WorldMap Help

Center for Geographic Analysis, Harvard

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1.0 Overview

This documentation refers to WorldMap Version 1.0. Though we are out of Beta, the system is still under rapid development with improvements planned to interface design, stability, and performance. Please send any comments or suggestions you might have to worldmap@harvard.edu.

WorldMap has been tested more thoroughly on Firefox and Chrome than on Internet Explorer, though it should work reasonably well with IE. There are known problems with Internet Explorer 6.

There are several areas of functionality that require you leave the main map page. When that happens, you will be asked whether you want to navigate away from the page. Click cancel, then save your map if desired, then proceed again. We hope to get this better implemented before long.

When you are away from the map page you have saved you can use the back button to get back to it.

Open System Access
The system is currently open to anyone in the world to use and is hosted by Harvard on Amazon's cloud infrastructure. We are allowing anyone to upload fairly large files to the system (up to 100 meg). The combination of open access and large file sizes means that the system could be slow at times.

Open Source
The platform is Open Source and can be deployed on Linux or Windows environments. WorldMap is currently being developed and deployed on Ubuntu Linux. Because it is Open Source, all code in the system can be examined and improved on by others. Source code for WorldMap is available at: https://github.com/cga-harvard/cga-worldmap.

1.1 Getting Support

About WorldMap: http://about.worldmap.harvard.edu

Getting started video: available http://www.youtube.com/watch?v=Ajctx6h1t5s

Main Help doc: http://worldmap.harvard.edu/site_media/docs/WorldMap_Help.pdf

User Group:
If you have a question that is not answered in the **Main Help doc** mentioned above, please check the Google Groups WorldMap users site http://groups.google.com/group/worldmap-users and see if it has been answered there. If not please put your question to the WorldMap Users group.

Facebook: http://www.facebook.com/pages/WorldmapHarvard/242899755749901

Contact:
You can contact us at: worldmap@harvard.edu.

1.2 Terminology

Layers
In WorldMap you can upload map data (currently Shapefiles or GeoTIFFs) to the system. Each data file you upload is called a "Layer" in WorldMap. You can control the way in which other people access to your layers by setting permissions for your layers.

Maps
WorldMap allows you to organize your Layers and other people's Layers together into collections, which you can configure and save. We call these collections of Layers that you manage "Maps". You can control permissions at both the Layer and the Map level.

2.0 Viewing a Map

WorldMap supports two basic uses of the system: 1) viewing (and if you are allowed, editing of Maps others have created, and 2) creating your own maps. We will start with viewing maps others have created.

2.1 Find a Map to View

To start searching existing maps, click "Viewing a Map" on the front page. Here you will see a list of maps others have created, listed in the order in which they were created. Use the search box to filter Maps by their title and abstract. Use the map to the right to refine your search geographically.

Next to the Map name is the name of the person who created it so you can contact them. WorldMap allows you to find out who added a particular Layer or created a Map and view their profile.

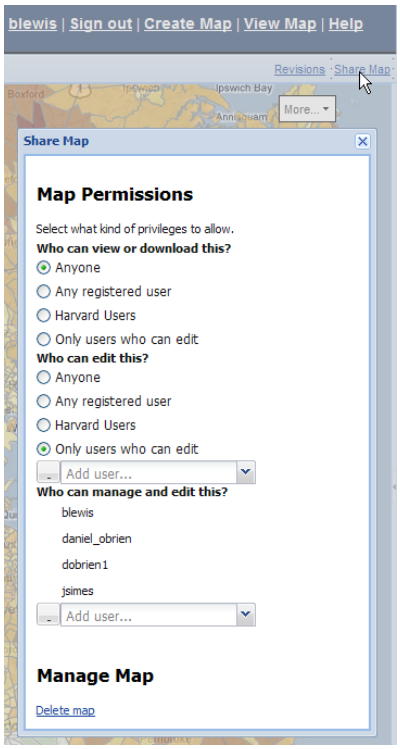
Click on Lex's profile. Lex is building a map called ChinaMap. Lex has added a custom banner, which you can do too; just email one to us and we will add it to your map. Eventually you will be able to add it yourself.

Let's take a look at AfricaMap Map by Suzanne Blier.

2.2 Note on Permissions

Without being registered you can make changes to this Map but you can't save the changes without permission to edit the map. You cannot have permission if you are not registered. If you had permission you would see a "Share Map" link in the upper right corner. In part two you will create your own map, to which you will have full permissions.

Currently this map is set to be viewable by anyone in the world. If you have permission to manage permissions for a map, a "Share Map" link will be visible at the upper right corner of the map view.



Share Map link brings up Map permission controls

Permission Level	Can View a Map	Can Download a Layer	Can Edit a Style	Can Add/Remove a Layer	Can Change Permissions
None	No	No	No	No	No
View	Yes	Yes	No	No	No
Edit	Yes	Yes	Yes	Yes	No
Manage	Yes	Yes	Yes	Yes	Yes

Overview of Map level permissions

2.3 Choice of Basemaps

A number of preset basemap layers are available, including Google Satellite, Hybrid, Roads, Physical, and Open Street Maps. Other commercial and non commercial base maps will be added soon.

2.4 Ways to Zoom

There are several ways you can zoom (change scales) in WorldMap:

- Map navigation tools include the standard zoom bar and map drag.
- Roll your mouse wheel.
- Choose a scale from the scale bar readout.
- Zoom and pan simultaneously by defining a box on the map (shift-drag box) which upon release zooms you to the area you defined with the box.
- You can right-click on a layer name and select "Zoom to Layer Extent" to zoom to that layer.

We highly recommend the shift-drag box approach as it is the most powerful way to navigate once you get the hang of it.

2.5 Layer on/off, Layer Order, Transparency

You can turn layers on and off and drag them around to control which layers are displayed on top in the map.

The topic category, which must be defined when data is added to the system, provides the default name for the folder it is placed in when a layer is added to a map. Folder and Layer names can be changed – see below.

2.6 Layer Renaming, Category renaming

You can rename layers by right-clicking a layer, selecting "Layer Properties", then "About". You can rename a category by right-clicking it and selecting "Rename Category".

2.7 Transparency Control

Right click on any layer (command-click on a Mac), then click the "Properties" tab, and adjust the transparency slider bar.

2.8 Bookmark and Embed Your Map in Another Web Page

In addition to being able to save changes to your map, it is also possible to save sub-views of your map using the "Link" button. These views can take the form of a bookmark URL or the form of an embeddable code snippet. The code snippet can be pasted into any web page to provide a live view of your map within a blog or any web page.

Create a view that you like and want to show to someone else. Then click the "Link" button at the upper left.

Now you have a bookmark URL for the view as well as an embed tag that you can paste into a blog or an HTML page.

Open a blog or page if you have one. If you don't have one and would like to try this, go to http://blogspot.com and create a blog.

You can change the size of the embedded map by using the pulldown to change the height and width of the embedded map (measured in pixels), or by editing the height and width parameters in the code snippet manually.

2.9 Feeds

Find the little "More" box at the upper right.

These items are feeds which are a form of map service similar to the WMS map services you loaded earlier through the "Add Layers" button.. These feeds need to be accompanied by a filter word which (currently) is stored in the form which appears when you click the "Save" button.

Click "Save" and type "Freetown" in the keywords section.

Now turn on Picasa. All of Picasa's photos which are georeferenced and which have the keyword "Freetown" are displayed on the map.

This also works for YouTube for videos and for maps stored in the Harvard Geospatial Library.

For Picasa and YouTube, keep zooming in on an area of interest if you see some content there. Generally more and more content will appear as you get closer to the ground.

These layers work best when only one layer is turned on at a time.

NOTE: This approach means if you have image or video content you want to have show up on WorldMap, you can load it to Picasa or YouTube, provide locations using the Picasa or YouTube location tools or, if you have it, key in an accurate lat/long. Then give your content one or more unique tags. Now when you user these keywords as your filter you will only bring in content you have uploaded.

2.10 Jump Tool

WorldMap supports "Jumping" to remote web sites using the geographic extent displayed in the current map view to define the view for the site being jumped to.

Current Jump sites include Bing Maps (useful for its oblique aerial photography in many major cities), Yelp (useful for detailed information on businesses and ratings), and Social Explorer (current and historic census mapping).

For example if one were looking at the Englewood neighborhood of Chicago in WorldMap and selected "Social Explorer" from the "Jump to" pulldown, a new tab will open displaying a Social Explorer interactive census map for the Englewood neighborhood. Social Explorer now also works for China.

From Sierra Leone, try Bing Map. Now let's zoom to Chicago and see how this works for Social Explorer in the US.

2.11 Map Click for Details

You can click on a map with multiple layers turned on and return attributes, by in effect "drilling" down at the point you clicked the map, through multiple layers and displaying the attributes on the right.

