

GeoWeb Toolsets for Ecoforestry Education and Management

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Abstract

We explore an open-source linked web-map/desktop GIS toolset for forest management in the case of an ecoforestry woodlot. Ecoforestry operations require tools both for management and planning, and for visitor services and education. We report on a combination of engagement processes and tools that input and extract data stored in spatialized databases and render that information to web browsers, desktop GIS, and three dimensional virtual world explorers. We examine the tools in terms of effectiveness, practicality, and scalability.

Background and Relevance

The roles, relationships, and strategies of private, public and NGO institutions in British Columbia forest planning are in flux. Spatial knowledge is a critically important component of this move to creating better practices, policies and power relations within a political system (Elwood 2006) and this is certainly true of forest management. Land trusts, advocacy groups, First Nations governments, and the BC government all use spatial narratives to push their agendas. These efforts, often using static or dynamic web-maps, have been mostly one-way presentations of information. The future of these advocacy tools will incorporate participatory elements like commenting, image/video blogging and even full interactive access to forestry databases. In so doing, the information will become contextualized and valued, will become knowledge.

Ecoforestry is a type of forest management that, in contrast to industrial stand replacing and old-growth removing forestry, emphasizes maintenance of ecosystem function, visitor education and production of value-added products (Rastogi 2007). Ecoforestry management focuses on collecting and processing information describing the forest as a provider of ecosystem services, non-timber forest products, and timber, in that order of priority. Ecoforestry sites are working forests of a new (or the oldest) kind, and ecoforestry practitioners emphasize open access to management decisions, holistic views on forest services, and public participation.

Geographic information system (GIS) tools are tools common to forest management and planning, but issues of functionality, interoperability and cost have to date largely prohibited adoption by smaller forestry operations. Ecoforestry sites are often owned and operated by small land owners or non-profit groups and these landowners do not have the resources to purchase or train in commercial off-the-shelf GIS. Map exploration has also been under-utilized as part of forest ecological educational outreach.

New dynamical map generation systems are becoming available to ecoforestry managers/educators. Using maps, trained foresters and ecologists or tourists can explore the forest virtually, before a physical visit, and may participate in knowledge building post-visit by uploading spatial information such as comments and images (place marking, geo-blogging). These systems also enable the contrasting (layering) of many themes of data (Kalliola et al. 2002) and are useful for reinforcing ecological lessons demonstrated at the site. Our ability to represent the dimensions, patterns and dynamics of nature is slowly rising to the task of capturing ecosystem complexity in accessible and compelling ways (Burnett 2002).

In this paper we ask the following questions: How readily can the current generation of web mapping tools be implemented by small non-profit groups for ecoforestry management and visitor services? How mature are open source solutions? How useful are free but commercial tools? Do open and closed systems play well together? What are the barriers to implementation? To answer these questions we built and bridged a web-mapping system for visitors and an open-source desktop GIS system for on-site managers. We break the following report into sections roughly mirroring Sieber (2006).

Place and People

We conducted our study at Merv Wilkinson's woodlot, now owned by The Land Conservancy of BC (TLC). Wildwood, located on Vancouver Island, is a 28 hectare mix of old growth and second growth Douglas-fir, western redcedar, grand fir, Arbutus, bigleaf maple, red alder, western hemlock. The property is diverse, with areas of steep and undulating slopes, marshy areas as well as dry ridges. Several paths run through the property, and ecoforestry tours are conducted every weekend by TLC staff (www.conservancy.bc.ca/content.asp?sectionack=wildwood).

TLC views Wildwood as (1) a model for alternative forestry, (2) a focal node in a local ecological network. It places a high priority on visitor education and knowledge sharing. We were asked to develop a Web-mapping/GIS system that was open and interactive, and able to provide three levels of access. Firstly, the system must serve two types of visitors. General visitors include neighbouring land owners, other woodlot owners from other parts of BC and the world, and many students. The second type of visitor to are those trained in ecology and forestry.

