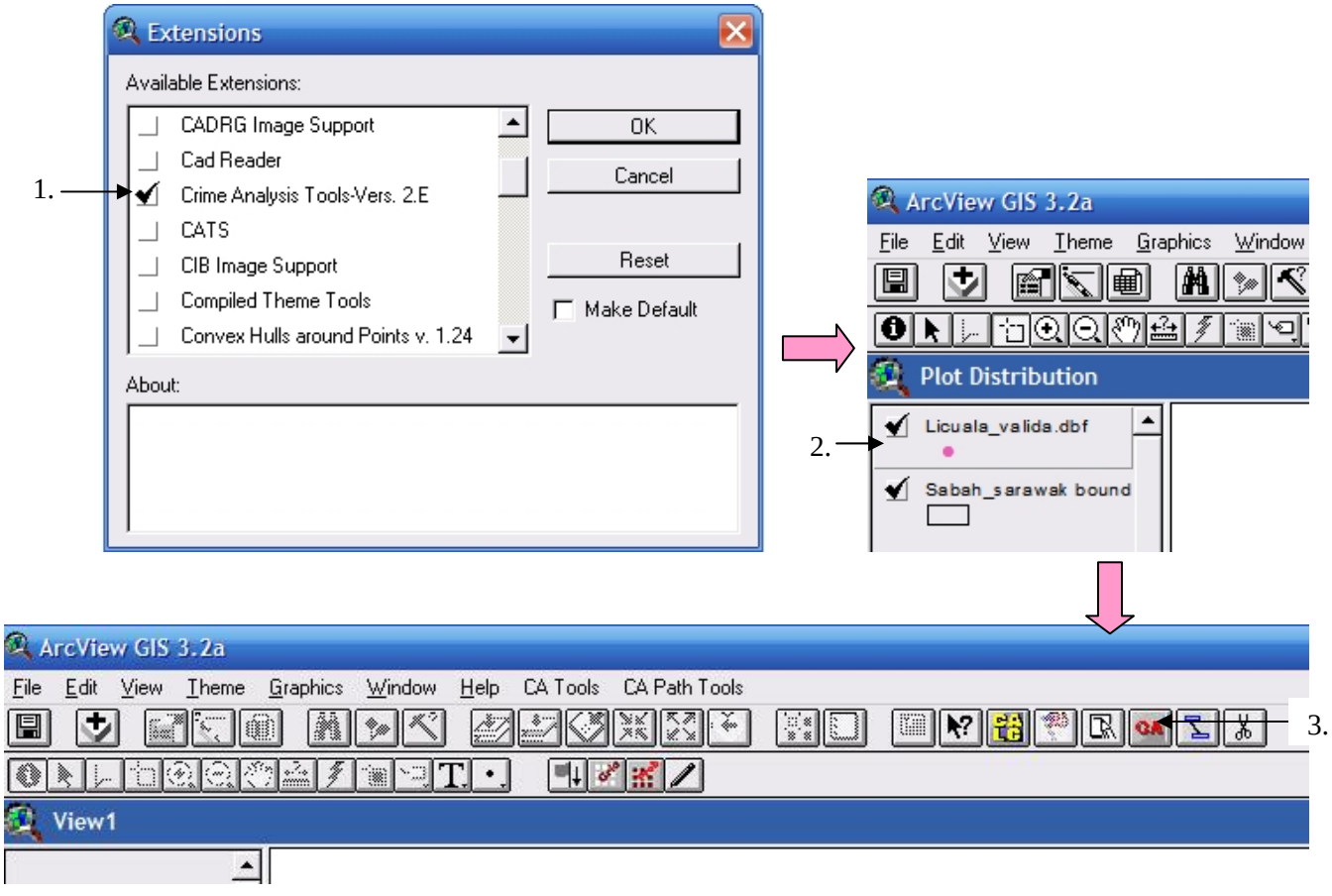
1. Double click on Plot_licuala_valida.shp to open the Legend Editor dialog
2. Double click on the symbol to open the Symbol Window
3. Click on the Symbol palette button and change the size to 20
4. Then, click on the Colour pallete and select black colour
5. Click Apply on the Legend Editor dialog

