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Database Component

**BUILT STRUCTURES DATABASE
USERS MANUAL**

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1. INTRODUCTION

The Built Structures database "BSData" contains data on man-made hydraulic structures on the Tonle Sap catchment. The structures are classified according to the intended use. For each structure position, extent and structure attributes such as structure height and construction material are stored.

Classification of structures

The structures are classified for eight higher level classes that may have one or more subclasses. The detailed classification can be found in the technical documentation.

The main classes are:

1. Storages (e.g. reservoirs)
2. Flow routes (e.g. canals)
3. Flow controls (e.g. dams, gates)
4. Fish and aquaculture (e.g. dai fisheries)
5. Erosion prevention (e.g. ripraps)
6. Agriculture (e.g. irrigated areas)
7. Transportation (e.g. docs and harbours)
8. Discharge (e.g. sewage outlets, mines)

Database access

The database can be accessed using three methods (see Figure 1.1):

1. Standard SQL tools (MySQL)
2. Local database access
3. Internet access interface

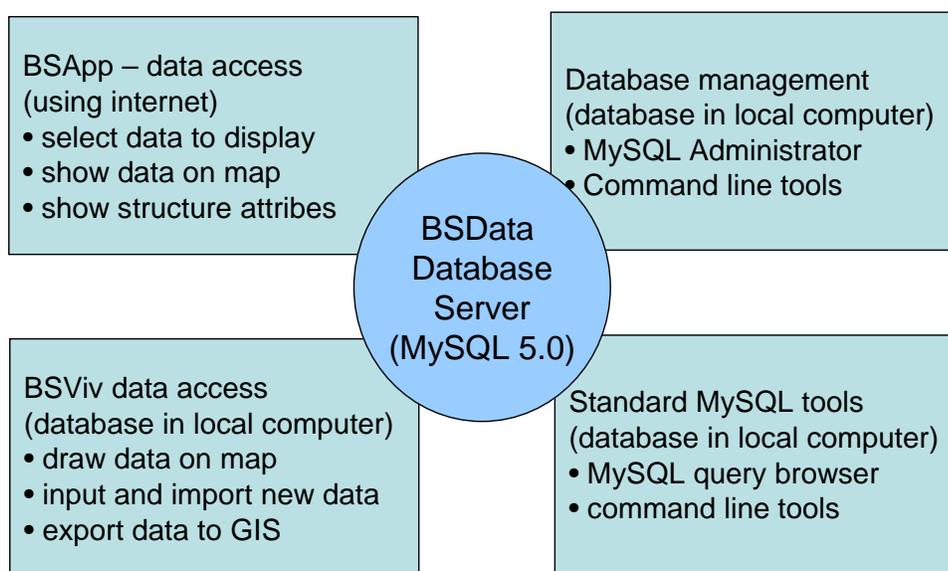


Figure 1.1: Database access and management tools

The standard MySQL tools are:

- a. MySQL database server (version 5.0. community edition)
- b. MySQL Query browser (version 1.1.20)
- c. MySQL Administrator (version 1.1.9)

The MySQL database server stores the database data and provides database services to client applications. The Query browser is an interactive tool that can be used to view and modify the data in the database in the computer that contains the database. Remote access is also possible. Use of the tool requires knowledge of SQL. The Administrator tool is used to manage the database server, for example, create new users and create data backups. The programs are available at the MySQL www-site www.mysql.com free of charge.

Please see the technical documentation on database structure. Chapter 1, "Setting up the database", explains how to set up the database and access it using Query Browser.

The Local database access tool "BSViv" can be used to view, add, and modify structure data on map-based windows applications. Also, importing and exporting to and from ESRI shape files is possible if larger amounts of structure data need to be moved to or from a GIS system. See Chapter 3 below on how to set up and use this application.

The Internet access interface "BSApp" can be used to view database data remotely using an Internet browser. In order to use this access method, a www-browser installation of the database system needs to be set up. See Chapter 4 below on how to setup and use this system.

