



SPATIAL DATA MANAGEMENT WORKSHOP MANUAL

CIFOR - GIS Unit

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Using ArcView ® Database Access (Version 2.1b). Environmental Systems Research Institute, Inc.

Vienneau, A. Using ArcCatalog. Environmental Systems Research Institute, Inc.

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1 Introduction

Over the past 10 years, the volume of spatial information generated by CIFOR is enormous, and the number of sources of information is equally overwhelming. Increasingly, such information is published using electronic means, but a substantial part of it remains inaccessible to users. The major problem facing information-seekers is the location of information sources corresponding to their needs.

Equally important, information-providers often do not easily find appropriate media for presenting their information, which then remains inaccessible to others. It is significant to solve the problem of "hidden" data for that accessible data will stimulate the efficient use of it and therefore removes the redundancy and improves the quality of the work performed by CIFOR in general, the research divisions and last but not least the GIS Unit.

In 2003 the GIS Unit started an initiative to address this issue by creating a centralized spatial database, in which each project can store, access and retrieve their own data. This approach provides a framework for authorized users to see what kind of data is available and where to find it.

In order to introduce the system to the GIS audience in CIFOR and ICRAF, a half day workshop is planned to provide an overview and give hands-on exercises on:

- how to connect to the spatial database;
- how to submit your data into the database;
- how to use the metadata editor to create metadata;
- and to provide an introduction to the Forest Spatial Information Catalog (FSIC).

We will hope that you will find this workshop useful and that you will start to see the advantages of using a centralized spatial database. Any questions, please get in touch. We look forward to meeting you all in the GIS unit on the 21st of January.

Best regards,

Joris Siermann, Atie Puntodewo & Andy Darmawan

2 ArcView Database Access

2.1 Introduction to ArcView Database Access

ArcView ® Database Access extension lets you bring data from your relational database management system into ArcView GIS, where you can use it to solve spatial problems. This manual will help you understand how you can use ArcView GIS software's main components.

You don't need to be experienced with ArcView or relational databases to start using the Database Access extension. This manual covers the ArcView basics and helps you get acquainted with relational database concepts.

The database access extension supports connections to SDE 3 and ArcSDE 8 servers. Information and instructions pertaining to SDE throughout this book can also be applied to ArcSDE 8 servers.

2.1.1 Using the Database Access extension

Your database contains many tables of data whose subjects are related to each other. You could have a table with property information, and several lookup tables describing codes in the property information table. Database Access lets you see the contents of these tables using an ArcView database table.



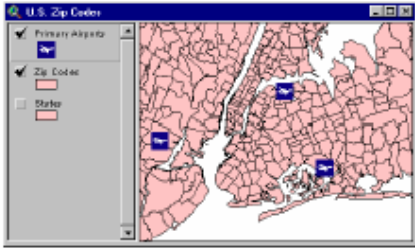
LAND PARCEL	STREET	CITY STATE	ZIP CODE
3652 SHERIDAN DR	PO BOX 258	DALLAS TX	75221-0280
3676 SHERIDAN DR	3676 SHERIDAN DR	AMHERST NY	14226-1791
2000 SHERIDAN DR	49 BEEFORD AVE	BUFFALO NY	14216-2680
3676 SHERIDAN DR	223 WISCONSIN DR	WILLIAMSVILLE NY	14221-1771
3689 SHERIDAN DR	84 ASHWATON DR	BUFFALO NY	14223-1516
2671 SHERIDAN DR	PO BOX 29226	GLENDALE CA	91201-6026
3691 SHERIDAN DR	3691 SHERIDAN DR	BUFFALO NY	14226-1792
3720 SHERIDAN DR	3720 SHERIDAN DR	BUFFALO NY	14226-1792
2090 SHERIDAN DR	3758 SHERIDAN DR	AMHERST NY	14226-1792
3775 SHERIDAN DR	3808 SHERIDAN DR	EGGERTSVILLE NY	14226-1790

Database tables are created using Structured Query Language (SQL) Select statements, which choose the columns and records of data you want to see from the tables in your database. You don't need to know SQL to see your data in ArcView. The Database Access extension provides a wizard that will walk you through the steps of choosing the data you want to see. When you're comfortable writing your own SQL Select statements, you'll be able to combine columns of data, summarize groups of records, and sort the records you get by more than one column.

Once you have a database table in your project, you can join it to other ArcView tables such as a shape file's attribute table. If you're not satisfied with a database table's contents, you can change its query.

With software like Spatial Database Engine™ (SDE™) or ArcSDE 8 from Environmental Systems Research Institute, Inc. (ESRI), you can create a spatial database that has land parcel shapes in your property information table. Database Access lets you add the land parcels in your database to an ArcView map using a database theme.

Database themes are created using queries that can retrieve shapes from the database. You can build those queries using the wizard. Walking through the wizard, you could, for example, join the property information table and the owners table to a table of zip code shapes, then create a zip code theme containing data from all three tables.



When a database theme is part of a map, you can change its projection, classify land parcels by their attributes, and locate specific land parcels.

2.1.2 Before you start to load the ArcView Database Access 2.1 b

Before you can begin the ArcView extension Database Access 2.1 b, you need to find out some information and make sure your machine is set up correctly.

Find out who the SDE database administrator is in your organization, and then arrange some time to ask the following questions.

- What is the name of the SDE server I'm connecting to?
The SDE server is the machine that has your data.
- What is the name of the SDE database instance I'm connecting to?
The SDE database instance is the SDE process that lets you access a set of spatial data.
- What user name and password do I use to access the data?

See **Appendix I** for the database connections properties. Now you have all the information you need to start using SDE data in ArcView.

2.1.3 Getting on-line help

To find out what a button, tool, or menu choice does

Move the cursor over it but do not select it. A short description will appear in the ArcView status bar.

To get more help about a button, tool, or menu choice

1. Click the Help button.
2. Click the button, tool, or menu choice you want to get help about.

To get help about a dialog box

Press the F1 key on your keyboard when the dialog is displayed.

To browse the contents of ArcView's help

1. From the Help menu, choose Help Topics.
2. Click the Index tab.

To search ArcView's help for a particular word

1. From the Help menu, choose Help Topics.
2. Click the Find tab.

Note If you use the Index or Find to locate topics in the on-line help, check the topic to make sure it belongs to the Database Access extension. All help topics for the extension have the name Database Access in the title or the first line of the topic.

