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Internet-Based Natural Resource Extension

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Internet-Based Natural Resource Extension

Abstract

The growth of the Internet, combined with the shifting demographics of private forest landowners that indicate increasing Internet use, presents great opportunities for natural resource extension. The study described here created two natural resource Web sites. An online survey of Pennsylvania forest landowners, foresters, Extension agents, and natural resource teachers examined their demographics, evaluated Web site effectiveness, and determined what site features the audience preferred. The groups had varied learning interests and would use Web sites in different ways. The Internet is an important addition to the natural resource learning community and must be tailored to suit different users needs.

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Introduction

Purpose of the Study

Private forest landowners (PFLs) are the primary audience for natural resource Extension programs. How can these landowners be reached more effectively and efficiently as we move into the Information Age? The Internet is obviously one possible tool. The purpose of the study described here was to discover the Internet capabilities of PFLs and natural resource educators, including how they would use the Internet and their opinions about two natural resource Web sites as Internet-based educational sites.

Study Audience

Although traditional PFL demographics have been described many times, these studies have not reported computer or Internet capabilities, nor did they determine how a PFL would use the Internet (Haymond, 1988; Downing, 1999; Foster, 2000; Jacobson, 2000). The primary audience for forestry information in Pennsylvania is private forest landowners (PFLs). There are over 500,000 PFLs owning 75% of the forested area in the state. Studies show the typical PFL is a white male, upper-middle class, with at least some college education. These characteristics correlate with higher frequencies of home computer ownership and Internet use (U.S. Census Bureau 2000).

It would, therefore, seem reasonable that a forestry and environmental Web site would be an effective tool for transmitting information to PFLs. Possible uses of the Internet for PFLs include getting up-to-date information on forest management techniques, looking for forestry-related workshops, locating a service forester (employed by the state Department of Conservation and Natural Resources to provide technical assistance to landowners), gathering information on problems such as forest insects and diseases, or learning about legislation and taxes that affect them as landowners.

In addition to PFLs, teachers could use the Web sites to supplement textbooks, and foresters and Extension agents could disseminate information online to PFLs.

Study Questions

The fundamental study question is "Are the Web sites useful?" There are also three supplementary, descriptive questions:

1. What are the demographics of the audience?
2. What kinds of information do the different audiences want on the Internet?
3. How should a Web site be designed?

Methods

Web Sites

The study involved developing two Web sites featuring Pennsylvania forests and forest management, carrying out focus groups and an email survey of potential users, and analyzing the data to better understand the role of Web sites as Extension tools. The Internet Forestry Explorer (IFE, <http://www.forestryexplorer.psu.edu>) and the Virtual Forest Project (Virtual Forest, <http://www.virtualforest.psu.edu>) were created at Penn State's School of Forest Resources. Through their critiquing of these two study Web sites, PFLs' and natural resource educators' Internet habits and desires would be assessed.

The IFE includes information on forest management, watersheds, Geographic Information Systems (GIS), and natural sites of interest throughout Pennsylvania. The most advanced feature of the IFE is the online GIS, powered by ESRI's ArcIMS software. This software enables home users to use an ArcView-like GIS interface. Several areas around the state, including the Allegheny National Forest, The Pennsylvania State University Stone Valley Experimental Forest, and two Pennsylvania watersheds, were featured using ArcIMS.

The Virtual Forest site is part of a project funded by the Society of American Foresters and the Sustainable Forestry Partnership. The site centers on an award-winning tree farm in Pennsylvania. The Montreal Process was applied and discussed in relation to the tree farm's forest management plan. The Montreal Process, a.k.a. Montreal Protocol, measures sustainable management using internationally accepted criteria and indicators (Montreal Process, 1998).

Focus Groups

Private forest landowners, service foresters working for the Pennsylvania Department of Conservation and Natural Resources, and forestry and agricultural Extension agents were chosen as representative of who might take an interest in and use the two Web sites, as well as representing the sample frame in the planned email survey. The objectives of these focus groups were to generate feedback on the Web sites, gather ideas to improve the next Web site versions, and to help design questions for the email survey. The summary of the focus group comments shows three distinct audiences. Extension agents are interested in clarity and ease in using the site, PFLs prefer the information to be simple, while foresters want more detail (Table 1).

Table 1.
Focus Group Comments by Group

Group	General Comments
Extension agents	<ul style="list-style-type: none"> • Too technical for a beginner • Need a definitions page • Should number the cameras on the walking tours • Need a site map <p>Uses: Showing GIS to landowner, County Economic Data</p>
PFLs	<ul style="list-style-type: none"> • Simpler navigation • GIS is hard to use • Need lots of pictures with descriptions <p>Uses: Find demonstration areas around the state, locate hiking trails</p>
Service	<ul style="list-style-type: none"> • More detail

foresters	<ul style="list-style-type: none"> • More forest treatments • More links • Need a tutorial <p>Uses: Show cutting techniques to landowners, print out fact sheets for landowners</p>
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Online Survey

An online (email) survey was created to gather more detailed feedback on the Web sites and to reach more people than was possible with the focus groups. The survey utilized Dillman's 2000 Total Design Method (Dillman, 2000).

