

THE WESTFIELD RIVER WATERSHED INTERACTIVE ATLAS: MAPPING RECREATION DATA ON THE WEB

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Abstract: Imagine searching the web to create a map to your house. You could use one of the many Internet mapping sites like MapBlast™ or MapQuest™ to create such a map. But maybe you wish to get a map of trails for the Grand Canyon. The National Park Service web site could serve that need. Or you may wish to get a map to show you the way from the Orlando Airport to Disney World. Again the web will come to the call. Generally, the web delivery of maps may simply involve the printing a graphics file. But in some cases, you create the map specific to your need by suggesting what elements are shown, at what scale and for your particular interest. The interactive element of delivering maps and data specific to a recreation and tourism theme will be illustrated in this paper. With a computer software program called ArcIMS, one can create maps on the web. Using the Westfield River Watershed Interactive Atlas, tourism data and maps can be delivered to a surfing population. Keywords: Internet Mapping, Westfield River.

Introduction

In recent years we have experienced a tremendous growth of two technological events that have influenced society. The first is in the explosive growth of the Internet. Some "think tanks" project that over 350 users worldwide will use the Internet by 2005 (NUA, 2000). About half of the users are found in North America, with the other half coming from Eurasia. This growth, despite the recent demise of many "dot-coms" can be expected to continue with a more refined and cautious surfer.

The second area of technological growth has a longer history and involves the automated creation of maps using computers. Geographic Information Systems, or a package of computer mapping software, hardware and data, permit the user to not only capitalize on the number-crunching capabilities of the computer, but also allow the creation of new information. Thus a GIS can aid in decision-making with the formation of new data from the analysis of digital data bases that reflect the "lay of the land".

It is the combination of these two technological advances, the Internet and GIS, and the birth of Internet Mapping Servers that this paper focuses on. In particular, Internet-

based mapping sites have also experienced a similar growth. With origins in Local Area Networks (LANs), the need to deliver maps to users is widely varied. For example, the Greater Atlanta Data Center (<http://www.gadc.kennesaw.edu/>) allows web users to track crime in Metro Atlanta, while Internet surfers can visit the US Air Force Bird Avoidance Model (<http://bam.geoinsight.com/>) to learn how pilots and flight planners can select flight paths and thereby avoid bird causing crashes!

For tourism interests, travelers can visit MapBlast (<http://www.mapblast.com>) or MapQuest (<http://www.mapquest.com>) to plan their next driving trip. In addition to the route, more and more Internet based mapping sites provide site specific information about parks, open space and regional attractions. In this paper we follow the creation and maintenance of a web-delivered interactive atlas. The Westfield River Watershed Interactive Atlas (WRWIA) premiered during the Spring 2001 and serves to deliver human and natural dimension data for Western Massachusetts.

Background

The use of technology for tourism is not new. The travel industry has fully grasped the information super highway (Sheldon, 1997). The natural linkage between the Internet and GIS is an obvious extension for decimating spatial information to the public. Recent research has noted the importance of tourism promotion via GIS technology. For example, Kilical and Kilical (1997) illustrate the potential use of a GIS for the Tourism Office of Turkey and the eventual use by tourism operators and tourists. Likewise, the Greater Yellowstone Area Data Clearinghouse (GYADC) shows the partnership between several public and private interests in the management and publication of ecosystem data via the web (Scarrah & Hamerlinck, 1998).

The National Geographic Society's Map Machine provides Internet surfers one of the most powerful mapping sites available today (<http://www.nationalgeographic.com/maps/>). So besides the occasional paper map wedged between the covers of the magazine, web users can log onto the Society's Homepage and create maps at their leisure.

The National Park Service (<http://www.nps.gov>) provides copies of many of their maps on the website, but these are essentially copies of the regular paper printed map. More and more web sites allow users to draw a map to meet their particular need. For example, hikers can plan trips on Ice Age Trail Map Buffet (<http://www.dnr.state.wi.us/org/at/et/geo/iceage/>). Likewise, ecotourists can create maps on the Ecotourism Interactive GIS provided in Australia (<http://www.gisca.adelaide.edu.au/cgi-bin/eco/ecogis>).