Getting technical support from ESRI

Please see the software registration and support card that came with ArcView, or look at the 'Obtaining technical support' section of ArcView software's on-line help.

Visit ESRI on the Web

Find out everything you want to know about ESRI ® software, data, and services by visiting ESRI's Web home page at www.esri.com.

2.2 Make A Map Using Simple Database Themes

Exercise 1 in this part is the basics of creating a map with SDE data. To follow the exercise, you need access to the SDE database containing Malinau Research Forest site, rivers, roads, and villages for Malinau district. **Appendix 1. Connections Properties** in this manual provide information to access the SDE database

Suppose you were asked by your supervisor to make an overview map of Malinau Research Forest for a planned field trip into some villages. What would you do? The first step in solving this problem is to bring all your data together in an ArcView map. In exercise 1, you'll learn how to:

- Load ArcView extension software.
- Create new database themes.
- Identify a feature in a map.
- Change the color of a theme.
- Save your work.


Start ArcView. Before you can start assembling a map, you need to load the Database Access extension. Loading the extension makes the required components available for connecting ArcView to an SDE database and working with SDE data.

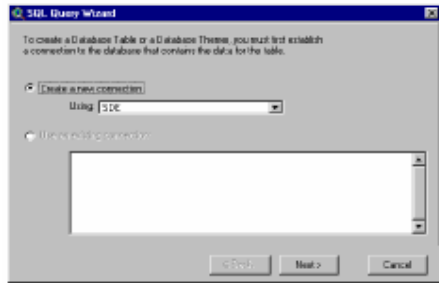
2.2.1 Load ArcView extensions

1. Make the Project window active.
2. From the File menu, choose Extensions.
3. Click the check box next to Database Access.
4. Click OK.

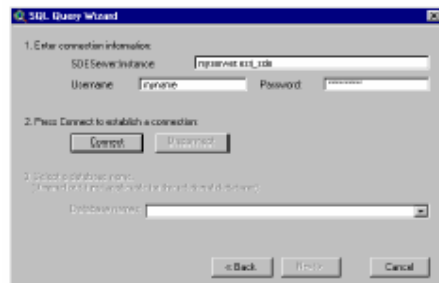
You'll create the map by adding the Malinau Research Forest site, rivers, roads, and villages together. The steps below show how to add simple database themes to your map.

2.2.2 Add simple database themes

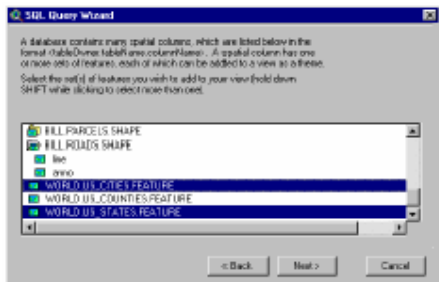
1. In the Project window, double-click on Views  to create a new map.
2. From the View menu, choose Add Database Theme. The SQL Query Wizard dialog appears. It will guide you through the steps of adding database themes to your map.
3. Click Create a new connection, then press Next.



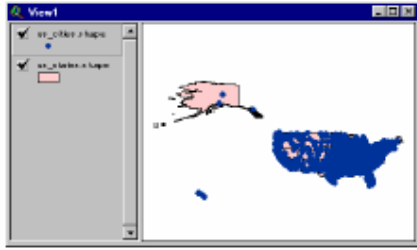
4. First, type the appropriate information into the Server: Instance, Username, and Password text boxes. (If you don't know what to type, read Appendix 1. Connections Properties.) Be careful when you type; SDE is case sensitive with these text strings. Second, click Connect. When the Connect button is dimmed out, you've successfully connected to the SDE server. Third, choose the database containing the Malinau Research Forest site, rivers, roads, and villages data. Continue by pressing Next.




5. Choose the cifor_mrf_site, cifor_malinau_rivers, cifor_malinau_roads_v3, and cifor_malinau_villages spatial columns from the list (hold down SHIFT and click on them). The list won't show the names "cifor_mrf_site", "cifor_malinau_rivers," "cifor_malinau_roads_v3", and "cifor_malinau_villages". The cifor_mrf_site spatial column will look something like "workshop.gisuser.cifor_mrf_site.shape". In this example, the user "gisuser" owns the table "cifor_mrf_site", which has a spatial column called "shape". Continue by pressing Next.




6. Click Create a theme(s) from the selected set(s) of features, and then press Finish. Your map now contains four database themes, which are named for their spatial column.
7. Draw the themes by clicking the check box next to the theme names in the map's Table of Contents. Make sure that the themes orders are villages, roads, rivers, and mrf_site. You can change the order by dragging themes up or down in the Table of Contents.



8. Change the names of the themes to Villages, Roads, Rivers, and Malinau Research Forest respectively. First, make the theme active by clicking on its name in the map's Table of Contents, and then click the Theme Properties button . In the Theme Name text box, type the appropriate name. Click OK.



2.2.3 Identify a feature in a map

1. Make the theme whose features you want to identify active by clicking on its name in the map's Table of Contents.
2. Click the Identify tool .
3. Click on one of the features you want to identify. The feature you click on flashes in the map, and its attributes appear in the Identify Results dialog.

Now that the map contains the required data, start customizing the way it looks. You can change the colors of the themes, the map's projection, and the themes' display properties.

The theme's colors were randomly assigned when the themes were created. To change their colors, use the Legend Editor.

2.2.4 Change the color of a theme

1. Make Villages, Roads, Rivers, and Malinau Research Forest themes active by holding down the SHIFT key while clicking on their names in the map's Table of Contents.
2. Click the Legend Editor button .
3. Choose a theme's name from the Theme drop-down list.
4. Double-click the symbol to display the Symbol Window.
5. In the Symbol window, click the Color button  to display the Color Palette.
6. In the Color Palette, click the color you want to use for the theme.
7. Click Apply in the Legend Editor.
8. Repeat steps 3–7 for the other themes in the Theme drop-down list.
9. Close the Legend Editor and the Symbol Window.