WorldMap will return attributes for as many (vector) layers as you have turned on. The layers will be listed at the upper right and the individual records will be listed in the panel below. You can select records grouped by layer in the upper panel and see the record highlighted on the map and attributes displayed in the panel below.

Each set of attributes will be presented with the layer it is from. Click the value for the layer and the feature will highlight on the map.

For each attribute, the data value presented below the name of the layer it is in, is the value which is set as the first to display. Setting display order of attributes is handled by the layer owner from the layer page under "update description of this data". You can get to this location by right clicking on the layer, then -> About tab –> Share Layer link –> "Update Description of this Layer" -> go to bottom of form. We hope to make this easier to set in the future.

2.12 Searching within a Layer

Any local vector layer can be search and matching features highlighted. To do this, use the search box at the bottom left, under the layer list. The search only works for text fields currently and wills search against all searchable text fields in the layer. If multiple layers are turned on, search will be done on the one that is displayed on top.

Defining which fields are searchable can be done by the layer owner by right clicking on the layer, then -> About tab –> Share Layer link –> "Update Description of this Layer" -> go to bottom of form. This are provides several ways to control how attributes are displayed and handled including whether attributes are searchable, field name aliasing (for Identify display), attribute display order, and whether attributes are displayed at all.

2.13 Street View

Select the Street View tool and then click on the map, preferably on a city street. Google Street View will come up in a window. This works for much of North America, Europe, Japan, Taiwan, and Autralia. Other areas are being added rapidly by Google.

2.14 Google Earth View within Browser

Select the Google Earth tool and the 2D map will be replaced with the Google Earth globe with your layer draped on top of it. It may take a little while to load, especially the first time because you must load the Google Earth plugin. Each time you pan you must wait a couple second for your layers to redraw as this

implementation does not use precached tiles yet. Transparency is not supported yet, so it will often be best to view your layers one at a time. This is an abbreviated version of Google Earth without many of the features available in the full Google Earth application.

You can also view your layer using the full Google Earth application assuming you have Google Earth installed on your machine. This approach involves downloading the Google Earth version of your layer. To access downloads for a layer, right click on the layer name -> Layer Properties -> About -> Share Layer. In the upper right hand corner of the page you will see download options "KML" brings a KML Google Earth version of the file into your browser. "View in Google Earth" bring the layer in as a map service.

2.15 Legend, Scale Bar

WorldMap generates legends automatically based on the SLD (Styled Layer Descriptor) symbolization. Legends for any vector layers being displayed are in the Legend tab next to the Data tab at the upper left. The scale bar changes with zoom level and the exact scale ratio is displayed.

2.16 Downloads

Maps may be downloaded in a number of file formats including: ESRI Shapefile, Google Earth KML, Adobe PDF, Microsoft Excel, CSV (comma delimited text), GML (geographic markup language), PNG (image), JPEG (image).

To access downloads for a layer, right click on the layer name -> Layer Properties -> About -> Share Layer. In the upper right hand corner of the page you will see download options.

2.17 Printing

Select the "Open Street Map" base layer and click on the "Print" button at the upper left. Choose:

- Portrait type
- Resolution
- Whether you want a legend
- Pan your map in print view if necessary
- Provide a title for your printout.

Click "Print" and generate a PDF which you can save, email, or print.

NOTE: Printing is supported at up to 300dpi and creates an Adobe PDF view of your map at 8.5" x 11" (216mm x 279mm) and 8.5" x 11" (216mm x 356mm) sizes.

2.18 Revision History

At the upper right corner of the map is a "Revisions" link which brings up a list of snapshots of your map created every time you save. Use this tool if you want to go back to an earlier version of your map. This link will only show up if you have Manage level permissions to the Map.

3.0 Create Your Own Map

3.1 Registering

To register click "Sign In" on the front page, then click "Register". Fill out your username, email address, password, and if you are Harvard check that. If so you will be sent to a page to verify your Harvard ID. (There is no difference in functionality between Harvard and non-Harvard. We are starting to allow access control by group and Harvard is the first group we have enabled.) You will then receive an email with a validation link that you must click to be registered. Now you have an account and a profile and you can log in on the front page.

NOTE: Unregistered users can view all public content on the system and can make temporary changes to Maps created by others. Registered users can create their own Maps, upload materials, change symbolization, and save changes. In addition registered users can control access to layers they own and can access any private content that has been made accessible to them by others.

3.2 Filling in Your Profile

Profiles allow people to find out about other users of the system. A user's profile name is associated with any layer or map they create. Once you are logged in you can go into your profile and add information about yourself. As you add materials to WorldMap, those materials will be listed here.

NOTE: The user profile contains at a minimum the user's name and email address. Other optional items include organization, position, phone, fax, address, city, state, zip, country.

3.3 Create a Map

Click "Creating a Map" link at the top of the page. A blank map template displaying the Google Terrain base map appears. Zoom to some part of the world and start to build your map. Zoom using the shift-drag approach to Sierra Leone in West Africa, scale level 10, about 1:500,000 scale.

3.4 Change Base Map

Change the base map from Google Terrain to Google Hybrid

3.5 Saving your Map

Save the map. Click "Save" and here we have several items we can define as we save the map.

- **Name -** This is the name as it will show up in the map search tool. The name is also displayed on the header at the top of the page.
- **URL** – You decide what is displayed at the end of the URL. Example: http://worldmap.harvard.edu/alpha/maps/mytest
- **Abstract** – A short description of the Map. This and the title are used by map search.
- **Keywords** – Words that are used to filter feeds Picasa, YouTube, and HGL. Separate keywords with a space. A space acts as an "or" operator to make your filter more general.
- **Splash page** – Formatted text which appears in an introduction box when the site is first opened by a user. This content also appears when you click on the "About" link at the upper left.

- **Banner** (coming soon) - Soon it will be possible to upload a banner to further customize your Map. Until then email us with your banner attached and the site you want it added to and we will add it.

3.6 Permissions, Map Name, Profile

Once you have created and saved a map, you can control who else in the world can see it. Click on "Share Map" link at the upper right and you can make your map private or share with just a couple people or open it to the world. If you want, you can choose to only allow certain people to make changes to your map.

Permission Level	Can View a Map	Can Download a Layer	Can Edit a Style	Can Add/Remove a Layer	Can Change Permissions
None	No	No	No	No	No
View	Yes	Yes	No	No	No
Edit	Yes	Yes	Yes	Yes	No
Manage	Yes	Yes	Yes	Yes	Yes

Overview of Map level permissions

NOTE: You can also control permissions on *layers* in your Map. If you want, you can create a map which is public and includes some public and some private layers.

Once you have created a Map or loaded new data to WorldMap, a link to that material shows up in your profile where others can see what you have created. If a map or layer is not public for viewing, the name of it will still show up here.

4.0 Adding Layers to your Map

There a number of ways to add layers to your map. One you have created a map (or while you are within someone else's map - though you won't be able to save your changes) click on "Add Layers" link at the upper left. You will see 5 tabs:

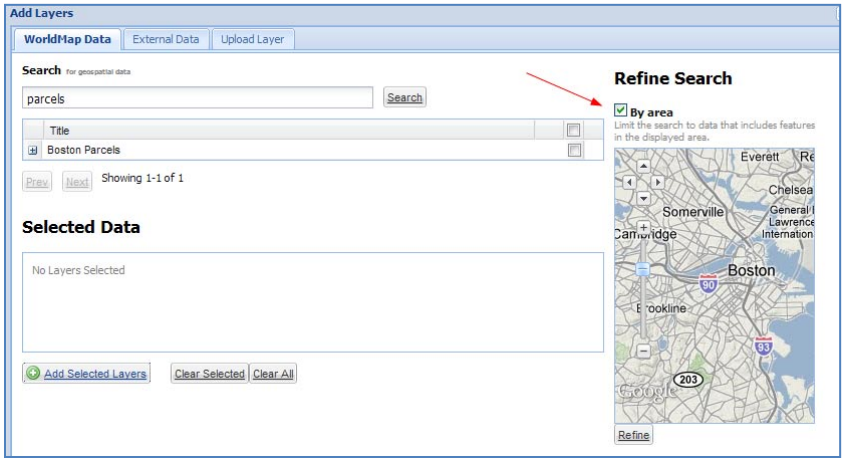
1. **WorldMap Data** – this lets you search for data which others have uploaded to the system and shared.
2. **External Data** – this lets you point to external servers using URLs which point to web services on those servers. These web services can be either in the form of OGC (Open Geospatial Consortium) Web Mapping Services or ESRI REST services.
3. **Upload Layer** – this lets you upload your own Shape or GeoTIFF file from your own hard drive.
4. **Create Layer** – this let's you define a point, line, or polygon layer and start creating it and editing it directly in the browser.
5. **Rectify Layer** – this points you to a sister WorldMap system called WorldMap WARP (which is based on the NYPL Map Warper developed by Entropy Free) where you can upload scanned maps and georeference them directly online, then bring them into WorldMap.

