



GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Introduction to GIS and Its Uses in Cultural Heritage
Surveys and Analysis (02.01)

William Raynolds

Jared Koller

ASOR TUTORIALS FOR CULTURAL HERITAGE SURVEY

ASOR and its partners have developed a series of tutorials and training modules aimed to help cultural heritage specialists perform surveys and condition assessments through open source tools and software, including QGIS, KoboToolbox, LibreCAD, and RealityCapture.

These modules provide step-by-step tutorials on how to download, install, and effectively use applications and software during data collection, analysis, and output. All tutorials can be found on ASOR's website: <https://www.asor.org/chi/chi-tutorials>.

WHAT IS GIS?

GIS stands for (G)eographic (I)nformation (S)ystems.

GIS is a computer-based system for retrieving, storing, integrating, manipulating, analyzing, and displaying geospatial data. "Geospatial" refers to the relationships between and among natural and cultural phenomena that are distributed across the earth (at varying scales) and that can be mapped.

A GIS includes three components:

1. **Hardware:** Computer, servers, input/output devices (GPS data collectors and increasingly cell phone apps like KoboCollect).
2. **Software:** Many types, but all usually include a few basic functions: data storage, management, analysis, and visualization.
3. **People:** GIS outputs are not automated. People determine how the data is used, analyzed, and presented to the world. Experience is needed to judge the appropriateness of GIS to specific problems.

Similar to Adobe Photoshop, InDesign, or other graphic-based software, GIS software relies on Layers to organize and manipulate information. Data layers can contain different types of information that produce new linkages between spatial and non-spatial datasets.

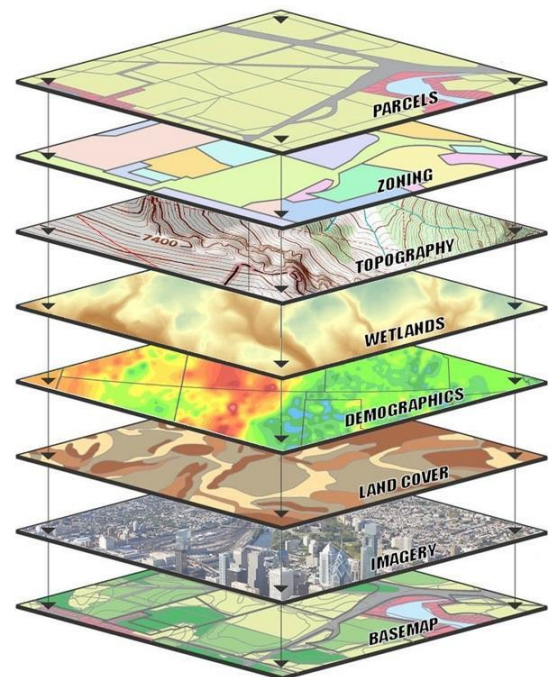


Image source: <https://www.usgs.gov/media/images/gis-data-layers-visualization>

SOME APPLICATIONS OF GIS IN CULTURAL HERITAGE WORK

IN THE FIELD

- Information Accessibility and Dissemination
- Efficient and Accurate Map Storage and Updating
- Monitoring & Risk Assessment
- Site Maintenance
- Site Preservation Planning and Analysis

IN THE GIS SOFTWARE

- Link or merge multiple types of spatial and non-spatial data
- Select information by area, theme, or specific attribute
- Analyze spatial characteristics of data
- Search for particular features within a specific area or location
- Update or modify data quickly and cheaply
- Model data and assess alternatives
- Produce numerous types of visualizations and outputs

LAYERS & TYPES OF DATA

GIS projects contain three types of data:

1. Spatial

- a. Vector Data
 - i. Point Data — Points described by x,y coordinates (lat,long; easting, northing)
 - ii. Line/Polyline Data — Line data have x,y points and lines between points.
 - iii. Polygon Data — Connected line segments enclosing areas
- b. Raster
 - i. Raster or “grid” data can be used to display gradients of spatial data e.g., elevation, population, artifact density...etc.
- c. Images
 - i. Examples include remote sensing data or scans of maps or other photos. This is a type of raster data where the number in each cell describes a specific color that are stitched together to form an image.
- d. Terrain and elevation models datasets built from lidar and other point clouds.

2. Attribute

- a. Non-spatial information that are connected to spatial layers through tables.

3. Metadata

- a. Scale
- b. Projection
- c. Resolution/Accuracy
- d. Data source

ABOUT QGIS

QGIS

QGIS is a free and open source Geographic Information System (GIS), or geodatabase, licensed under the GNU General Public License. QGIS runs on Linux, Unix, Mac OSX, Windows and Android and supports numerous vector, raster, and database formats and functionalities.

QGIS users can view, edit, and analyze spatial information through its free software toolkit.

Download QGIS here: <https://qgis.org/>.

Documentation: <https://docs.qgis.org/3.16/en/docs/index.html>



The screenshot shows the QGIS website homepage. At the top, there is a navigation bar with the QGIS logo, version numbers (3.22.2 and 3.16.15 LTR), and menu items: DISCOVER QGIS, FOR USERS, GET INVOLVED, and DOCUMENTATION. A search bar and a language dropdown (English) are also present. The main heading reads "QGIS A Free and Open Source Geographic Information System". Below this is a large image of a diverse group of people, with the text "QGIS is a team effort" and "Support our community events!". Underneath the image, it says "QGIS Community meetings" and "Find out more about our tradition of user and contributor meetings!". Further down, there is a paragraph: "Create, edit, visualise, analyse and publish geospatial information on Windows, Mac, Linux, BSD and mobile devices" and "For your desktop, server, in your web browser and as developer libraries". At the bottom, there are two green buttons: "Download Now" and "Support QGIS".

For more detailed information on anything within this tutorial, please visit QGIS Documentation:
<https://docs.qgis.org/3.16/en/docs/index.html>



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