

USING THE INTERNET TO DISSEMINATE SEDIMENTS RESEARCH INFORMATION: A CASE STUDY

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ABSTRACT

The Internet has become an indispensable tool for research organizations in disseminating information to the public, fellow researchers, and environmental managers. This case study will show how the EPA-sponsored Hazardous Substance Research Centers/South & Southwest (HSRC/S&SW) has used the World Wide Web to disseminate information about its contaminated sediments program. In addition to its regular web site, the center has developed an environmental tutorial on in-situ capping technology, a sediments web community to stimulate interaction among researchers and practitioners, a library of audio-visual workshop presentations, and visualizations of sediments and sediment management processes. The presentation will demonstrate these resources and summarize lessons learned by the HSRC/S&SW program in using the web to disseminate technical information. The session will conclude with a forecast of the center's future plans for using the Internet in technology transfer.

RESUME

Pour le monde du domaine de la recherche, l'internet est devenu un outil indispensable pour la diffusion d'information, tant au public, qu'aux collègues et aux autorités de gestion. Cette étude montrera comment le Département de l'Environnement, Hazardous Substance Research Centers/South & Southwest (HSRC/S&SW) – a l'internet pour transmettre de l'information concernant son programme sur les sols contaminés. En plus de son site internet, le centre a développé un programme pédagogique pour avancer la technologie "in-situ"; une communauté virtuelle dans le domaine des sols contaminés afin de stimuler l'interaction entre chercheurs et praticiens, une bibliothèque de présentations audio-visuelles, ainsi que d'aides visuelles concernant les procédures de gestion de sols. La présentation reprendra les ressources utilisées et les leçons apprises dans l'utilisation de l'internet pour la diffusion de l'information technique. La session conclura avec les prévisions du Centre quant au futur de l'internet pour le transfert de technologies.

1. INTRODUCTION

Until the mid to late 1990s, research organizations disseminated information to their target audiences through a variety of vehicles, including brochures, annual reports, fact sheets, technical journal articles, journalistic articles, classes, workshops, and conference presentations. The media for communicating scientific information have broadened considerably since affordable Internet service became routinely available to scientists, government officials, and the general public. Less than a decade after the commercialization of the Internet, World Wide Web sites have become the principal means of technology transfer for many scientific groups. Their reliance on multimedia computer networks is easy to understand. Well-designed web sites provide a variety of benefits to disseminators and consumers of technical information, including: 1) seamless integration of text, photographs, diagrams, illustrations, video, audio, and databases into information-rich displays; 2) easy and continuous dissemination of information to audiences that allow information providers to save the costs of printing and distribution; 3) the capacity for rapid and simple updating of information; 4) customized learning paths for visitors with varying levels of interest and knowledge; and 5) easy interaction between scientists and audience members through e-mail links built into the web site.

This paper describes how the Hazardous Substance Research Centers/South & Southwest (HSRC/S&SW) has used the Internet and World Wide Web to disseminate information about contaminated sediments research to a

variety of audiences. The HSRC/S&SW is one of five regionally focused university consortia that have received funding from the U.S. Environmental Protection Agency (EPA) during the 1990s to perform research, technology transfer and training, and community outreach on hazardous substance remediation topics. The South & Southwest center serves EPA regions 4 and 6, and its research has focused primarily on contaminated sediments and dredging. During phase one of its activities, from 1993 to 2001, the center consortium consisted of the Louisiana State University (LSU) as lead institution, the Georgia Institute of Technology (Georgia Tech), and Rice University. When EPA reauthorized the center in 2001 for another five years, Texas A&M University joined the consortium. Current research deals with the following general topics: 1) assessment of the physical, chemical, and biological processes that influence contaminant availability; 2) evaluation and enhancement of biotransformation processes in sediments; and 3) improvement of the science of risk management.

Under the leadership of Georgia Tech technology transfer specialists, the HSRC/S&SW began to make heavy use of the Web in 1995. After creating a main program web site, the center developed an introductory web primer on in-situ capping of contaminated sediments, a remediation option that was new and poorly understood by the sediments community at large. This primer included color animations that demonstrated important sediment processes and alternative capping technologies. Other projects have included the establishment of the Sediments Web

Community (SedWeb) community to serve as an information resource for researchers, regulatory officials, engineers, and environmental managers. Over the last several years, center staff members have compiled a web-based library of audio presentations and workshops, including presentations from the HSRC/S&SW's two international environmental training institutes in Prague, Czech Republic, and Rio de Janeiro, Brazil. Internet-based newsletters, such as the quarterly "HSRC Update" and the SedWeb monthly e-mail report on sediments activities in and beyond the center, have become key vehicles for keeping audiences up to date on center activities. Finally, the center is now introducing video clips of key research presentations into its web site as a means of increasing the audience for HSRC-sponsored meetings. The rest of this paper summarizes each of these Internet-related information dissemination activities in greater detail. It ends with a section on the main lessons learned by the center in using the Internet and a forecast of how the HSRC/S&SW will use the online medium in the future.