More… Tool - Another way to add layers includes using the "More.." tool at the upper right. This tool uses GeoRSS to bring in media layers from YouTube, Picasa, and Harvard Geospatial Library(HGL). The filter used by this tool is defined in the "Save" form. This will be moved to a more logical place sometime soon. Layers loaded from the More tool cannot currently be saved in the Map.

Data found this way from HGL part can be loaded to the map directly as remote web services and saved. This is the beginning of a possible simple federation approach that could be used to share geospatial materials between libraries even when the GetCapabilities approach become cumbersome because of too many layers. Of course OpenGeoPortal http://code.google.com/p/opengeoportal/ provides another nice approach.

4.1 WorldMap Data

Click on the "Add Layers" link and then the "WorldMap Data" tab. You can filter your search for layers using text combined with the map extent. Make sure the "Refine Search" by area toggle is on if you want to filter by geography as well as text or instead of text.



Highlight the layer you want to add, then click "Add Selected Layers" at the bottom.

Close the form and you will see the layers you added.

Sometimes layers will be loaded to the bottom of the layer list at the left, sometime layers will be added to folders based on their category designations.

4.2 External Data

WorldMap supports the addition of a layer to a map via a "web map service" or WMS or via ESRI's ArcGIS REST service protocol. Given a service URL to remote server X, WorldMap will then request a list of all the Layers on that remote server, and display the list in WorldMap to select from and add to the Map.

(Currently WMS supports the Identify command to return attributes from the map based on a map click while the ArcGIS REST service, as it is implemented in WorldMap, does not yet support Identify command.)

For a remote WMS or ArcGIS REST service to work, it will need to support one of the following projections: EPSG:900913 or EPSG 3857. To see whether a WMS supports one of these projections, load the URL to a web browser and view the resulting XML document displayed.

Let's look at how a remote WMS layer can be added.

Copy the World Health Organization URL below:
http://Maps.who.int/tools/geoserver/wfs?request=GetCapabilities?SERVICE=WMS&REQUEST=GetCapabilities

Click "Add Layers and go to the "External Data" tab and click "Add WMS Server".

Paste the URL into the form and make sure there are no spaces at the end of the URL. Click "Add Server".

After a moment, WorldMap should display a list of Layers from the WHO server.

Click on Title list to sort. Click on "Global Health Facilities" and at the bottom click "Add Layers". Close the "Add Layers" window.
Save your map.

Now add another WMS server (this is a list of all layers on the original AfricaMap system):
http://worldmap.harvard.edu/africamap/tilecache/tiles.py/1.0.0/

Click on the Title list to sort. Click on "Landscan" Layer and then "Add Layers".
Save your map.

4.3 Upload Layer

To upload a shapefile to WorldMap, click "Add Layer" and select "Upload Layer".

WARNING: Currently any uploaded layer which can be viewed by the public is also technically downloadable even though it may appear not to be. There do exist custom layers in WorldMap which reside on a separate server and can be viewed but not downloaded, but the ability to make layers viewable but truly not downloadable is not yet enabled in the WorldMap interface.

Now choose the required parts of the shapefile starting with the ".shp" part and continuing with .dbf, .shx, and .prj parts. You can optionally include an SLD for styling. You can also optionally define the text encoding if you know what it is, though for this layer the default is appropriate, Latin 1. For example, if you knew you had Japanese or Arabic characters in your file, you might choose UTF8 instead of Latin 1, or for

Chinese you might choose GBK. UTF8 is a sunset of the Unicode standard compatible with ASCII and can handle almost all symbols in all languages.

Items with an asterix (*) are required.

***Title:** Give your layer a title.

***Data:** Choose a Shapefile (.shp part) or zip compressed shapefile or GeoTIFF as your data to load. If you use a zip compressed shapefile, be sure the zip file contains the .shp, dbf, shx, and prj parts of the shapefile.

HINT: You will increase your chances of a successful upload by having your shapefile or GeoTIFF file be in the "plain vanilla" projection space, Geographic WGS 84, also known as EPSG:4326. To know whether your shapefile is in this space, the contents of your .prj file will look like this in a text editor:

GEOGCS["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID["WGS_1984",6378137.0,298.257223563]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]]

You may not have a .prj file for your GeoTIFF as it is not needed since the projection information for a GeoTIFF is stored in the header of the GeoTIFF.

If your .prj file does not look like this, the upload may still work fine. If it doesn't, the most likely culprit is the projection space. The best way to fix that is to use an application like ArcGIS or QGIS and reproject your file to Geographic WGS 84. This can be done for shapefiles or GeoTIFF files. Check with us on how to do a reprojection if you need help.

SLD: Optionally provide an SLD. This is an XML document that you would have created using the ArcMap2SLD or QGIS tools (see Section 3.8 above).

***Abstract:** Provide a description of your data. More information is better. At the very least when you add real data, please include a brief description of the data, who created it, for what purpose, and when. Please also include source materials used to create the data layer. This information is important both for you to remember what the data is about, and to allow someone else a chance to benefit from your work (assuming you want to make the data available for others to use at some point).

Permissions: Default permissions are set such that the world can view it but only you can change it. Add individual users to define who can edit (modify the style), or manage (delete layer, change permission settings).

Permission Level	Can View a Layer	Can Download a Layer	Can Edit a Style	Can Add/Remove a Layer	Can Change Permissions
None	No	No	No	No	No
View	Yes	Yes	No	No	No
Edit	Yes	Yes	Yes	Yes	No
Manage	Yes	Yes	Yes	Yes	Yes

Overview of Layer permission settings

If you select a GeoTIFF file for the **Data** item above, the view will remain the same. If you choose a shapefile, (the part of the shapefile with the ".shp" ending), the view will change to handle the additional parts of the shapefile as shown below as well as an optional encoding selection:

***Data:** Choose the .shp portion of the shapefile
***DBF:** Choose the .dbf portion of the shapefile
***SHX:** Choose the .shx portion of the shapefile
***PRJ:** Choose the .prj portion of the shapefile
Encoding: Choose an optional encoding. The default is Latin1.

NOTE: A number of character encodings are supported including UTF8/Unicode, GBK, and Latin1/ISO-8859-1 to Latin15/ISO-8859-15, and in addition various Windows encodings. Specific encodings can be set when a layer is being uploaded. The default encoding is Latin1.

You must read and agree to the Terms and Conditions.

Click "Upload" and once uploaded you will be presented with a metadata form (see below).

4.3.1.1 Metadata

NOTE: Users uploading new layers are prompted to fill in both optional and required descriptive information about the layer. Required items include: Title, Abstract, Keyword, thematic category (ISO 19115 format). Eventually Author, Source, and Date will be included as options in the metadata editor.

Once the file has been uploaded, the only additional required items are Keyword and Category, though there are useful metadata fields here which we strongly encourage you to make use of. Items with an asterix are required.

***Title** Provide a title for your dataset. We recommend using the following naming convention:

<geography - continent, country, state, or city>_<what it is>_<date data represents>_<optional version>_<optional tmp if it is for testing purposes and can be removed after a week>

Example:
africa_ethnographic_1959_2_tmp

Date This date is filled in automatically with the date of upload, but can be changed.

Date Type (creation/publication/revision) Choose type of date you want to describe. The default type is "creation".

Edition Use this field to describe the edition.

Abstract Give an overview of the dataset. What does the data represent? Who created it and when? What sources were used?

Purpose Describe briefly how the data can be used.

Maintenance Frequency How often is the data updated?

***Keywords** Add keywords that will be useful handles others can use to find the dataset. Separate keywords with a space.

Keywords Region (under construction) Select a major region of the world. Other regions in addition to countries will be added.

Constraints Use What are the rules governing the use of this data? We encourage users to adopt an appropriate Creative Commons (http://creativecommons.org/) license to define the type of attribution they require. The license should specify whether the data can be used commercially and under what conditions modified versions can be redistributed.

For example if you would like to restrict use of your data to non-commercial uses and don't mind others using as long as they provide proper attribution and don't mind others modifying your work and redistributing modifications as long as this license is attached, we would suggest a non-commercial share alike license such as this one: http://creativecommons.org/licenses/by-nc-sa/3.0/. Or feel free to create your own license. If you do, include the URL to the license here in the Constraints Use section.

	Can someone use it commercially?	Can someone create new versions of it?
Attribution		
Share Alike		Yup, AND they must license the new work under a Share Alike license.
No Derivatives		
Non-Commercial		Yup, AND the new work must be non-commercial, but it can be under any non-commercial license.
Non-Commercial Share Alike		Yup, AND they must license the new work under a Non-Commercial Share Alike license.
Non-Commercial No Derivatives		

List of common Creative Commons License schemes

Constraints Other Include any additional constraints.

