Data Access Tutorial 1

1.1 – Locating and Downloading the GLOBE Landsat Image
1.2 – Locating and Downloading the Aerial Photographs

We're all familiar with the internet. But have you ever used the internet to access and download digital geographic data? Some of you probably have, others perhaps haven't. It isn't necessary to have any experience downloading data, but the usual caveat applies – *proceed with caution and only download data from reputable sites*. All the sites used in this and related tutorials are safe. These are as far afield as you need to go to fulfill the WV GLOBE Land Cover – Biometry protocol. However you may want to explore further once you're familiar with satellite images. See the Glossary for useful geographic data sites.

1.1 <u>Locating and Downloading the GLOBE Landsat Image</u>

Boot your web browser and browse to http://www.wvview.org. Click on 'Data Services' tab and you'll see the following page:
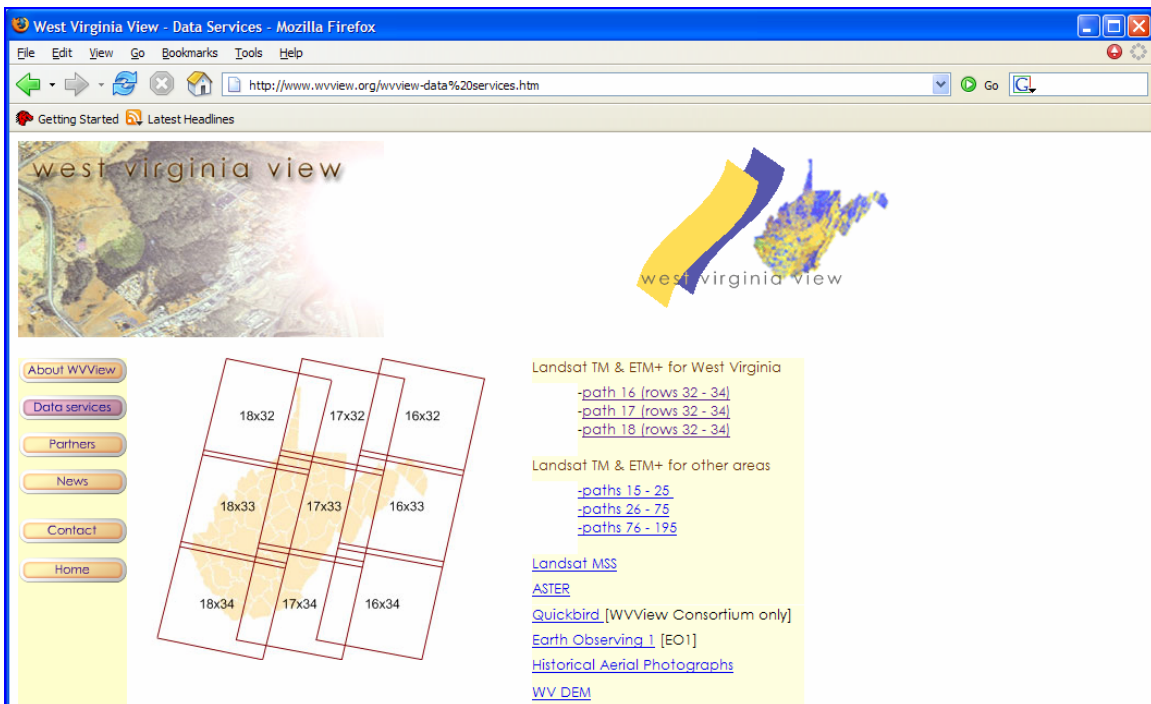

Figure 1. The West Virginia View 'Data services' page showing the Landsat scene tiles.

The Landsat satellites (4,5, and 7) use the Worldwide Reference System orbit (see http://ltpwww.gsfc.nasa.gov/IAS/handbook/handbook_htmls/chapter5/chapter5.html, see Figures 5.1, 5.2, and 5.3). The 'boxes' with numbers refer to the scene's Path and Row. West Virginia is covered by Paths 18, 17, and 16, and Rows 32, 33, and 34.
Using the scene tile boundaries, click on the Morgantown geographic area. Notice that this isn't as simple as it sounds… is Morgantown in Path 17 Row 32 or 17-33? Because

of he scene overlap, Morgantown is on both scenes, but 17-33 is the better selection (there's better coverage for our area).
Select 17x33, bringing you to the thumbnails of the Landsat images for that Path 17 and scroll down to 17x33. There are 11 images covering 17x33, dating from June 1985 (Landsat Multi Spectral Scanner, or MSS, onboard Landsat 5), to March 2002 (Landsat ETM+, the Enhanced Thematic Mapper onboard Landsat 7). Click on an image and you'll see some of the metadata for that particular dataset.

