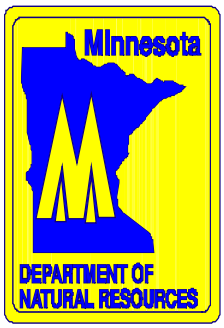
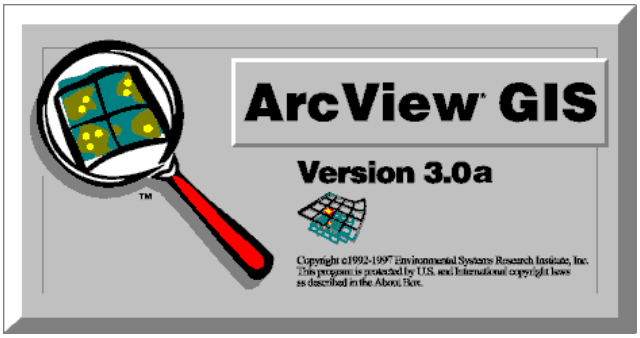
The DOQ/DRG Tool Extension for ArcView GIS





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DOQ/DRG Tools User's Guide

Introduction

This document describes the functionality and use of the **DOQ/DRG Tools Version 1.1** extension for ArcView desktop GIS software. This extension allows users to easily access and view Digital Orthophoto Quadrangles (DOQs) and Digital Raster Graphics (DRGs).

What is a Digital Orthophoto Quad (DOQ)?

A DOQ is a digital image of the earth's surface that has been digitally scanned and processed to remove the distortion inherent in aerial photography. Using a digital elevation model and advanced image processing techniques, radial and topographic distortion is removed from the image providing a true planimetric product.

A DOQ image typically covers one-quarter of a 1:24,000 scale USGS topographic map plus a little overlap. The resolution of the image is quite high at one square meter per pixel. As a result of this fine cell size, these images consume large quantities of disk space. To conserve disk space the images are stored in JPEG image format which compresses the data very efficiently. In JPEG format the images average 4.5 MB but when uncompressed they average 45 mb!

An Example DOQ

JPEG is a "Lossy" compression technique. That means that there is some loss of image quality due to the nature of the compression. When you zoom way in on a DOQ you can see the pixelation that is a result of the JPEG compression. See Appendix F for a discussion of DOQ standards.

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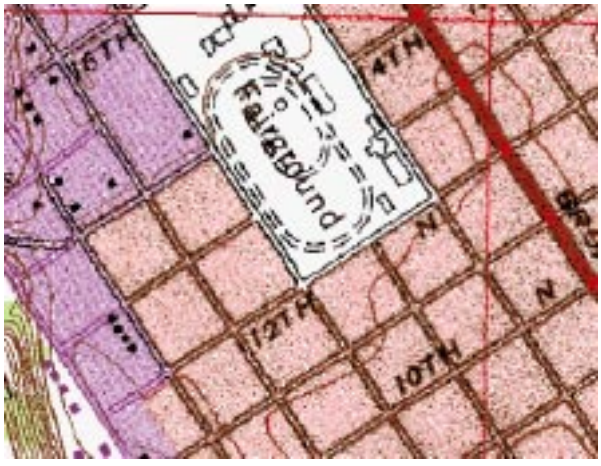
What is a Digital Raster Graphic (DRG)?

A digital raster graphic (DRG) is a scanned color image of a U.S. Geological Survey (USGS) standard series topographic map, including all map collar information. The image inside the map neatline is georeferenced to the surface of the earth and fit to the Universal Transverse Mercator projection. The horizontal positional accuracy and datum of the DRG matches the accuracy and datum of the source map. The source maps are scanned at a minimum resolution of 250 dots per inch.

DRGs are created by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the UTM projection. Colors are standardized to remove scanner limitations and artifacts. The average data set size is about 6 megabytes in Tagged Image File Format (TIFF) with PackBits compression.

DRGs are stored as rectified TIFF files in geoTIFF format. GeoTIFF is a relatively new TIFF image storage format that incorporates georeferencing information in the header. This allows software, such as ArcView, ARC/INFO, or EPPL7 to reference the image without an additional header or world file.

An Example DRG



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Why use the DOQ/DRG Tools?

Although ARCVIEW 3.0 can read JPEG images, it cannot read USGS standard distribution DOQ's in JPEG format from the USGS distributed CDROM. This is because the USGS DOQ's don't have a standard .JPG extension and the georeferencing information is not in the world file format that is supported by ArcView. This extension gets around these limitations so that you can view the DOQ's directly from CDROM in JPEG format without having to uncompress them.

The DRGs for Minnesota Users have been post-processed by the Department of Natural Resources to remove the collar information (the information not on the quadrangle itself including scalebar, legend, etc) and to bring them into conformance with the DNR's GIS data specifications (UTM Extended Zone 15, NAD83 Datum) and storage structure. There are tools in this extension that allow the user to take advantage of this structure for efficient DRG access.

The remainder of this document describes the functionality of this extension and will use examples to illustrate what they do and how they work.

If you need to install the extension, refer to *Appendix A, Installation of the DOQ/DRG Tools.*

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How to Read This Document

Formatting Conventions

The following conventional terms, text formats, and symbols are used throughout this document. These formatting styles are designed to make this document more readable and to guide you through the use of this ArcView Extension

BOLD UPPERCASE

All text in **BOLD UPPERCASE** letters refers to a drop-down menu. When you see this style of text you should be able to look at the menu interface and find a menu with this name.

Italics

All text in *Italic* format refers to drop-down menu options. In this case the text are usually preceded by a **BOLD UPPERCASE** menu option in the form:

MENU: *Option*

BOLD ITALICS UPPERCASE

Text formatted as ***BOLD ITALICS UPPERCASE*** refers to a form or dialog window. These windows are not part of the standard ArcView interface and usually "float" above the ArcView screen.

Bold Italics

Text formatted as ***Bold-Italic*** refer to buttons that you will find on an interface or dialog box.

"Double-Quoted"

Any "Double-Quoted" text refers to text you should see on the screen in a dialog, menu, button or tool.

"DOUBLE-QUOTED UPPERCASE"

Any "DOUBLE-QUOTED UPPERCASE" text refers to text that you will type in exactly as shown.

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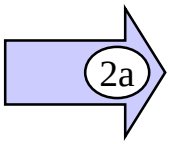
How to Read This Document

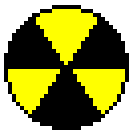
<Italic text in arrows>

When the instructions need to direct the user to a disk drive, such as a CDROM reader, whose designation varies from PC to PC. In this case you will see the instructions encased in arrows (<>) and italicized. For example <*CDROM*> would represent the drive letter that is your CDROM reader. On my system it would be E:\.

Arrows



When you see an Arrow with a number in it this is pointing something referenced in the text of the document. This helps you find the topic or input line that you are looking for. The number in the arrow always has a corresponding reference in the body of the instructions you are reading. Usually these are used in lessons or tutorials.



When you see Radiation Icon you should recognize this as a warning. You need to read this to make sure that you avoid common mistakes or problems that are often encountered

When you see the Light bulb icon this represents a hint or trick that you can use to make life easier.

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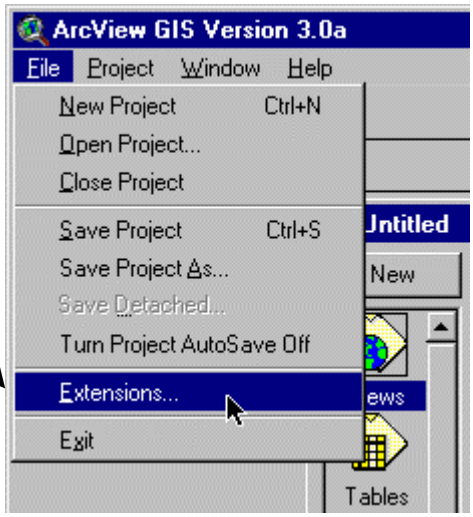
Getting Started

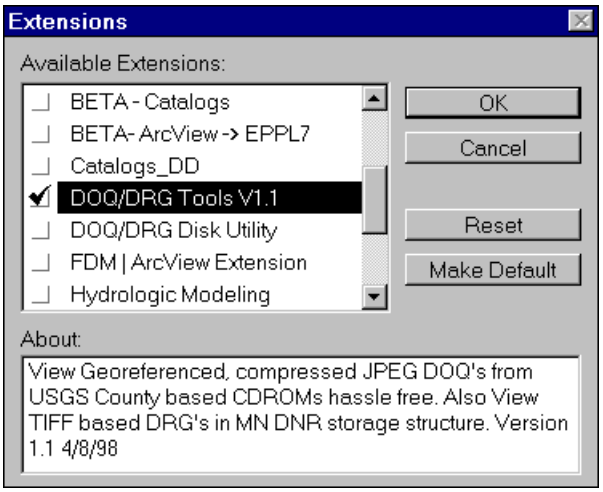
Accessing Extensions

To access the Tools form within ArcView you can use the **FILE:** *Extensions* option when the project window is active.