Spatial Representation Type

- **grid** – raster dataset such as georeferenced satellite image or scanned georeferenced map in GeoTIFF format.
- **steroModel** – currently not supported unless stored in a GeoTIFF or Shapefile format
- **textTable** - currently not supported unless stored in a GeoTIFF or Shapefile format
- **tin** - currently not supported unless stored in a GeoTIFF or Shapefile format
- **vector** – point, line, or polygon dataset in ESRI Shapefile format.

Language Please choose the language closest to the language used in the attribute table if the dataset is a Shapefile and for the language used on the map if the dataset is a GeoTIFF.

Temporal Extent Start Date (Under construction) Use only a start date if a date range does not make sense for your data. This date should describe the "temporal footprint" of the data. What time period does it describe? This is generally not the date the data was published.

Temporal Extent End (Under construction) Use an end date if the data in your layer is best presented by a date range.

Geographic Bounding Box This describes the theoretical box necessary to enclose the data geographically and is automatically calculated by the system. It can also be modified here. The projection system used to define the bounding box is also defined here.

Supplemental Information Additional information about your data.

Distribution URL This URL is calculated by the system. This URL displays this data layer along with information about it and is a possible form of citation.

Distribution Description (Under construction)

Data Quality Statement Add any information you have describing data quality.

Point of Contact Person who should be contacted with questions about the data.

Metadata Author Name of the person who created the metadata.

***Category** These are ISO 19115 categories and help make it possible for queries from other system to return meaningful results.

Attributes For Shapefile datasets an attribute control table is automatically generated with the following columns. These controls let the user control how attributes are displayed when using the Identify tool and clicking on a feature to return attributes in the right-hand panel:

- **Attribute** Lists the fields in the database.
- **Display Title** Is used to control how the fields are displayed when a user clicks on the layer on the map and returns attribute information in the panel to the right.
- **Display Order** This is the order in which the attribute information is listed when returned in the panel to the right after a click on a map. **NOTE**: The field which is displayed first is used in the summary table in the upper part of the panel to the right. It is best to designate a field to be first which provides meaningful information at the record level.
- **Visible?** This toggle determines whether a given field is displayed at all when one clicks on the map using the Identify tool.
- **Searchable?** This toggle determines whether the field will be searchable from the text search box to the lower left of the map.

4.3.1.2 Troubleshooting Shapefile Uploading

If the layer does not upload there are several possible reasons why:

1) The projection is not being read properly. If the layer is not already in Geographic WGS 84 space, also known as EPSG 4326, project the shapefile to that space and try again.
2) The SLD file is not correct. Check and make sure that you have made the required changes to the file as defined above.
3) Check to see that the XML is valid: http://validator.w3.org/#validate_by_input
4) Check to see that the SLD file was created for this shapefile and not another shapefile. The fields described in the SLD should match the fields in the shapefile.

If all else fails, project your file to Geographic WGS 84 (we can help) and don't include any SLD.

4.3.2 Upload GeoTIFF

Raster files are images and can be satellite imagery or scanned maps which have been georeferenced. GeoTIFF files are rasters and have all the necessary information for display and georeferencing in one file.

Click “Add Layers” and “Upload Data”. Now give it a title “elevation_BGL_7158”. Choose the elevation.tif file to upload. Provide abstract information and click “Upload”. Fill in a keyword and category. Notice that there are no fields for raster layers. This means there will not be information returned when the layer is clicked on, unlike shapefiles which contain attributes.

Raster (GeoTIFF) images do not have the same type of styling options as vector (shapefile) layers do.

4.3.3 Permissions

Users can control whether others can see and/or modify the layers they load to their Map. Layer permissions are added using email addresses, as with a Google Doc. Layer permissions can be set at the time of upload and can be modified as needed later. Currently the only group authentication control is for Harvard and uses Pin authentication via an Isites page.

WARNING: Currently any uploaded layer which can be viewed by the public is also technically downloadable even though it may appear not to be. There do exist custom layers in WorldMap which reside on a separate server and can be viewed but not downloaded, but the ability to make layers viewable but truly not downloadable is not yet enabled in the WorldMap interface.

4.4 Create Layer

WorldMap supports the creation of new layers by digitizing on the map. These layers can be made up of points, lines, or areas (polygons).

1. Once you are logged in and in your Map, click on “Add Layers” link at the upper left.
2. A form will come up with 4 tabs: WorldMap Data, External Data, Upload Layer, Create Layer. Click on “Create Layer”.
3. Now enter a Name for your Layer using letters and numbers only.
4. Enter a Title.
5. Choose the type of layer: Point, Line, or Polygon.
6. Specify the projection (you should leave the current setting EPSG:4326).
7. Enter something for the Abstract.
8. Enter one or more keywords separated by a space.
9. Agree to the terms and conditions.
10. Click “Create”.
    In the Editing Details (metadata) form which is returned, add in descriptive information. You can come back to this later and update it. (To come back and edit the Description later, right click on the

layer in the Map, then click “About”, then “Share Layer”, then “Update the description of this data”.)

11. The only additional item that must be added at this point is the “Category” type down toward the bottom of the form. Click “Update” to create your layer which will appear in the layer list to the left of your Map.

4.4.1 Create Features and Link Rich Media to Them

Now you are ready to start adding content to your new Layer.

1. With your new layer highlighted, click the “Create Feature” link above the Map.
2. Now zoom to the area of the Map where you want to create your new feature.
3. As you click on the map you will be starting to draw your feature. If you are creating a point layer, a single click will generate a new feature and an attribute form will come up to allow you to add in attributes. If you are creating a line, two points will suffice. For an area or polygon, you can keep clicking points as long as you want. Double click to close the polygon.
4. After you create a feature a form will come up to allow you to add attribute information for the feature. You can add values for Name, Description, Start date, End Date, String Value 1, String Value 2, Number Value 1, Number Value 2.

   NOTE: Description is a special field which supports HTML which means you can include media such as video, photos, sound, etc. which will display when users use the “Identify” tool with these features.

5. To add HTML to the Description field:
   a. Click on the empty Description box to add content. A rich text editor will appear.
   b. Type any text you want to display and format it with the tools provided.
   c. If you want to include video or any other media via an “embed snippet of HTML”, first click in the description box then click on the blue HTML box (the last icon on the right).
   d. A new “Edit HTML” view will open. Paste your embed snippet in the line below the HTML “
” text displayed.
   e. Here is an example of a snippet for an image to add:
      ```
      <img src="http://www.hamillgallery.com/DRUMS/TalkingDrums/TalkingDrum03.JPG"
      width="300" height="400">
      ```
      (This was created by gathering the URL and image size by right clicking on the image in question and inserting those pieces of information into the Image Source template above after typing in the code: <img src= then paste your URL (add quotation marks on either side of your URL), then add your size information as above.
   f. To add a YouTube vide, go to youtube, find your video, click “Share” at the bottom. Then click on “Embed”. Copy the embed snippet code (with URL) that is highlighted. Paste this embed snipped in the HTML box described above on the line beneath the “
”.
   g. Click “Submit Query”.
   h. You should now see the Video loaded to your Description section. Click “Save”.

i. Now you will see the attribute form. Click "Save" on the bottom of the form.
j. To see how others will see the attributes you have added for this feature, click "Identify" tool above the Map, then click on the feature you have just edited. Your video should appear, ready to be played along with anything else you added.

6. To edit the geometry or attributes of any vector layer you have edit permissions for:
   a. Highlight the layer you wish to edit.
   b. Click the "Edit Feature" link above the Map.
   c. Click on the feature you wish to edit to select it.
   d. Click "Edit" at the bottom of the attribute form. Now you can edit the geometry of the feature or the attributes of the feature. To edit the geometry, click on a vertex (white box) on the feature and drag it. To add a new vertex, click on the faded vertex between two existing vertices and drag. To edit attributes, click in the attribute form for the attribute you want to edit and make any changes.
   e. When you are finished editing geometry and attributes, click "Save" at the bottom of the attribute form. Then close the form by clicking on the 'X' in the upper right corner of the attribute form.

4.5 Rectify Layer

To georeferenced your scanned maps online, go to Add Layers, click on the "Rectify Layer" tab, the click on "WorldMap WARP" or go to http://warp.worldmap.harvard.edu.

A video demonstrating how to use WorldMap WARP is here.

Create an account in WorldMap WARP. Eventually you will not need two accounts, but now you do. Upload any scanned map you would like to georeference: click "Upload Map" tab, then fill in metadata, then browse to the image file you want to upload, choose whether you want the map to be public or not, and click "Create".

The map should now be displayed un georeferenced. Click on "Rectify" to define corresponding points between your scanned map and the Open Street Maps global base map. The link just below the map, called "Advanced Options" allows the user to choose the rectification method and the sampling method, should they choose to override the automatic settings.