2.2.5 Save your work

1. From the Window menu, choose Untitled to make the Project window active.
2. From the File menu, choose Save Project.
3. In the dialog that appears, specify a name (e.g., GIS Workshop) and location for the new project file, then click OK. ArcView will automatically add the .apr extension to the name you gave for the new project file.

When you save your project, ArcView doesn't store the theme's values in the project; it stores the query used to get the values from the database. If you close your project now and open it again later, you will be prompted to log in. When you do, ArcView will re-establish its connection to the database and retrieve the shapes and values for the themes in your map.

3 ArcCatalog

3.1 Introducing ArcCatalog

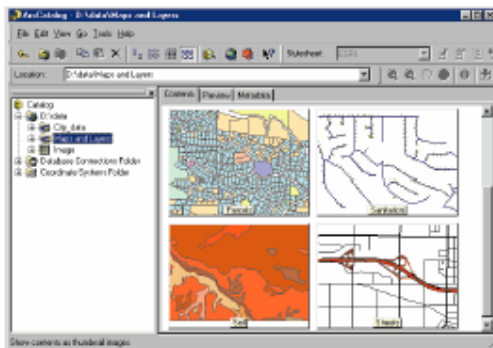
ESRI® ArcCatalog software makes accessing and managing geographic data easy. First, you add connections to the geographic data you work with to the Catalog. You can connect to folders on local disks, to shared folders and databases that are available on the network, or to Internet map servers.

After building your Catalog, you can search for the data you need and explore the search results using the different views that are available. In ArcCatalog, you can work with all data the same way regardless of the format in which it is stored. Several tools are also available to help you organize and maintain your data. For a cartographer, it's never been easier to ensure you're adding the right data to your maps. And, whether you're an analyst managing your personal data holdings or an administrator managing those of a large organization, ArcCatalog simplifies the job.

3.1.1 What can you do with ArcCatalog?

Browse for maps and data

Select a folder, database, or Internet server in the Catalog tree, and then examine the list of geographic data it contains in the Contents tab. You can change the appearance of the Contents list using buttons on the Standard toolbar. Switch your view from large icons to small icons, or list properties and metadata for each item to help you decide which is the right one to use. Thumbnail view lists snapshots illustrating the geographic data contained in each item in the folder, database, or Internet server.



Thumbnails provide an overview of data in the selected folder.

Explore the data

Thumbnails give you a quick look at the contents of an item, but you may want to check whether or not a specific feature in coverage has been updated. Select an item that contains data in the Catalog tree and then examine its data using the Preview tab.

Look at geographic data with Geography view. Buttons and tools on the Geography toolbar let you zoom and pan to explore the features in a computer aided design (CAD) drawing, cells in a raster, or triangles in a triangulated irregular network (TIN). The Identify tool lets you click a feature, cell, or triangle and see its attributes.

ArcCatalog comes with a metadata editor that you can use to document your data. The Catalog will fill in as much information as it can using the data's properties. When the data changes for example, when a new attribute has been added the next time you look at the metadata the Catalog automatically updates it with the new information. Metadata is an integral part of the data and will follow when the data is copied or moved to a new location.

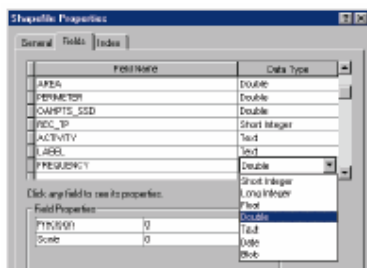
Use data in ArcMap and ArcToolbox

After finding the map you want to use, double-click it to open it in ArcMap. Add data to the map by dragging it from the Catalog for example, dragging it from your search results and dropping it on the map. In addition to creating printed maps, ArcMap is where you go to edit geographic and tabular data.

Instead of adding the data to a map, you may want to convert the data you've found to a different format or buffer its contents. After opening a geoprocessing tool or wizard in ArcToolbox, you can drag the data source from the Catalog and drop it onto the tool. The Toolbox automatically fills in as many options in the tool as possible. If you use a group of tools frequently, you can customize ArcCatalog by creating a new toolbar and adding these tools to it for quick access.

Manage data sources

After looking at the contents of a data source and reviewing its metadata, you might want to modify it to better suit your needs. You can manage the structure of a data source using the Properties dialog box. For example, the Properties dialog box can be used to define a shapefile's coordinate system, generate a coverage's topology, or add an attribute to a table. You can also create a relationship class that defines the relationships between the features in coverages and attributes in INFO tables.



Add an attribute to a shapefile.

The Catalog makes it easy to organize your data. Delete a coverage by pressing the Delete key on your keyboard. Rename shapefiles and copy tables to another geodatabase just as you would rename and copy files with Windows ® Explorer. ArcCatalog makes it easy to start consolidating your spatial data into a coherent library that's distributed across the network.

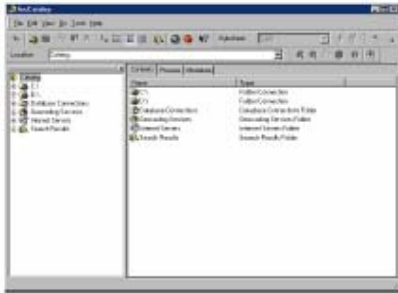
If you're a data administrator, the Catalog can help you create an environment in which geographic data can be easily used by everyone in your organization. Layers include a shortcut to the data and additional information such as symbology, percent transparency, queries that select specific features, and joins or relates that link attributes in external tables to the spatial data. You can create layers in ArcCatalog and place them in a shared folder on the network where everyone can access them. Others can add those layers to maps without having to know how to access the database, how to classify data, or even the format in which the data is stored.

Similarly, you can customize metadata in the Catalog to include information that's specific to your organization such as whether or not new coverages have passed quality assurance tests. You can also customize how metadata is displayed so the right information is presented to the right people in your organization.

Overall, ArcCatalog will revolutionize how you do your work. It makes accessing and managing geographic data so easy that before long it will be a constant companion on your desktop.

3.1.2 What's in the Catalog?

On the left of the ArcCatalog window, you see the *Catalog tree*; it gives you a bird's-eye view of how your data is organized. On the right are tabs that let you explore the contents of the selected item in the Catalog tree.