Loading the Tools Extension

Once selected you will see the **EXTENSOINS DIALOG** window that shows the extensions that are available to ArcView. Scroll down until you see ***DOQ/DRG Tools V1.1*** and click on the check box adjacent to it. Then press the ***OK*** button.



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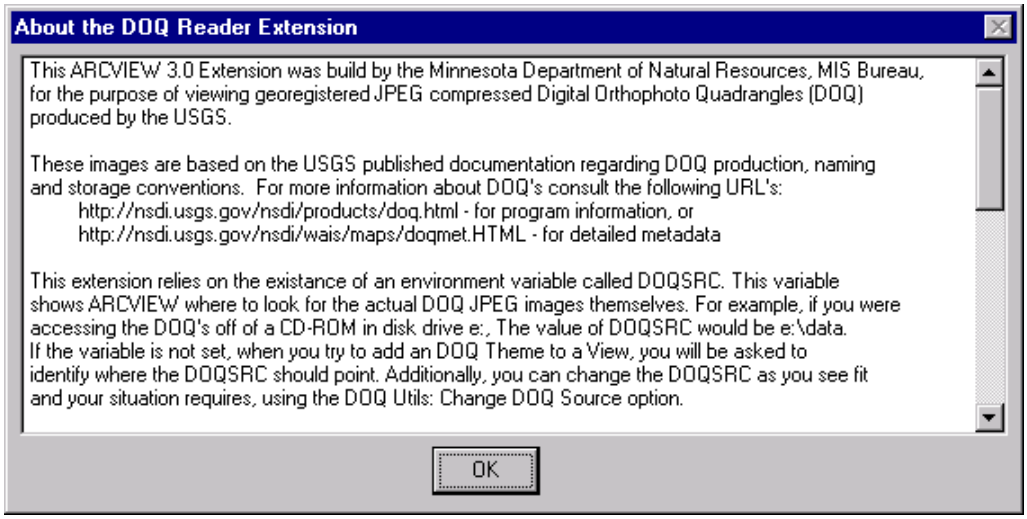
Turning on the Extension

Once you press the *OK* button on the Extensions Dialog box you will be presented with an introductory message.



This message provides information related to where documentation can be found concerning DOQs and DRGs. The message is automatically copied to the clipboard and you can insert the contents into a text file if you so desire. Press the *OK* button to proceed.

DOQ/DRG Tools Functionality

The functionality of the DOQ/DRG Tools is present on the View Document Interface as a collection of menus, buttons, tools, and forms (the View document is the ArcView window where you display mapped data).

To see the new menu options create a new View document and make it active.

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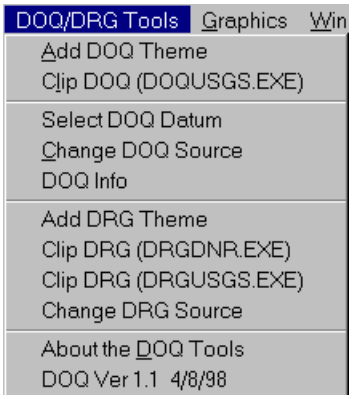
Turning on the Extension

DOQ/DRG tools Menu

Once you have a View document active you will notice a new menu option called **DOQ/DRG TOOLS,** found next to the exiting **THEME** menu.



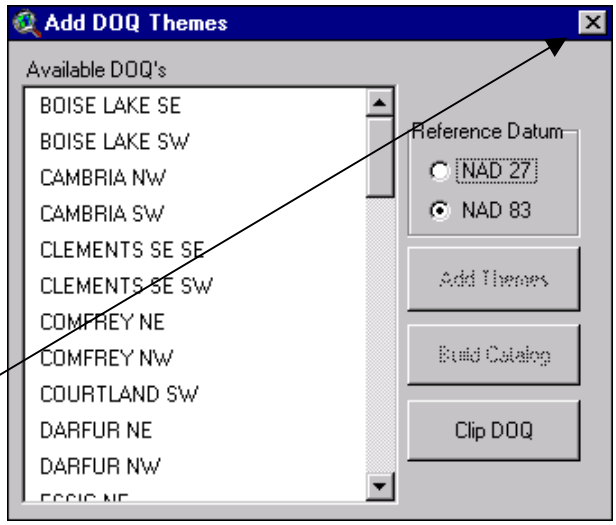
This menu contains most of the extension's functionality. The menu shown may have fewer options than you see. This will be explained later in this document.

The options are organized by the type of image you want to view, a DOQ or DRG, and are accessed by pressing on the menu option with the mouse pointer. Based on the function of the menu option selected, you will be prompted for additional information.

DOQ/DRG Forms

Forms are used in this extension to display information and system functionality in an intuitive way. One of the forms, the ***ADD DOQ THEMES*** form is presented below

These forms are "modeless", that is, they can be moved around the screen and used when needed. Other menus, buttons, and tools on the interface are fully accessible when these forms are open.



Closing Forms

Close the forms by pressing the X in the upper right hand part of the Form.

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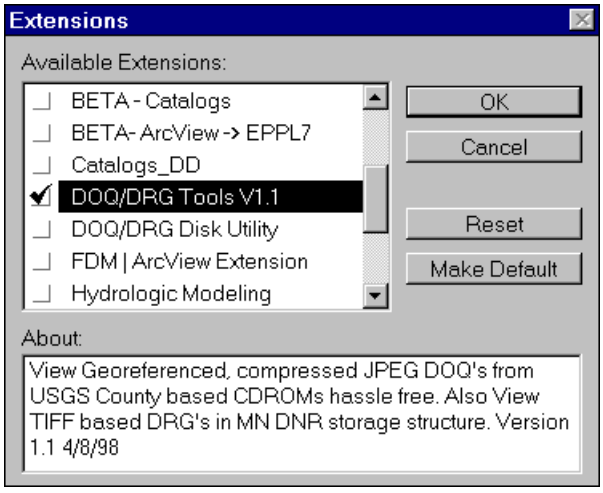
Turning on the Extension

Unloading the Extension

To unload the DOQ/DRG Tools extension you must access the Extensions dialog through the **FILE:** *Extensions* option and un-checking the box next to the DOQ/DRG Tools V1.1 extension selection. This will remove extension and all menus, tools, buttons, and forms related to it from the current ArcView project.



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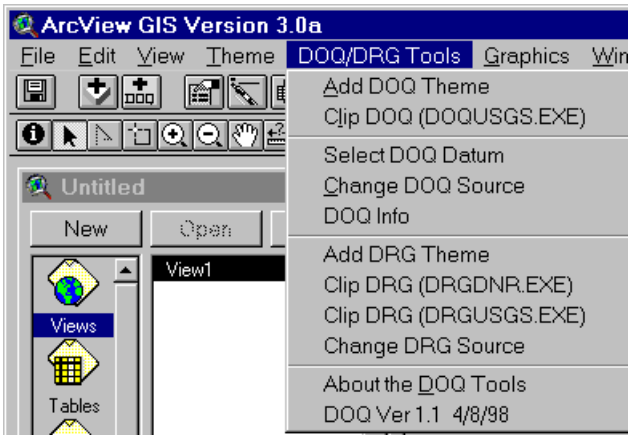
The DOQ/DRG tools Menu

The DOQ/ DRG Tools Menu

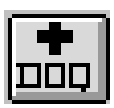


Once the extension is loaded, you will see a new menu option appear in the View document interface (the menus, buttons and tools available when a view document is active).

