

Problem Solving with Open Source GIS

Web GIS for Decision Support

a personal perspective

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Goals

- Illustrate how Decision Support GIS can benefit from OS Tools
- Overview summary about tools I used in various projects
 - How these tools where used – summary compilation
 - Functionalities used, which technical aspect they covered
 - Examples/case studies
- Personal background / perspective on
 - How I stumbled into OS GIS
 - How to develop technical skills in OS GIS
 - What skills are needed, ongoing education/ training

Background

- How I got into OS GIS
- Running a GIS consulting business since 2007
- Educational background in natural resources:
Physical Geography and Soil Science
- Using Open Source GIS a lot over the last 8 years
- Decision support GIS in
 - Natural resources management & conservation
 - Sustainable development
 - Social and environmental issues

Web GIS Projects

	description	PostGIS	MapServer	OpenLayers	GeoExt	Jquery	Custom PHP	Other
Ekiti State Infrastructure Viewer	Infrastructure Viewer	●	●	●	●		●	
Weave - WA Conservation Voters	Member and Voter engagement, mapping of members and active voters	●	●				●	MapScript
Whippet	Weed management prioritization tool	●		●		●	●	Code Igniter Wkhtmltopdf
US Geocoder	Geocoder (+reverse), Location based information about elected officials and spatial joins	●	●	●		●	●	
CALweedmapper	mapping the spread of invasive plants, data collection, database	●	●	●	●		●	
Micuenca	Integrated Watershed management projects in Latin America	●	●	●	●		●	
VFS Viewer (München Germany)	Large scale forest soil maps, suitability maps by tree species for private forest owners	●	●	●	●	●	●	Wkhtmltopdf
Office of Civil Legal Aid GIS	Mapping Poor people and civil legal aid resources in WA State	●	●				●	MapBender
Obama for America Campaign 2008	Campaign support for organizers in battleground States	●	●	●			●	
GeoSpatial Partners	Web based image processing. Map creation from sat. imagery via model algorythms, plant vigor etc.	●	●	●	●		●	GDAL/OGR Wkhtmltopdf

How Decision Support GIS can benefit from OS Tools

planning of :

- **Inventory & Quantification**
 - how many features + where
- **Localization**
 - where to allocate resources
(pro bono lawyers + poor people match)
- **Prioritization**
 - allocation of resources
 - action
(weed management , contact voter, ask for support, ...)

Translating planning tasks into functionalities

Summary how I used OpenLayers – Viewer



- **Map Display, „trivial“ Map Viewer tasks , e.g.**
 - attribute ID Tool
 - display and highlight vector data
 - choice of commercial base maps
- **GIS functionalities**
 - reproject features client side
 - create WKT vector features client side
 - use any custom map projection
 - use custom created map tiles (TileCache e.g.)
 - support dynamic layer update client side (*mergeparams*)
- **Integrated with JQuery or GeoExt (Javascript)**
 - tabular data representation and user interface

Translating planning tasks into functionalities

Summary how I used PostGIS - Database

- **Unified data storage and retrieval**
- **GIS functionalities**
 - Find nearest spatial features
 - Nearest road (reverse geocoding)
 - Nearest *conspecific* plant species (Whippet model)
 - Buffer, locate within another feature, and calculate distances (modeling)
 - Model calculations of attributes (leading to prioritization scores)
- **Extension of MapServer capabilities**
 - Data queries for dynamic data display



Translating planning tasks into functionalities

Summary how I used MapServer – Rendering Engine

■ Map Display and rendering functionalities



- Cartography, map layer classification etc...
- Dynamic Layer Display
 - replacement variables
 - SLD (read external SLD, output SLD)
- Map Tile Rendering engine

■ Data publishing

- WMS
- Dynamic Legend images
- wide range of input formats

Translating planning tasks into functionalities

Summary how I used GDAL/OGR

■ Raster / Image processing

- run automatically from server side scripts on server bash shell
- image mosaicing, reprojection
- custom scripts to process 3 band tiff images e.g. vegetation vigor classification (Landsat 7+ 8)
- assemble *synthetic* map images , grayscale for background + color classified raster map



Examples/case studies

- VFS Viewer

An information system for privately owned forest areas in the State of Bavaria, Germany

- Web Based Image Processing

Commercial system for automatic web based image processing and map delivery

- Whippet

Weed management & prioritization in California



Kein Hintergrund Open Street Map Google: Straßen Hybrid Luftbild Relief Bing: Straßen Hybrid Luftbild