The first time you start ArcCatalog, it contains *folder connections* that let you access your computer's hard disks. The Catalog also contains folders that let you create and store connections to databases and Internet servers and manage geocoding services and search results.

A screenshot of the 'Contents' tab in ArcCatalog. It shows a table with two columns: 'Name' and 'Type'. The table lists several items with their respective icons and types.

Name	Type
CA	Folder Connection
CA	Folder Connection
Database Connections	Database Connections Folder
Geocoding Services	Geocoding Services Folder
Internet Servers	Internet Servers Folder
Search Results	Search Results Folder

When you select a connection, you can access the data to which it's linked. Folder connections let you access *folders*, or directories, on local disks or shared folders on the network. Database connections let you access the contents of a database. When you remove folder or database connections from the Catalog, you are only removing the connection, not deleting the data.

Together, your connections create a catalog of geographic *data sources*. Individual folders and data sources are *items* in that catalog. If you use ArcInfo Workstation, you're accustomed to using the term "item" when referring to a coverage's attributes; in this book, "item" refers only to an element in the Catalog tree.

The Contents tab

When you select items such as folders or geodatabases in the Catalog tree, the Contents tab lists the items they contain. To change the appearance of the Contents list, use the appropriate buttons on the Standard toolbar.



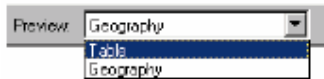
Large Icons view represents each item in the list with a large icon. List view uses small icons. Details view shows properties of each item in columns; you can sort the list by the property

values. Thumbnails view displays a snapshot for each item in the list, providing a quick illustration of the item's geographic data.

Items such as maps, shapefiles, and tables don't contain other items. When you select them in the tree, the Contents tab lists the item's properties and its thumbnail. Thumbnails give you a quick look at an item's geographic data; they're useful when browsing through folders. However, you must often see the data in more detail to determine whether or not you want to use it.

The Preview tab

The Preview tab lets you explore the selected item's data in either Geography or Table view. For items containing both geographic data and tabular attributes, you can toggle between the Geography and Table views using the dropdown list at the bottom of the Preview tab.



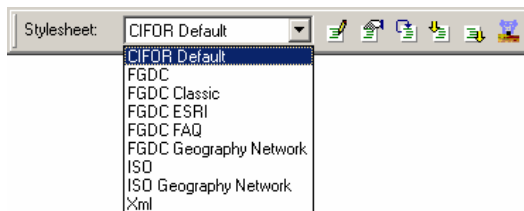
Geography view draws each feature in a vector dataset, each cell in a raster dataset, and each triangle in a TIN dataset. When drawing geographic data, the Catalog uses a default set of symbology. When drawing a layer's contents, the Catalog uses the symbology stored in the layer. You can explore the selected items geographic data using the buttons on the Geography toolbar.

Table view draws all rows and columns and the value for each cell in the selected item's table. You can explore the values in the table using the scroll bars, the buttons at the bottom of the table, and the context menus that are available from the column headings.

The Metadata tab

The Metadata tab shows descriptive information about the selected item in the Catalog tree. Metadata includes properties and documentation. Properties are derived from the data source, while documentation is information provided by a person.

Metadata is stored as *extensible markup language (XML)* data in a file with the data or in a geodatabase. The Catalog uses an *extensible stylesheet language (XSL)* stylesheet to transform the XML data into a *hypertext markup language (HTML)* page. You can change the metadata's appearance by changing the current stylesheet using the dropdown list on the Metadata toolbar. To use within CIFOR, we suggest you to use the CIFOR Default stylesheet.



You can browse through the available metadata just as you would browse through any Web page in a browser.

3.2 Building a catalog

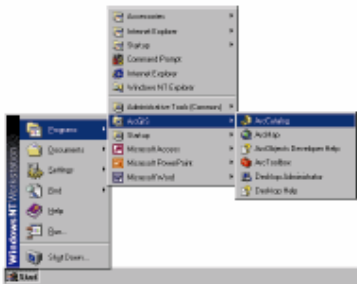
When you first open ArcCatalog, you see folder connections that let you access data on your computer's local disks. Often, however, the data you use isn't stored on your computer. You can build your own catalog of geographic data by connecting to other disks or folders on the network and adding connections to databases and Internet servers. You can also add file types and hide items that you don't need for the moment.

When all your data is in one place, you gain more than just an inventory. It becomes easier to find the data. And because you can work with all types of geographic data sources the same way, regardless of their format, your data becomes easier to manage.

Start ArcCatalog

To start ArcCatalog just simply use the following step.

1. Click the Start button on the Windows taskbar.
2. Point to Programs.
3. Point to ArcGIS.
4. Click ArcCatalog. The ArcCatalog window appears.



3.3 Adding folder connections

When you first start ArcCatalog, the Catalog tree has entries for your computer's hard disks. To access data stored on a CD, floppy disk, or another computer on the network, you must add connections to those locations. A folder connection can point to any folder to which you have access. If only one folder in your computer's C:\ drive, called "workshop_data", contains GIS data, you don't have to include the entire C:\ drive in the Catalog tree. Add a new connection that points directly to the C:\data folder, then remove the C:\ drive connection from the Catalog tree.

A quick way to do this is to drag the C:\workshop_data folder from the Contents tab and drop it on the Catalog at the top of the Catalog tree. To quickly connect to folders that aren't currently available in ArcCatalog, type the folder's path into the Location text box and press Enter. If a shared folder is unavailable on the network the next time you start ArcCatalog, a little red 'x' will appear on the folder connection's icon indicating that it is unavailable. The 'x' disappears when the connection is reestablished.

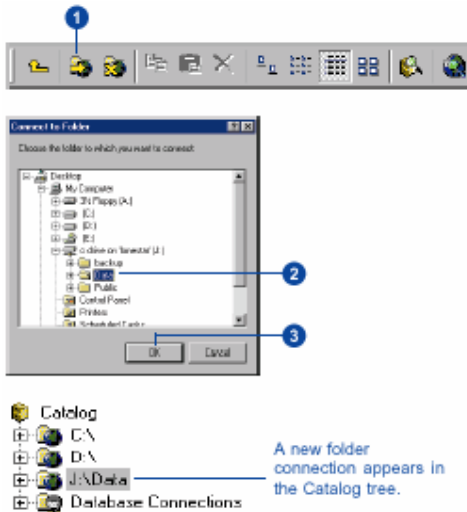
In **Exercise 2** you'll learn how to

- Connecting to a folder
- Disconnecting from a folder

Connecting to a folder

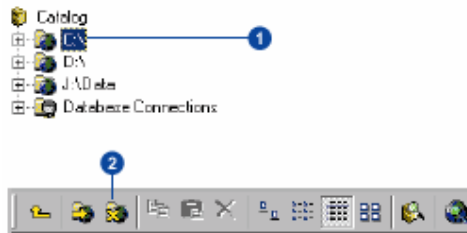
1. Click the Connect To Folder button.
2. Navigate to the "workshop_data" folder that you want to add to the Catalog.