This new menu option, called **DOQ/DRG TOOLS,** is the primary point of access for the commands used in this extension. This menu contains options that are organized by what type of image they work on, DOQ or DRG. The DOQ related commands are organized on the top section and the DRG related commands are in the lower section of the menu.

You may notice that the menu shown on your screen has a couple of options that are grayed-out. These commands are not yet available because conditions for their use are not yet met. In this case they are grayed out because you need to have a polygon based theme on the View document before you can use these menu options.

In some cases you may not even see the menu options for clipping DOQ's and DRG's. In this case you don't have EPPL7 Version 3.0c or the custom software needed to do the clipping. See *Appendix D - Getting Extra Software* for information on obtaining these programs.



Note the new button next to the *Add Theme* button. This is a shortcut to the ***Add DOQ Theme*** Form.

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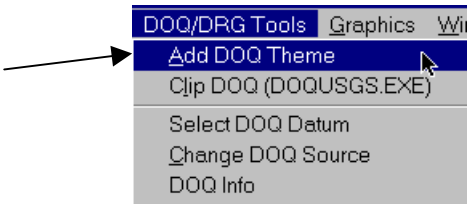
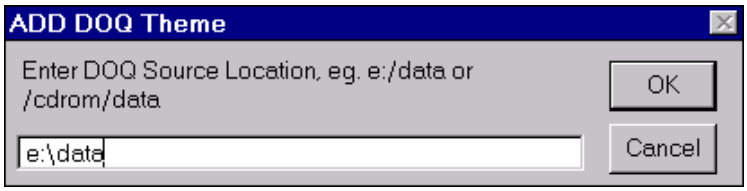
Adding a DOQ Theme

Adding A DOQ Theme

Adding a DOQ image to the View as a theme is done using the **DOQ/DRG TOOLS:** *Add DOQ Theme* option or using the Add DOQ button.

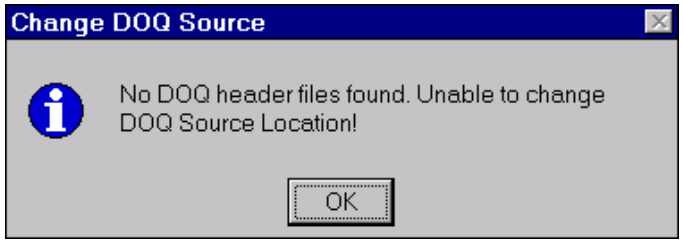


Once you select the option the system will search for the location of the DOQ images. If the DOQ source has not been set, you will be prompted to specify the DOQ source location. In most cases this will be the \DATA subdirectory on the CD. In the following example, the CD drive is the E: drive. Don't worry about forward slashes or backward slashes, ArcView checks all that for you.



Once you specify a DOQ source you won't have to do it again in the current ArcView session. If you want to permanently set the source, set an environment variable called DOQSRC (refer to *Appendix A - Installation of the DOQ/DRG Tools*).

If the source entered is invalid or there are no DOQ's found in the location specified, you will get the following message and the source will not be set.



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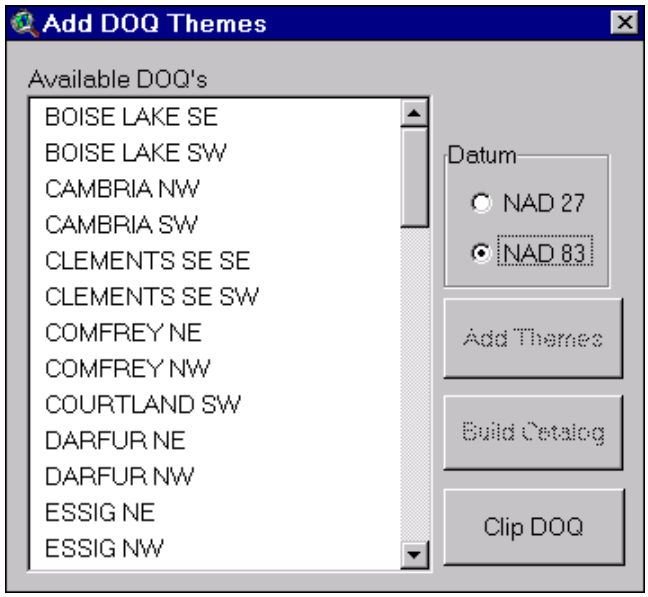
Adding a DOQ Theme

Adding A DOQ Theme

Once a valid DOQ source has been set, ArcView will look for DOQ's at that spot. Once complete, the ***ADD DOQ THEMES*** form will be displayed.



This form contains a list that shows the available DOQ's and the controls required to manage the display of the DOQ's. This form is "Modeless", that is, it operates independently of other ArcView menus. While this form is open you have access to all of the other menus, buttons, and tools available in ArcView.

The DATUM Control Panel

The ***Datum Control Panel*** is used to specify the horizontal datum that you want to use to display the DOQ's. The default value of Datum is NAD83. To change the datum simply use the mouse to select the appropriate datum radio button.

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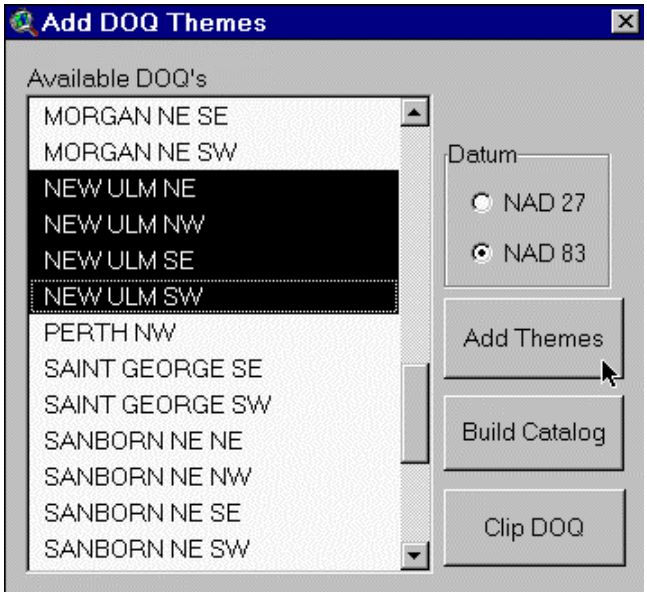
Adding a DOQ Theme

Adding A DOQ Theme

To add a DOQ theme to the current view you simply select one or more DOQ's that you wish to display and then press the ***Add Themes*** button and the themes will be added to the currently active View document.



To select more that one DOQ press the shift key while making selections.

When you want to view only one DOQ just double click on the quad of interest and it will be added to the View.

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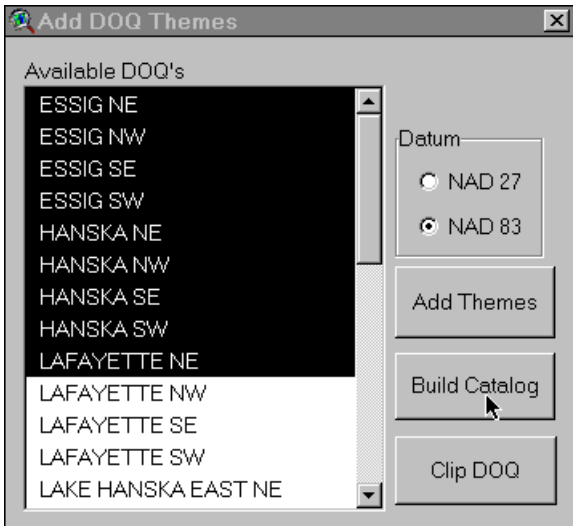
Creating a DOQ Image Catalog

Creating a DOQ Image Catalog

Many times you have to add many DOQ themes to the view document. If this is the case you would normally have to create a single theme for each DOQ. In this case it may be more efficient to create a DOQ Image Catalog.

An Image Catalog is a database that stores image filenames and their x and y dimensions. Based on this data, ArcView can display several DOQ Images as a single image theme. Using the information in the image catalog, ArcView will selectively display only those DOQ images that fall within the current View display.

Creating a DOQ image catalog is just like adding DOQ themes except that once you have selected the DOQ's of interest you press the ***Build Catalog*** button rather than the ***Add Themes*** button.



You will then be required to enter a new image catalog filename, and then catalog will be created and added to the view.