Database management, such as adding users and backing up data, can be done using Database standard tools. Some tasks can be done using the "BSViv" applications. See Chapter 5 on database administration and updating.

2. SETTING UP THE BSDATA DATABASE

Running environment

The database system works on PC computers using Windows 2000/XP operating systems. About 150 Mb of disk space is needed to set up the system. Software installation packages can be found on the distribution CD.

Setting up database for local use

To set up the BSData database the following software needs to be installed:

1. MySQL database server (version 5.0.21)
2. MySQL Query Browser (version 1.1.20)
3. BSViv application (version 1.0)
4. FWTools toolset (version 1.1.0)

Detailed installation instructions for the MySQL database server can be found on the MySQL www-site (www.mysql.com). The following instance configuration options seem to work quite well:

- Developer machine
- Multifunctional database
- Tablespace in C: disk and "Installation Path"
- Number of concurrent connections 15 (Manual setting)
- Enable TCP/IP networking (also configure your Firewall, so that access to port 3306 is allowed from localhost ip-address 127.0.0.1 only)
- Standard character set

- Set password to 'tietoa'. If you change this the password in the BSViv application must be changed as well. See below.

To install the Query Browser, BSViv application and FWTools just run the corresponding installation files "mysql-query-browser-1.1.20-win.msi", "BSVivSetup.exe" and "FWTools100.exe". Please use the default installation directories. The database data is in the BSViv setup.

After the database server is installed and working, the database data needs to be imported. This can be done using the BSViv application, or by using MySQL command line client.

If you are using the BSViv, do the following:

- Start the BSViv application (Windows "Start" menu)
- If you changed the database root password, select the Database/Connection setup from the main menu and type in the new password to dbpasswd-field.
- To create to database select the "Database/Create bs0 database" menu item. If the database already exists, this will return an error.
- To import data to the database select the "Database/Import dump file" menu item, then select "bs0dump.sql" from the file list, and click "Open". The dump file is located in "C:\Program Files\BS\bsdb directory".

If you like to use MySQL command line, do as follows:

- Start MySQL command line (from Windows "Start" menu)
- create the database by typing "create database bs0;", then press <Enter>
- import data by typing "source C:/Program Files/BS/bsdb/bs0dump.sql;".

Setting up database remote access

There are two possibilities for accessing the database remotely:

- Access through IP-port 3306, using BSViv and Query Browser.
- Access using www-browser and BSApp

First, access to the database server can be opened to selected remote computers, by configuring the firewall of the server computer to allow access to IP-port 3306 from the remote computers. Note that access to port 3306 should be allowed for friendly ip-addresses only. In this case the BSViv and Query Browser can be used to access the database. Just configure the database server to the remote server computer.

The second way is to set up remote access using a www-server and the BSApp data browsing program. This configuration allows access to anyone with an Internet browser, and knowledge of the correct userid and password.

To setup remote internet access the following software needs to be installed (in addition to the local database installation):

- Apache 2.2.2 www-server
- BSApp www-pages and cgi-program.

The Apache www-server setup is on the distribution CD. The latest version can be downloaded from <http://www.apache.org>.

The BSApp system setup can be done by running the BSAppSetup program from the distribution disk. The setup program will put the BSApp www-pages to directory c:\bs\www by default. In addition to running the setup program following task need to be done:

- Set up network access userids for the MySQL database by running the "bsdb/bs0users.sql" macro using the BSViv "Run SQL macro" command.
- Modify Apache configuration file so that it works with BSApp. After installing the BSApp, an example configuration file "httpd.conf" can be found from the wwwconf-directory. To setup the default configuration for Apache, with local www-server access only, copy the provided example configuration file to Apache configuration directory (typically "C:\Program files\Apache Group\Apache2\conf"). Note that Apache must be restarted after the configuration has been changed. To modify the file by hand, "Includes" must be allowed for bs directory, and "bs/cgi-bin" directory must be defined to contain script files. See the provided "httpd.conf" file for details.