Needs assessments suggested that the *general visitor* wanted a system allowing pre-visit planning opportunities and post-visit posting of comments, pictures and video (place marking, multimedia blogging). *Trained visitors* wanted to view, down-load data on, and comment on permanent sample plots, timber cruises, species maps, blow-down maps, location of good seed trees, skidding trails, non-timber forest resources, disease outbreaks, and cutting plans. The *site manager* requested additional GIS functionality for management, but wanted the web-mapping system and any desk-top GIS to be linked

Technology and Data

How did we provide interactive access to spatialized forestry data to three types of users? We linked two systems (Figure 1). The first system, serving the visitor types is based on a modified Drupal Content Management System (CMS, www.drupal.org). Drupal is the world's most popular open-source CMS and is generally noted for its portability to almost any hosting environment and a modularity and extensibility that allows it to be customized for almost any purpose. The system we built for wildwood extends Drupal by adding a spatial data type. Our Drupal GeoBrowser module (GPL'd and available for free), we give users the power to intuitively browse an online map of hyper-linked data points. The visitor can open pop-up windows associated with each point (for example, an old-growth stand or a permanent sample plot) and peruse text, images, video and other multimedia. Visitors may also post comments, images and video. The site is easily managed; administrators may add or edit content and spatial metadata in a wiki-like manner (with the possibility for rollback if any mistakes are made) – allowing non-technical administrators the flexible management without the fear of permanently breaking or disfiguring the site. The Wildwood manager has access to Drupal's powerful web-based information management tools including ability to manage visitors, add custom icons to the map, and change the back-ground 'base map' data.

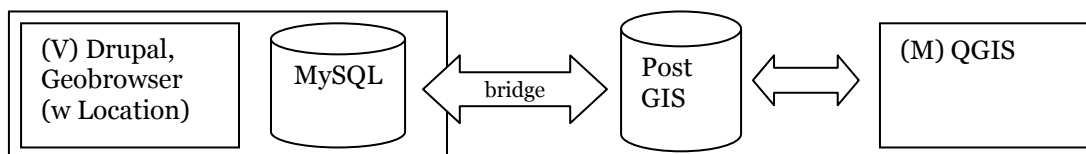


Figure 1. Current system architecture for (V) visitors and (M) site manager

The second toolset we developed for Wildwood focused on providing the site manager with more powerful GIS tools. This desktop GIS system needed to be linked to the web-mapping system so that changes made to the 'visitor' layer in the web-map would appear in the GIS as an up-dated layer. We loaded all the Shapefiles and associated table data that the Wildwood manager provided to us into a PostGIS database. We then set-up an open-source desktop GIS, Quantum GIS (www.qgis.com), to display and edit these features.

Future Steps

The next steps (Figure 2) will be to modify the Geobrowser code so that it works with the Drupal Geo module instead of the Locations module. Location is fine for lat/long and basic place name capture, but Geo will store feature data in a full OGC-compliant simple features format, like PostGIS. Since Drupal can use PostgreSQL as a back-end database, PostGIS is what we are aiming for.

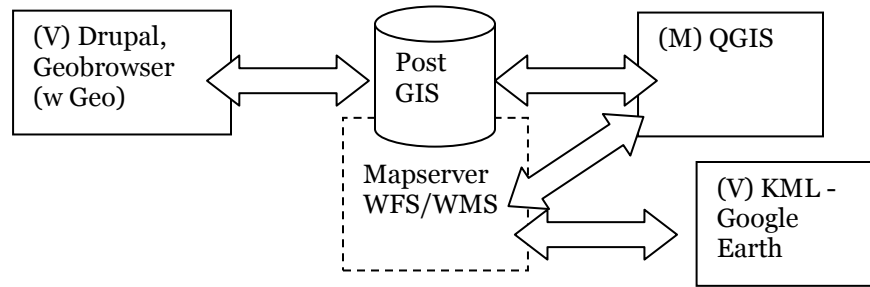


Figure 2. Future system architecture for (V) visitors and (M) site manager

Outcomes and Evaluation

You can explore the demo community portal at <http://wildwood.geomemes.com>. We asked volunteer foresters and ecologists from the Ecoforestry Institute to explore some of the Wildwood data online using web browsers. We will be presenting some of their comments on the participatory nature of the system at the SKI Conference.

Feedback from the Wildwood manager is that the GeoBrowser-based tool is excellent for the kind of visitor education that The Land Conservancy aims for. We will work with TLC to get more multimedia information onto the system. For example, the original owner of the site, Merv Wilkinson, is still alive and active on the site and it would be excellent to get video segments uploaded and linked to points of interest in the web-map site.

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