2. PROGRAM OBJECTIVES

The center's Internet-based technology transfer program has several important objectives. Probably the most important has been to disseminate comprehensive information about HSRC research that is suitable for varied audiences. Through HSRC/S&SW web sites, individuals can learn a great deal about the center program without talking to a single person or requesting brochures, reports, or other paper-based documents. A second objective has been to use the Internet as a channel for increasing interactivity between HSRC audiences, program staff members, and research investigators. Much of the program's correspondence is e-mails sent by individuals who have visited an HSRC/S&SW web site. E-mail links make it possible for project investigators to have substantive interaction with outside parties through a series of notes. These exchanges enrich the understanding of the investigator and the correspondent alike and sometimes lead to collaborative work or enhancements of the research. Another objective of the HSRC's Internet-based technology transfer has been to promote discussion of sediments topics by researchers, environmental regulators, environmental managements, and remediation technologists. The primary vehicle for reaching this objective has been the Sediments Research Community (SedWeb), a web and e-mail information service.

The primary portal of entry for visitors wanting to tap the resources of the HSRC/S&SW on the web is www.hsrtc-ssw.org. The main web site provides access to center publications such as its quarterly online newsletter, annual reports, summaries of current and past research, and research progress reports. It also includes a growing library of audio-visual and slide presentations garnered from various workshops and center meetings. In addition, the site includes biographical information on center participants as well as links to special-purpose web sites, such as its in-situ capping web primer, community outreach site, and Sediments Research Community site.

3. IN-SITU CAPPING PRIMER

Until recent years, the accepted wisdom of environmental practitioners was that removal and treatment were the only effective methods for cleaning up contaminated sediments. However, during the 1990s, studies sponsored by the South & Southwest HSRC and other research institutions offered strong evidence that properly designed caps composed of sand, silt, rock and/or geotextiles can sequester contaminated sediments from the surrounding water for lower costs than required by conventional dredging operations. The HSRC/S&SW decided to create a web primer on in-situ capping to introduce the technology to regulators, environmental managers, and engineers.

The web primer (www.hsrtc.org/capping), created in 1996, offers a single recommended path for visitors, but its design allows students with varying interests and levels of knowledge to customize their own path through the learning material without getting lost. Ease of orientation and navigation is promoted through use of color-coded sections and the placement of links to all sections and the main primer menu on each page.

The scientific processes and technologies involved in capping are difficult to depict because they take place under water. The primer designer made use of animations to visualize these concepts because they: 1) could represent the motion accompanying these processes and technologies; and 2) they did not require too much memory to be transmitted via the World Wide Web. Viewed by present-day standards, the initial animations look primitive, but in the mid 1990s they offered a relatively sophisticated means of illustrating technical information. In 2001, these animations were updated in Macromedia Flash, a software application that allows the developer to produce more naturalistic depictions of motion.

After completion of the introductory primer, the designer added information to accommodate the learning needs of visitors with extensive knowledge of capping technology. One section contained four detailed "Technical Briefs" authored by the U.S. Corps of Engineers' Waterways Experiment Station on capping design requirements, equipment and placement techniques, site selection, and monitoring. A "Research Findings" section offered selected abstracts of recent research studies on in-situ capping.

The web capping primer won an award of merit in the "institutional and reference" category of the online communications competition sponsored by the Atlanta Chapter of the Society for Technical Communication.

4. SEDIMENTS WEB COMMUNITY (SEDWEB)

The main role of the South & Southwest HSRC is to conduct research in targeted research theme areas, but the center is also attempting to bring sediments interest groups together where possible to enhance mutual knowledge about the state of the art in contaminated sediments management. The principal vehicle for these activities is the Sediments

Web Community (www.sediments.org), which was created in 1997. SedWeb provides an introduction to sediments management, with brief summaries of the sediments remediation problem in general, remediation alternatives, natural attenuation, key contaminants, and site characterization. SedWeb also has a community directory, which provides a space for visitors to place professional information. A Bulletin Board section contains recent news items of general interest to the sediments community such as congressional legislation, professional conferences, and individual awards. The site has an extensive list of links to resources, organized by topic.

In the past year, SedWeb has added a new and popular feature, a monthly newsletter on developments in the sediments community sent free of charge to an e-mail distribution list and archived on the web site. The initial mailing list for this newsletter totals approximately 525 persons, and subscriptions are available by making e-mail requests to mark.hodges@gtri.gatech.edu.