4.5.1 Adding georeferenced maps to WorldMap

Once the scanned map is georeferenced it can be exported in several ways including as a GeoTIFF that can be used in other system and also a way that can be easily brought into WorldMap.

To do this, click on the "Export" tab. Right-click on "Tiles base URL" link and choose "Copy Link Location". Now go to your WorldMap map and go to "Add Layers". Then go to "External Data" tab. Click "Add another server" then paste the URL you just copied from the Georeferencer. Be sure it is set to "WMS". Click "Add Server".

You will now see a list which gives the name of your layer and the name of the server. Click on the name of your layer and then click “Add Layers” at the bottom. Now close the “Add Layers” window.

At the bottom of your list of layers on the left in WorldMap you should see the layer you just georeferenced show up. If your new layer is not visible, right click on the layer name of the new layer and select “Zoom to Layer Extent” to see your map.

Save your map so that when you come back to your map your new layer will remain visible in your map.

4.5.2 Masking your map

You can mask your map by drawing a line around only the area you want to display.
One you have uploaded and georeferenced (rectified) your map, go to the Crop tab.

1. Click the “Draw Polygon” tool to the right of the hand “Move Around Map” tool.
2. Click on the map to draw a polygon around the area you wish to keep.
3. Double click to close the polygon.
4. Click “Mask Map!” at the bottom of the page to apply your mask.
5. You can select your polygon and delete it using the “Delete Polygon” tool.
6. You can delete you mask by clicking the Delete Mask link at the bottom of the page.

5.0 Changing Map Cartography

In addition to controlled data sharing, one of the key benefits of WorldMap is cartographic expressiveness. The Style tool allows you to create SLDs or Styled Layer Descriptors which are XML documents that define the way a layer looks.

To define the cartographic appearance of a Layer, the user can create Styles for that layer. Styles can be created for both raster (image) and vector (point/line polygon) data types, but the options are richer for vectors. There are online tools for styling vector layer, but one can also create styles using desktop tools like ArcGIS and QGIS, then upload them together with the layer to be symbolized.

To create a Style for a layer in WorldMap, (whether using online or desktop tools) one is creating a Styled Layer Descriptor(SLD) XML document which is stored in WorldMap. The SLD is used to control how the layer is displayed. It is possible to define more than one style for a given dataset. One can then choose which style to use after the layer has been loaded to the map. The layer will at first appear using the default style, but other styles are available to be chosen instead.

5.1.1 Online Styles Creator

NOTE: Users can modify the way a vector (point, line, or area) map is displayed, and control the color of lines or area fills as well as labels. Users can also use rules to support complex symbolization schemes based

on database and scale conditions. WorldMap uses an open format for symbolization called SLD (Styled Layer Descriptor). SLDs created can be uploaded to WordMap and used to symbolize a given layer.

It is possible to edit map styles and create new styles in WorldMap. Styles are created using one or more rules. Each rule can have several parts, including a label, coloring, scale dependency, and one or more database conditions.

At the top of the tool you can choose between existing styles for a given layer, copy an existing style, or edit an existing style, or create a new style from scratch.

Let's start by editing a rule from the currently chosen style. Select the rule and click Edit. There are three tabs containing options for defining the rule you are editing. Aspects of a rule that you set in the various tabs are cumulative for a rule so for example you create a rule by setting the color in the Basic tab and then a database condition to control when that color is displayed in the Advanced tab.

In the Basic tab it is possible to:

- change the name of the style
- change its fill and outline color (if it is a polygon)
- control opacity of line or fill
- control line width and line style

In the Labels tab it is possible to:

- Select a field to use as content for your labels
- Choose a font type and size and style for the Label
- Choose the color for the Label as well as the opacity
- Choose a halo (background color) for the Label, including its color, size, and opacity

In the Advanced tab it is possible to:

- Limit the display of whatever you have defined in Basic and Label tabs in terms of maximum display scale and minimum display scale.
- Limit the display of whatever you have defined in Basic and Label in terms of one or more database conditions. It is also possible to set multiple groups of conditions.

Explore how:

- Polygon styles can be changed.
- To modify simple style in terms of fill, outline, opacity.
- To set label and scale dependency (LandType)
- To set a database condition for a rule and combine it with another database rule. (Suitability > 50).
- Show how to create a new style from scratch or duplicate one.

5.1.2 Desktop Styles Creation

WorldMap contains powerful online tools for styling your vector (shapefile) layers. These tools are described in the previous Section. For some situations however it can be very tedious to create styles using online tools. For example if you want to create a chloropleth map which uses census data to display income levels in 6 shades of blue and specified income ranges for each shade you will save time using ArcMap or QGIS approaches described below.

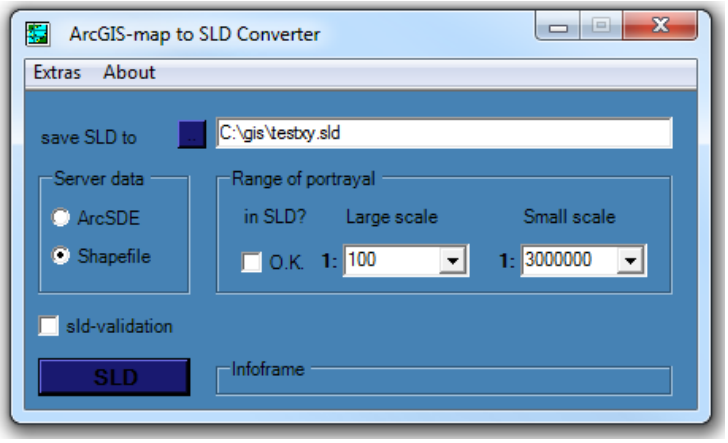
There are various software packages for creating styles for your maps. This section summarizes two different software tools, highlighting pros & cons for each technology used for creating SLD styles for your maps. First is a tool which runs in ArcGIS 9.3 and ArcGIS 10 called ArcMap2SLD. The second is a plugin which runs in QGIS, an open source software called Quantum GIS available for download for free.

5.1.2.1 Using ArcMap2SLD in ArcGIS 10

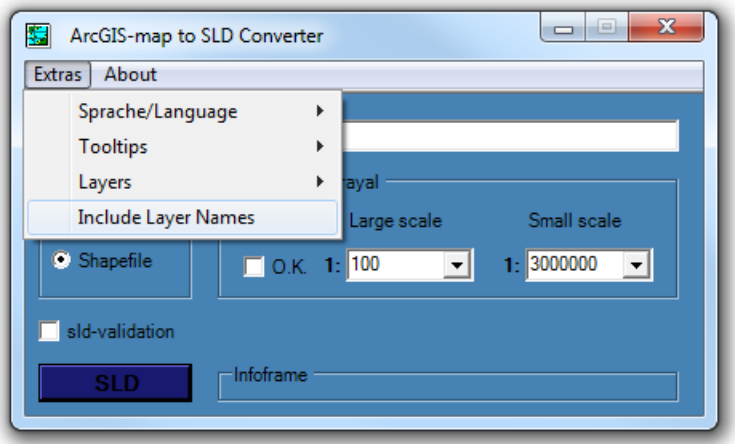
This approach allows you to take advantage of some of the symbolization power of ArcGIS and apply it to your WorldMap layer. The latest version, ArcMap2SLD 1.3, which runs in ArcGIS 10 on the 32 bit version of Windows 7, is here: http://wald.intevation.org/projects/arcmap2sld. The 64 bit Windows 7 version is here http://cga-5.hmdc.harvard.edu/data/worldmap/ArcMap2SLD_1.3_64_bit_Setup.zip.

The earlier version of ArcMap2SLD, 1.2.2.1, which runs on ArcGIS 9.3 and Windows XP is here: http://wald.intevation.org/frs/?group_id=32

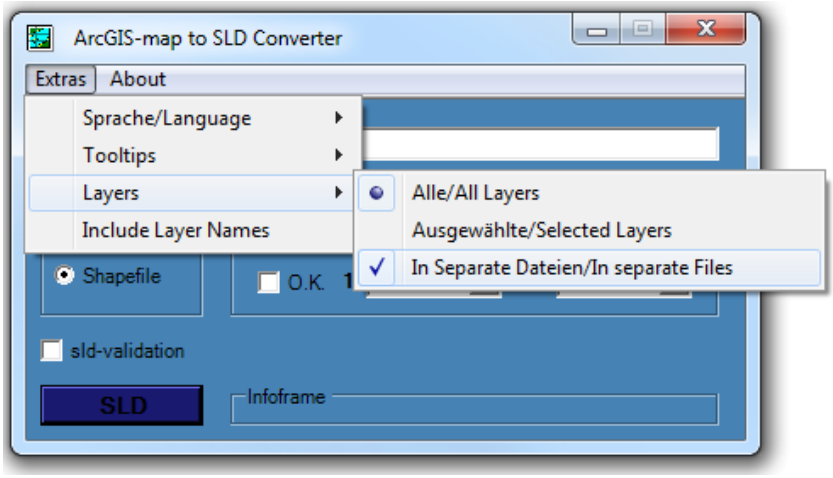
To get started, open ArcGIS 10 and load the layers you want to symbolize and add to WorldMap to your MXD. Once you have symbolized your layers, start ArcGIS2SLD. (Currently this tool works best with capturing the colors of point, line, and polygons layers.)