The sample frame included PFLs, service foresters, forestry and agriculture Extension agents, and natural resource high school teachers, with PFLs comprising most of the sample. There were 288 valid email addresses comprising all four groups.

The online survey was created with SurveyPro (<http://www.surveyprom.com>), an online, do-it-yourself survey tool. The survey was a single Web page that scrolled down to view and answer the questions, either by clicking a radio button or typing an answer.

Blind carbon copy emails describing the study, containing a hyperlink to the online survey and offering an incentive of \$50 to one of the first 100 people who responded to the survey, were sent to the audience. Six days after the survey was sent, respondents were sent thank-you emails. Everyone else was sent a reminder email with the hyper-linked survey URL listed (Dillman 2000). This procedure was repeated the following week. The final data download occurred at the end of the third week.

Results

There were 115 surveys returned by the end of the three weeks for a 40% response rate (Table 2). Responses were fairly evenly distributed among the four groups. Service foresters who did not complete the survey were telephoned and asked why they did not respond. Most said they did not have time to critique the sites and answer the survey.

Table 2.
Response Rate

Group	Relative frequency (%) of total	Relative frequency (%) of group
PFLs	38	30
Teachers	17	36
Extension agents	23	28
Forester	17	43
Non-response	5	
Total	100	

Demographics

Demographics show that the average respondent was a 49-year-old male, college educated, and earned between \$50,000 and \$75,000 annually. The average PFL responder was a 57-year-old male, college educated, often with an advanced degree, and earned over \$60,000 annually (Table 3).

Table 3.
Demographics of Private Forest Landowners

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Characteristic	Category or range	Relative frequency (%)
Age	Median = 57	
Annual Income	20K - 29K	9
	30K - 49K	18
	50K - 59K	15
	60K - 75K	30
	Over 75K	27
Education	Completed high school	8
	Some college	21
	Completed college	34
	Graduate degree	37

Equipment

The average respondent used a Windows-based machine that was 1 to 3 years old (Table 4). Respondents usually accessed the Internet from their home or place of work via a 56 kbps connection and used Internet Explorer (IE) as their browser. Thirty-three percent of respondents indicated they access the Internet via a high speed or cable modem. The average PFL used a Windows-based machine (79%) that was 1 to 3 years old (57%) and accessed the Internet from home (90%) using Internet Explorer (62%) on a 56 kbps connection (49%).

Table 3.
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Web Site Features

GIS

Macintosh and Netscape Navigator (NN) users were unable to use the online GIS due to ArcIMS software limitations. Respondents who used either a Macintosh computer or NN were therefore removed from the GIS evaluation. There was no significant difference between respondent education levels and their ease of using the GIS.

Comments indicated all groups desired more detailed information in the GIS layers or at least links to Web sites that provide such information. Two respondents suggested adding a description about why GIS is important to natural resource professionals and including a better tutorial. Respondents also said that the GIS was slow to load or that they had trouble viewing it at all. Comparing the connection speeds of respondents who said the GIS was slow to load revealed no relation between connection speed and perception of "slowness."

Topical Information

A five-point Likert scale was used to measure level of interest in various topics presented on the Web sites, with 1 indicating "No Interest" and 5 indicating "A Great Deal of Interest." PFLs had the strongest interest in wildlife management and forest management, closely followed by programs and services for the forest landowner (Table 5). Breaking down responses by group showed that there was a significant difference in respondents' interests. PFLs are most likely to be interested in forest management practices, wildlife management, programs and services for forest landowners, and in information about land inheritance. Surprisingly, those who own forestland were less interested in timber marketing or timber taxes than respondents who do not own forestland.

Table 5.
Interest Topics by Group

Topic	Group	Average	p value
Forest management practices	Foresters	4.89	0.009*
	Teachers	4.47	
	Ext. agents	3.88	
	PFLs	4.39	
	Average/Total	4.34	
Timber marketing	Foresters	4.72	0.042*
	Teachers	4.17	
	Ext. agents	4.00	
	PFLs	3.51	

	Average/Total	4.00	
Non-timber products	Foresters	4.33	0.142
	Teachers	4.11	
	Ext. agents	3.64	
	PFLs	3.57	
	Average/Total	3.81	
Forest ownership taxes	Foresters	4.78	0.030*
	Teachers	3.28	
	Ext. agents	3.60	
	PFLs	3.59	
	Average/Total	3.78	
Watershed management	Foresters	4.44	0.355
	Teachers	4.17	
	Ext. agents	3.84	
	PFLs	3.64	
	Average/Total	3.90	
Programs and services for the forest owner	Foresters	4.94	0.016*
	Teachers	3.94	
	Ext. agents	4.00	
	PFLs	4.23	
	Average/Total	4.26	
Wildlife management	Foresters	4.83	0.021*
	Teachers	4.50	