3. USING BSVIV TO ACCESS BSDATA LOCALLY

The BSViv program is used to access BSData locally; that is, the database server containing the data is in the same computer. The program can be configured to access data in remote servers as well.

The BSViv can be used for the following tasks:

- querying database data by class, and showing the results on the map
- moving data from an ESRI shapefile to the BSData database
- exporting data from the BSData database to a shapefile
- modifying single structure attributes
- adding and removing single structures from the database
- importing photos to the database
- modifying class related database data
- creating a database dump file and importing all data from an existing dump file
- creating a database report of the number of structures in each class.

Installation and starting the program

To install the BSViv application, see chapter 2, Setting up the database for local use. The installation program creates a start-menu item "BSViv", that is used to start the program. To start the system from command line, move to the installation directory ("C:\Program Files\BS\viv") and give command "C:\Program Files\BS\viv\viv bs.ip".

Main window, tools and main menu

The BSViv main window displays a menu, toolbar, data layer list, and map window workspace typically containing a single map window.

The top part of the window holds the main menu and toolbar. Main menu commands are used to initiate actions such as querying of the database. Toolbar tools are used to zoom and pan the map window, and select, add and remove structures from the data layers.

The map window displays some base map data (catchment boundaries and main rivers) from which database structure data is drawn. The data in the map window is divided into layers that are listed in the layer list. The map window can be zoomed and panned using the toolbar tools. The UTM coordinates of the current mouse location are shown on the toolbar as well.

On the left side of the window is the layer list containing a list of data layers shown in the map window. A data layer can hold data for one class of structures only. Many

data layers can be shown at the same time. Some actions require selecting a data layer from the layer list. This can be done simply by clicking the layer name in the layer list. Clicking a layer name with the right mouse button causes a popup menu to appear. By using this menu the layers can be rearranged or completely removed.

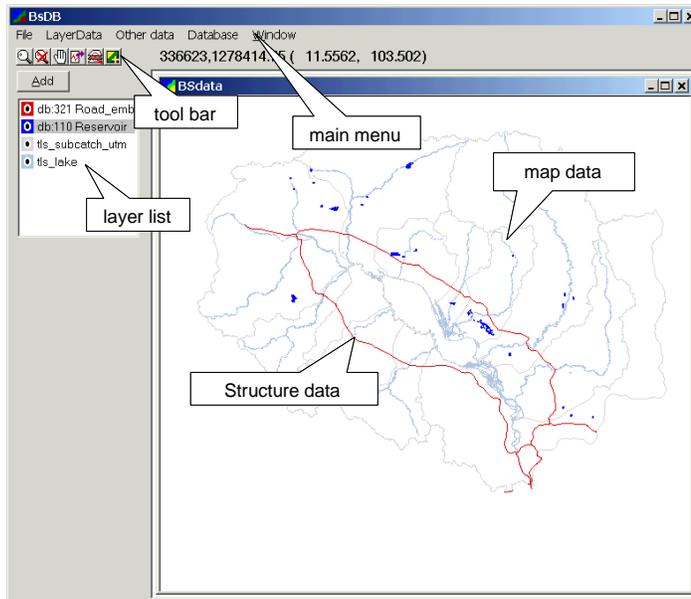


Figure 3.1: BSViv main window

The toolbar has the following tools:

	Zoom in by dragging a rectangle to a model window
	Zoom back to previous zoom setting
	Pan by dragging the mouse
	Copy window contents to the clipboard as a Metafile
	Zoom to selected layer boundaries
	Add a new structure to the selected data layer
X,Y (Lat,Lon)	Current mouse position coordinates: UTM-East,UTM-North, (latitude, longitude) Units: meters and decimal degrees

The main menu has the following commands:

File menu	
New	Create a new map window
Run SQL command	Run a SQL command
Run SQL macro	Select a SQL macro file and run it
Show cmd window	Display viv command window
Exit	Exit program

LayerData menu

New layer	Create a new empty structure data layer
Query by class	Query data from the database and create a new data layer
Read shapefile	Import graphics and attributes from a shapefile to a structure data layer
Write to shapefile	Write structure graphics and attributes to a shapefile
Import to database	Write structure data from a structure data layer to the database

Other data menu

Import photo	Read a .jpeg photo to database, convert to standard size and also create an icon file
Edit class data	Select class and edit related data, such as line and fill color

Database menu

Connection setup	Set database location and userid information
Program path setup	Set MySQL command line and FWTools paths
Report by class	Count and report the number of items in each class
Dump to file	Dump all database data to a SQL-script file
Create bs0 database	Create a database, used when setting up the database
Reset tables	Create database tables, used when setting up the database
Import dump file	Used to import all database data and tables from a SQL dump file

Viewing and updating database data

To view and edit database data, a database query must first be made. The query will then fetch data from the database and create a new data layer in the map window. To perform a query use the "LayerData/Query by class" command from the main menu, select structure class and click OK. After the query is completed a new data layer is added to the layer list, and the structure data is drawn to the window.

To view or modify single structure attributes zoom in on the area of the map where the structure is located, and click the structure graphic with the mouse. This action will create a popup menu showing a list of nearby structures, where the preferred structure can be selected. A dialog box containing the structure data then opens in the window, shown in Figure 3.2 below.

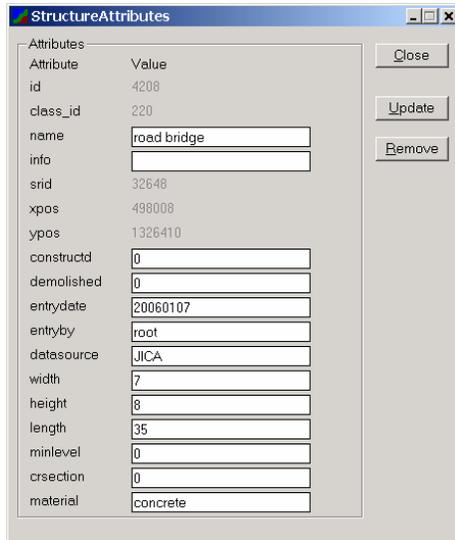


Figure 3.2: Structure data dialog box

The dialog box allows editing of structure attribute data. Attribute fields visible in the window depend on the structure class. To modify and update the data to the database first modify the desired fields, and then click the "Update" button. To close the window with no update click "Close". To remove the structure from the database click "Remove".

Graphical structure data cannot for now be modified in the BSViv application. If graphical data needs to be modified, the old structure must be removed, and a new structure with the modified data must then be created.

Importing data from ESRI shapefile to the BSData database

To move data from the ESRI shapefile to the database, first the shapefile must be imported to BSViv, and then from BSViv to the database.

To import shapefile contents to BSViv, use the "LayerData/Read shapefile" menu command. After giving the command two things need to be selected. First the shapefile to import, and then the structure class for the objects in the shapefile. Each shapefile may contain only structures belonging to same structure class. After selecting these an attribute selection window opens, in which the shapefile attribute data can be mapped to BS database structure attributes. (See Figure 3.3 below).