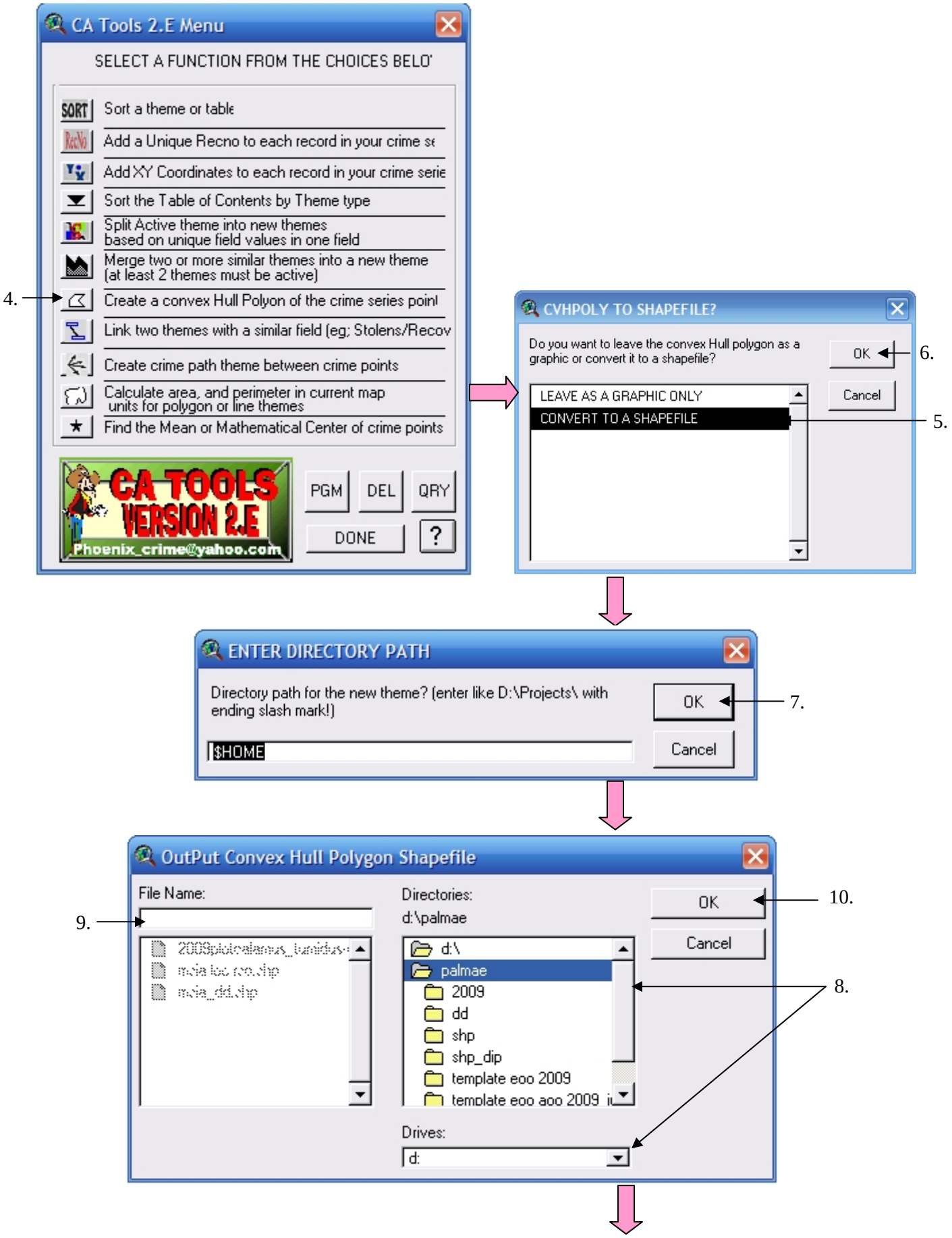
8. Creating a convex hull polygon

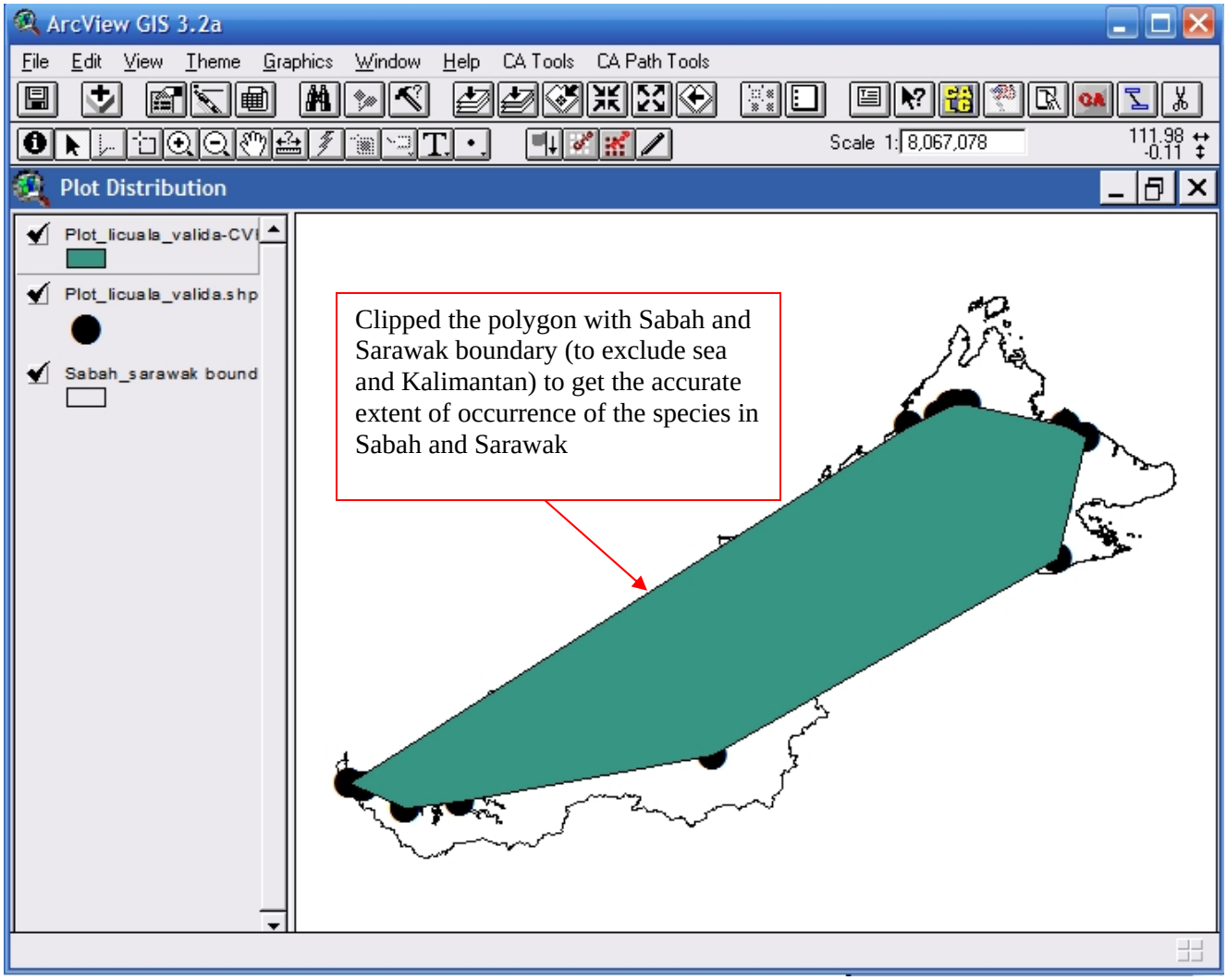
Convex hull or minimum convex polygon is used to measure Extent of occurrence (EOO). This polygon is drawn by connecting all the outer most point, with no internal angle exceeding 180°. A convex hull polygon can be only drawn when the species have more than 2 unique localities.

