

Cyberspace Station: WWW Shrinks the Globe

By Richard Mead

The Internet is a beneficial tool which provides an international forum of communication. It also represents the first global system of its kind available to the average person. Almost all countries have at least one Internet access point. Its strength is its flexibility, whereby it is effectively impossible for the Internet to globally fail in a catastrophic way.

Although the Internet began more than 25 years ago, it did not grow exponentially until the early 1990s. With the appearance of the first web browser, Mosaic, the World Wide Web aspect of the Internet exploded in 1993. The hyperlink and multimedia capabilities of the "Web" increased the ease-of-use aspect of the Internet. The Internet now has 200,000 web pages added to it daily and is viewed by 35 million people. Yet, before all the hype and hoopla over the WWW, there were (and still are) other forms of information on the Internet. The Internet provides thousands of discussion groups via e-mail which allow users to place themselves on electronic mailing lists. One can globally discuss any topic imaginable.

Irrigation information on the Internet was initiated by using e-mail lists. Today, e-mail discussion lists are the primary interactive sources of irrigation information. There are four distinct irrigation e-mail discussion groups: Irrigation-L, Trickle-L, Salinity-L and SoWaCS.

The mailing list known as **Irrigation-L** was created by the pioneer of Internet irrigation information, Thomas M. Stein. Stein resides in Germany and works at the University of Kassel. He also runs the Virtual Irrigation Library which will be discussed later. Irrigation-L has 400 subscribers from 37 countries and covers technical aspects of irrigation, like design,

hydraulics and system layouts. It also is open for topics like irrigation management, and socio-cultural, political and economic questions relevant to irrigation.

Trickle-L was initiated in mid 1994 by the Water Management Research Laboratory-ARS in Fresno, CA. Trickle-L focuses on all aspects of microirrigation technology. Trickle-L has 490 subscribers from 30 countries. The author of this paper is the owner of Trickle-L.

Salinity-L also was initiated at the WMRL in late 1995. It was the brainchild of Richard Soppe, now a Ph.D. student in agricultural engineering at U.C. Davis. Salinity-L discusses the management practices for saline soils along with more detailed discussions of salt movement in the soil and crop salt tolerance. Salinity-L now has 175 members from 26 countries.

Finally, the fourth discussion list pertinent to irrigation is SoWaCS, or Soil Water Content Sensor. SoWaCS covers all methods and techniques used to measure soil water content and soil water potential. Discussion includes TDR, FDR, gypsum blocks, tensiometers, neutron probes and other forms of soil water measurement instrumentation. Controlled irrigation, soil water related research, or automatic measurements also are discussed. SoWaCS is owned and operated by Bruce Metelkamp in Pietermaritzburg, South Africa. The list was created in late 1995 and has 311 members from 21 countries.

All of the above discussion groups are operated by a listserver, which automatically distributes an e-mail message from one member of the list to all other members on the list. When you subscribe to a list, your name and e-mail address is automatically added to the list. To subscribe to any of the four lists above, send in the e-mail message (without the quotes), "sub-

scribe (choice of list) your name" to the following addresses:

For IRRIGATION-L:

LISTSERV@listserv.gmd.de

For TRICKLE-L:

LISTSERV@UNL.EDU

For Salimty-L:

LISTSERV@UNL.EDU

For SoWaCS:

Majordomo@aqua.ccwr.ac.za

So, what's on the Web? Again, Thomas-M Stein of Germany has continued his pioneering efforts by building the WWW **Virtual Library of Irrigation** at http://www.wiz.unikassel.de/kww/projekte/irrig/irrig_i.html. The V.L.I. provides links and information to servers and sites holding knowledge relevant to irrigation and hydrology on the web. The on-line library includes information on the discussion lists described above, listings of water experts, irrigation systems, statistics, hydraulic engineering, standards, management, hydraulic modeling, hydrology software, irrigation drainage, salinity, agronomy, drought management, and soil water relationships. The virtual library will soon have Irrigation-L archives with a searchable index.

Microirrigation **Forum** at <http://www.cybergate.com/~rmead> is the web home base for Trickle-L archives. It also contains a directory of all drip manufacturers and related industry products, a calendar of drip irrigation affiliated events, a section of related links specifically to drip or microspray systems, and a digital gallery of visual descriptions that explain microirrigation technology.

The SoWaCS discussion list operator has followed suit by creating a web page at <http://www.icfrnet.unp.ac.za/~mete/SoWaCS.html>. The SoWaCS website has archives of all previous discussions, a visu-



Agricultural Irrigation

al database of the many sensors on the market and descriptions of how they work.

The Water Management Research Laboratory (ARS-USDA) in Fresno was one of the first irrigation-related organizations to establish their niche on the Internet at <http://asset.arsusda.gov/WMRL/WMRL.html>. Accompanying annual reports, you will find a list of WMRL publications and a montage of digital pictures associated with the lab's research sites and facilities. The WMRL web site also contains the largest bibliography of microirrigation information on the Internet at <http://asset.arsusda.gov/WMRL/dripbib.html>.

Another ARS facility on the net dealing with irrigation is the Water Management Research Unit out of the Conservation & Production Research Laboratory in Bushland, TX. Along with explaining their research, their page includes on-line WMRL publications at <http://www.net.usda.gov/cprl/wmru/wmpubs.htm>. Utah State University's International Irrigation Center's home page contains a wide variety of irrigation engineering software at <http://www.engineering.usu.edu/departments/bie/software.html>. Some of the software packages are free to download, some you'll have order and pay for.

The California Department of Water Resource's C.I.M.I.S. program has an on-line database at <http://www.dwr.water.ca.gov/> which includes general irrigation, irrigation scheduling, irrigation scheduling software, mobile irrigation laboratories, consultants, crop coefficients and related publications. From the 100-plus C.I.M.I.S. weather stations located throughout 41 counties, one can obtain daily ETo and weather data from the previous week or view summed monthly data from the past 11 months.

The Adams Trade Press, publishers of the Irrigation Journal, now has its publications on-line with editorial archives going back to spring of 1996. Be sure to check out their very useful search engine at <http://www.aip.com/Green/archive.html>.

WaterWiser-The Water Efficiency Clearinghouse at <http://www.waterwiser.org/> has established itself as the preeminent resource for water efficiency and conservation. One can order copies of reference materials related to water issues. Using their search engine, you'll find 117 articles related to irrigation and water conservation. Books, CDs and software also can be obtained from this water-related Internet locale.

More generic sources of irrigation information include the National Water-Use Information Program sponsored by the USGS at <http://h2o.usgs.gov/public/watuse/wufactsheet.html>, and the Florida Agricultural Information Retrieval Service at <http://hammock.ifas.ufl.edu>. If you want your irrigation information off line and in hard copy, the Amazon book-

store web site at <http://www.amazon.com> is the best book resource on the web.

Although it is difficult to predict the future of irrigation information on the Internet, the potential is there to retrieve real time ETo information for your specific locale, order irrigation parts from virtual distributors, or communicate with consultants and industry reps using video conferencing. New concepts for this technology pop up everyday. Now is the time for everyone in the irrigation community to move up the digital food chain. A

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