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Clipping DOQ Images

The CLIP DOQ (DOQUSGS.EXE) Menu Option

This menu option allows the user to window, merge and clip DOQs based on the outline of an input polygon in an ArcView shapefile.

Why CLIP a DOQ?

If you have been using DOQs from the disk you know that their display and use is not extremely fast. Even with the fastest computers you end up waiting for these huge images to be uncompressed and displayed.

While this is not a problem for casual browsing if you are working with a DOQ or two and you plan on digitizing or using these images extensively you might want them to work faster.

This is where the *CLIP DOQ (DOQUSGS.EXE)* option comes into play. This command uses a custom program (DOQUSGS.EXE) and EPPL7 Version 3.0c raster GIS software to import, window, merge and clip DOQs based on the outline of a polygon in a shapefile.

Another case where this program is essential is when you are looking at DOQ's for the western part of Minnesota that are in UTM Zone 14 vs. UTM Zone 15 (the DNR standard). If you were to view these in ArcView from the CDROM you will immediately notice that they are not displayed where you expect them to be displayed. This problem is resolved by CLIPPING the DOQs. The CLIP routine will detect which DOQs are not in Zone 15 and project them accordingly.

What Do I Need to CLIP a DOQ

The DOQ CLIP process relies on the existence of some DOQs and a polygon shapefile on the View. The polygon shapefile should contain only one polygon. The boundaries of this polygon will be used as a cookie cutter to create the new theme.

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Clipping DOQ Images

What Do I Need to CLIP a DOQ

You will also need to have the EPPL7 Version 3.0c software package. This is used to import the JPEG DOQ, window, merge and clip them to the boundary of the shapefile. If EPPL7 does not exist on the system (as referenced by the CGIPATH environment variable) then the *CLIP DOQ* option will not be available.

You also need to have a copy of the DOQUSGS.EXE program in the EPPL7 installation directory. This program was written by Craig Perreault of the Minnesota DNR and is freely available by contacting Craig at craig.perreault@dnr.state.mn.us. Once again, if this program is not found in the EPPL7 subdirectory, the *CLIP DOQ* menu option will not appear.

What does CLIP DOQ produce?

The *CLIP DOQ* command produces an output image on the hard drive in either TIFF (GeoTIFF), ERDAS (GIS), or EPPL7 format. While the original DOQs are compressed JPEG format images the resulting CLIPPED images are not. Thus, they can get rather big so be careful to verify that you have ample hard drive space.

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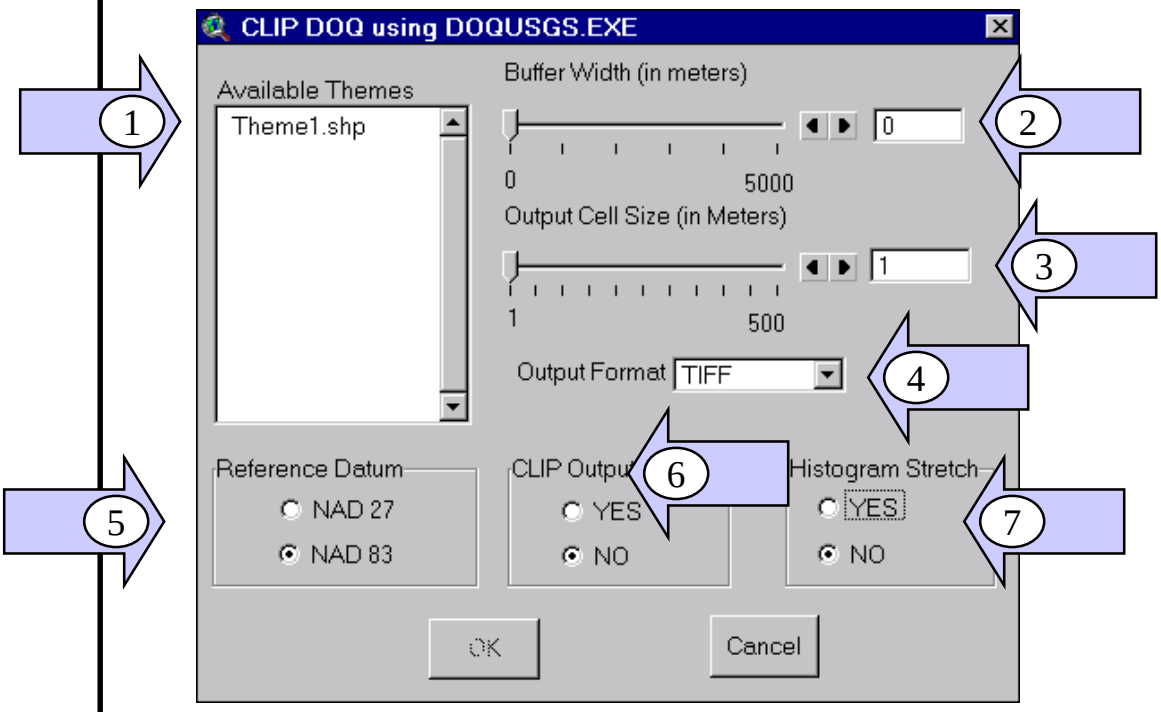
Clipping DOQ Images

The CLIP DOQ Form

Once you select the *CLIP DOQ (DOQUSGS.EXE)* option, the ***CLIP DOQ*** Form will be displayed. This form is displayed below:



OPTIONS:

1) Available Themes - This is a list of the available polygon themes in the View that you can clip with. Select one.
2) Buffer Width (in Meters) - If you want the output image to extend beyond the clipping polygon specify the distance here.
3) Output Cell Size (in Meters) - Specify the output image cell size (default is 1, the DOQ cell size)
4) Output Format - One of three options, TIFF (GeoTIFF), ERDAS (GIS) or EPPL7 Version 3.0c
5) Reference Datum - Specify the output reference Datum
6) CLIP Output? - Clip the image to the exact extent of the input polygon. If you don't clip then the image will be clipped to the bounding box of the clipping polygon.
7) Histogram Stretch - Use this option to minimize contrast differences between images

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Clipping DOQ Images

The CLIP DOQ Form

The process of clipping an image is as follows:

1) Create the polygon theme that contains the clipping polygon
2) Access the **CLIP DOQ** Form.
3) select the theme that contains the clipping polygon
4) change any of the options you want
5) press the OK button.

Things to watch out for

There are a couple of issues that you need to be aware of when you clip DOQs. Number one, you need to watch your disk resources. One meter DOQs on the hard drive (4.5 MB) must be uncompressed by EPPL7 (45MB) and then all the images must be put together before the final file is output. To determine a rough idea of the amount of disk space you will need use the following equation

(number of DOQ quarter quads * 45) * 2

As you can see, Clipping can consume a lot of disk space. For example:

A four quad DOQ clip consumes:
(16 quarter quads * 45 mb) * 2 = 1.4 GB of free space to build the image, final image 720 mb

As your area of interest (polygon) gets bigger your output cell size needs to get BIGGER! To calculate the disk space requirements just divide the output size by the cell size reduction factor squared.

((number of DOQ quarter quads * 45 mb) * 2) * 1/(output cell size)2

Taking the above example of a four quad DOQ clip at 2 meters.
((16 * 45) * 2) * 1/2 = 720 to build the image, final image is 360 mb

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Clipping DOQ Images

Clipping FAQ

1) *Why is there a "Clip Output" Option on the **CLIP DOQ** Form? Aren't we already doing a clip?*

ANS - This option allows the users to clip the output DOQ to the exact boundaries of the polygon that was used for the clipping. This is not really a big issue when you have a rectangular clipping area.

Clipping Polygon

Output without Clip

Output Clipped

2) *What is a Histogram Stretch?*

ANS - A histogram stretch is an image processing command that improves contrast in monochrome images by redistributing the individual gray tones in an image across the full range of possible gray tones. This process reduces the peaks and clusters in the image histogram and may make the image components easier to view. It is also useful when mosaicing multiple images together that have very different histograms. This will help reduce the contrast between the images you are mosaicing.

3) *EPPL7 bombed out during the clipping process. What happened and why?*

ANS - There are several things to watch out for when you are clipping DOQ images. Number one is Disk Space. Make sure that you have ample disk space available to you before you clip an image.