Now, try to create convex hull polygon for Licuala valida by using CA Tool extension (Hill, B. 2002. CA Tools Version 2.E . Available at http://arcscripts.esri.com)

1. Load CA Tools (Crime Analysis Tools-Vers.2.E)
   File⟶Extension⟶ check the Crime Analysis Tools-Vers.2.E check box⟶Click OK
2. Click on Plot_licuala_valida.shp in Table of Content to activate the theme
3. Click CA Tools button to display the menus
4. Click on the Create a convex Hull Polygon of the crime series point button
5. Choose CONVERT TO A SHAPE FILE to create polygon in shape file
6. Click OK
7. You can ignore the ENTER DIRECTORY PATH dialog by clicking OK **or** you can enter the directory path, where you want to save the shape file and then click OK
8. Specify the directories where you want to save the shape file
9. Rename the shape file
10. Click OK. The polygon theme will be added to the Table of Contents
11. Click DONE to exit the CA Tools Menu

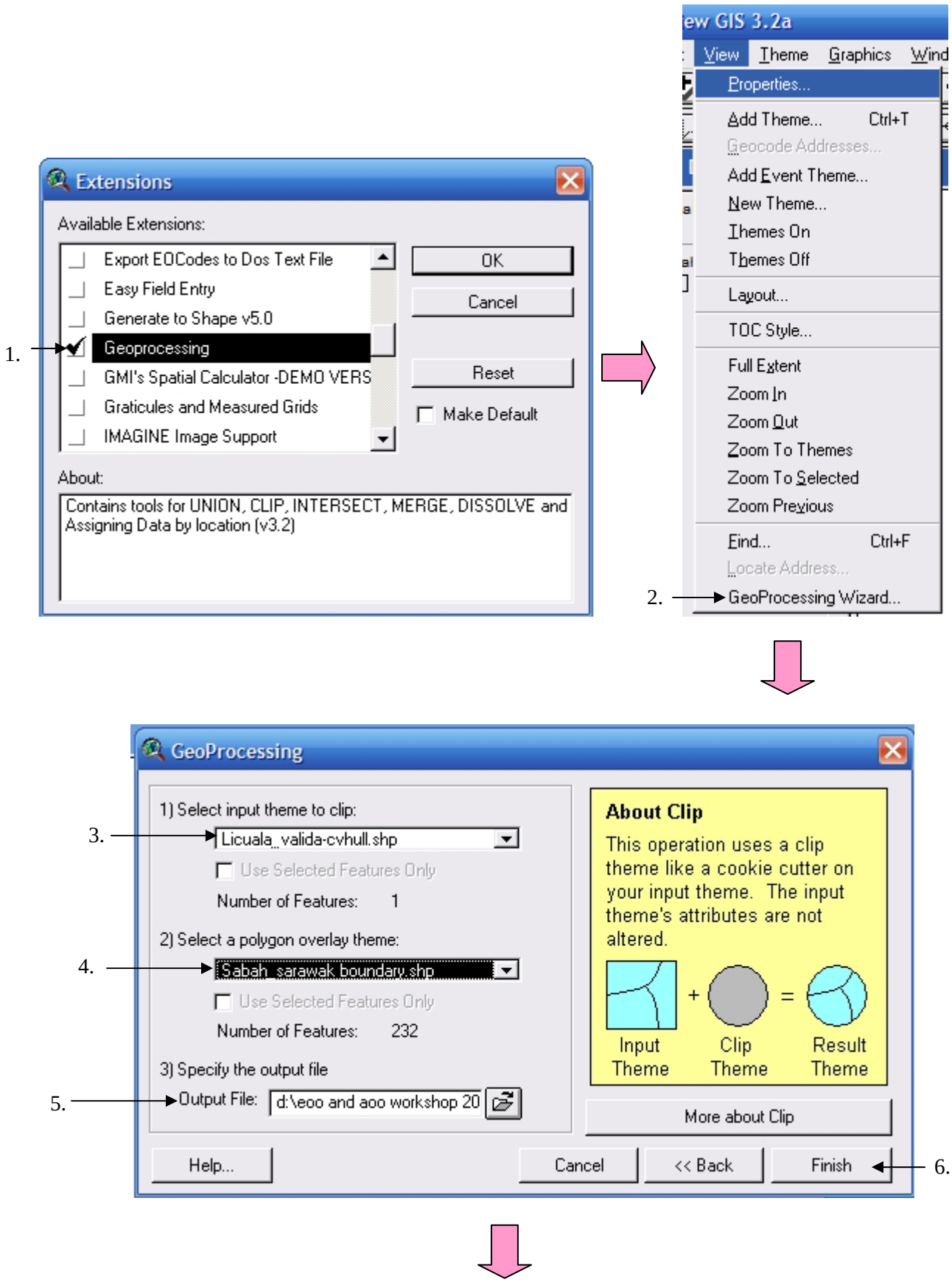


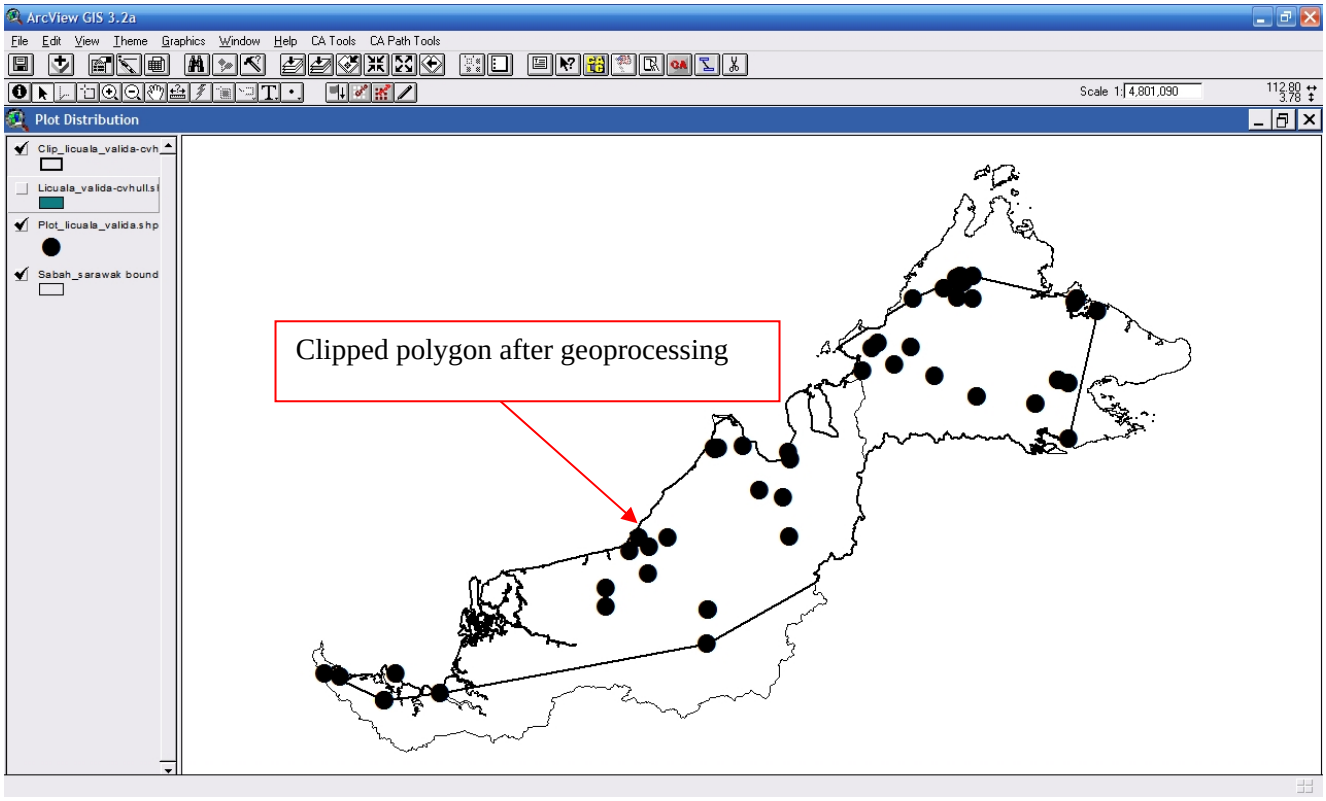

CA Tools 2.E Menu
SELECT A FUNCTION FROM THE CHOICES BELO'
Sort a theme or table
Add a Unique Recno to each record in your crime se
Add XY Coordinates to each record in your crime serie
Sort the Table of Contents by Theme type
Split Active theme into new themes based on unique field values in one field
Merge two or more similar themes into a new theme (at least 2 themes must be active)
Create a convex Hull Polyon of the crime series point
Link two themes with a similar field (eg; Stolens/Recov
Create crime path theme between crime points
Calculate area, and perimeter in current map units for polygon or line themes
Find the Mean or Mathematical Center of crime points
CA TOOLS VERSION 2.E
Phoenix_crime@yahoo.com
PGM
DEL
QRY
DONE
?
4.
CVHPOLY TO SHAPEFILE?
Do you want to leave the convex Hull polygon as a graphic or convert it to a shapefile?
OK
6.
Cancel
LEAVE AS A GRAPHIC ONLY
CONVERT TO A SHAPEFILE
5.
ENTER DIRECTORY PATH