General identification		Data organization		Location		Processing details	
Unique ID		Preview	Yes	Reference system	WGS84	Projection	UTM
Platform	Landsat 7	Access	Public	Quadrangle	_	Zone	17N
Sensor	ETM+	Format	Erdas *.img GeoTiff	Path/Row	17/33	Projection parameters	_
Processing level	Terrain	Bands	1-8	UL X	474840.0	Datum	WGS84
Scene ID	LE7017033000208750	Bits/Pixel	_	LR X	699030.0	Ellipsoid	_
Cloud cover	0%	Pixel size	15/30	UL Y	4411920.0	Units	meters
Acquisition date	3/28/2002	Pixel units	meters	LR Y	4199360.0	Resampling	cubic con

**NOTE FOR DOWNLOADS: To download data with Microsoft Internet Explorer, right click on data hyper-links below and select "save-as" option.

Download Imagine Multispectral, GeoTiff Multispectral, Imagine pan, GeoTiff Pan, NLAPS metadata

Figure 2. Some of the information provided in the metadata file for the Landsat 7 ETM+ 17x33 image acquired March 28, 2002.

Click on Imagine Multispectral and download the file (browser-dependent, see the "Note for downloads" at the bottom of the table). Save the file in an appropriate directory/folder.

1.2 Locating and Downloading the Aerial Photographs

For this exercise, we'll use the State Addressing and Mapping Board's 2003 aerial photographs of West Virginia. These are a very valuable, high-quality resource that we're very fortunate to have in West Virginia. Let's take advantage of them.

Each "tile" or image is 10,000 ft x 10,000 ft (3.048 km x 3.048 km), and is a 3-band (R,G,B), natural color MrSID file (MrSID stands for **M**ulti **R**esolution **S**eamless **I**mage **D**atabase). MrSID's are compressed files, allowing quicker access and storage.

First, browse to the West Virginia GIS Technical Center's web site at <http://wvgis.wvu.edu>

The opening page provides various links, including a link to the center's mandate and objectives. Click on "About the Center" under the 'Menu' bar on the left side and you'll see their raison d'etre.

We'll be accessing the SAMB photos using the Center's handy GIS data server. Click on 'GIS Data under the 'Menu' on the left, bringing you to the West Virginia GIS Data Clearinghouse:
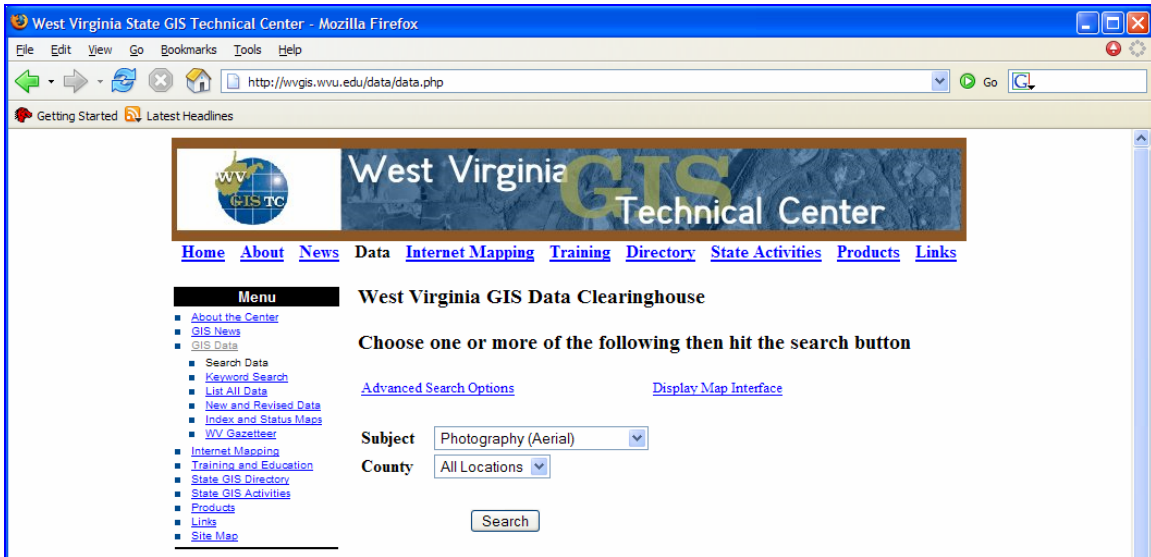
Figure 3. The West Virginia GIS Technical Center's GIS Data Clearinghouse page.

In the 'Subject' draw-down menu, go to Photography (Aerial), click the 'Search' button, bringing you to the selection of aerial photographs served by the Center (notice that you can search by county, 'all locations', or 'statewide'). Notice that there are *seven choices*, including the SAMB link.