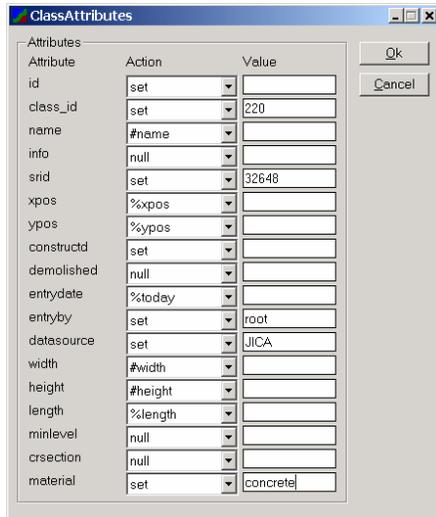


Figure 3.3: Setting class attributes during shapefile import

For each structure attribute there are the following options: “set to given value”, “use attribute from shapefile”, or “compute from geographic data”. The dialog box “Action” column pull-down menus define how to set the field value. Items starting with “%” are values that are computed from geographical data (“%length”, “%xpos”, “%ypos”). The items starting with “#” are attributes from the shapefile. If the action column value is “set” then the value in the “Value” column is set for all imported structures.

After pressing OK the shapefile data is imported to BSViv and displayed on the map. The structures are, however, not yet in the database, (structure “id” values are set to zero to show that the structures are not yet in the database). To copy the data from the new shapefile layer to the database, first select the new layer from the layer list, and then use the “LayerData/Import to database” command.

Exporting data from BSData database to shapefile

To export data from the database to a shapefile, first query the preferred structure from the database using the “LayerData/Query by class” command. After the query is done and a new data layer is created in the map window, select the data layer from the layer list and select the “LayerData/Write to shapefile” command from the main menu. Select a new name for the new shapefile and press OK:

Adding and removing single structures from the database

Adding new structures to the database can be done by importing shapefile data as described above, or by creating new structures manually.

To create a new structure, a data layer for the structure data must first be created using the “LayerData/New Layer” command. The command asks for the structure class of the new layer, after which it creates a new empty layer in the layer list.

To add a new structure to the created data layer, click the “Add new structure” tool from the toolbar, and then use the mouse to click a location on the map for the new structure. If the structure is a point, one mouse click is sufficient. If the structure is a line-type or polygon, draw the structure on the map with a sufficient number of mouse clicks, and finish the drawing by double clicking. After the geographic data is clicked to the map, a dialog box asking for structure attributes opens. Fill the structure data and press “Create” to create the structure in the database.

Importing photos to the database

Photos can be put into the database and associated with structures that are already in the database. The imported photos must be in .jpeg format. Photos can be imported using the "Other data/Import photo" command, which will open a dialog box asking for the photo file name, photo location and associated structure id. After the information is given, the command creates a 800x600 pixel size version of the photo and copies it to the database. Also, a 80x60 pixel size icon is made and put into the database as well. The www-interface is able to show the photos along with structure data. The BSViv cannot display photos.

Modifying class related database data

Class related data, such as drawing line color and fill color, can be modified using "Other data/Edit class data". After selecting the class to edit, a class data edit dialog box opens. The drawing attributes and class description can be changed. Class identifiers and shapetype cannot be changed, since other applications use the defined values.

Creating database dump file and importing all data from an existing dump file

Database dump files can be used to move the whole database to another computer, or to backup the database before making changes to the data content. To create a database dump use the menu command "Database/Dump to file", select a new name for the database dump, and click OK.

To restore the database from a dump file, use the menu command "Database/Import dump file", select the database dump file from the file window, and click OK.

Creating a database report

A simple report listing number of items in each structure class can be created using the menu command "Database/Report by Class". The command will create a new text window containing the generated report.

class	items	class name
110	55	Reservoir
211	3732	Irrigation canal
220	1278	Bridge
230	323	Culvert
310	38	Dam
320	892	Embankment
321	28	Road embankment primary
322	1848	Road embankment other
323	14	Railroad embankment
324	3	Reservoir dike
340	2	Weir
371	44	Hydrological station
372	85	Meteorological station
411	11	Dai fishery
413	472	Fence system
440	41	Fishing lot
450	7	Fish sanctuary
610	1323	Rice field
620	372	Field crops
630	77	Plantation
640	2708	Other agriculture
650	157	Irrigated area
710	4	Docks/Harbour
730	4	Ferry
814	62	Mine

Figure 3.4: Database Report by class

4. USING BSAPP TO ACCESS BSDATA REMOTELY

The BSApp interface can be used to connect to the BSData database using an Internet browser, such as IE 6.0 or Firefox 1.5. The Internet server should have BSData database installed for remote access.