Directory path for the new theme? (enter like D:\Projects\ with ending slash mark!)
OK
7.
Cancel
$HOME
OutPut Convex Hull Polygon Shapefile
File Name:
9.
Directories:
d:\palmae
OK
10.
Cancel
d:\
palmae
2009
dd
shp
shp_dip
template eoo 2009
8.
Drives:
d:



9. Clip polygon using Geoprocessing extension (if the polygon is crossing the sea and/or country boundary)

1. Load the Geoprocessing extension to the project
2. Select Geoprocessing Wizard to display the Geoprocessing window from the View menu
3. Select input theme to clip: Licuala_valida-cvhull.shp
4. Select a polygon overlay theme: Sabah_sarawak boundary.shp
5. Specify the output file and name the new theme as clip_Licuala_valida-cvhull.shp
6. Click Finish
7. Turn on the clip_Licuala_valida-cvhull.shp theme
8. Change its solid foreground to “no fill”


Extensions
Available Extensions:
Export EOCodes to Dos Text File
Easy Field Entry
Generate to Shape v5.0
Geoprocessing
GMI's Spatial Calculator -DEMO VERS
Graticules and Measured Grids
IMAGINE Image Support
OK
Cancel
Reset
Make Default
About:
Contains tools for UNION, CLIP, INTERSECT, MERGE, DISSOLVE and Assigning Data by location (v3.2)
1.
ew GIS 3.2a
View
Theme
Graphics
Wind
Properties...
Add Theme... Ctrl+T
Geocode Addresses...
Add Event Theme...
New Theme...
Themes On
Themes Off
Layout...
TOC Style...
Full Extent
Zoom In
Zoom Out
Zoom To Themes
Zoom To Selected
Zoom Previous
Find... Ctrl+F
Locate Address...
GeoProcessing Wizard...
2.
GeoProcessing
1) Select input theme to clip:
Licuala_valida-cvhull.shp
Use Selected Features Only
Number of Features: 1
2) Select a polygon overlay theme:
Sabah_sarawak boundary.shp
Use Selected Features Only
Number of Features: 232
3) Specify the output file
Output File: d:\eoo and aoo workshop 20
3.
4.
5.
About Clip
This operation uses a clip theme like a cookie cutter on your input theme. The input theme's attributes are not altered.
Input Theme
Clip Theme
Result Theme
More about Clip
Help...
Cancel
<< Back
Finish
6.