Click on it and scroll down to view information describing the images. You may find these links and associated files very useful when/if you decide to use these images in your own training sessions. I would encourage you to explore at your leisure.

But for now, scroll down to the bottom of the page to 'Download', click on the license agreement link, click on the "yes, I agree…" link which takes you to the ftp server showing various directory options:

Figure 5. The WVGIS Technical Center's ftp site serving the SAMB photos.

At this point, I typically click on the county dataset. For us, let's get the county index sheet so we know what images we'll need for our area. So, click on 'index samb03', then on 'county PDFs', then on 'D size', then on 'north' which will take you to the county of interest (Monongalia.pdf). Download it, open it, and zoom in to Morgantown. You'll notice that most of Morgantown, with the exception of Sabraton, is located within the 'N-K08 tile' bounded in bold pink (Sabraton is covered by the N-L08 tile). The referencing system is hierarchical, with North and South further subdivided using an alphanumeric code.
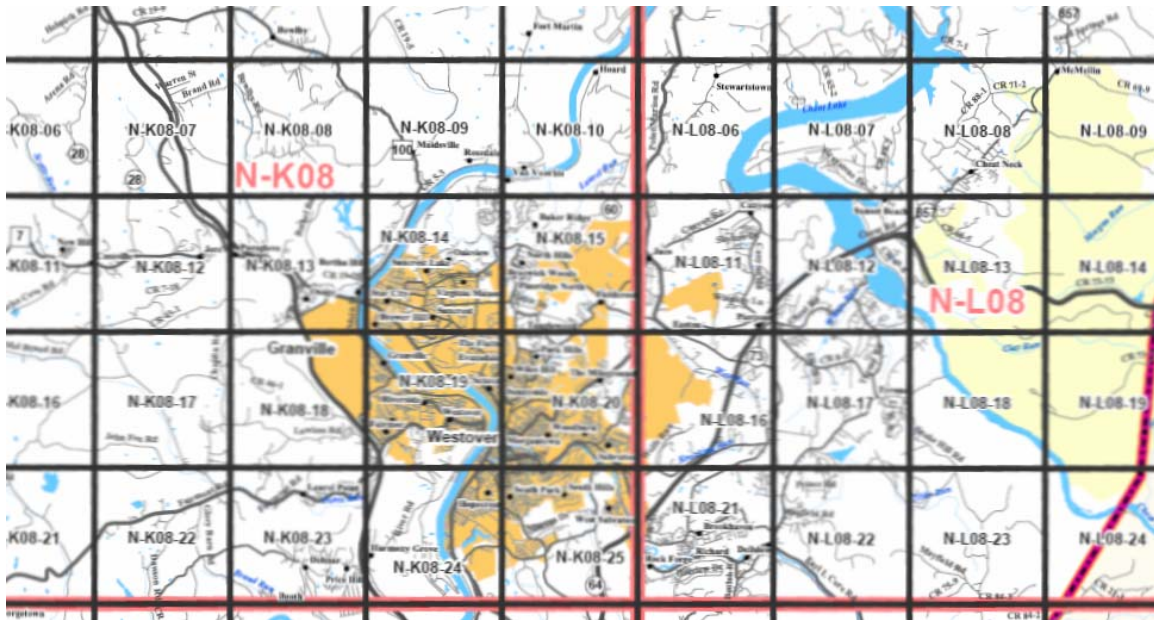

Figure 7. The SAMB tile index pdf file of Monongalia County showing the tiles and images covering the Morgantown area.

Once you know the codes for the images you're looking for, record them and browse back to either the county-wide datasets or the north / south directories.

Save the images to a known directory (e.g. data_files/rasters/SAMB/county_sets). Make certain that you save both the MrSid image file (e.g. N-K08-15.sid) and the header file (N-K08-15.sdw).

There are two more steps required before these files can be used for our purposes. *We need to define the projection for each image, and then reproject them to our GLOBE-standard projection*. The initial NAD 1983 projection is provided, but it has not yet been defined. The firs step is to define it.

To define the projection, boot ArcCatalog, create a connection to the respective directory, select the MrSid SAMB image, right-click and draw down to 'Properties…' (at the bottom of the tab), scroll down to 'Spatial Reference' and you'll see 'undefined' in the value column. Now, click the 'Edit' tab, click 'select', double-click 'Projected

Coordinate Systems', open the 'State Plane' folder, open the 'NAD 1983 (Feet) folder, browse way down to West Virginia North FIPS 4701(Feet).prj, select it, click 'Add' and you should be taken to the 'Spatial Reference Properties' dialog box showing the NAD_1983_West_Virginia_North_FIPS_4701 etc. in the 'Name' box under Coordinate System and X/Y Domain. If you see the NAD 83 WV ft. projection as stated in the above box, click the 'Apply' button at the bottom, then'OK' and you should be taken back to the Raster Dataset Properties dialog box. Click 'OK' once and that's it; the projection should now be defined. To check, go to the ArcCatalog 'View' menu, refresh (F5 key), reselect the file you just defined, right click and draw down to 'Properties…' again, and check the Spatial reference. It should say NAD 1983 State Plane West Virginia etc.