5. VIRTUAL WORKSHOPS AND PRESENTATIONS

Improvements in Internet connectivity, computing capacity, and software for audio and video streaming have allowed the center to develop a library of online web presentations gathered from HSRC workshops, conferences, and other meetings. This section of the web site is accessible by selecting the "Web Workshops" button at www.hsrc.org/hsrc/html/ssw.

The presentations work like lectures in a conventional classroom. Audio clips and overhead slides of the speaker's talk are synchronized. The speed of movement from one slide to another is a function of the user's Internet connection.

The web access speeds available to consumers have improved considerably in the last several years, making it possible for many people to view streaming video clips without difficulty on their computers. In response to this enhanced processing capability, the center is introducing onto its web site streaming video clips of the progress reports made by researchers on HSRC-funded studies.

6. LESSONS LEARNED

Seven years of experience in disseminating sediment information via the Internet and World Wide Web have provided the HSRC/S&SW technology transfer staff with some important lessons:

First, the Internet has become an essential tool for research organizations whose mission involves knowledge dissemination to the public. The percentage of households and companies that use the Internet on a regular basis to gather information is now very high. The HSRC/S&SW program office gets frequent inquiries from corporate, academic, and individual e-mail accounts requesting amplifications of information found on center web sites. In

the early days of the Internet, the online medium could not package information with the same precision and attractiveness as conventional paper brochures or reports. However, software for creating electronic publications has advanced to the point that files containing brochures or reports can be downloaded, viewed and printed in a specified design format. This capability makes it possible to establish web-based libraries that are accessible continuously and updated as content changes without incurring expensive mailing charges. Use of this medium has become ever more attractive as communications and marketing budgets have shrunk and public familiarity with the Internet grew.

In the center's experience, interactivity with audiences via the Internet has become more common but is probably most effective and efficient when the information provider makes active efforts to reach its constituencies. The HSRC/S&SW sought to involve members of the sediments community in knowledge exchanges through a web chat room and e-mail listserv discussion group. Neither medium has stimulated the kind of self-sustaining discussions that the center sought. The HSRC/S&SW has had far more success in attracting an audience for sediments information when it began disseminating a monthly e-mail newsletter on contaminated sediments remediation. The initial audience, gathered from existing center mailing lists, had 370 names. In less than a half year, the list has grown to 525 based on requests for free subscriptions, and recipients are starting to suggest news items for the web periodical. Most of this increase was due to a notice of the newsletter's availability on a well-read monthly EPA listserv known as Tech Direct. The lesson here is that organizations need to "push" information to audiences on a regular basis rather than depending on their constituencies to find them on the Internet. This is not a startlingly fresh insight—commercial marketing organizations reach out to customers in this manner every day—but Internet publishers have often tended to overlook the need to help audiences get to their sites.

A third lesson has been that visualizations can be highly effective in condensing voluminous text information displaying it in easy-to-understand formats. Though production of such images may be difficult and time-consuming, the effort can pay dividends. For instance, the community outreach projects of the five Hazardous Substance Research Centers are depicted on a common interactive map (www.toscprogram.org/sites.html). This map of the United States contains color-coded markers that are "hot links"—that is, the visitor to the web site can select them with a click of their computer mouse and move to another page with specific information about the community. The distinctiveness of the interactive map is that provides visitors with access to the most significant work activities of all five centers in a single geographically meaningful graphic display. Figure 1 shows how this map works. In the past, the center has gone slow in adopting sophisticated visualizations such as video clips, but the bandwidth now normally available to many audience members makes it possible to use this medium.