10. Label the points

1. Open the Plot_licuala_valida attribute table
2. Choose Start Editing from the Table menu
3. Choose Add new field from the Edit menu
4. Name the field as “Point no”
5. Click OK. The field “Point no” will be added to the attribute table

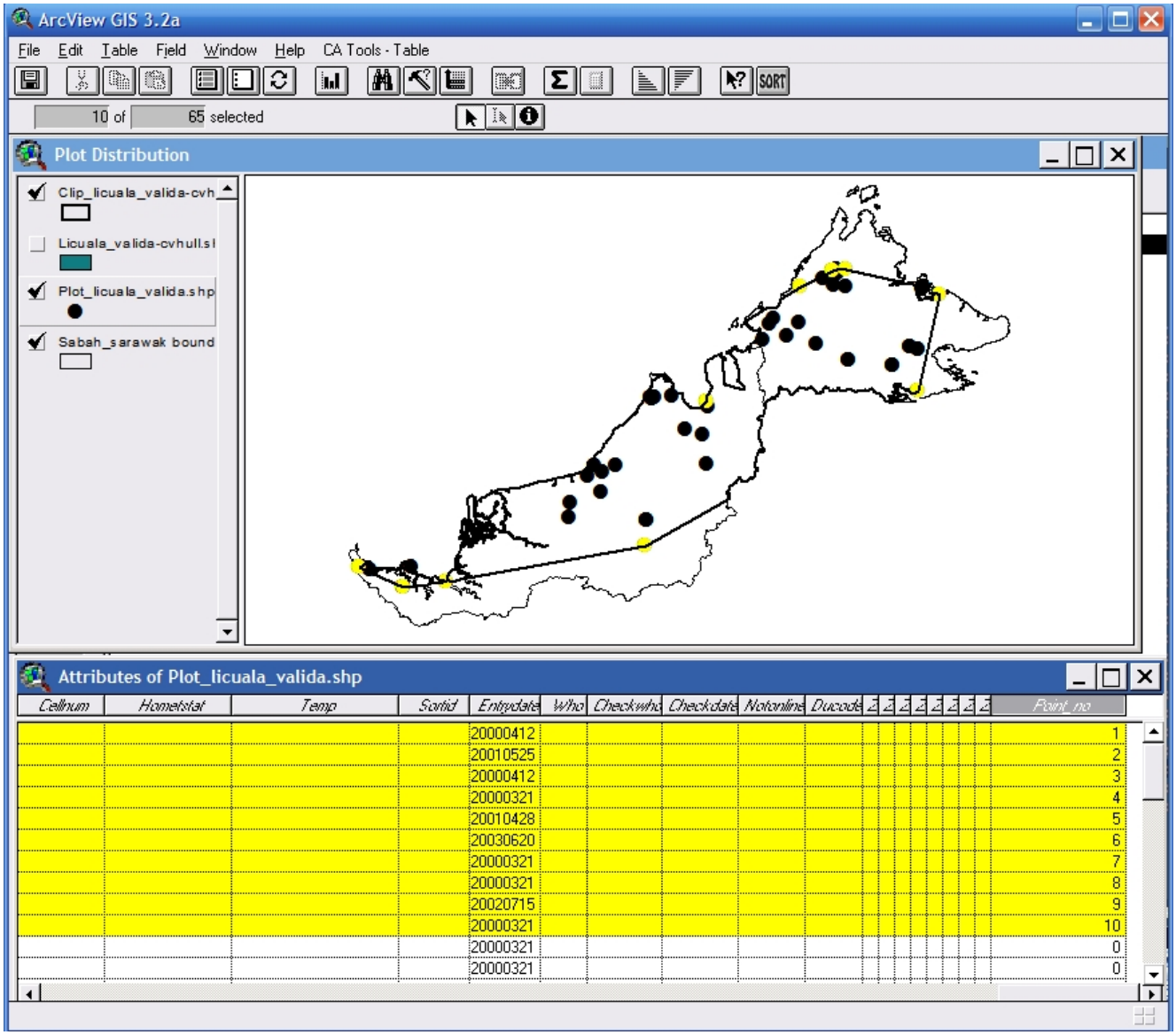
Now, we can start labeling.