Define a path and name for the SLD file you want to create.



IMPORTANT: Uncheck "Include Layer Names" under Extras.



If you would like to include only selected layers (this is not the same as turned-on layers) to be exported from your ArcGIS map to SLD, check "Selected Layers". If you have multiple layers in the map you are exporting, you will need to also check "In Separate Files". The tool will then create separate SLD files, one for each layer in your ArcGIS map. To load these to WorldMap you will need one SLD for each corresponding shapefile you wish to symbolize. Click the blue SLD button at the bottom left to create your SLD files.

Note on Multiple SLDs for a Single Shape File

If you want to create multiple SLDs for a single shapefile layer, create the SLDs then contact us at worldmap@harvard.edu. If you email us the SLDs and tell us which layer you would like them associated with we can make the association for you. There is currently no way for end-users to upload multiple SLDs for a given shape file layer.

Pros & Cons for Using ArcMap2SLD in ArcGIS 10 method

- Pros:

- ArcGIS 10 is the most commonly used commercial software package and many people are familiar with it.
- One can create multiple SLDs at one time, great for large number of layers or for a single layer for which you want to style in multiple ways.
- There are no additional changes in the SLD document required, just make sure to uncheck "Include Layer Names" option.

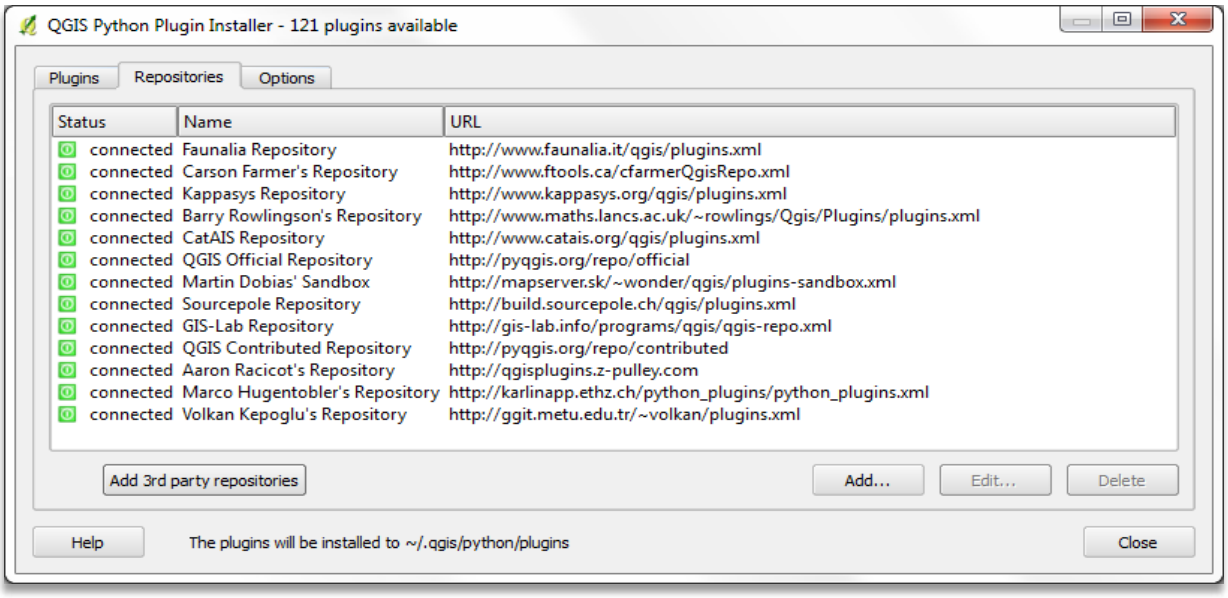
➢ Cons:

- Arc2SLD tool does not run on 64 bit OS, even in compatibility mode (tested on various PCs), works fine on 32 bit.
- Does not recognize <all other values> category/class in the layer properties -> symbology tab if you want to classify by "unique values" in ArcMap 10. *Simple fix:* add all unique categories, and then group the selected ones as "all other values". For example, imagine you have 2 categories: "missing values" & "blank" that you want to assign one color as "missing data". Grouping those 2 categories into one makes it work for SLDs.
- Does not work with Layer Properties -> Definition Query in ArcMap 10. For example, if you want to display only selected records from the data, you should use the symbology tab instead, or alternatively create a new shapefile with the selected records only.
- Does not work for layers grouped together. *Simple fix*: ungroup the layers when creating multiple SLDs.
- Does not recognize Display -> Transparency in ArcMap 10. For example, if you set the transparency layer to 50%, the SLD will take it as 100% color. In other words, when you upload the layer to WorldMap you will not see it transparent, instead you will see it as a lighter shade of the solid color you chose. This can be remedied in WorldMap by changing transparency at the Layer or Style Rule level.
- Does not work with charts, such as pie chart or bar chart symbology.

5.1.2.2 Using "Save as SLD" plugin in QGIS 1.7

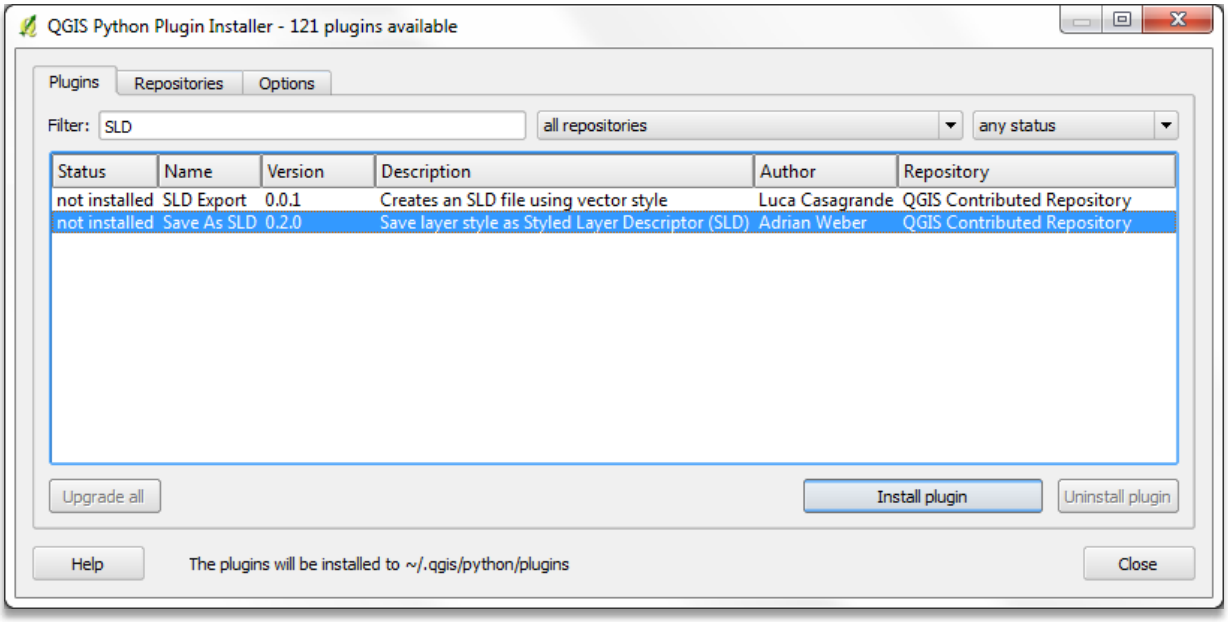
QGIS is an open source desktop GIS software application, available for free download at http://www.qgis.org. Use QGIS 1.7 desktop application to create your maps and symbolize your layers, and "Save as SLD" plugin to export them to SLD styles.

To install "Save as SLD" plugin in QGIS, go to Plugins -> Fetch Python Plugins -> Repositories tab.