Clipping FAQ

Another common cause of problems is long filenames. Since EPPL7 cannot handle long filenames neither can any of the clipping routines. You must make sure that you're filenames are 8.3 compliant.

One more thing that you will need to verify is that the clipping theme is not in "Edit" mode. That is, it must be saved to the hard disk before you can clip the image. A common problem is that people create a new polygon theme, add a clipping polygon and then try to clip before the file is saved to disk.

4) *I tried to mosaic an entire county and EPPL7 fails. Why?*

ANS - The likely cause is that the image is too big for EPPL7 to handle. You will have to make the cell size larger in order to handle an image of this size.

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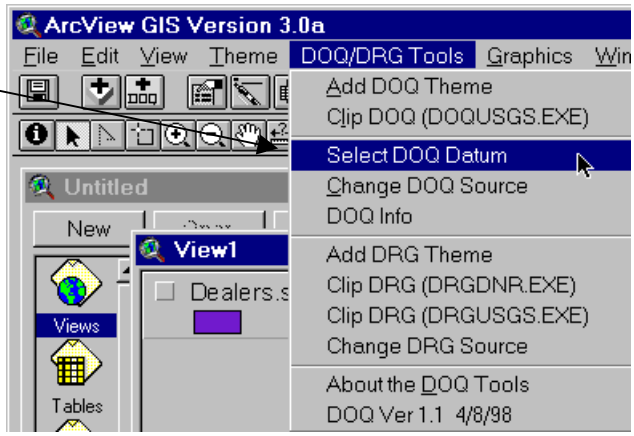
Selecting a Display Datum

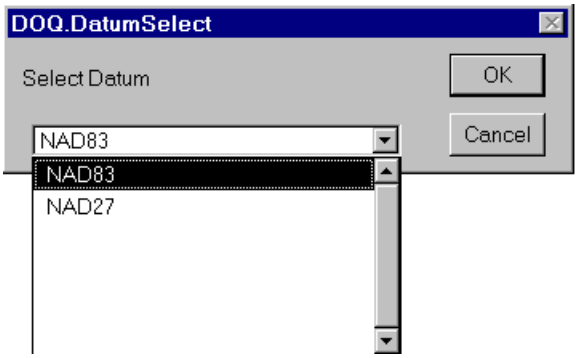
Changing the Display Datum

The DOQ's header information contains the rectification coordinates for the images in both NAD27 and NAD83 datums (North American Datum). The default display datum in NAD83 but you can change the datum if you so desire using the **DOQ/DRG TOOLS:** *Select DOQ Datum* menu option.

The Select DOQ Datum Menu option



Once selected you will presented with a dialog that lists the two datum options. Make the desired selection and press the *OK* button.



Once a DOQ has been added to the view it's reference datum cannot be changed. If you want to change the display datum you will have to re-add the DOQ theme.

Using DOQ's

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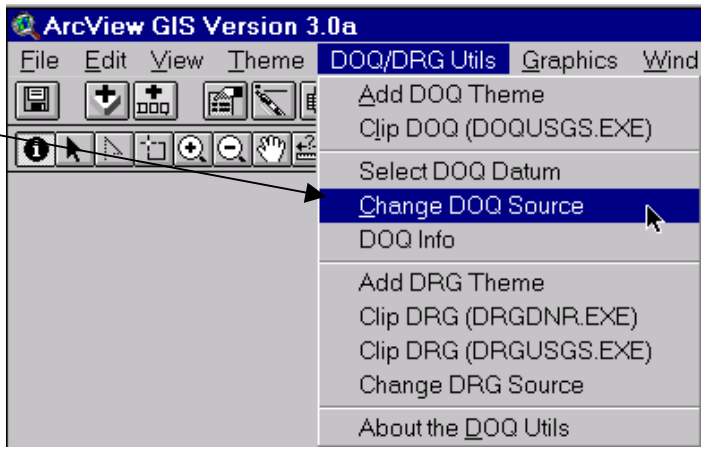
Changing the DOQ Source Location

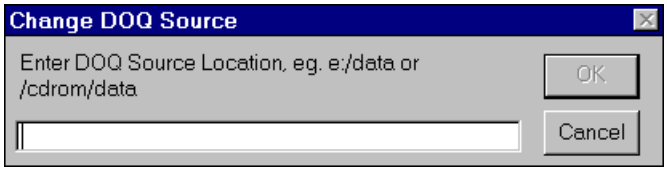
Changing the DOQ Source Location

The **DOQ/DRG Tools:** *Change DOQ Source* option is used to specify where you want ArcView to look for the DOQ images. This is useful if you have more than one CD reader or you have your DOQ's in more than one subdirectory.

The Change DOQ Source Menu option



Once selected you will be required to enter a new DOQ source location.



Once you have specified a new location the program will verify that there are DOQs there. If not you will get the following message

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DOQ/DRG Tools User's Guide

Changing the DOQ Source Location

If the program found valid DOQs at the specified location, the source will be reassigned and you will get the following message that the source was successfully changed.

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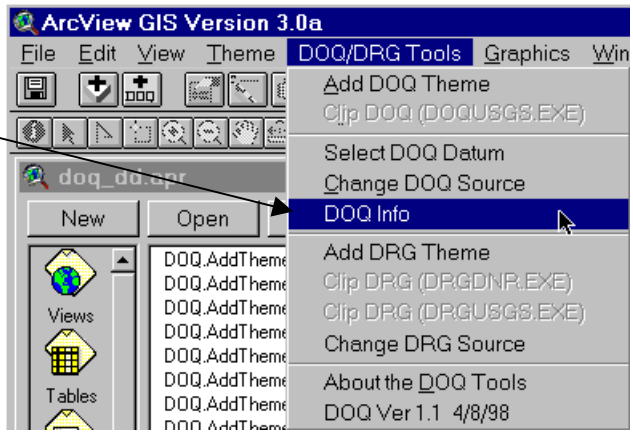
Displaying DOQ Information

Displaying DOQ Flight Information

Each DOQ has an associated header file that contains a variety of information including rectification coordinates for the image**,** photography date, plane height and image size among other things. This information can be retrieved using the **DOQ/DRG TOOLS:** *DOQ Info* menu option.

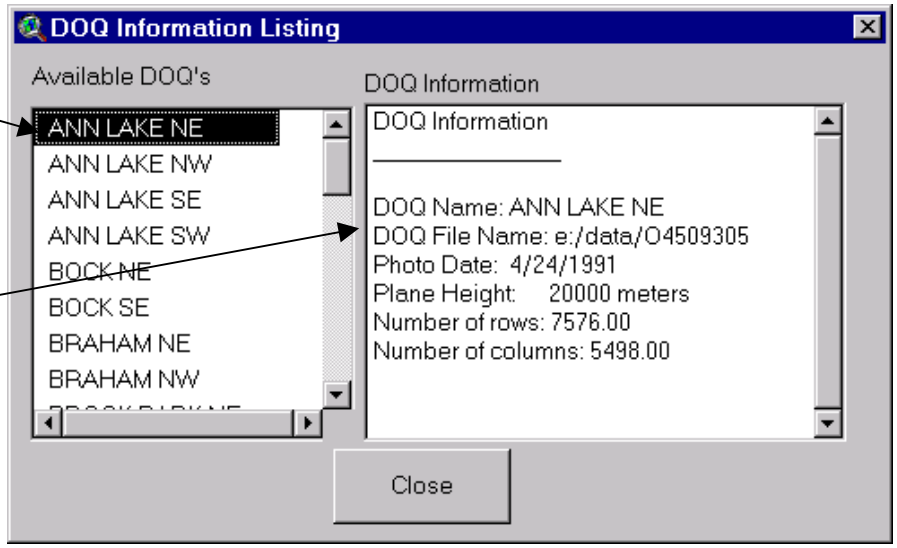
The DOQ Info Menu option



Once selected you will presented with a dialog that lists the DOQ's found in the current source location in the left hand window and the information about the quad selected in the right hand window. To show the information for a particular DOQ simply select the DOQ of interest and the header information will be displayed.