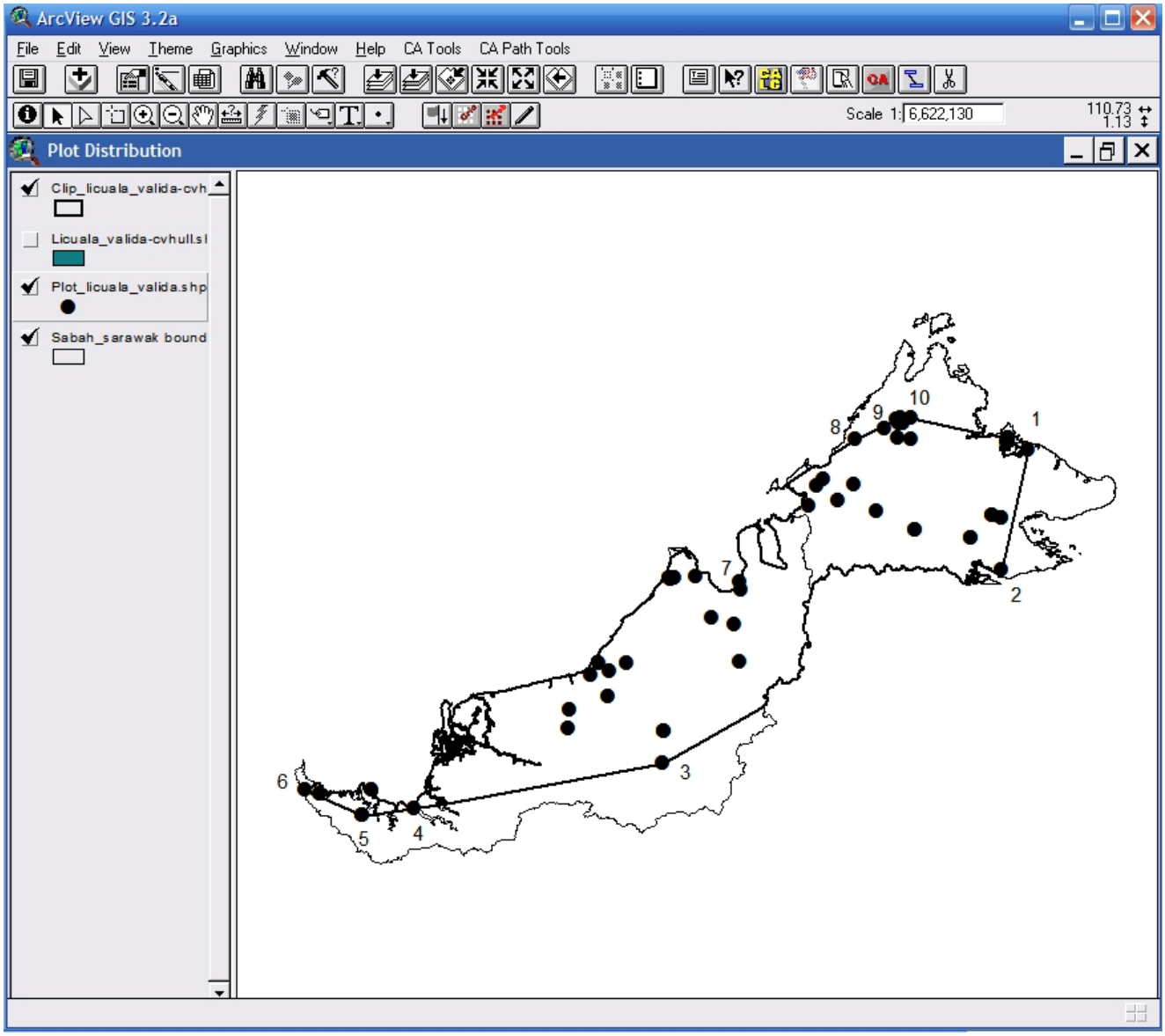
6. Activate the table. Select the first point from the view using the Select Feature tool . The selected record will be highlighted in the attribute table
7. Click on the in the attribute table and type 1 to the highlighted record on the ‘Point_no’ column
8. Repeat step 6-7 to label the remaining points. Label 10 points at most that form the EOO polygon boundary
9. When you finish, choose **Stop Editing** from the Table menu and click YES to save edits
10. Click on the Point_no field to activate it
11. Click the Ascending button to sort all the record ascending by Point_no
12. Select the records that you have put in numbers
13. Click the promote button to bring all the selected record to the top
14. Click on the Plot_licuala_valida in the ‘Plot Distribution View’ Table of Contents to activate it
15. Choose Auto label from the Theme menu
16. Choose the Point_no from the Label field list
17. Choose Use Theme’s Text Label Placement Property

18. Click OK

19. Rearrange the position of the numbers in the view by using pointer tools

20. Click Clear Selected Features button to clear selection





11. Create map and map design

11. 1 Duplicate Layout template

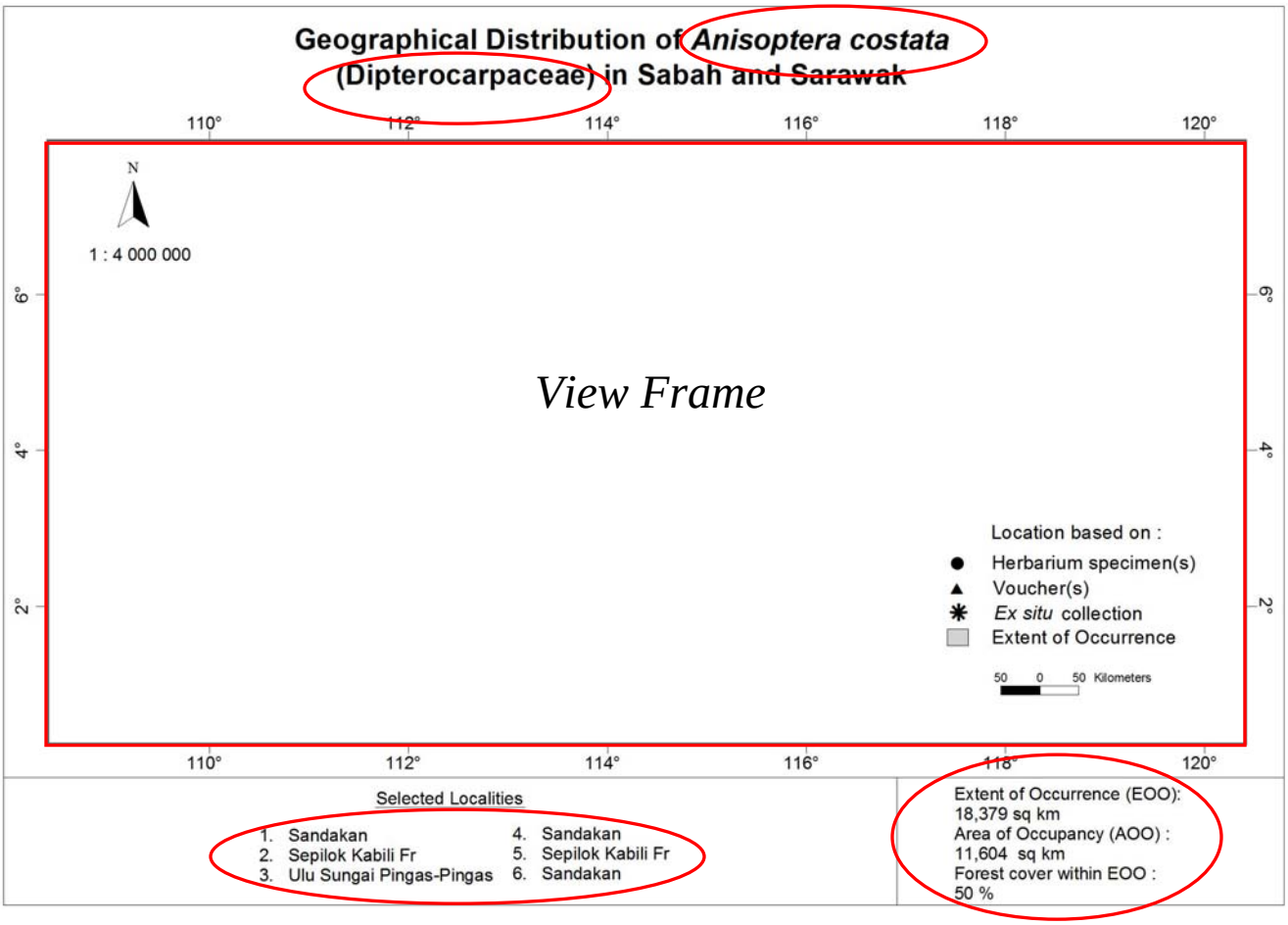
1. Open the Layout_Template_SS_aug 2009
2. Load the Memo Tools extension
3. Choose Duplicate Layout from the Memo Tools menu
4. Named the duplicate as Licuala valida SS
5. Click OK