3. Click OK. A new folder connection appears in the Catalog tree.



Disconnecting from a folder

1. Click the folder connection that you want to remove from the Catalog.
2. Click the Disconnect From Folder button. The folder connection is removed from the Catalog tree.



3.4 Adding and working with spatial database connections

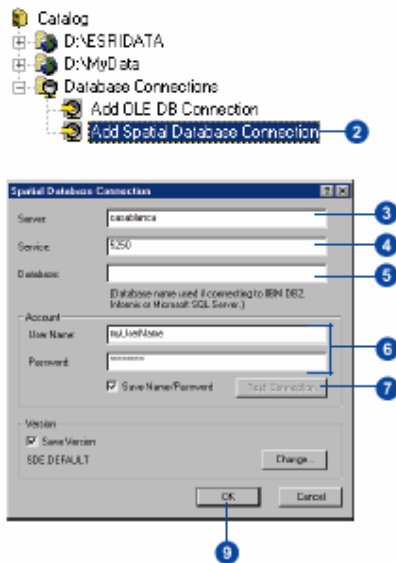
With ArcCatalog, you can explore and manage geographic data stored in an RDBMS through *ArcSDE*. Similarly, *SDE for Coverages* lets you access coverage, *ArcInfo LIBRARIAN*, and *ArcStorm* databases the same way you access data from an RDBMS. To access these spatial databases, you must add a connection to the Catalog.

You aren't required to type your username and password to create a connection; if you don't, you will be prompted to enter them when a connection is established. However, you can type your username and password and create a test connection if you're unsure whether the information you have is correct. If the connection test fails, contact the database administrator to ensure the database is operational. You can still add this connection to the Catalog but will be unable to retrieve data until the problem is resolved. After creating a test connection, uncheck *Save name and password* if you prefer not to save your login information as part of the connection. Choosing not to save login information as part of the connection can help maintain the security of the database. To make it easier to log in each time, create a connection for which you only have to enter your password each time; provide the server information and your username, then click **OK**.

To understand how to connecting and working with spatial database try **Exercise 3** below.

Connecting to a spatial database

1. Click the Database Connections folder in the Catalog tree.
2. Double-click Add Spatial Database Connection.
3. Type the name or IP address of the server to which you want to connect. (Please refer to **Appendix I** for the connection properties)
4. Type the name or port number of the service to which you want to connect.
5. If the data is stored in a Sybase®, SQL Server™, IBM DB2, or Informix RDBMS, type the name of the data-base to which you want to connect. If the data is stored in another RDBMS, skip this step.
6. Type your username and password for accessing the data.
7. Click Test Connection. If the test was successful, the button becomes unavailable. If the test fails, you won't be able to retrieve data until you've provided the correct information or the database problem has been resolved.
8. Uncheck Save Name/ Password if you don't want this information saved with the connection.
9. Click OK.
10. Type a new name for the database connection.
11. Press Enter.



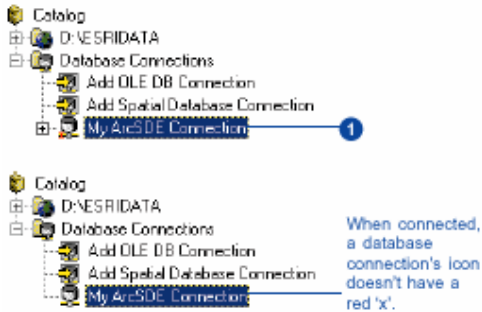
Working with database connections

Database connections are either connected or disconnected. All connections are disconnected when you start ArcCatalog. The first time a connection is selected, the Catalog attempts to connect to the database. If your login or version information isn't saved with the connection, you'll be prompted for it. When a connection is established, you can access the database's contents. Database connections remain connected until ArcCatalog is closed or you can disconnect manually. You could make a local copy of the data and disconnect before editing it onsite. The strategy you choose for connecting and disconnecting affects the number of licenses available to others who must access the database.

If the database is moved to a new computer, or the usernames and passwords for accessing its contents change, you must update your database connections, as well as the source information for layers that access data in that database, with the new connection information.

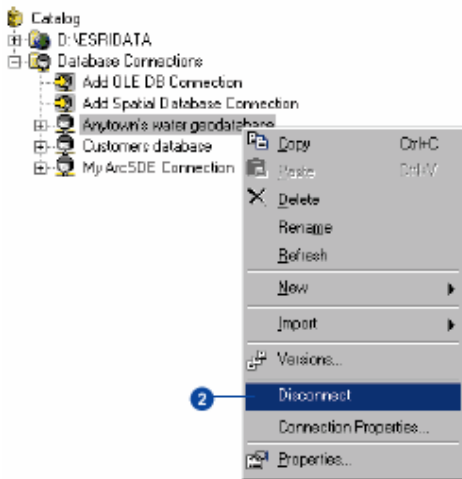
1. Click the database connection you want to use.

2. If your login information isn't saved with the database connection, a login dialog box will appear. Type the required information, and then click OK. The red 'x' disappears from the database connection's icon.



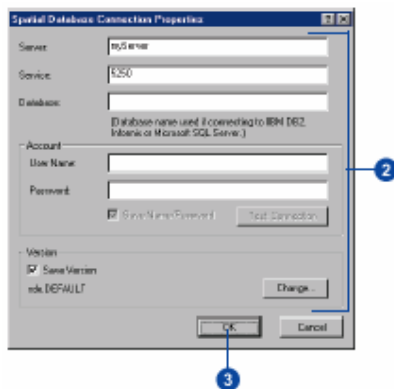
Disconnecting from a database

1. Right-click the database connection that you want to disconnect.
2. Click Disconnect. A red 'x' appears on the database connection's icon.



