

GRASS

Geographical Resources Analysis Support System



Commonly referred to as GRASS, this is a Geographic Information System (GIS) used for geospatial data management and analysis, image processing, graphics/maps production, spatial modeling, and visualization. GRASS is currently used in academic and commercial settings around the world, as well as by many governmental agencies and environmental consulting companies.

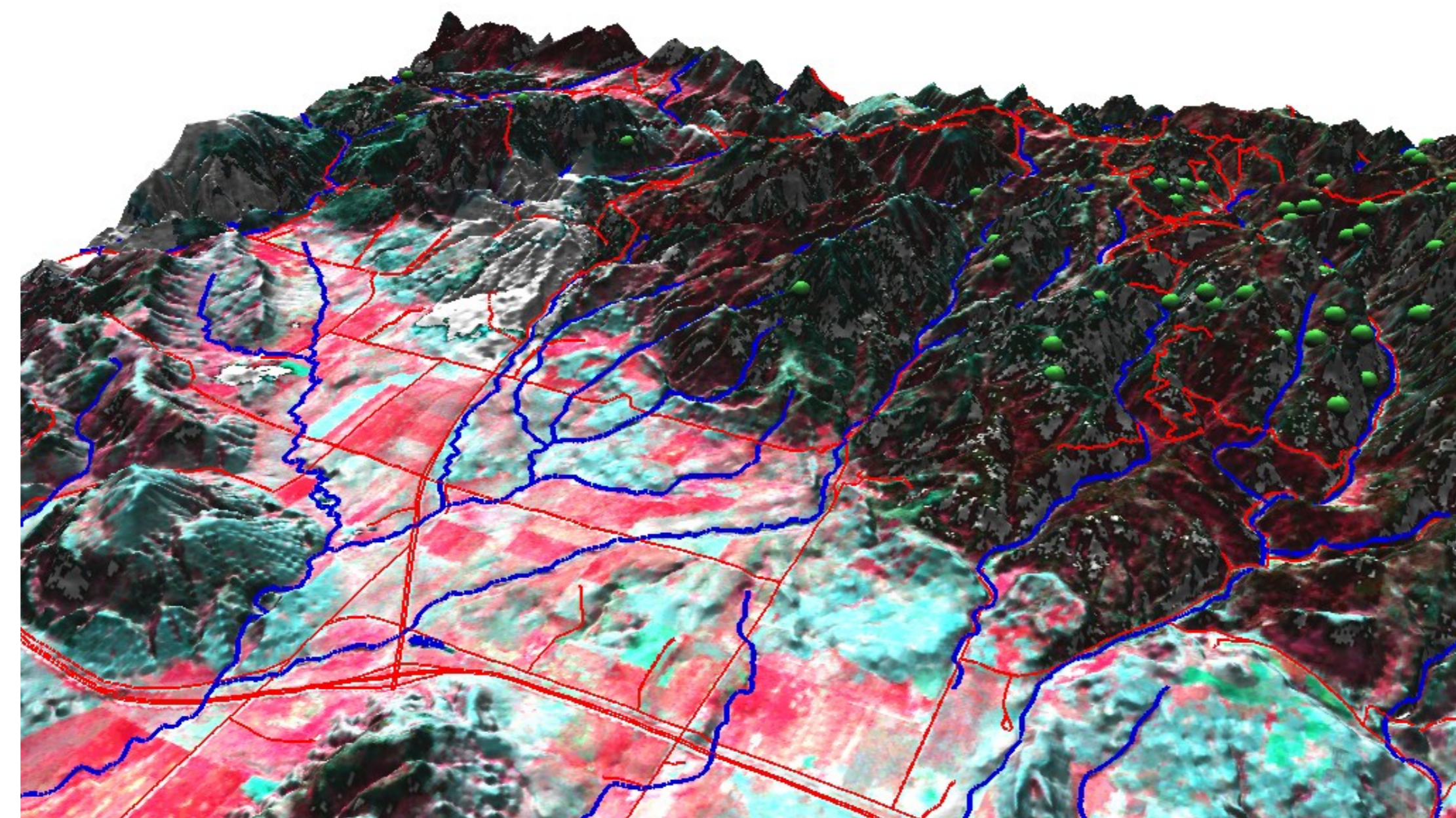
General Information

Geographic Resources Analysis Support System, commonly referred to as GRASS GIS, is a Geographic Information System (GIS) used for data management, image processing, graphics production, spatial modelling, and visualization of many types of data. It is Free (Libre) Software/Open Source released under GNU General Public License (GPL).