11.2 Link view to the view frame

You have to link Plot Distribution view to the view frame in layout. To do so, follow these steps:

1. Double click in the view frame to display the View Frame Properties
2. Select Plot Distribution from the View list

3. Check the Live Link check box
4. Set scale to 1: 4000000
5. Click OK

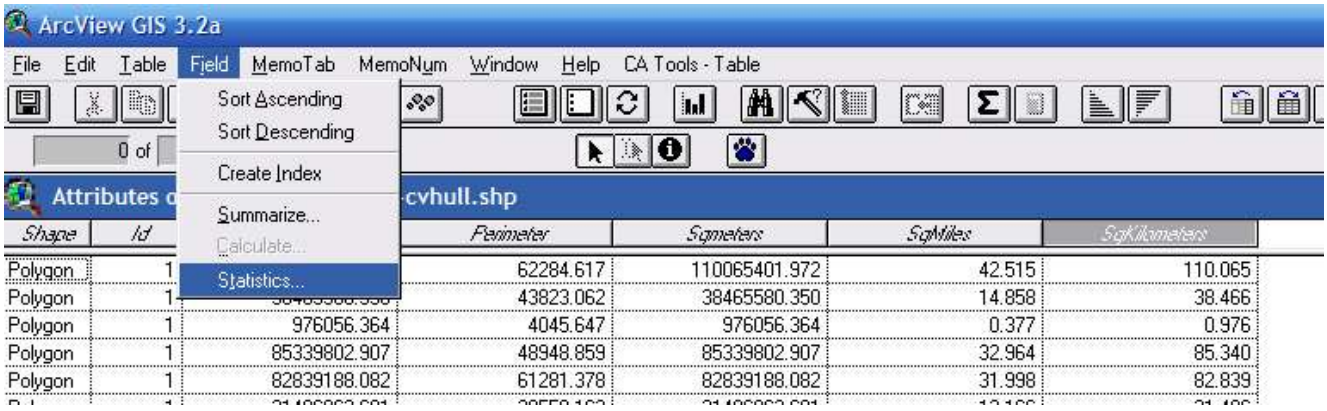


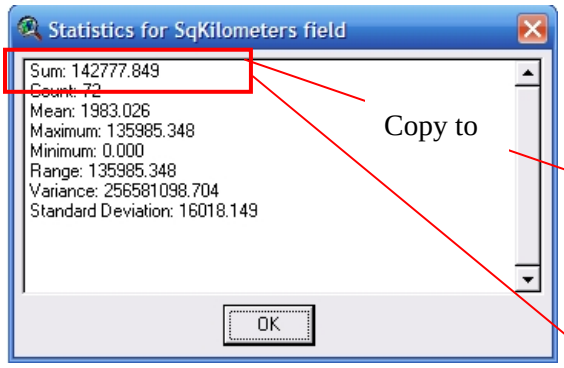
Notes: All text circled has to be changed accordingly to the species.

12. Calculate the area of the convex hull polygon (EOO)

All calculation has to be done in "Calculate" view which is projected in RSO

1. Copy clip_Licuala_valida-cvhull.shp to the Calculate View
2. Click on clip_Licuala_valida-cvhull.shp to make the theme active
3. Click the CA Tools button
4. Click button (Calculate area, and perimeter in current map units for polygon or line themes)
5. Click OK in the pop up window/dialog
6. Click button to open its attribute table
7. Click on the SqKilometers field
8. Choose Statistic from the Field menu to generate report
9. The value after Sum is the total area of the polygon and also is the EOO of *Licuala valida*. Copy this value to the column EOO in the Excel data sheet and map.