Since we need to be working with data that is all in the same projection, we need to "reproject" the SAMB photos from NAD 83 to UTM WGS 84 (a GLOBE standard, and indeed a very common projection). We'll use Arctoolbox to perform this process. Boot Arctoolbox, scroll down to Data Management Tools', select and open 'Projections and Transformations', then 'Raster', then 'Project Raster'. Double-click on it and the dialog box will open. Browse to your SAMB data for 'Input Raster', select te image, 'Add' it, and note that it automatically names the new output raster but doen not provide a file type ending (it defaults to an ESRI GRID raster file). We want a .img file (Multispec works well with these file types, as do many other image processing programs). So, rename the file the same exact name as its original, but place .img at the end (n-k08-19.img). Now select the output coordinate system (as we did before in the previous exercise, only this time select 'Projected Coordinate Systems', 'Utm', Wgs 1984, then scroll down to WGS 1984 UTM Zone 17N.prj, 'Add' it, 'Apply', 'OK', accept the remaining defaults, and the wizard should start. It'll take a minute, and then you can check its new projection as we did in the previous exercise.

That's it. Now we can work with our georeferenced high resolution aerial photographs as "ground reference" data for our MUC classification.

There are other types of data freely available on the internet for use in this and other related exercises. You are encouraged to search around and locate those data sources that fit your specific needs. To start, see explore the links below. The WVGIS Technical Center has links to other on-line data sources.

Free Digital Geographic Data Sites

West Virginia View – free Landsat and other selected satellite images
<http://www.wvview.org>

United States Geological Survey (USGS) – offering a very wide range of both free and purchased imagery and other digital geographic data <http://www.usgs.gov>

West Virginia GIS Technical Center – a wealth of free geographic data of West Virginia <http://wvgis.wvu.edu/>

The Global Land Cover Facility, University of Maryland – a very valuable, dense site offering free satellite and related data from all over the world
<http://glcf.umiacs.umd.edu/index.shtml>

SAMB 2003 Orthophoto Download Instructions

All orthophotography and related data © 2003 West Virginia Statewide Addressing and Mapping Board. All rights reserved.

1. Click on the web page link at the WV GIS Technical Center's website.
   http://www.wvgis.wvu.edu/data/dataset.php?action=search&ID=254
2. Select DOWNLOAD. Then from the DOWNLOAD options select either the directory for North or South State Plane Zone.
3. Each files represents a 10,000 ft by 10,000 ft. tile. For more information about the WVSAMB Tile Index Layout refer to
   http://wvgis.wvu.edu/stateactivities/wvsamb/WVSAMB_Tile_Index_Description.pdf
4. Use the tools below to locate the correct tile number(s):
   o Feature name gazetteer -
      http://wvgis.wvu.edu//data/gazetteer.php?action=gazetteer
   o County index grid map (Adobe pdf) -
      ftp://ftp.wvgis.wvu.edu/pub/Clearinghouse/samb03/index_samb03/county_PDFs/
   o GIS index file overlays -
      ftp://ftp.wvgis.wvu.edu/pub/Clearinghouse/samb03/index_samb03/GIS_index_files/
5. Select the appropriate tile number(s), right click and select "copy to folder." Some mapping programs require both the sid (the image) and the sdw (georeferencing world file) for it to display correctly.
6. A File Download window will appear. Save the selected files to your hard drive.
7. Before continuing you need to make sure you have installed the MrSID Viewer or have some other mapping program that reads MrSID files. LizardTech's ExpressView Browser Plug-in (MrSID) can be downloaded from
   http://www.lizardtech.com/download/.
8. If using the MrSID Viewer, goto FILE, OPEN, and select the file you want to view. The MrSID file can also be viewed with GIS software such as ESRI ArcView.
9. For ArcGIS Desktop 8.3 users, download the Raster Update for displaying JPEG2000 images, MrSID Generation 3 images, and DIGEST (ASRP/USRP) images.
   http://support.esri.com/index.cfm?fa=downloads.patchesServicePacks.viewPatch&PID=43&MetaID=579
10. Having difficulty downloading the files or viewing the MrSID DOQQ images? E-mail the WV GIS Tech Center at wvgis@wvu.edu for technical assistance.

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