Originally developed by the U.S. Army Construction Engineering Research Laboratories (USA-CERL, 1982-1995), a branch of the US Army Corp of Engineers, as a tool for land management and environmental planning by the military, GRASS has evolved into a powerful utility with a wide range of applications in many different areas of scientific research. GRASS is currently used in academic and commercial settings around the world, as well as many governmental agencies including NASA, NOAA, USDA, DLR, CSIRO, the National Park Service, the U.S. Census Bureau, USGS, and many environmental consulting companies.

The new GRASS 6.0.0 release introduces a new topological 2D/3D vector engine and support for vector network analysis. Attributes are now managed in a SQL-based DBMS. A new display manager has been implemented. The NVIZ visualization tool was enhanced to display 3D vector data and voxel volumes. Messages are partially translated (i18N) with support for FreeType fonts, including multibyte Asian characters. New LOCATIONS can be auto-generated by EPSG code number. GRASS is integrated with GDAL/OGR libraries to support an extensive range of raster and vector formats, including OGC-conformal Simple Features.

The GRASS Development Team has grown into a multi-national team consisting of developers at numerous locations.



a traditional 2D/2 application: draping of an hyperspectral image and several vectorial layers on a digital terrain map.

Supported platforms

* **Architectures:** Intel x86, Motorola PPC, SGI MIPS, Sun SPARC, Alpha AXP, HP PA-RISC, CRAY, others.

* **Operating systems:** Linux/Intel, Linux/PowerPC, Solaris/SPARC, Solaris/i86, SGI IRIX, HP UX, Mac OS X (Darwin), IBM AIX, BSD-Unix variants, FreeBSD, CRAY Unicos, iPAQ/Linux handhelds and other UNIX compliant platforms (32/64bit), additionally Windows NT/Cygnus.

* GRASS is written in C with documented C-API and offers a preliminary C++ interface.

Source code and selected binaries can be downloaded on the web site grass.itc.it

GRASS Programming

GRASS is released under GNU GPL, the source code (more than 1 Millions lines of C) is completely available. GRASS provides a sophisticated GIS library which can be used for own developments. A GRASS Programmer's Manual is also available.

Import/Export: Data formats supported by GRASS

- * 2D raster data,
- * 3D raster data (voxels),
- * topological vector data (2D, currently extended to 3D)
- * point data (called sites)

In detail:

* **Raster:** ASCII, ARC/GRID, E00, GIF, GMT, TIF, PNG, ERDAS LAN, Vis5D, SURFER (.grd) ...
Using GDAL library (r.in.gdal) more formats like CEOS (SAR, LANDSAT7 etc.) can be read

* **Image (satellite and air-photo):** AVHRR, BIL/BSQ, ERDAS LAN, HDF, LANDSAT TM/MSS, NHAP aerial photos, SAR, SPOT, ...

* **Vector:** ASCII, ARC/INFO ungenerate, ARC/INFO E00, ArcView SHAPE (with topology correction), BIL, DLG (U.S.), DXF, DXF3D, GMT, GPS-ASCII, USGS-DEM, IDRISI, MOSS, MapInfo MIF, TIGER, VRML, ...