The BSApp can be used for the following tasks:

- querying database data by class and geographical area, and showing the results on the map
- Viewing structure attribute data for selected structures
- Viewing structure attribute data in table format

Installation and starting the program

The BSApp runs in any modern Internet browser that can run Java applets. To run the program an Internet browser should be installed. The BSApp also uses Java Runtime Environment 5 or later, which should be installed on the client computer (JRE download: <http://java.sun.com/javase/downloads/index.jsp>).

To start the BSApp, start your browser program and type the address of the BSData server into the address bar of the browser. A test version of the database is available during 2007 at <http://www.eia.fi/bs>, userid "bsclient" and password "gh4ntx89". On the welcome page there is a button where the BSApp can be started.

After clicking the start button the application downloads from the www-server, which can take some time, since a few megabytes of data program code need to be downloaded. The application code is cached to the accessing computer, so next time the program is started the start time will be shorter.

Main window, tools and main menu

The main window of the BSApp applet is shown in Figure 4.1. The window displays a base map with main rivers and catchment boundaries, a coordinate grid and a scale bar. On the right side of the window is a data layer list displaying all data layers shown in the window. The top part of the window contains the menu and toolbar.

The map window can be zoomed and panned using the toolbar tools. Also, the Zoom, Query, Classes and Areas commands are located on the toolbar for fast access. The geographic coordinates of the current mouse location are shown on the toolbar as well.

On the right side of the window the layer list containing a list of maps and data layers in shown in the window. A data layer holds data that results from one database query. Many data layers can be shown at the same time. Some actions require selecting data layers from the layer list. This is done simply by clicking the layer name in the layer list. By clicking a layer name with the right mouse button, a popup menu appears. Using this menu the layers can be rearranged or completely removed.

The window menu contains the following commands:

File menu	
Print	Print window contents
Exit	Exit program

Help menu	
Help	Open up a help window
About	Application version etc. information

Querying database data

To view database data a database query must be made. The query will then fetch data from the database and create a new data layer in the map window. To perform a query click the "Query" button on the toolbar, which opens a query dialog box (Figure 4.2). In the query dialog box select a structure class and area and click OK. After the query is completed a new data layer is added to the layer list, and the structure data is drawn in the window.

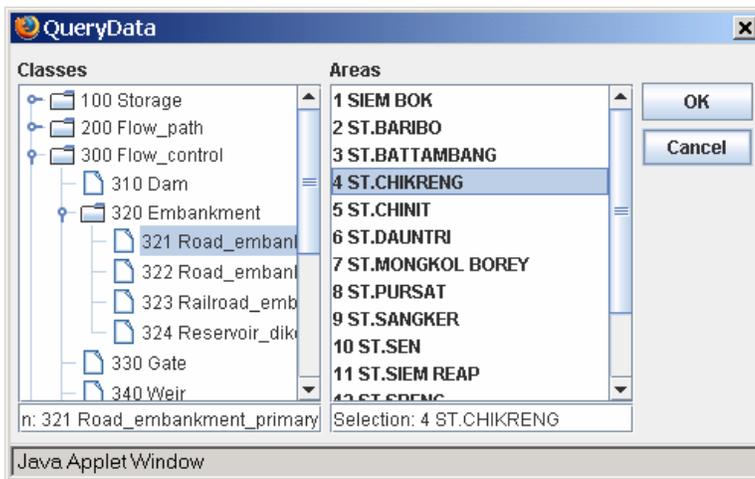
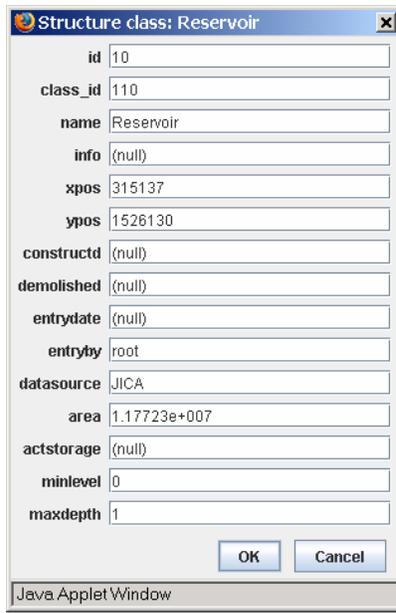