List of DOQs

DOQ Information



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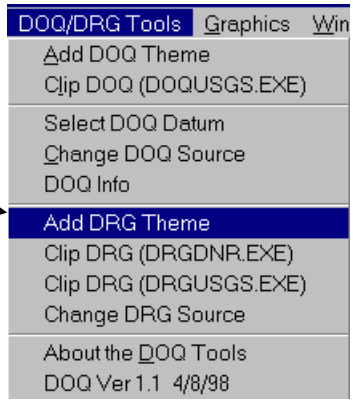
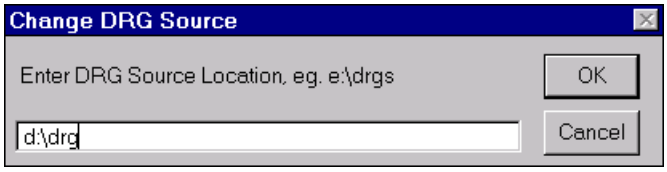
Adding a DRG Theme

Adding A DRG Theme

Adding a DRG image to the View as a theme is done using the **DOQ/DRG Tools:** *Add DRG Theme* option.

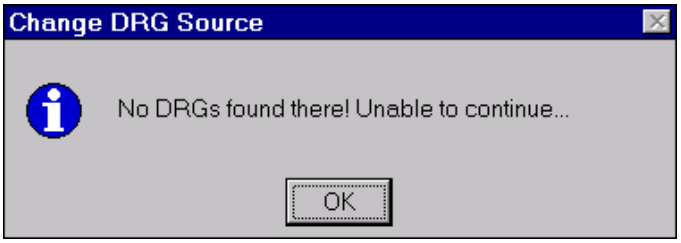


Once you select the option the system will search for the location of the DRG images. If the DRG source has not been set, you will be prompted to specify the DRG source location. Don't worry about forward slashes or backward slashes, ArcView checks all that for you.



Once you specify a DRG source you won't have to do it again. If you want to permanently set the source, set an environment variable called DRGSRC (refer to *Appendix A - Installation of the DOQ/DRG Tools*).

If the source entered is invalid or there are no DRGs found in the location you will get the following message and the source will not be set.



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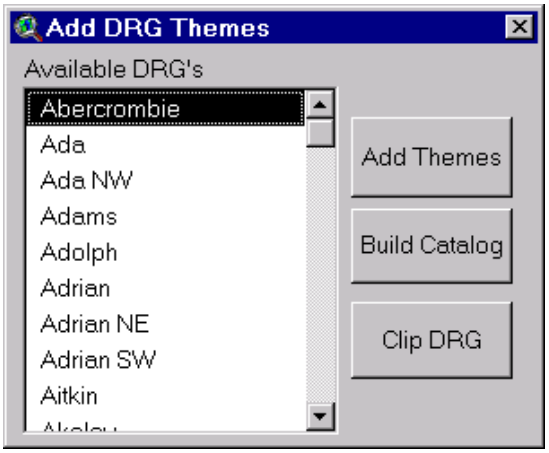
Adding a DRG Theme

Adding A DRG Theme

After a valid source has been set, ArcView will look for DRG's at that spot. Once, complete the ***ADD DRG THEMES*** form will be displayed.



This form contains a list that shows the available DRGs by their quad name and the controls required to add DRGs themes to the View document. This form is "Modeless", that is, it operates independently of other ArcView windows. While this form is open you have access to all of the other menus, buttons, and tools available in ArcView.

Remember that the data needs to be stored in a specific structure. For DRGs to be displayed there is an associated quad index file that is used to determine which quads are available on your system. If this file does not exist you cannot view the DRGs. In this case you will see the following message:

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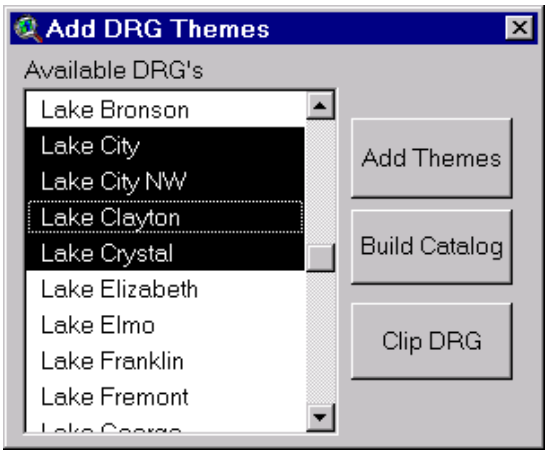
Adding a DRG Theme

Adding A DRG Theme

To add a DRG theme to the current view you simply select one or more DRG's that you wish to display and then press the ***Add Themes*** button.



To select more that one DRG press the shift key while making selections.

When you want to view only one DRG just double click on the quad of interest and it will be added to the View.

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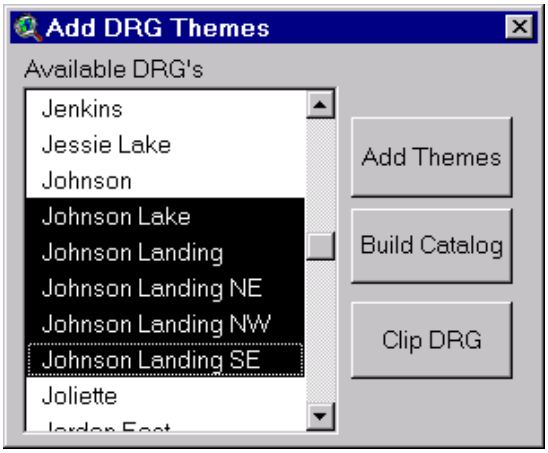
Creating a DRG Image Catalog

Creating a DRG Image Catalog

There are times when you have to add many DRG Quads to the view document. Normally you would have a single image theme for each DRG. In this case it is probably more efficient to create a "DRG IMAGE CATALOG".

An Image Catalog is a database that stores image filenames and their x and y dimensions. Based on this data, ArcView can display several DRG Images as a single theme. Using the information in the image catalog, ArcView will selectively display only those DRG images that fall within the current View display.

Creating a DRG image catalog is just like adding DRG themes except that once you have selected the DRG's of interest you press the ***Build Catalog*** button rather than the ***Add Themes*** button.



You will then be required to enter a new image catalog filename, and then catalog will be created and added to the view.

You can now edit the legend of this Image Catalog Theme, change the background (value 255) to transparent, and it will apply to all the images in the catalog!

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Clipping DRG Images (DRGDNR.EXE)

The CLIP DRG (DRGDNR.EXE) Menu Option

This menu option allows the user to window, merge and clip DRGs based on the outline of an input polygon in an ArcView shapefile. This is the equivalent of cutting and taping together paper USGS topo maps.

Why CLIP a DRG?

If you have been using DRGs in their raw form you know that their display and use is not extremely fast. Even with the fastest computers you end up waiting for these images to be displayed.

While this is not a problem for casual browsing if you are working with a DRG or two and you plan on digitizing or using these images extensively you might want them to work faster.

This is where the ***CLIP DRG (DRGDNR.EXE)*** command comes into play. This command uses the EPPL7 Version 3.0c raster GIS software program to import, window, merge and clip DRGs based on the outline of a polygon in a shapefile.

Another reason to Clip DRGs is that when you want to print a View that has multiple DRGs that are adjacent, and you have changed the background cells (value 255) to transparent. Problem is, ArcView has a terrible time printing transparent colors for raster data. In this case you would need to Clip and merge the DRG's together to get around this issue.

What Do I Need to CLIP a DRG

The DRG CLIP process relies on the existence of some DRGs and a polygon shapefile on the View. The polygon shapefile should contain only one polygon. The boundaries of this polygon will be used as a cookie cutter to create the new theme.

The command makes use of the DRGSRC environment variable. Form more information on setting up this variable refer to *Appendix A Installing the DOQ/DRG Tools.*

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Clipping DRG Images (DRGDNR.EXE)

What Do I Need to CLIP a DRG

You will also need to have the EPPL7 Version 3.0c software package. This is used to import the GeoTIFF DRG, window, merge and clip them to the boundary of the shapefile. If EPPL7 does not exist on the system (as referenced by the CGIPATH environment variable) then the CLIP DRG option will not be available.

You will also need to get a copy of the DRGDNR.EXE program in the EPPL7 installation directory. This program was written by Craig Perreault of the Minnesota DNR and is freely available by contacting Craig at craig.perreault@dnr.state.mn.us. Once again, if this program is not found in the EPPL7 subdirectory, the *CLIP DRG* menu option will not appear.