Repairing a database connection

1. Right-click the database connection you want to fix and click Connection Properties. The appropriate dialog box appears for spatial or OLE DB database connections.
2. Change the connection properties. For example, change your username and password.
3. Click OK.



4 Working with metadata

4.1 What is metadata?

Metadata is information that describes your data in the same way a card in a library's card catalog describes a book. After you create new data, you should create metadata to document its contents. When detailed metadata has been created, it can answer your questions and help you make decisions. For example, it can help you determine when your data is out of date, what map scale is appropriate for presenting your data, or how accurate your data is and therefore how much confidence you can have in your conclusions.

Any item in the Catalog, including folders and file types such as Word documents, can have metadata. With the Catalog's default settings, all you have to do to create metadata is click the item in the Catalog tree and click the Metadata tab the Catalog both creates metadata and records the item's properties within it. Once created, metadata is copied, moved, and deleted along with the data source when it is managed with ArcCatalog or ArcInfo Workstation.

4.1.1 Metadata in ArcCatalog

Metadata in ArcCatalog consists of properties and documentation. *Properties*, such as the extent of a shapefile's features, are derived from the item itself. *Documentation* is descriptive information supplied by a person.

By default, when you attempt to view an item's metadata, ArcCatalog will create it automatically if metadata doesn't already exist; it will then add many of the item's properties to it. Hints about the documentation you should provide are also added. Once created, metadata becomes part of the item itself. It is automatically moved, copied, and deleted along with the item.

Every time you view the metadata, the Catalog automatically updates the properties recorded in it with current values. This ensures that the metadata is kept up to date with changes to the data source. For example, the extent and count of a shapefile's features will be current when you look at its metadata, even if new features were recently added.

If you want more control over when metadata is created and updated, you have a few choices. You can turn off automatic updates for individual items for example, after they have been published. Then, you can choose to create and update metadata manually by clicking the Create/Update Metadata button on the Metadata toolbar.

4.1.2 Writing documentation

Documenting your data protects your organization's investment in that data. Without knowledge of the data's accuracy, provenance, and age, you can't have a high level of confidence in decisions based on that data. Creating detailed metadata describing these qualities ensures that you can continue to use your data and make decisions based on it.

In its simplest form, documentation might be a few lines in a text file. While better than nothing, this type of documentation may only be useful to the person who created it. For example, steps in the processing history may be omitted because they seemed obvious at the time. It is important that other people clearly understand your documentation particularly information describing how your data should and should not be used.

Because errors of omission and misinterpretation can be costly, efforts have been made to create standards for documenting spatial data. Standards range from simple to complex. Different states and countries have created their own standards to try to simplify and clarify the information that should be recorded. However, the proliferation of standards has caused confusion.

Fortunately, the *International Standards Organization (ISO)* is creating a unified content standard. With a common standard it will be easier for those within an organization, as well as the GIS community as a whole, to create and use metadata.

Simply because so many different standards exist, metadata in ArcCatalog isn't required to meet any specific one. However, standards can be enforced by a metadata editor. The metadata editor provided with the Catalog lets you document your data following the *FGDC* standard. If you complete the documentation suggested by the Catalog's hints, your metadata will satisfy the FGDC standard's minimum requirements.

4.1.3 How metadata is stored

Metadata created with ArcCatalog is stored as XML data either in a file alongside the item or within its geodatabase. XML is a markup language similar to HTML. HTML defines both the data and how it's presented. XML, on the other hand, lets you define data using tags that add meaning.

Stylesheets define how XML data is presented. They are created using XSL. XSL elements query and evaluate XML data. A stylesheet retrieves specific values from an XML document, formats them, and then defines how they are presented. ArcCatalog stylesheets generate HTML pages from XML data. Therefore, you can interact with metadata as you would interact with any HTML page in a browser.

Because the presentation information is stored separately, you can change the metadata's appearance using different stylesheets. To change the stylesheet that is currently being used to transform the metadata, simply click a different stylesheet from the dropdown list in the Metadata toolbar.

4.2 Creating metadata

By default, metadata is automatically created or updated when you view it in the Metadata tab. However, you can choose to create and update all metadata manually. When you change these settings in the Options tab, it affects how metadata is handled for all items in the Catalog. You can turn off automatic updates for specific items using the Metadata Properties dialog box. You might do this after completing and publishing their metadata so it is not accidentally changed later.

You can manually update an item's metadata at any time by clicking the Create/Update Metadata button on the Metadata toolbar. Suppose that while you are viewing an item's metadata, you modify its properties. Click the Create/Update Metadata button to have those changes reflected in the metadata.

Exercise 4 will show you step by step on how to:

- Create an Update metadata manually
- Add documentation
- Import and export metadata
- Publish your metadata into an ArcIMS metadata server

Creating and updating metadata manually

1. In the Catalog tree, click the item whose metadata you want to create or update.
2. Click the Metadata tab.
3. Click the Create/Update Metadata button on the Metadata toolbar.



4.3 Editing metadata

Your Catalog has been installed with a CIFOR Metadata Editor. To start using the CIFOR Metadata Editor, click the CIFOR Metadata Editor button on the Metadata toolbar. If you want to use other metadata editor, you just simply change your option on the Options dialog box. Although you can only use one at a time, you can use different editors to document your data. Because metadata for coverages, shapefiles, and other file-based data sources is stored as XML files on disk.

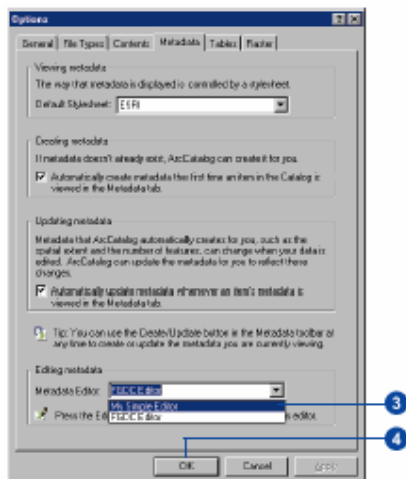
Adding documentation

1. Click the item whose metadata you want to edit in the Catalog tree.
2. Click the Metadata tab.
3. Click the CIFOR Metadata Editor button on the Metadata toolbar.
4. Document your data using the metadata editor.
5. Close the metadata editor.