Figure 4.2 Query data window

Viewing structure data

To view structure attribute data zoom the map to the area where the preferred structure is located and click the structure graphic with the mouse (when the Arrow tool is active). This will open a dialog window showing the structure data (Figure 4.3). The displayed attributes depend on structure class.

To view all the attribute data of a data layer in table format, click the layer title in the layer list with the right button, and select "Show table" from the popup menu. This will open a table view of all structure attribute data (Figure 4.4). The table rows can be selected using the mouse and copied to Clipboard by pressing Ctrl-C on the keyboard.



Structure class: Reservoir

id: 10

class_id: 110

name: Reservoir

info: (null)

xpos: 315137

ypos: 1526130

constructd: (null)

demolished: (null)

entrydate: (null)

entryby: root

datasource: JICA

area: 1.17723e+007

actstorage: (null)

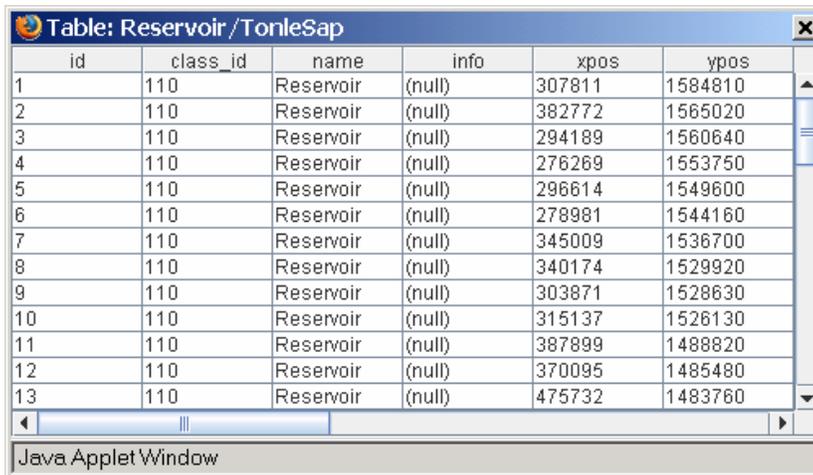
minlevel: 0

maxdepth: 1

OK Cancel

Java Applet Window

Figure 4.3 Structure data dialog box



id	class_id	name	info	xpos	ypos
1	110	Reservoir	(null)	307811	1584810
2	110	Reservoir	(null)	382772	1565020
3	110	Reservoir	(null)	294189	1560640
4	110	Reservoir	(null)	276269	1553750
5	110	Reservoir	(null)	296614	1549600
6	110	Reservoir	(null)	278981	1544160
7	110	Reservoir	(null)	345009	1536700
8	110	Reservoir	(null)	340174	1529920
9	110	Reservoir	(null)	303871	1528630
10	110	Reservoir	(null)	315137	1526130
11	110	Reservoir	(null)	387899	1488820
12	110	Reservoir	(null)	370095	1485480
13	110	Reservoir	(null)	475732	1483760

Java Applet Window

Figure 4.4 Table view of layer attribute data

Other functionality

"Zoom" – toolbar button has some zoom shortcuts, including, "TonleSap river", "TonleSap lake" and "Full extent".

"Areas" – toolbar button can be used to draw selection areas to map window. This includes subcatchments, provinces and mediumflood boundary