What does CLIP DRG produce?

The *CLIP DRG* command produces an output image on the hard drive either TIFF (GeoTIFF) or ERDAS GIS format.

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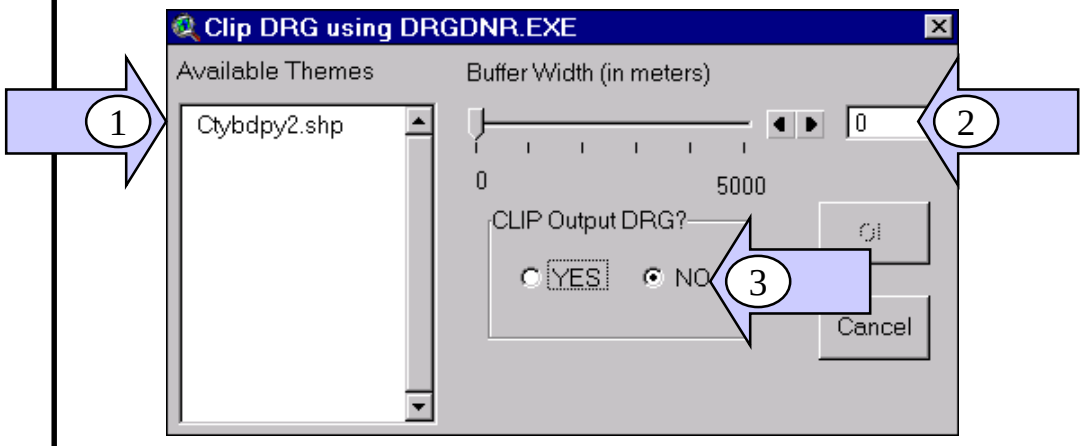
Clipping DRG Images (DRGDNR.EXE)

The CLIP DRG Form

Once you select the *CLIP DRG (DRGDNR.EXE)* option, the ***CLIP DRG*** Form will be displayed. This form is displayed below:



OPTIONS:

1) Available Themes - This is a list of the available polygon themes in the View that you can clip with. Select one.
2) Buffer Width (in Meters) - If you want the output image to extend beyond the clipping polygon specify the distance here.
3) CLIP Output? - Clip the image to the exact extent of the input polygon. If you don't clip then the image will be clipped to the bounding box of the clipping polygon.

The process of clipping an image is as follows:

1) Create the polygon theme that contains the clipping polygon
2) Access the **CLIP DRG** Form.
3) Select the theme that contains the clipping polygon
4) Change any of the options you want
5) press the OK button

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Clipping DRG Images (DRGUSGS.EXE)

The CLIP DRG (DRGUSGS.EXE) Menu Option

This menu option allows the user to window, merge and clip DRGs based on the outline of an input polygon in an ArcView shapefile. This option differs from the CLIP DRG (DRGDNR.EXE) option because it reads the DRG's from the distribution disks provided by the USGS.

Why use DRGUSGS.EXE?

If you have USGS standard distribution CDROM diskettes of DRGs this is the command for you. It will determine which DRG's are necessary, clip the collars and merge them together. It also transforms those DRG's that are not registered to UTM Zone 15 to Extended Zone 15 coordinates in either NAD27 or NAD83 datum.

What Do I Need to CLIP a DRG with DRGUSGS.EXE

The DRG CLIP process relies on the existence of a standard distribution DRG CDROM and a polygon shapefile on the View. The polygon shapefile should contain only one polygon. The boundaries of this polygon will be used as a cookie cutter to create the new theme.

In addition, you need to have the EPPL7 Version 3.0c software package. This is used to import the GeoTIFF DRG, window, merge and clip them to the boundary of the shapefile. If EPPL7 does not exist on the system (as referenced by the CGIPATH environment variable) then the CLIP DRG option will not be available.

You will also need to get a copy of the DRGDNR.EXE program in the EPPL7 installation directory. This program was written by Craig Perreault of the Minnesota DNR and is freely available by contacting Craig at craig.perreault@dnr.state.mn.us. Once again, if this program is not found in the EPPL7 subdirectory, the *CLIP DRG* menu option will not appear.

What does CLIP DRG produce?

The *CLIP DRG* command produces an output image on the hard drive either TIFF (GeoTIFF) or ERDAS GIS format.

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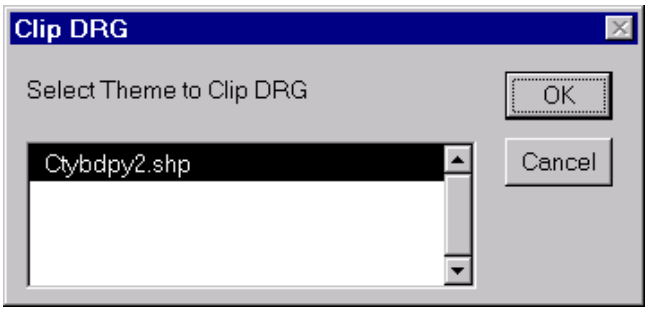
Clipping DRG Images (DRGUSGS.EXE)

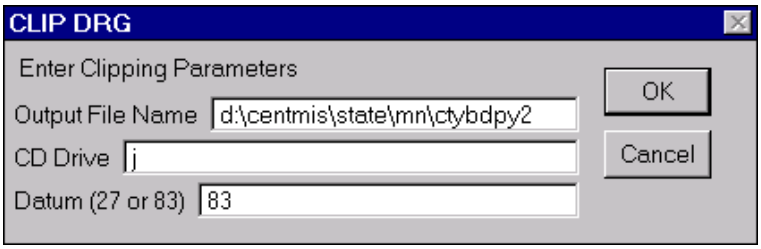
Using CLIP DRG (DRGUSGS.EXE)

Once you select the *CLIP DRG (DRGDNR.EXE)* option, you will see the following set of windows

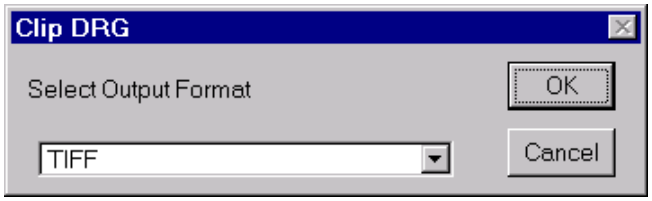
Step 1 Specify the Shapefile you want to clip with



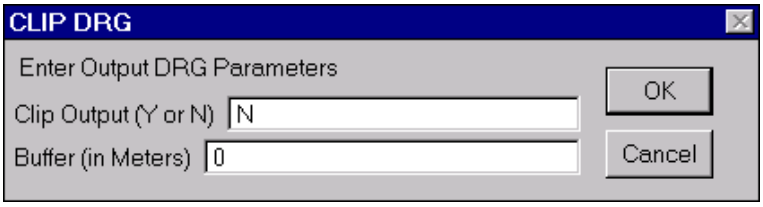
Step 2 Specify the Clipping Parameters



Step 3 Select the output format



Step 4 Clip or Buffer the output



Once all the parameters have been specified, ArcView will call EPPL7, process the files and then return back to ArcView.

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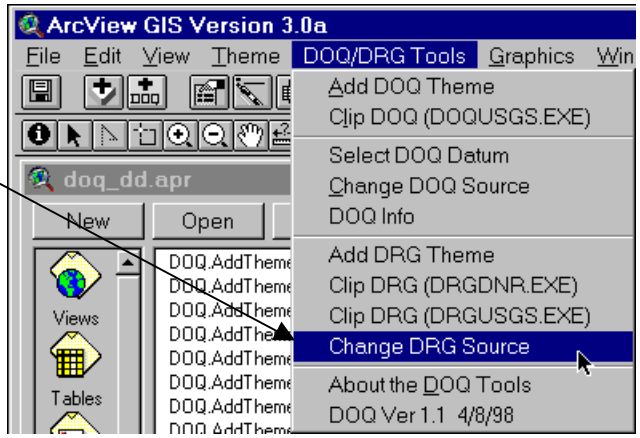
Changing the DOQ Source Location

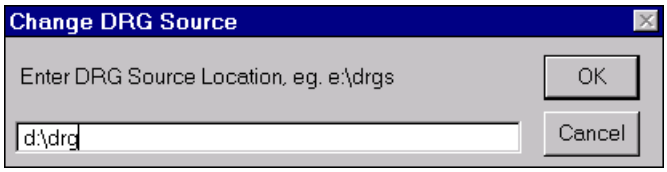
Changing the DRG Source Location

The **DOQ/DRG Tools:** *Change DRG Source* option is used to specify where you want ArcView to look for the DRG images. This is useful if you have more than one CD reader or you have your DRG's in more than one location.