	Ext. agents	4.08	
	PFLs	4.39	
	Average/Total	4.40	
Handing your land to your heirs	Foresters	4.50	0.285
	Teachers	3.56	
	Ext. agents	3.60	
	PFLs	3.83	
	Average/Total	3.86	
Recreational activities	Foresters	4.00	0.049*
	Teachers	4.11	
	Ext. agents	3.28	
	PFLs	3.71	
	Average/Total	3.70	
*Significance at the 10% level			

Usefulness of the Web Sites

Two-thirds (64%) of the PFLs would use the Web site information in their work, and 62% would use the sites again or tell a friend. There was a significant difference in respondents' motivation after viewing the sites. Teachers and PFLs were the most likely to seek more information about forestry, watershed management, and GIS, whereas foresters and PFLs were the most likely to refer the sites to a friend or colleague. PFLs were also the most likely to seek more information on GIS (43%) or watershed management (43%) after viewing the sites.

Table 6.
Positive Action After Viewing the Sites by Group

Topic	Group	Relative frequency (%)	p value
Use it again	Foresters	78	0.401
	Teachers	78	
	Ext. agents	60	
	PFLs	62	
	Average/Total	65	

Seek more information about forestry	Foresters	6	0.001*
	Teachers	56	
	Ext. agents	28	
	PFLs	52	
	Average/Total	39	
Seek more information about watershed management	Foresters	6	0.026*
	Teachers	39	
	Ext. agents	24	
	PFLs	43	
	Average/Total	30	
Seek more information about GIS	Foresters	6	0.042*
	Teachers	39	
	Ext. agents	36	
	PFLs	43	
	Average/Total	33	
Consult a natural resource professional	Foresters	6	0.871
	Teachers	11	
	Ext. agents	8	
	PFLs	12	
	Average/Total	9	
Attend a natural resources workshop	Foresters	6	0.183
	Teachers	28	
	Ext. agents	16	

	PFLs	29	
	Average/Total	20	
Use this information in your work	Foresters	61	0.250
	Teachers	61	
	Ext. agents	40	
	PFLs	64	
	Average/Total	56	
Refer these sites to a friend or colleague	Foresters	78	0.078*
	Teachers	39	
	Ext. agents	48	
	PFLs	62	
	Average/Total	55	
* Significance at the 10% level			

Discussion

Most responses about the sites were positive (e.g., "excellent site, well presented"), while only one person said the study sites were awful. Three did not like the Internet in general, or used it only for specific, timely information such as grain prices. All groups indicated that they would use the sites again and, except for teachers, are likely to refer them to friends or colleagues.

The fact that 77% of the respondents used either a 56 kbps or a high-speed connection indicates that offering higher speed applications such as video and audio clips is possible. The site should not rely on video or audio clips to convey information, but respondent comments indicate such applications would add attractiveness to the sites and enhance the learning experience.

The majority of respondents (85%) used a PC machine with IE (69%) as their browser. The Web sites should be designed for this equipment. However, the site should still function with a Macintosh or with NN to accommodate those 20% of respondents.

PFLs had a more positive opinion about the usefulness of the sites and would be more apt to seek out information about certain topics than the natural resource professionals and teachers. The results suggest varying needs of different audiences, but this does not imply that different Web sites are needed for each audience. Forest management practices rated among the highest interest topics with all audience groups. Wildlife management were of the highest interest to PFLs. Forest taxes and timber marketing scored relatively high among service foresters, though these topics did not generate much interest among PFLs. To cater to PFL interests, non-production type topics such as wildlife management and aesthetics should receive as much emphasis as timber production.

Implications for Extension Agents

Interestingly, Extension agents had the least interest in most of the topics on the Web sites. This is partly due to most of the agents having little or no forestry responsibilities. Given their wide range of responsibilities, Extension agents can be well-served by using the Internet as a way to reach forest landowners, and it should become a part of an Extension agent's or service forester's toolkit. Natural resource professionals may benefit from forestry and watershed information on the Internet, if only to refer forest landowners to relevant sites. Web sites can also supplement

classroom textbooks.

Natural resource extension Web sites must present information at a level and depth that is comparable to what the user might find through traditional natural resource media such as newsletters or forestry management workshops. The same standards should apply to Internet-based programs, and in this way those users who are unable to attend more traditional programs can find the same information and derive the same benefits.

The main ideas learned from the online survey are as follows.

1. Most PFLs and natural resource professionals will use a well-designed natural resource Web site.
2. The sites should have detailed, up-to-date information that mimics what can be found through traditional Extension programs.
3. Information should emphasize simple information to have the most benefit for PFLs, while still offering more detailed information if desired.
4. Forest management emphasis on wildlife and recreation will be most useful to PFLs.
5. Advanced features such as online GIS and streaming video are desirable, but should not be central to the Web site. This is especially important for PFLs as they generally have slower Internet connections than natural resource professionals.
6. Simple navigation and clean design are essential.
7. Site design should cater to Internet Explorer and PC machine users, while still being usable to Netscape Navigator and Macintosh computer users. Nearly 30% of PFLs used Netscape Navigator, and 17% used a Macintosh.

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