Fortunately for users, there are several web indexes available to start your search. The University of Minnesota maintains a gallery of map servers. Berkeley provides a link page (<http://sunsite.berkeley.edu/GIS/intergis.html>) for

inquires also. Environmental Systems Research Institute, Inc (ESRI) has a several pages of links available on their web site (<http://www.esri.com>). ESRI has even published a book called *Serving Maps on the Internet* (Harder, 1998). McKee (2001) highlights this revolution, noting the relative ease for today's surfers. He also notes that mapping web sites provide not only maps, but also other forms of data including video, photographs and text documents. For a general guide to leisure and tourism Internet resources see Theobald and Dunsmore (2000).

Westfield River Watershed Interactive Atlas

The Westfield River Watershed Interactive Atlas (WRWIA) was born during early Spring 2001. As a response to the growing demand for information about Massachusetts' first Wild and Scenic River, the Westfield River, and to provide an educational forum for social and natural environmental data via the Internet, the WRWIA project began. The GIS lab at Westfield State College had been involved with mapping projects for several years, the next logical step was the publication of these data via the Internet. Using the software called ArcIMS (ESRI, inc.) and Servlet Exec 3.0 MS IIS/Windows, and a computer server, Westfield State College premiered the first mapping server in the Massachusetts State College Nine Campus System. The River, as the server is called, is available at the web address <http://river.wsc.ma.edu>. For those interested in estimating costs, the Dell Server cost approximately \$1600 (educational pricing), the Servlet was \$658. The price for ArcIMS is unavailable since Westfield State College has a Site License for ESRI products.

The mapping software uses ESRI's ArcView GIS data structure and thus while not required to deliver maps on the web, the ArcView software does come in handy in the initial preparation of maps. The first map delivered to our web audience was one of neighboring Stanley Park (<http://www.stanleypark.org>). The second author edited this map and created an orienteering course using GPS technology.

Other maps have followed and with data collected during the summer 2001 (funded by a Massachusetts' Department of Environmental Management Greenways Grant), the River will deliver tourism related maps and data to the public. Included one will find information about parks, open space areas, as well as support infrastructure such as lodging and restaurants. Considering the popularity of the Berkshire Mountains in Western Massachusetts, one should find this information especially useful for tourists.

Interactive Mapping Technical Information

This section of the paper will identify some of the key elements involved in the creation and maintenance of an Internet Map Server. For the casual reader, you may wish to skip this section since it is filled with computer details and jargon.

For the WRWIA, the ArcIMS software and Microsoft Windows NT 4.0 with Service Pack 4 Server operating system were employed. The River resides on a Dell Power Edge 1400, 800 MHz Server with 256 MB RAM. The machine has one floppy disk drive (1.44 MB) and 20/48x CD Drive. An external 100 MB Zip Drive and the network connections provide a backup. The ArcIMS software works with a web server software. The Application Server Connectors (ActiveX Connector) uses Microsoft IIS 4.0 for Windows NT Server as a Servlet Engine. Java Runtime Environment (JRE) is needed for some mapping applications and is downloaded from the River to the client browser if needed.

Client browsers include Microsoft Internet Explorer 4.0 or higher and Netscape 4.5 or higher. However, we have found IE 5.0 and Netscape 4.7 to work best. Java prepared maps obviously requires the higher end browsers and current limitations with ArcIMS preclude Netscape with Java Custom Viewers.

The ArcIMS architecture involves the serverside and the clientside. The client is the end user, typically one surfing on the web, while the server is the host machine that delivers the map product. Clients may use a standard HTML Viewer (any typical browser) or a Java Viewer (usually a higher end browser). On the server end, one will find the Manager, a Web Server, an Application Server and a Spatial Server. All link the software with the hardware to produce interactive maps.

The Spatial Server is the backbone of ArcIMS. It processes the clients' request for maps and data. The Application Server manages the whole system by balancing the requests for maps and tracking usage. The Application Server Connectors links the Web Server and the Application Server. The ArcIMS language is known as ArcXML. Lastly, the Manager is just that, a management system that is an interface and supports the three main tasks in ArcIMS. The three tasks are to author MapServices, Design Web pages and to Administer the site. For more information, readers are directed to the ArcIMS website (<http://www.esri.com/software/arcims/index.html>) and the ArcIMS Manuals.

Summary

The delivery of maps and data for tourism applications over the Internet has a great potential. As high speed connections and faster computer become commonplace, we could expect virtual tourism to explode. Further, tourism maps, as a deliverable product over the net will broaden the public's "spatial" awareness. That said, developers must adhere to cartographic standards and produce quality products. Or else, tourism maps could become a biased marketing tool that will feed into the divide between the "Haves" and the "Have nots".

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