

NSDI Cooperative Agreements Program Integration with Web Mapping Services

Final Project Report

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Project Narrative:

The State of Oregon has initiated a Pacific Northwest Coastal Information Management System project named the **Oregon Coastal Atlas (OCA)**, funded by the National Science Foundation and NOAA to address data access issues relating to geospatial data for the Oregon coast. The OCA (www.coastalatlus.net) is a collaborative effort to create an interactive mapping and data sharing web site targeted at coastal managers, scientists, and the general public. It is a web site that is intended as a depot for traditional and digital information that can be used to aid decision-making relating to the Oregon coastal zone, from the crest of the Oregon Coast Range to the territorial sea boundary. Intended primarily for coastal resource managers, the OCA provides background information for different coastal systems, access to interactive mapping, online geospatial analysis tools, and direct download access to an array of natural resource data sets and metadata relating to coastal zone management. Embedded in the OCA is the Oregon Coast Geospatial Clearinghouse, a Geodata.gov/NSDI node established with FGDC funding in 1998 that aids in making OCA metadata and data accessible well beyond Oregon.

The OCA is made possible by a multi-year, three-way partnership between OSU's Department of Geosciences in Corvallis, OR, the Oregon OCMP offices in Salem and Portland, and Ecotrust, a nonprofit organization located in Portland. These organizations have formed a unique bond to allocate resources, conduct individual work programs, and share the effort needed to perform the complex series of tasks required to design, build, test and operate the system. The OCA is therefore the unique product of government, education/research and non-profit organizations forming a special project based partnership that allows each to achieve their individual goals while leveraging their specific assets for the benefit of the group effort. The core of the OCA's success is the ability of each of these primary partnership organizations to use its own network relationships to leverage additional assistance and content in building the system. Our WMS project was an attempt to provide additional integration between these individual

networks

Indeed, various components of the OCA are housed at each of the three major partner organizations, although the intent is that users navigate seamlessly between all three locations and are unaware of the transition. This is accomplished through the use of a unified html template for the various components on each organizations server. Essentially, this is a single unified front-end or store front for the three back-end silos. The project partners take advantage of a variety of off-the-shelf commercial and open-source software packages to deliver the web-based final product to coastal users. We were successful in making operational OGC Web Mapping Services (WMS) within the OCA framework by establishing three WMSs: one at each of the different organizations. The WMSs are still in prototype mode and will not become “live” on the OCA until next year as we finalize the layers and interfaces at each node (OCMP, OSU, Ecotrust) and solve some data projection issues (discussed in the last section of this report). Setting up a WMS at each partner organization will now allow us to create a version of the main interactive map client interface of the OCA (<http://www.coastalatlant.net/maps/index.php>) that, next year, is a fully functional WMS client, drawing from and interactively display data residing at any of the three partner locations.

The main purpose of our project was to learn the ins and out outs of WMS and just get it up and running, and for this we are very grateful for the FGDC funds. This is the jump start that we needed. As our data holdings have nearly tripled in recent weeks, and will continue growing, especially raster layers at the OCMP and OSU nodes, the WMSs will eliminate the need to duplicate many base layers used across the three partner organizations. The OSU node will be bringing in several satellite remote sensing layers as part of a new series of educational modules on coastal remote sensing that are being developed with ArcIMS. So it has been very useful for us to learn about establishing WMS within ArcIMS (v. 9 at OSU and v. 4.01 at Ecotrust), as well as Minnesota MapServer (OCMP node). Demonstrating this capability within the OCA will increase awareness in the Oregon GIS community of the potential of WMS in general, and may lead to potential for new partnerships with other specific data providers in the region (i.e., throughout the broader Pacific Northwest). We already have an informal partnership with the Coastal & Marine Resources Centre in Cork, Ireland (<http://cmrc.ucc.ie/>), visited by the PI on a Fulbright exchange this fall, which is working heavily in WMS and implementation of other open source software (e.g., <http://www.irlogi.ie/pdf/Newsletters/Newsletter%20v7-3.pdf>), and will continue to work with us as a “mentor” of sorts for future WMS work. We will also continue to work with our state’s Oregon Geospatial Enterprise Office, which is the only other state entity that we know of that is implementing WMS on a fairly large scale.

Status of Clearinghouse Node/WMS Integration

- Oregon Coast Geospatial Clearinghouse/Oregon Coastal Atlas (128.193.212.115, port 210, database Ocmtdata). We are a member of geodata.gov/Geospatial One-Stop, and have set up weekly, automatic harvesting of our XML metadata records with them.

- 1438 metadata entries
- 0 metadata entries with OGC WMS references in them.
- Issues in metadata management and service: Getting services up and running was our main goal. We had great difficulty upgrading from Isite 2.07i to Isite 2.10, which is required for WMS capability. It did not upgrade well at all on our Sun Blade running Sun OS 8 and would not compile at all on a Mac G5 running OS 10 that we were considering for a future hardware upgrade. But now that we have services up and running we will commence with editing metadata entries in winter 2005. Our graduate research assistant on this project (Bower), now funded by NOAA NESDIS to continue working with this, will edit appropriate metadata records. Once we decide what layers we want to expose to the WMS requests it should be fairly easy to get this accomplished by March 2005.