Choosing a metadata editor

1. Click the Tools menu and click Options.
2. Click the Metadata tab.
3. Click the Metadata Editor dropdown arrow and click the editor you want to use.
4. Click OK.



4.4 Importing and exporting metadata

While you can create metadata in ArcCatalog, you may already have metadata that was created with another metadata tool. If it's stored in the text, XML, or SGML format defined by the FGDC's metadata parser utility, mp, you can import that metadata. ArcCatalog uses mp itself to import and export metadata in its supported formats; these are the FGDC CSDGM formats in the Format list. The XML format can be used to import metadata that was created with ArcCatalog. Importing overwrites all of an item's existing metadata.

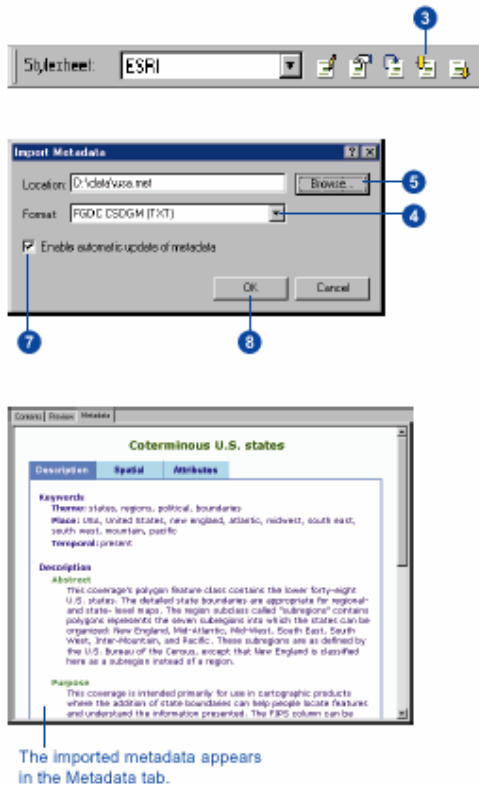
Suppose you import metadata created with another application. By default, ArcCatalog updates as many metadata elements as possible with current values derived from the item such as the extent and coordinate system of its data. These values will be updated automatically every time you view the metadata. However, if you uncheck Enable automatic update of metadata, ArcCatalog won't overwrite any existing values

You might export metadata that is maintained by ArcCatalog to publish it on the Nadirs geospatial data clearinghouse. When exported to the FGDC CSDGM formats, the elements defined in the ESRI profile are excluded. Because ArcCatalog uses mp to create the resulting files, they can be posted directly on the clearinghouse. Exporting to the format "HTML" creates a file that represents the selected item's metadata exactly as you see it in the Metadata tab. The format "XML" creates a copy of the item's metadata in a new XML file. This lets you work with metadata for geodatabase items outside ArcCatalog.

If your organization has defined its own metadata standard or a metadata database, you can create custom importers and exporters that translate between the Catalog's XML and your custom format. You may want to do this if you want the Catalog to automatically maintain the metadata, but other applications require metadata in your format. Once registered with the Catalog, your importer or exporter will appear in the list in the Import or Export dialog box.

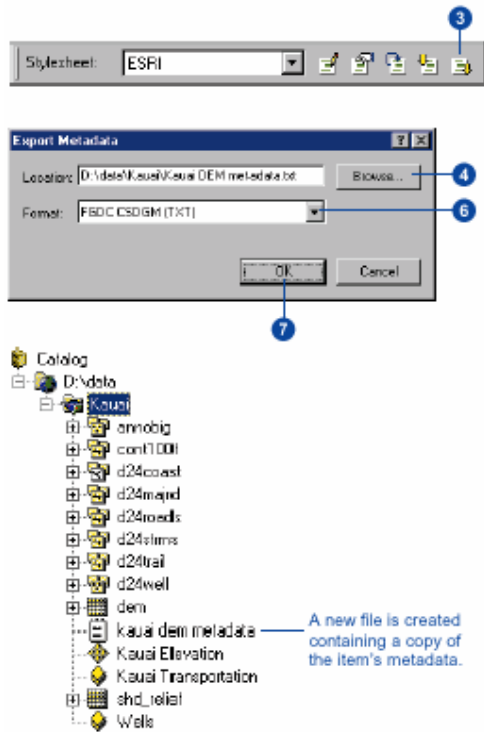
Importing metadata

1. In the Catalog tree, click the item for which you want to import metadata.
2. Click the Metadata tab.
3. Click the Import Metadata button on the Metadata toolbar.
4. Click the Format dropdown arrow and click the format of the metadata that you will be importing.
5. Click the Browse button.
6. Navigate to and click the metadata file whose contents you want to import. Click Open.
7. If you don't want ArcCatalog to update the metadata with the current properties of the data, uncheck Enable automatic update of metadata.
8. Click OK. The imported metadata appears in the Metadata tab.



Exporting metadata

1. In the Catalog tree, click the item for which you want to export metadata.
2. Click the Metadata tab.
3. Click the Export Metadata button on the Metadata toolbar.
4. Click the Browse button.
5. Navigate to the folder in which the exported metadata should reside, type a name for the new metadata file, and then click Save.
6. Click the Format dropdown arrow and click the format in which you want to export the metadata.
7. Click OK. A new file containing a copy of the item's metadata is created in the appropriate format.



4.5 Publishing metadata to an ArcIMS metadata service

Anyone can publish an item's metadata as well as individual XML documents to any ArcIMS metadata service as long as they have permission to do so. However, for administration reasons, please contact GIS Unit to assist you in publishing metadata to an ArcIMS metadata service.

5 Forest Spatial Information Catalog (FSIC)

If you know something about the data you are looking for, but you do not know where it is located, FSIC can help. The [Forest Spatial Information Catalog \(FSIC\)](#) is a tool for searching and browsing the contents of a metadata service. FSIC uses metadata to evaluate whether a data source satisfies your criteria. Having excellent documentation will be essential for people to be able to find the data they need. This is when metadata is especially important.