Kartenanzeige ▲

Kartendaten
 Flurkartenschnitt 1:5.000
 Regierungsbezirk
 Landkreis
 Gemeinde
 Kartiergebiete
Kartiergebietsgrenze
 Bayern
Schutzgebiete

Datenquellen:
Regierungsbezirke, Landkreise,
Gemeinde, Flurkartenschnitt: LVG
Bayern
Schutzgebiete: LFU Bayern

Impressum:
Verein für forstliche
Standortserkundung e.V.
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Email: info@vfs-muenchen.de
Internet: www.vfs-muenchen.de

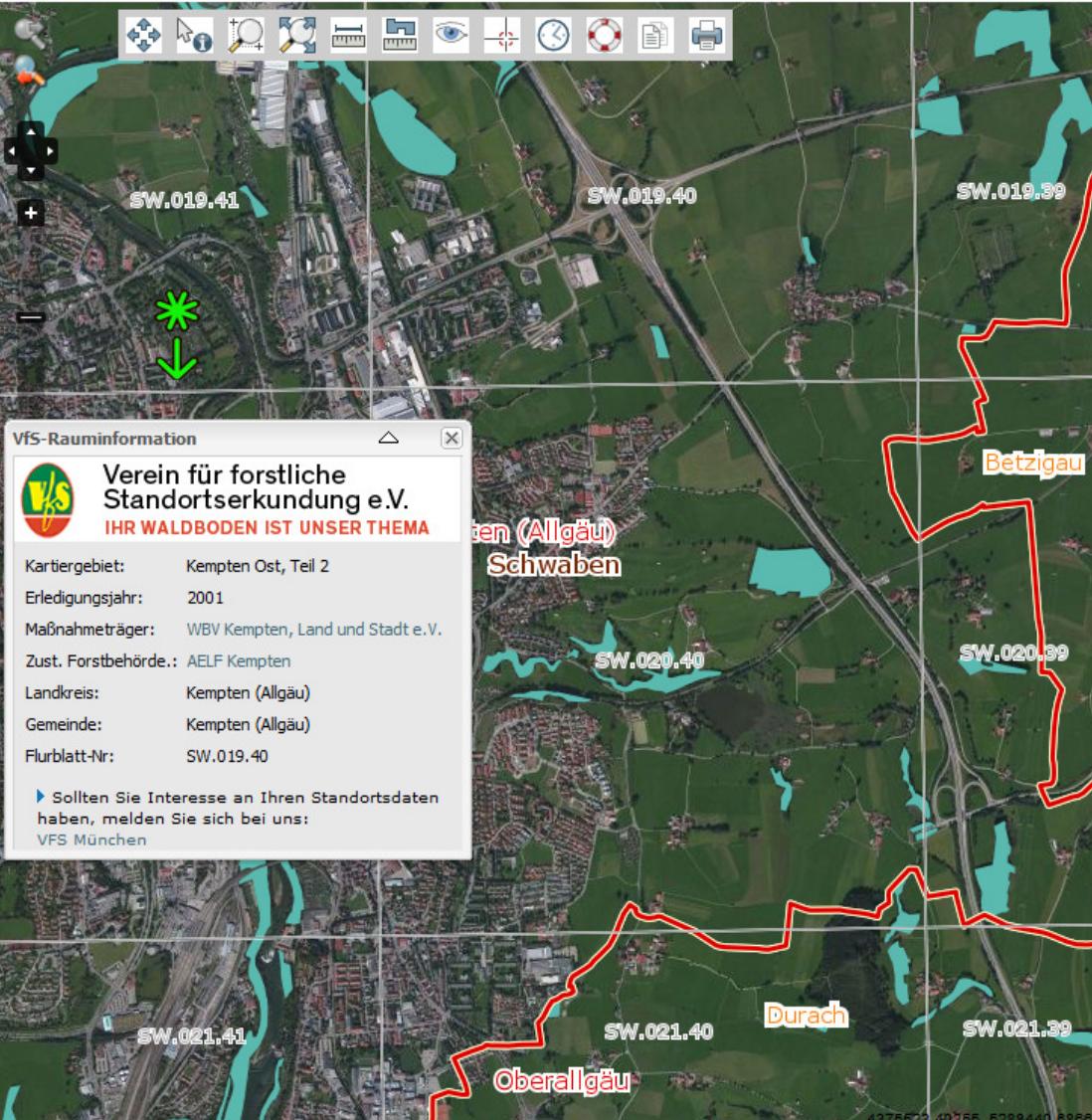
Technik:
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Innere Wiener Str. 32
D - 81667 München
Tel.: (089) 37415227
Email: info@csgis.de
Internet: www.csgis.de