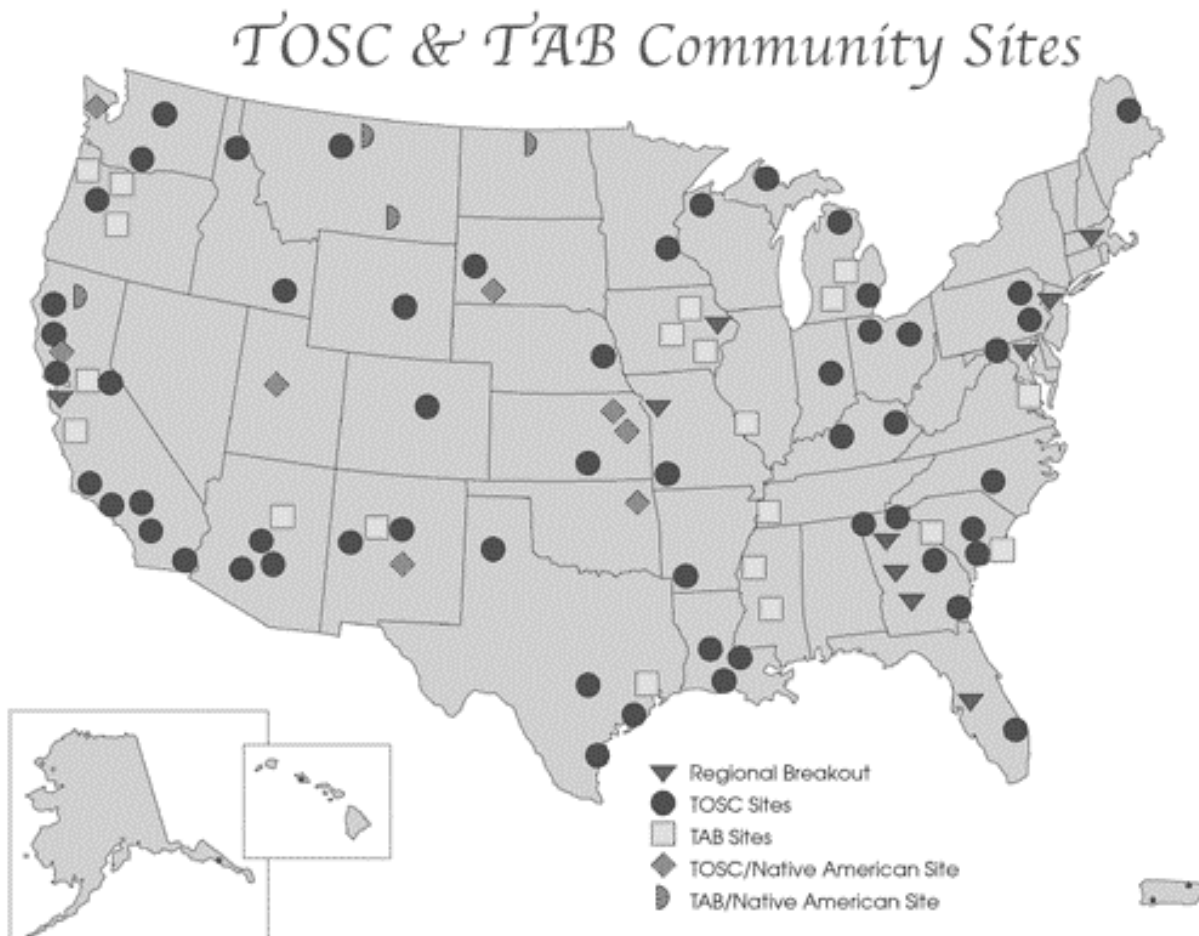


Figure 1: Visualizations such as this interactive map of HSRC outreach projects integrate disparate data into easy-to-understand formats.

7. FUTURE PLANS

In 2001, the consortium of research institutions operating the HSRC/S&SW won funding to operate the center for an additional five-year period. The grant was competitively awarded, and reviewer comments indicated that one of the strong points in the existing consortium's application for renewal was its active program of Internet-based technology transfer offerings. Based in part on this endorsement, the center is moving forward in expanding this aspect of its program. We plan the following general slate of activities:

1. Expansion of resources on the basic HSRC/S&SW web site. The center intends to make available more of the center's funded research reports on the web in PDF format.
2. Expansion of the audio-visual lecture library. Center staff will continue to record presentations of center events so that clients can refer to them on a continuing basis. The HSRC/S&SW is also going online with collection of streamed video progress reports on the four research

projects now underway, and usage of video on the site is likely to increase.

3. Production of (or participation in) live, made-for-the-web panel discussions and presentations on sediments topics. Events will be scheduled, and participants can sign up for telephone connections so that they can hear presenters talk while looking at their overhead slides online or download them from the web to their local computers. The center's first foray in this area has been to arrange for the center director to speak on the HSRC-led Anacostia River capping demonstration project in an Internet-based workshop sponsored by the EPA Technology Innovation Office (TIO). During this session, center researchers will discuss the demonstration with participants who are watching their presentation slides over the Internet and listening to them through conference telephone lines. This live event (tentatively scheduled for March 2003) is to be taped and archived on TIO's www.clu-in.org web site.

4. Continuation of the monthly sediments e-mail newsletter with increased efforts to include questions and comments by participants. If the discussion phase of the newsletter becomes established, then it may be "spun off" as a separate Internet e-mail group.

5. Development of interactive animations on sediment remediation topics. The center's initial efforts have focused on the depiction of environmental processes and remediation technologies, but in the future technology transfer staff members hope to build animations that require the visitor to make choices and, thus, test their understanding. They also want to create sediment management problem scenarios that allow users to select alternatives and see the consequences of their decisions.