Its architecture includes components for metadata generation (based on the FGDC standard), OpenGIS compliant Web Mapping and client side metadata searching and retrieving. The entire content of the database has been made available to authorized users; the searching and viewing of the metadata is open to everyone.

It is provide with two ways of spatial data querying. First by typing one or more keywords on the search page and second by interactively selecting an area on the map. You can also use the “Advanced Search” to narrow your focus when searching for a catalog.

For more information on FSIC, please visit FSIC at <http://gislab.cifor.cgiar.org>

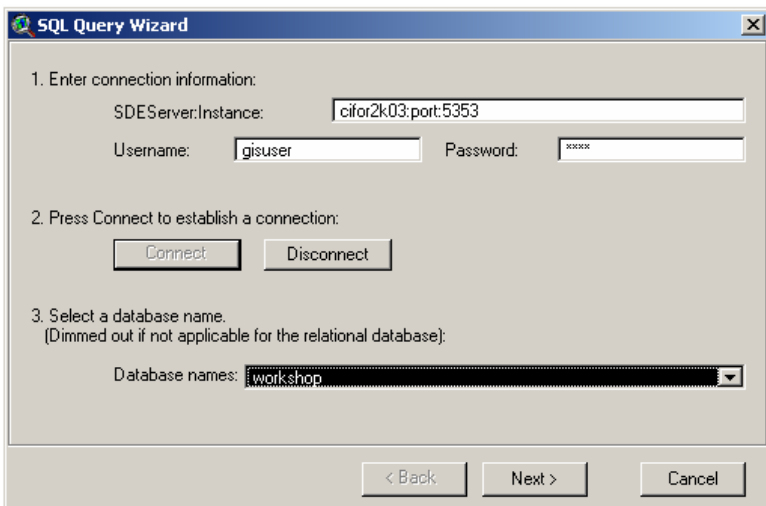
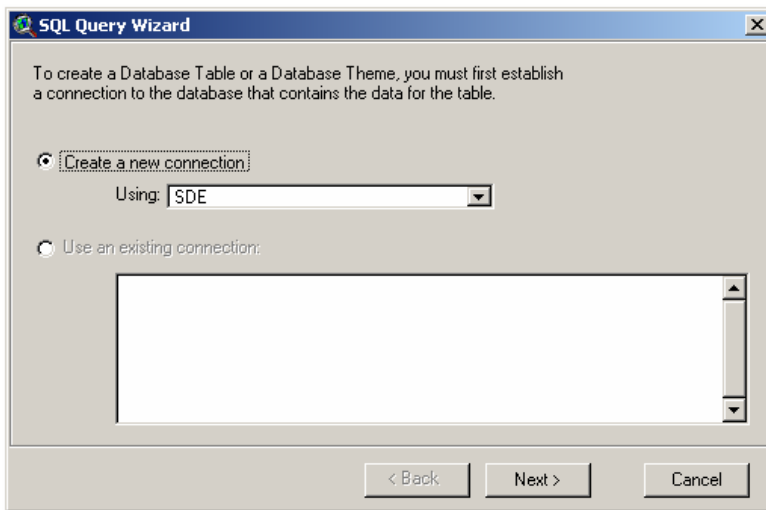
Appendix I. Connection Properties

For ArcView Database Access

Create a new connection
Using: **SDE**

Enter connection information
SDE Server:Instance: **cifor2k03:port:5353**
Username: **gisuser** Password: **topo**

Select a database name.
Database names: **workshop**



In ArcCatalog

Server: **cifor2k03**
Service: **port:5353**
Database: **workshop**
Account
User Name: **gisuser**
Password: **topo**

The screenshot shows the 'Spatial Database Connection' dialog box. It has a title bar with a question mark and a close button. The main area contains several input fields and checkboxes. The 'Server' field is 'cifor2k03', 'Service' is 'port:5353', and 'Database' is 'workshop'. Below the database field is the text '(If supported by your DBMS)'. The 'Account' section has 'User Name' as 'gisuser' and 'Password' as 'xxxx'. There is a checked checkbox for 'Save Name/Password' and a 'Test Connection' button. The 'Version' section has a checked checkbox for 'Save Version' and the text 'sde.DEFAULT' with a 'Change...' button. At the bottom are 'OK' and 'Cancel' buttons.

Appendix II. Workshop Group

Group I

1. Atiek Widayati
2. Agus Salim
3. Meilinda Wan
4. Sonya Dewi
5. Levania Santoso
6. Tini Gumartini (Leave for Field Trip)
7. Danan Hadi Prasetyo
8. Haris Iskandar
9. Herry Purnomo (Meeting)
10. Iwan Kurniawan
11. Jusupta Tarigan
12. Hety Herawati

Group II

13. Ronny Syam
14. Yuan Octavian
15. Imam Basuki
16. Miriam Van Heist
17. Wil de Jong
18. Brian Belcher
19. Andree Ekadinata
20. Heru Komarudin
21. Hari Priyadi
22. Yulia Siagian (Change to Group I)
23. Nining Liswanti (Change to Group I)

Appendix III. Workshop Schedule

Group I

08.15 – 08.30 Introduction

08.30 – 09.30 ArcView Database Access

- Introduction to ArcView Database Access.
- Make a map and add simple database themes

09.30 – 10.30 ArcCatalog

- Introduction to ArcCatalog
- Building a catalog
- Adding folder connections
- Adding and working with spatial database connections

10.30 – 11.30 Metadata

- What is metadata?
- Creating metadata
- Editing metadata
- Importing and exporting metadata
- Publishing metadata to an ArcIMS metadata service

11.30 – 11.45 Forest Spatial Information Catalog (FSIC)

- Demonstration of FSIC

Group II

13.15 – 13.30 Introduction

13.30 – 14.30 ArcView Database Access

- Introduction to ArcView Database Access.
- Make a map and add simple database themes

14.30 – 15.30 ArcCatalog

- Introduction to ArcCatalog
- Building a catalog
- Adding folder connections
- Adding and working with spatial database connections

15.30 – 16.30 Metadata

- What is metadata?
- Creating metadata
- Editing metadata
- Importing and exporting metadata
- Publishing metadata to an ArcIMS metadata service

16.30 – 16.45 Forest Spatial Information Catalog (FSIC)

- Demonstration of FSIC