* **Sites (point data lists):** XYZ ASCII, dBase

GRASS Features

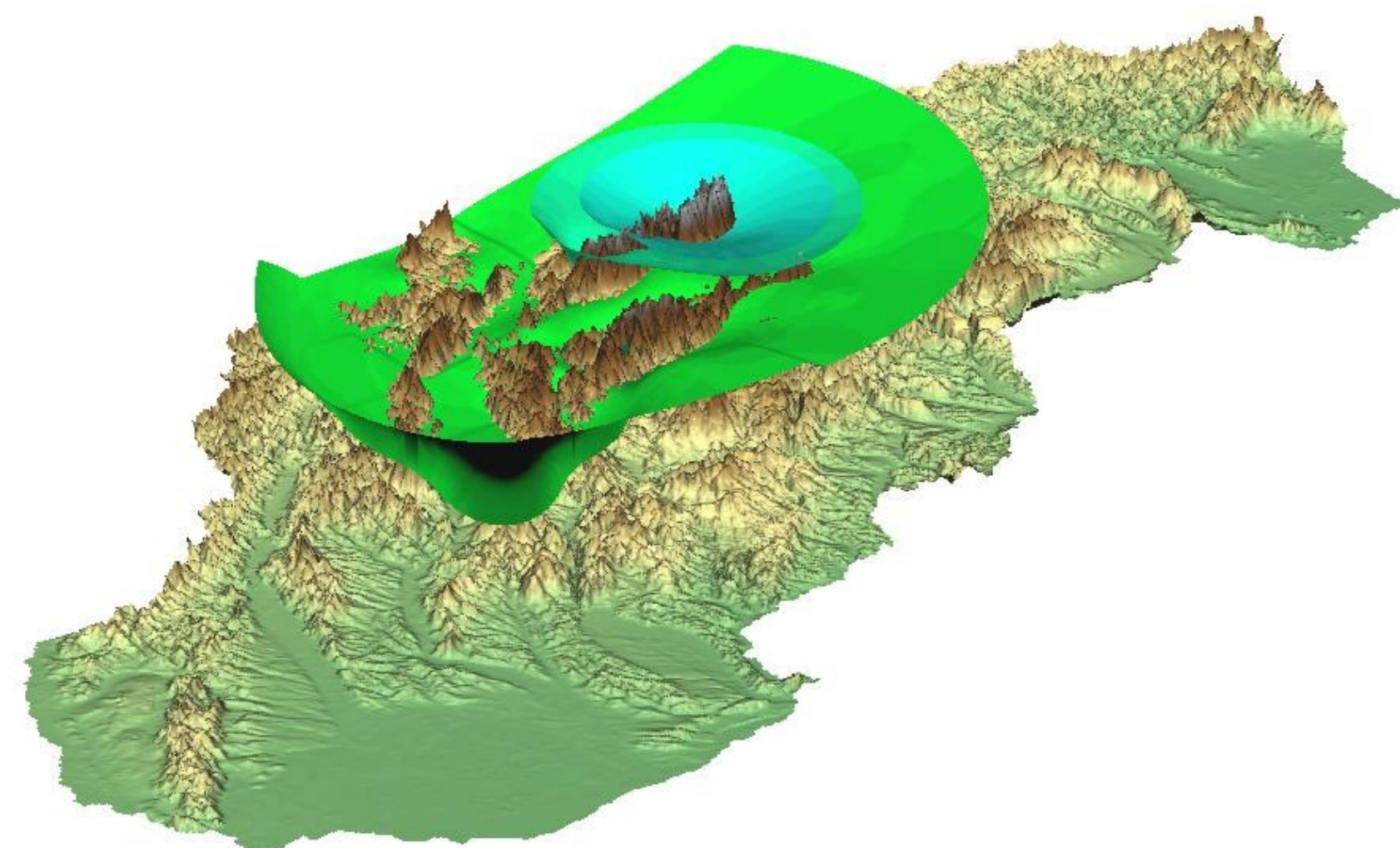
GRASS is a raster/vector GIS, image processing system, and graphics production system. GRASS contains over 350 programs and tools to render maps and images on monitor and paper; manipulate raster, vector, and sites data; process multi spectral image data; and create, manage, and store spatial data. GRASS uses both an intuitive windows interface as well as command line syntax for ease of operations. GRASS can interface with commercial printers, plotters, digitizers, and databases to develop new data as well as manage existing data.