Copy to

	EOO (sq km)	AOO (sq.km) 2x2 km cell	Forest cover (sq km)	Forest cover within its EOO (%)
Peninsular Malaysia				
Sub-total	**0**	**0**	0	
Sabah and Sarawak				
Sabah and Sarawak (mainla	142778			
Sub-total	**142778**	0	0	0
Total	**142778**	**0**	0	

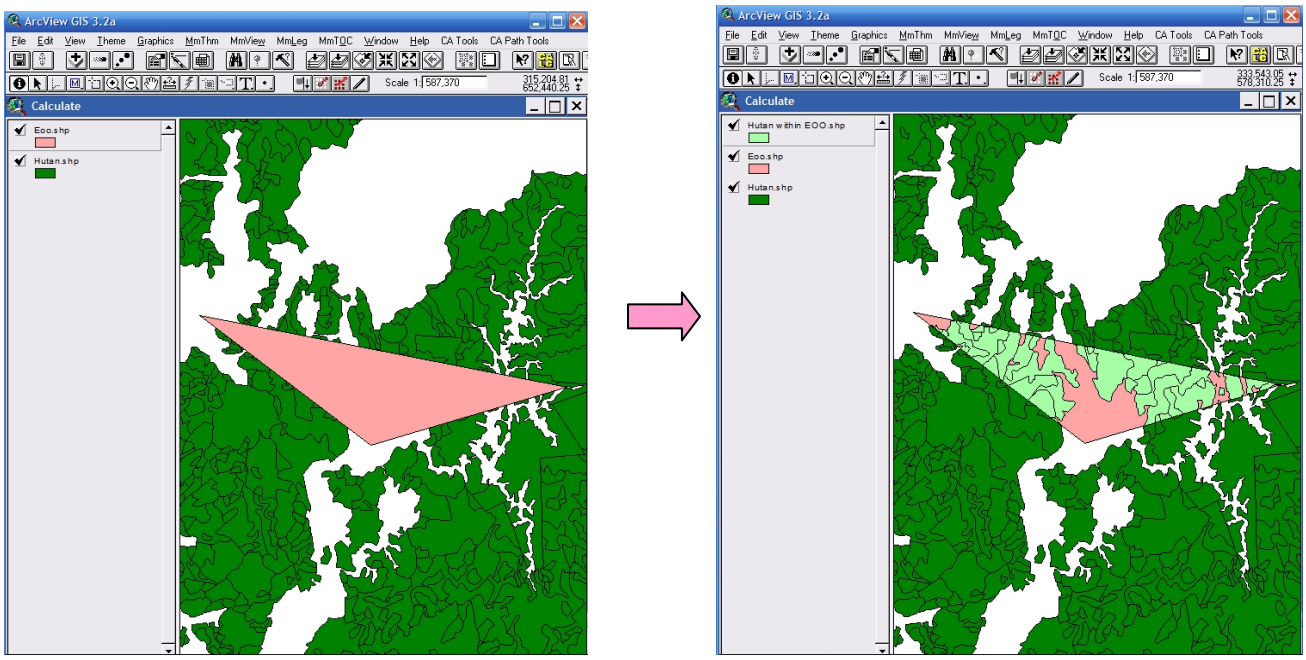
Selected Localities

1. Sandakan
2. Sepilok Kabili Fr
3. Ulu Sungai Pingas-Pingas
4. Sandakan
5. Sepilok Kabili Fr
6. Sandakan

Extent of Occurrence (EOO): 18,379 sq km
Area of Occupancy (AOO) : 11,604 sq km
Forest cover within EOO : 50 %

13. Calculating forest cover within its convex hull polygon (EOO)

Calculation has to be done in “Calculate” view which is projected in RSO



You have to clip the polygon with the forest cover theme to get the forest cover (forested area) within the polygon.

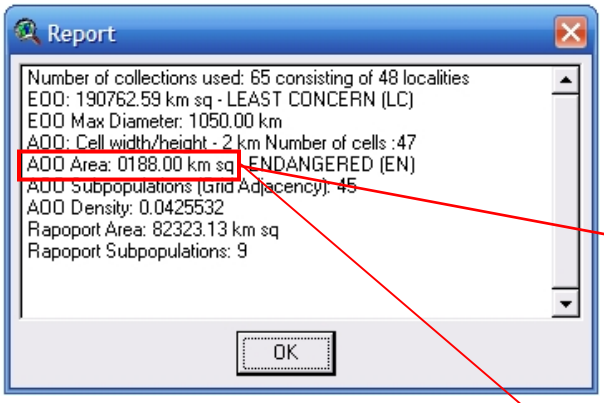
1. Add the forest cover shape file to Calculate View
2. Load the Geoprocessing extension to the project
3. Select input theme to clip: Forest cover shape file
4. Select a polygon overlay theme: clip_Licuala_valida-cvhull.shp
5. Specify the output file and name the new theme as hutan_Licuala_valida-cvhull.shp
6. Click Finish

Now, you have to calculate the area of the forested area within the polygon

7. Turn on the hutan_Licuala_valida-cvhull.shp theme
8. Click the CA Tools button
9. Click button (Calculate area, and perimeter in current map units for polygon or line themes)
10. Click OK
11. Click button to open its attribute table
12. Click on the SqKilometers field (as we want the area in km^2)
13. Choose Statistic from the Field menu
14. The Sum value is the total forest area in the polygon. Copy this value to the column Forest cover in the Excel data sheet. Percentage of forest cover within the polygon will be calculated in Excel data sheet. Copy the result in percentage to the map

14. Calculating Area of Occupancy of a species (AOO) using CAT extension (Moat, J. 2007. Conservation Assessment Tools extension for ArcView 3.2, version 1.2. GIS unit, Royal Botanic Gardens Kew. Available at http://www.rbgkew.org.uk/gis/cats)

1. Copy the Plot_licuala_valida.shp to the "Redlist Assessment" view
2. Click on Plot_licuala_valida.shp in the Table of contents to make it active
3. From the Red List Tools, choose Preliminary IUCN assessment – Single
4. Enter the width of the grid cell that you want to use
5. Click OK
6. A report window will appear. Copy the AOO area into the excel datasheet



	EOO (sq.km)	AOO (sq.km) 2x2 km cell	Forest cover (sq km)	Forest cover (%)
Peninsular Malaysia				
Sub-total	**0**	**0**	0	
Sabah and Sarawak				
Sabah and Sarawak (mainla	10000			
		188		
Sub-total	**10000**	188	0	
Total	**20000**	**188**	0	

Notes: In CATS, you can also run the preliminary Red List assessment in batch. Please refer to the "Documentation for using CATS in ArcView" **at http://www.rbgkew.org.uk/gis/cats** on how to run CATS in batch.