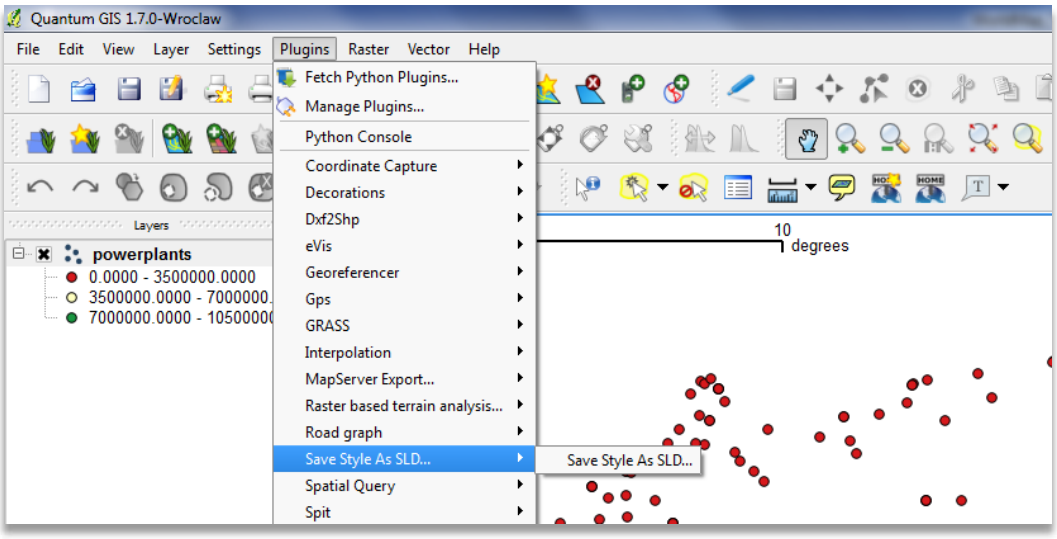


IMPORTANT: Click on “Add 3rd party repositories” and click OK to the message prompt.

Then click on “Plugins” tab and filter for "SLD", select “Save as SLD” and install plugin.



“Save as SLD” should then appear under the Plugin dropdown menu.



After styling your layer, simply click on *Save Style as SLD* and specify the path for the layer style.

Pros & Cons for Using "Save as SLD" plugin in QGIS 1.7 method

- Pros:
  - QGIS is an open source desktop GIS application, available for free download.
  - QGIS is easy to use and learn.
  - Runs on various OS, including Windows 7 64 bit OS as well as Macs.
  - SLD plugin is easy to install.
  - No additional changes in the SLD style code are required.
- Cons:
  - No option to export multiple SLDs, export one layer at a time; hence, not good if you have large number of layers.
  - No option for styling with proportional symbols by size. For example, styling layers with point feature data to represent various sizes in points based on the quantity they represent is not an option in QGIS styles.
  - Does not work with charts, such as pie charts or bar charts.

5.1.3 Creating Raster Styles with Desktop Software (Advanced)

Raster (GeoTIFF) images do not have the same styling options as vector (shapefile) layers do. However, you may still need to define transparency levels to selected areas in your image. For example, if you have an older scanned map that has been georeferenced (assume that the map has a white background), and you need to make the white areas transparent. In such case, you may find the next section helpful as it walks you through the steps for defining transparency to selected areas in your GeoTIFF. ***Note:*** in order to follow the instructions below and upload your raster image to the WorldMap, you need to make sure that it is a GeoTIFF image.

Steps for adding transparency to selected areas in GeoTIFF (advanced level):

1. Find out where your GDAL utilities are located. If you have QGIS installed on your computer it is likely to be here: C:\Program Files (x86)\Quantum GIS Wroclaw\bin

   Note: GDAL is a powerful tool for working with raster images such as GeoTIFF. Hence, if you don't have GDAL utilities installed, you can download it from http://www.gdal.org/.

2. Use *gdalinfo* utility to find out all the information about your raster data. First, in the Windows command line (cmd), change directory to your GDAL utility files directory by typing:

   cd C:\path to your GDAL utility files

   For example, in my case the path is the following:

   cd C:\Program Files (x86)\Quantum GIS Wroclaw\bin

   Then use gdalinfo to find out info about your raster data:

   gdalinfo C:\path_to_your_raster\your_raster.tif

3. Look into the results and find out what kind of raster data you have.

   a. If you have a *3 band raster* file with 8 bit pixels, and you want to make all white pixels in the image transparent, you would create an *alpha channel* using *gdalwarp*:

   To add alpha channel to a 3 band raster type in:

   gdalwarp -srcnodata "255 255 255" -dstalpha C:\your_raster.tif C:\your_raster_alpha.tif

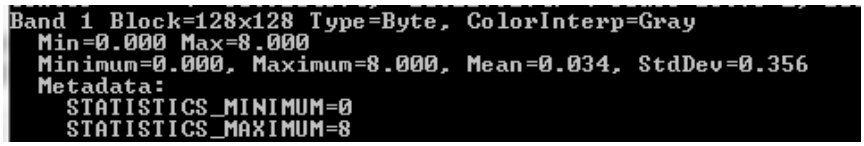
   Note: "255 255 255" refers to the values in each R, G, B layer that is a no-data value (appears as white in the original tiff). If the area that needed to be transparent was black, this would be "0 0 0" instead.

   As a result you should see something like this:

   Creating output file that is 3931P x 3762L. Processing input file C:\rasters\ming.tif.
   0...10...20...30...40...50...60...70...80...90...100 - done.

   This will create the alpha channel (4th band) and add transparency to your raster image areas that are white; thus, your new raster_alpha.tif file is ready for upload to WorldMap.
   Note: *this method does not allow retaining legends for your map as there is no style SLD file attached to it. This makes sense for those types of images which don't need data derived legends such as satellite imagery, and various types of scanned paper maps.*

   b. If you have a *single band grey scale raster with 8 bit pixels*, your gdalinfo output with no color table should look like this:

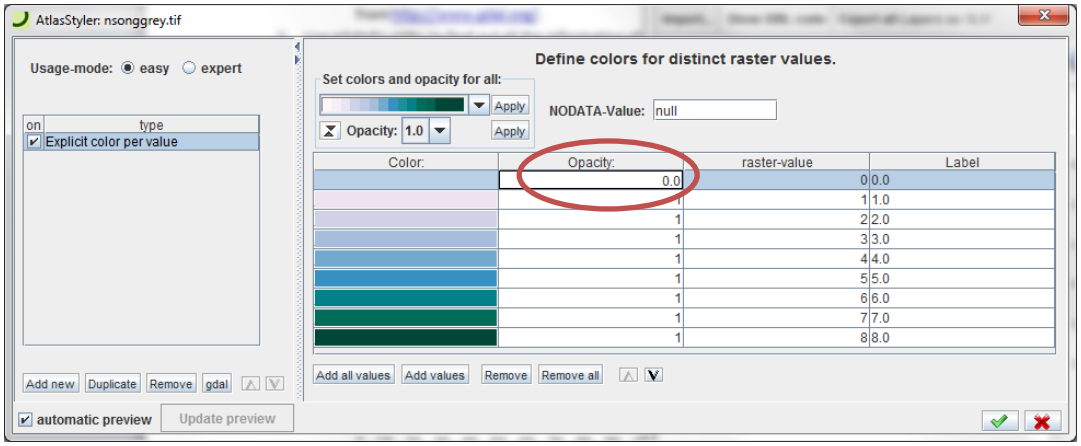


   Note: ColorInterp = Grey and there is no color table

   In this case you can simply import your raster image into the Atlas Styler and create the SLD style with transparency in the styles window. Follow the steps below:

   - Open the AtlasStyler and import your raster
   - Right click on your raster and go to "styles"

- Click on “add new” on the left hand side and chose either *“Explicit color per value”* or *"Colors for Value Ranges"* style option
- Select the color scheme and add all values/classes
- Change opacity of selected cell values to ‘0’ (e.g. in the image below white areas of the raster are defined to be 100% transparent)



You can also add labels for your legends here. After you finish defining the colors, opacity and labels, confirm your changes and save your file as an SLD style file. You can now upload your raster image and the SLD style file on the WorldMap.