GRASS and network support for team

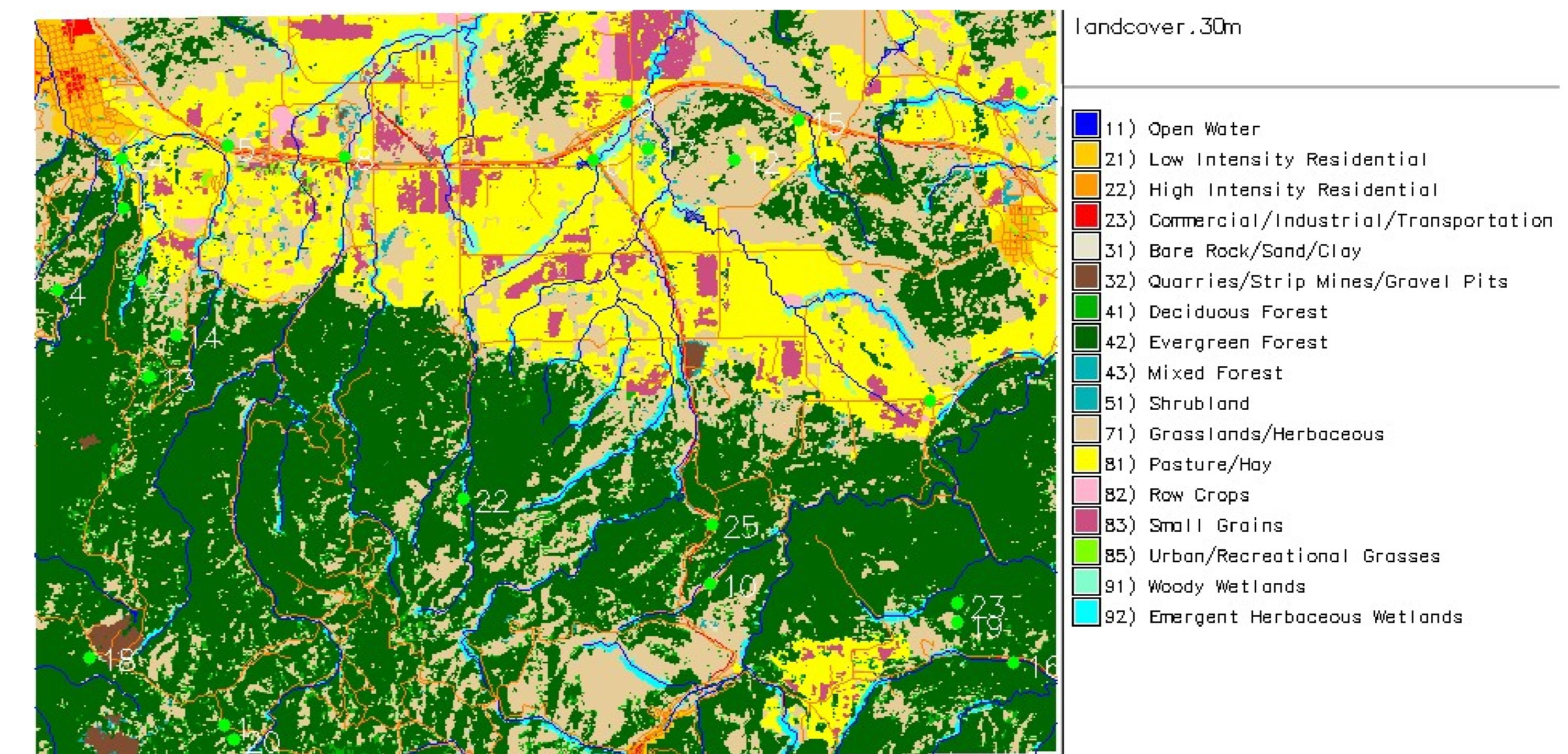
GRASS supports work groups through it's LOCATION/MAPSET concept which can be set up on NFS (Network File System). Keeping LOCATIONS with their underlying MAPSETs on a central server, a team can simultaneously work in the same project database.

Data Management capabilities of GRASS

- * Spatial analysis
- * Map generation
- * Data visualization (2D, 2.5D and 3D)
- * Data generation through modeling (list of simulation models)
- * Link to DBMS (PostgreSQL, others via ODBC, ...)
- * Data storage



Example of the 3D raster voxel volumes with the NVIZ Visualization tool.



Example of displaying raster and vectorial layers with a legend. Grass supports 7 possible windows to display geographical data.

<http://grass.itc.it>