Status of Web Map Service

- Software type and version used
 - o OCMP node working with Minnesota Mapserver 4.2.2
 - o Ecotrust node working with ArcIMS 4.01.
 - o OSU node working with ArcIMS 9.0 with Service Pack 2
- Status/Issues with the OGC WMS setup
 - o OCMP - Status is operational with just a few layers exposed. Major limiting factor is projection of source data. We currently use a custom Oregon Lambert projection for most of our data. The European Petroleum Survey Group (EPSG) geodesic code for Oregon Lambert does not appear to be widely known or supported (EPSG 4495). If we can resolve this, the sky is the limit as far as the data that we can share. If not, and we are required to use EPSG 4326 for WMS (the most common other option) then we will likely not serve much raster data.
 - o Ecotrust - Status is operational with just a few layers exposed using EPSG 4326. Once we determine what projection to serve data in, and who will serve what data, we'll be ready to populate the WMS.
 - o OSU - Status is operational (GetCapabilities is working), but GetMap fails using EPSG 4495. Work is in progress to resolve...
- Provide URLs to WMS "getCapabilities" request
 - o OCMP - http://www.coastalatlant.net/cgi-bin/mswms.exe?map=e:\atlas_wms.map&REQUEST=GetCapabilities
 - o Ecotrust - <http://www.inforain.org/wmsconnector/com.esri.wsit.WMSServlet/wms1?&version=1.1.1&request=GetCapabilities>
 - o OSU - <http://terrene.science.oregonstate.edu/servlet/com.esri.wms.Esrimap?SERVICE=OregonCoast&VERSION=1.1.1&REQUEST=getcapabilities&SERVICE=wms>
- Initially, types and coverage of data
 - o OCMP - Detailed base map of the Oregon coast, including all estuaries, islands and all major coastal river shorelines.
 - o Ecotrust - Hillshade image of the Oregon coast.

- OSU - An outline of Pacific NW states and one sea surface temperature (SST) raster from July 15 00 (AVHRR). In coming weeks we will upload some composite month SST images, along with color legends.

Issues and Next Steps

- Next phase in project
 - Fix GetMap on OSU node. We normally use Oregon Lambert for our data sets to match with other data sets in the OCA (and the convention for data exchange within the state of Oregon), but may re-project to geographic in order make GetMap requests work.
 - Once we decide what layers we want to expose to the WMS requests and edit all accompanying metadata records to include WMS references by March 2005.
 - In coming weeks we will upload some composite month SST images, along with color legends from OSU node.
 - Create a version of the main interactive map client interface of the OCA (<http://www.coastalatlantlas.net/maps/index.php>) that, by Spring 2005, is a fully functional WMS client, drawing from and interactively display data residing at any of the three partner nodes.
- Regarding WMS installation or updating of metadata records or registry, no further requirements for technical assistance or software needed.

Remaining issue with EPSG coding in WMS:

Our understanding thus far is that a full and complete GetMap request is required to ask for a specific projection by specifying an EPSG code. This is done by the parameter `SRS=EPSG:9999`, where 9999 is the four-digit EPSG code. Most people who operate WMSs use a geographic projection (EPSG 4326). Our idea was to share data amongst our partners, most of whom use Oregon Lambert. We don't want our servers re-projecting on the fly when it is not necessary. The EPSG list of codes is an internationally maintained list of codes which shortcut as descriptors for local projections. If one is on the EPSG official list of projections one gets an official code. Otherwise, users are allowed to assign themselves an unused code at the end of the list of code numbers, although it just won't be recognized by the wider world that uses the official list.

At first were unsure of how one gets a permanent EPSG code assigned to a specific local projection, but thought that our problem was that the EPSG code listed in ArcGIS for the Oregon Lambert projection, 4495, was not on the official EPSG list. This may be why GetMap requests that specified `SRS=EPSG:4495` initially failed. We diagnosed the code as the problem because there was a failure with it no matter what WMS map server we used. When we specified `EPSG:4495` the GetMap request failed on both ArcIMS and on Minnesota MapServer. The same exact URL with only the EPSG code changed worked on both WMS server brands.

Recently we received confirmation from the Oregon Geospatial Enterprise Office that Oregon Lambert does indeed have an official EPSG code (4495) and is listed in the EPSG database at : <http://www.epsg.org>. However the issue of `SRS=EPSG:4495` causing GetMap requests to fail remained. The next step, in general practice then, is to check that

the definition of 4495 is included in the EPSG library that ships with MapServer or ArcIMS. If the library is on the older side there is a decent chance that more recent EPSG codes (such as Oregon Lambert) were not included when a product shipped or was downloaded. This turned out to be the case for OCOMP node, so we are hopeful that Ecotrust and OSU can find a similar solution.

Solutions that now works for OCOMP node:

- find out where the epsg library lived on the system. In the case of Minnesota Mapserver this was a simple text file called "epsg" which came as part of the Proj4 library... clearly this is different in ArcIMS, but the principle must be the same.

- open epsg file in a text editor and search for "4495". If not found, then add the following definition (adapt to whatever syntax is relevant to ArcIMS):

```
# NAD83 / Oregon Lambert (Intl ft)
<4495> +proj=lcc +lat_1=43 +lat_2=45.5 +lat_0=41.75 +lon_0=-120.5
+x_0=400000.00000 +y_0=0 +ellps=GRS80 +datum=NAD83 +to_meter=0.3048
no_defs <
```

- save file. Re-starting the web server alone was not enough for this to take effect. I actually had to re-boot the machine. I think this is because the file gets read only once and is cached in memory from that point on...

Now that this is working we can start looking into what additional layers we might want to expose via the WMS. Being able to use Oregon Lambert really opens up the possibilities, as this makes our growing raster libraries a viable option, something that is crucial for a related project involving OCA that we have funded by NOAA NESDIS.

Feedback on Cooperative Agreements Program:

The CAP has been indispensable in terms of providing our primary need, which is the funding base, which was sufficient and effective. We did not seek much technical assistance from them and there were no program management needs or concerns. This CAP did not require us to attend any meetings, workshops or training, and as such, we do not feel qualified to lay out any formal program strengths and weaknesses. We very much appreciate the funding, which, again, gave us the jump start that we needed to get involved in WMS.