Note: *this method does allow retaining legends in the style SLD file attached to it; you are uploading raster image together with the style SLD file created with AtlasStyler to the WorldMap environment. However, once you upload it to the WorldMap, you cannot edit your styles and/or legends. Not being able to edit raster legends is a bug.*

c. If you have a *single band raster with a built in color map*, your gdalinfo output window should look like this:

```
Band 1 Block=128x128 Type=Byte, ColorInterp=Palette
  Min=1.000 Max=163.000
  Minimum=1.000, Maximum=163.000, Mean=10.726, StdDev=18.098
  NoData Value=0
  Metadata:
    STATISTICS_MINIMUM=1
    STATISTICS_MAXIMUM=163
    STATISTICS_MEAN=10.725693751248
    STATISTICS_STDDEV=18.098143492813
  Color Table (RGB with 256 entries)
    0: 0,0,0,255
    1: 255,255,128,255
    2: 253,255,128,255
    3: 251,255,125,255
    4: 246,255,122,255
    5: 241,252,119,255
```

Note: ColorInterp = Palette and Color Table has RGB values defined

In this case, you can import your *color map* into the AtlasStyler and define opacity for the selected areas in your image by following the steps below:

- Open the AtlasStyler and import your raster

- Right click on your raster and go to “styles”
- In the styles window click on ***gdal*** button and copy paste the gdalinfo output including the color table with RGB values into this window, then click ok
- The color map classes will show up in the style window where you can change the opacity for selected cell values to ‘0’ as well as define labels for your legends
- Confirm the changes and save your raster & SLD, then upload it to the WorldMap environment

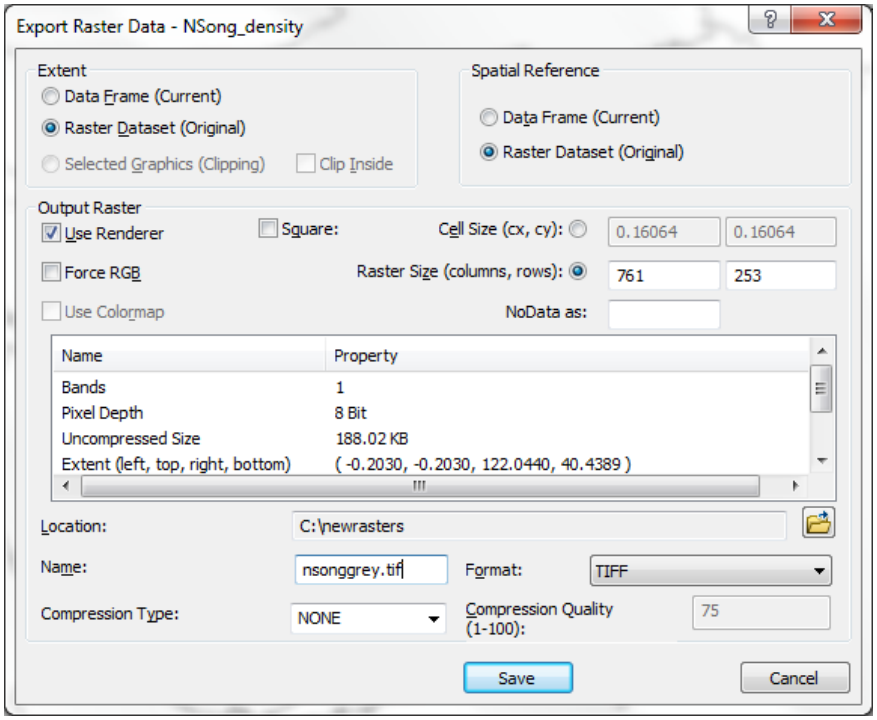
Note: *this method does allow retaining legends in the style SLD file attached to it; you are uploading the raster image together with the style SLD file created in the AtlasStyler to the WorldMap environment. However, once you upload it to the WorldMap, you cannot edit your styles and/or legends. Not being able to edit raster styles is a bug.*

d. If you have a single band raster with 24 bit pixels, the steps described in sections 3a, 3b, 3c will not work. You will first need to convert your raster data into a *3 band 8 bit pixel* image. You can do that using the open source *pct2rgb.py* gdal utility:

pct2rgb.py your_original.tif your_new_3band.tif

Once you convert your raster image, you can follow the steps in section 3.a to add transparency to selected areas on your image. You can read more about *gdal* utilities at http://www.gdal.org/gdal_utilities.html

Alternatively, you can use GIS software packages such as ArcGIS 10 to reformat your 3 band raster into a single band raster image. To convert your image into an 8 bit pixel single band raster in ArcGIS 10 simply copy or export your raster data with the following properties defined:



Important: make sure to check the "Use renderer" option for the pixel depth 8 bit to take place.

After you convert your image to single band 8 bit pixel raster file, first make sure that your new 8 bit raster is saved as GeoTIFF (use *gdalinfo* utility described in step2). Then you can follow the steps described in section 3.b. ***Note:*** if your image is saved as TIFF and NOT as GeoTIFF, you will first need to convert it to GeoTIFF in order to follow this tutorial. There are a number of commercial software packages available for this task, e.g. GlobalMapper or FME. If you have problems with converting your raster file to GeoTIFF, please contact CGA at contact@help.cga.harvard.edu and one of our GIS professionals will be available to help you.

4. Final step is to add your new raster file to the WorldMap and check it for transparency.

Summary notes:

- It is *important to understand the type of raster GeoTIFF image* you have. Use *gdalinfo* utility described in step 2 and study the gdalinfo output results first.
- If you have a *3 band raster image*, you will need to create an alpha channel to add transparency to selected areas in your image (see section 3.a for details).
- If you have a *single band 8 bit pixel raster (with a grey scale)*, the easiest method is using Atlas Styler open source software package to add styles and transparency to your raster image (see section 3.b for *grey scale* details).
- If you have a *single band 8 bit pixel raster (with a built in color map)*, you can use Atlas Styler open source software package to import the *color map* styles and add transparency to selected areas in your raster image (see section 3.c for *color map* details).
  If you have a *single band 24 bit pixel raster*, you will first need to convert your image to one of the formats mentioned above, and then add transparency (see section 3.d for details).

5.1.4 How to Use Multiple Styles

NOTE: WorldMap supports the association of multiple styles with a single data layer. The user can choose the default style within the "Share Layer" page. After a layer is added to a map, the style can be changed from the default style to another one. It is possible to load the same layer to a map several times and have it displayed each time with a different style.

Currently users can upload one style at a time along with a layer. There is no way yet for users to associate more than one style with a layer, however a WorldMap administrator can do that – contact us at worldmap@harvard,edu.

6.0 Appendices

6.1 Some Web Map Services that work in WorldMap

See **Section 4.2** above for details on how to add a WMS or ArcGIS Rest service to your map.

ESRI Global Satellite Service
This is a great alternative to Google's satellite if you need it. Load this as an ESRI Rest Service. The "World Imagery" layer has all the high resolution imagery included via scale dependency.
http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer

MassGIS – Massachusetts GIS
http://giswebservices.massgis.state.ma.us/geoserver/wms

Harvard AfricaMap Server (cached).
These layers are not well named or documented yet (we are working on that), but there are many valuable layers here you won't find anywhere else.
http://cga-5.hmdc.harvard.edu/tilecache/tiles.py/1.0.0/

New York Public Library Map Rectifier (cached)
Thousands of cached maps can be found from the NYPL collection and added to WorldMap by searching NYPL Site http://maps.nypl.org/warper.
Go to the rectified map you want, click Edit/Rectify, Select Export Tab, copy "Tiles base URL" to WorldMap

National Map Program (NAIP)
http://isse.cr.usgs.gov/ArcGIS/services/Combined/USGS_EDC_Ortho_NAIP/MapServer/WMSServer?request=GetCapabilities&service=WMS

Haiti Relief Map
http://**maps**.**nypl**.org/**relief**/**maps**/wms/32?request=GetCapabilities&version=1.1

Cubewerx
http://demo.cubewerx.com/demo/cubeserv/cubeserv.cgi?SERVICE=wms&VERSION=1.1.0&REQUEST=GetCapabilities

NEXRAD Weather
http://mesonet.agron.iastate.edu/cgi-bin/wms/nexrad/n0r.cgi

Human Journey
http://geoserver.thehumanjourney.net/geoserver/wms?request=getCapabilities?SERVICE=WMS&REQUEST=GetCapabilities

World Health Organization
http://apps.who.int/tools/geoserver/wfs?request=GetCapabilities?SERVICE=WMS&REQUEST=GetCapabilities
http://apps.who.int/tools/geoserver/wms

Argentina National GIS
http://sig.gov.ar/geoserver/ows?service=WMS&request=GetCapabilities

Australia's Tropical Land and Seas
http://e-atlas.org.au/geoserver/wms?service=wms&request=GetCapabilities?SERVICE=WMS&REQUEST=GetCapabilities

DARMC WMS
http://cga6.cga.harvard.edu:8081/arcgis/services/DARMC/RE_Provinces_117/Map

DARMC REST
http://cga6.cga.harvard.edu:8081/arcgis/rest/services/DARMC/CF_Crusader/MapServer

http://sampleserver1.arcgisonline.com/ArcGIS/rest/services/Specialty/ESRI_StatesCitiesRivers_USA/MapServer

6.2 Software

ArcMap2SLD – Open Source .NET app for Map Styling from Within ArcGIS 10
http://wald.intevation.org/projects/arcmap2sld

Desktop tool for converting Excel, GPS, or Google Earth files to Shape for uploading to WorldMap:
Minnesota DNR Garmin

AtlasStyler – Standalone Open Source Map Styling
http://en.geopublishing.org/AtlasStyler

QGIS – Full featured Open Source GIS which Includes Styling
http://www.qgis.org