VfS-Rauminformation

Verein für forstliche
Standortserkundung e.V.
IHR WALDBODEN IST UNSER THEMA

Kartengebiet: Kempten Ost, Teil 2
Erledigungsjahr: 2001
Maßnahmeträger: WBV Kempten, Land und Stadt e.V.
Zust. Forstbehörde.: AELF Kempten
Landkreis: Kempten (Allgäu)
Gemeinde: Kempten (Allgäu)
Flurblatt-Nr.: SW.019.40

Sollten Sie Interesse an Ihren Standortsdaten
haben, melden Sie sich bei uns:
VFS München



Übersichtskarte

Germany

ankfurt Chemnitz
Plzen Cze
Nuremberg
Stuttgart Augsburg
Ulm Munich Salzburg
Wels Lin
Witten
Munich
Salzburg
Aust
Map Data - Terms of Use

Wo liegt mein Wald?
Treffer ein-/ausschalten

Adresse
Ortsteil, Gemeinde, Straße, Postleitzahl:
kempten

Die Suche ergab genau
einen Treffer

starten

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Overview Map



Google Terms of Use

Map Layers

- Base Layers
- General Information
- Countries
- Country Border
- Provinces / States
- Administrative Borders
- Image Boundaries
- Image Border
- Areas of Interest
- AOI Border
- Soils
- Soils
- Parcels
- Parcels
- NED 30m DEM



Product Preview Window

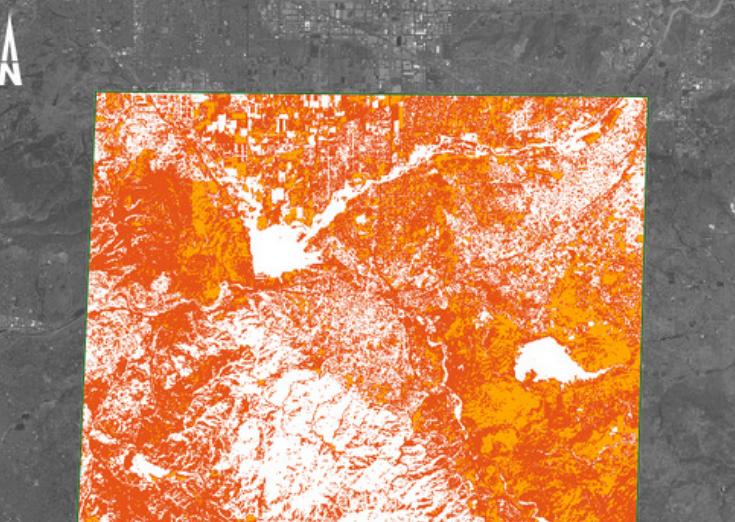




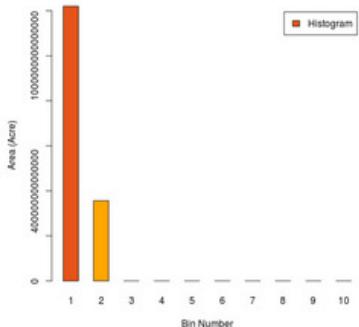
Sensor: Landsat8
Location: USA California
Product name: Vegetation Vigor
Collection date: 2013-07-25 18:24:31
Image resolution: 30m

Admin User
GSP Admin
(234) 567 8979

Vegetation Vigor



Product Statistics



Absolute Binning
Vegetation Vigor (%)

<input type="checkbox"/> Bare Soil + Other	<input checked="" type="checkbox"/> 1-10
--	--

[cancel order](#) [proceed with order](#)

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TERRA GIS
TERRESTRIAL ENVIRONMENT REGIONAL ANALYSIS



WHIPPET

[User Guide](#)[New Session](#)[Load Session](#)[Save Session](#)[Log Out](#)**BETA****BETA**