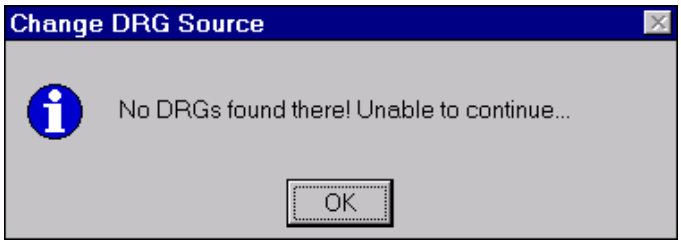
The Change DRG Source Menu option



Once selected you will be required to enter a new DRG source location.



Once you have specified a new location the program will verify that there are DRGs there. If not you will get the following message



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Appendix A - Installation

Installing the Extension

To install the DOQ/DRG extension you will need to copy the file DOQ_DD.AVX to a location on the hard drive and then tell ArcView where to look for it. This is done through the USEREXT environment variable. For example, if you copied this extension to a directory called D:\EXT, you would set the environment variable USEREXT to D:\EXT. See the next section to learn more about setting environment variables.

Another option is to copy the file to the location where ArcView stores extensions it always lists. This is in the installation directory and is usually:

\esri\av_gis30\arcview\ext32	on Windows 95 and NT
\esri\av_gis30\arcview\ext16	earlier versions of Windows

If you copy the extension to this location, you don't need to worry about the USEREXT environment variable.

You can then load the extension using the Project window menu interface. Look in the FILE menu for the Extensions option. Once selected you will now see the extension DOQ Image Tools. By checking the box with the mouse you will load the extension. A new menu option will be present in the View Document Interface called DOQ Tools that contains the Tools described above.

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Appendix A - Installation

Environment Variables

This extension makes use of a number of user defined environment variables. These environment variables allow user's to customize locations where DRG's and DOQ's are stored and for a variety of machine specific settings.

Environment variables are set in a number of ways. In Windows 3.1 and Windows 95 the variables are added to the Autoexec.Bat file in the following manner:

SET <Variable_Name>=<Variable_Value>
e.g. SET DOQSRC=E:\DATA

The only requirement is that there is no space between the equal sign "=" and the variable name or variable value.

In Windows NT environment variables are set in the Environment Tab of the System Control Panel.

In UNIX the set commands are located in the .cshrc file in the following manner:
setenv <VARIABLE_NAME>=<Variable_Value

Required Environment Variables

Optional Environment Variables used by this extension

Variable Name	*Valid Values*	*Variable Purpose*
DOQSRC	PATH	DOQ Source
DRGSRC	PATH	DRG Source
DOQFIRST	PATH	Look for DOQ's here first
DRGFIRST	PATH	Look for DRG's here first
DNRMSG	ON or OFF	DNR Extension Messages
DOQDATUM	NAD27 or NAD83	Initial DOQ Datum
CGIPATH	PATH	EPPL7 Software Location
USEREXT	PATH	ArcView User Extensions

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Appendix B - DOQ Storage Options

DOQ Storage Options

This extension uses environment variables to locate DOQs. They are called DOQSRC and DOQFIRST. These variables tell ARCVIEW where to look for the actual DOQ JPEG images. If you have more than one location where DOQs may be stored you can use both variables. If you only have one location, then you only need the DOQSRC variable.

When clipping DOQs, the program will first look to see if the required DOQ exists in the location referenced by DOQFIRST , if it's not found, then it will look for the DOQ in the location referenced by DOQSRC.

When displaying DOQ's, only DOQSRC is evaluated. If you need to view DOQ's from two different sources you can change the value of DOQSRC as you see fit and your situation requires, using the **DOQ/DRG TOOLS**: *Change DOQ Source* option.

Another way of storing DOQ data is to copy the DOQ's, and their header files, to a location on a hard drive. You could copy multiple counties to a single location on the hard drive and all DOQ's will be available to the user.

This helps speed display and also allows for multi-county DOQ access.

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DOQ/DRG Tools User's Guide

Appendix C - DRG Storage Options

DRG Storage Options

This extension uses environment variables to locate DRGs. They are called DRGSRC and DRGFIRST. These variables tell ARCVIEW where to look for the actual DRG GeoTIFF images. If you have more than one location where DRGs may be stored you can use both variables. If you only have one location, then you only need the DRGSRC variable.

When drawing, creating image catalogs, and clipping DRGs, the program will first look to see if the required DRG exists in the location referenced by DRGFIRST , if it's not found, then it will look for the DRG in the location referenced by DRGSRC.

This extension expects that the DRG's are stored in a 1:24,000 quadrangle tiled format as specified in the Minnesota Department of Natural Resources GIS Standards Document. DRG's must be named DRGNCIM3.TIF for the extension to recognize them.

The program also must have a 1:24,000 quadrangle index file available to the program.

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DOQ/DRG Tools User's Guide

Appendix D - Getting Extra Software

Obtaining Clipping Software

The software mentioned in this document and used for clipping and merging the DOQ's and DRG's was created by Craig Perreault, Minnesota Department of Natural Resources. These programs include:

DOQUSGS.EXE
DRGUSGS.EXE
DRGDNR.EXE

They are available from Craig at:
craig.perreault@dnr.state.mn.us

You must be aware that these tools were customized to work within the DNR's coordinate standards and won't be too useful for people outside of Minnesota.

Obtaining EPPL7 Version 3.0c

The custom software relies on a PC Raster GIS called EPPL7. EPPL7 Version 3.0c is available from the Minnesota Land Management Information Center (LMIC). LMIC has a web site that contains information about obtaining the software, cost, versions etc. Their web site is:

www:\\lmic.state.mn.us

Any questions regarding the ArcView extension can be directed to Tim Loesch, Minnesota DNR at:

tim.loesch@dnr.state.mn.us

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DOQ/DRG Tools User's Guide

Appendix E - USGS DOQ Formatting Information

DOQ Standards and Formats used by this extension

The DOQ reader is based on the USGS published documentation regarding DOQ production, naming and storage conventions. For more information about DOQ's consult the following URL's:

http://nsdi.usgs.gov/nsdi/products/doq.html - for program information, or

http://nsdi.usgs.gov/nsdi/wais/maps/doqmet.HTML - for detailed metadata

Standard CD-ROMs from the USGS have a file called DOQLIST.TXT in a directory \DOCUMENT\DOQTEXT. This is a fixed field, ASCII file that contains a list of the DOQ's on the disk, the name of the quad, the quadrant, and the actual 8 character file name of the image. The application reads this file then lists the available quarter quads in a multi-selection list box. If this file is not found the application will look for all of the JPEG files on the disk, read the headers and generate the of available quads.

If you would like to copy the DOQ's to a hard drive you can do so. The application will look in the directory that the quads are loaded for the DOQLIST.TXT file. You can modify this file to remove or add DOQ's to the list, just make sure that the file format is the same as specified by USGS i.e., fixed field, ASCII format. This method is useful for those who would like to store multiple counties in a single location.

The format of the file is:

```
lat       long    quad name and quadrant              filename  doq   header
45-11-15 093-22-30 ANOKA NE                             O4509353. NEC / NEH
45-11-15 093-26-15 ANOKA NW                             O4509353. NWC / NWH
45-07-30 093-22-30 ANOKA SE                             O4509353. SEC / SEH
```

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Appendix E - USGS DOQ Formatting Information

The important columns are:
Quad name and Quadrant in columns 20 - 58
Filename in columns 59 - 67

The application tries to generate a file name from columns 59 - 67 and then attempts to locate the file. If it is not found, it (the app) continues to the next line. That makes the format fairly flexible. That is, you can add comment lines to this file if you want and the program will not fail.

If you copy more than one counties of DOQ's to a hard drive you can store them in the same location and append the DOQLIST.TXT files from the two counties without editing the file to remove header lines. The extension will read the appended file and display DOQ's from both counties.