Terrain Satellite

Adjust population variables

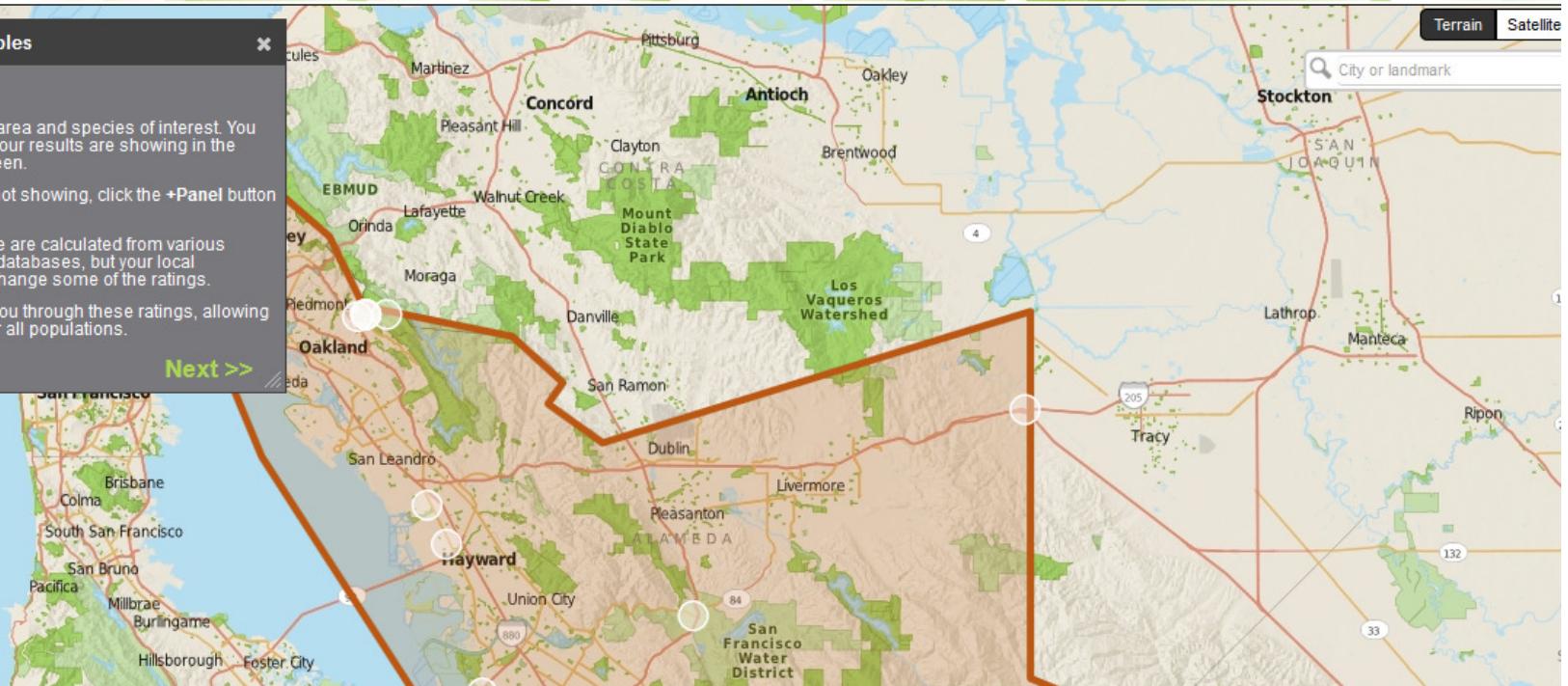
Step 1 of 5

The first step is to select the area and species of interest. You have already done this, and your results are showing in the table at the bottom of the screen.

If the table of populations is not showing, click the +Panel button in the lower right corner.

The default values in the table are calculated from various conservation and land cover databases, but your local knowledge may lead you to change some of the ratings.

These next panels will walk you through these ratings, allowing you to change them for any or all populations.

[Next >>](#)

Found 15 populations of *Acacia dealbata*, *Acacia melanoxylon*, *Acroptilon repens*, *Aegilops triuncialis*, *Ageratina adenophora*, *Agrostis avenacea*, *Agrostis stolonifera*, *Ailanthus altissima*

Species	Observer & Date	Site Value	Accessibility	Pop'n Size	Herbicide?
<input checked="" type="checkbox"/> <i>Ageratina adenophora</i>	Daniel Gluesenkamp 2012-03-21	Very High (10)	Moderate (3)	> 1-10 ac (3)	<input checked="" type="checkbox"/> Yes
<input checked="" type="checkbox"/> <i>Acroptilon repens</i>	Edmund Duarte 2011-08-08	Moderate (3)	Moderate (3)	> 1-10 ac (3)	<input checked="" type="checkbox"/> Yes
<input checked="" type="checkbox"/> <i>Acroptilon repens</i>	Edmund Duarte 2011-07-26	Very High (10)	Moderate (3)	> 1-10 ac (3)	<input checked="" type="checkbox"/> Yes

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