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Year of the Woman

By Ric Jensen
Information Specialist, TWRI

In the minds of many groups, 1992 represented a "watershed" year for women. Because more women were running for and being elected to political offices than ever before, 1992 was designated by many groups as "The Year of the Woman." Women also stepped to the forefront of many other important issues including water and environmental science.

This issue of Texas Water Resources expands on that theme. Now, more than ever before, women politicians in Texas ranging from Governor Ann Richards to State Senators and Representatives have been playing key roles in solving waterrelated disputes. At the policy-making level, women now comprise a majority of the Commissioners of the Texas Water Commission. A woman has also been appointed to the Texas Water Development Board.

The number of women scientists and researchers working in water-related issues at Texas colleges and universities is also increasing dramatically. In the past, there simply were not many women that were involved in careers in scientific and engineering research. We typically viewed women as merely supporting science by serving as secretaries and laboratory aids. Now, in many cases, women are the scientists. It's becoming much more common to see women at Texas universities investigating and helping address such diverse issues as agricultural irrigation, the effects of drinking water on public health, coastal wetlands, aquaculture, and hazardous wastes.

You might ask, "Why should an issue of Texas Water Resources be devoted to women?" First, many people believe that women still are not adequately represented in careers in politics or science. Pointing out success stories of women working in what we used to think of as "non-traditional" fields should provide role models, especially to youth. This could encourage more women to pursue thesecareers. Secondly,thewhole notion of

waterand environmental management has changed dramatically over the past 20 years. For example, the emphasis has largely shifted from water development to efficient management of existing resources. Perhaps one reason behind these changing attitudes is that women professionals are bringing fresh attitudes, ideas, and perspectives about which issues truly are important and how they ought to be corrected.

"There was a time not too long ago that many women weren't pursuing careers in science but that's changing now," says Wayne Jordan, Director of the Texas Water Resources Institute. "We're not exactly sure why, but we're seeing a lot more women applying to graduate studies in all fields and we welcome the change. They're excellent scientists and sometimes bring new perspectives to complex issues that haven't been brought up before."

Finally, we need to make it clear that when we mention the accomplishments of women in elected offices that we are not endorsing anyone nor are we, on the other hand, passing judgment on the job they've done. Information on these policy makers is strictly non-partisan and simply reflects their accomplishments.

Governor Ann Richards

In recent Texas history, few policy makers has exerted a greater influence on crafting the State's water and environmental policies than Governor Ann Richards.

Some of her major efforts have included promoting the creation of a new State agency that would assimilate many environmental programs, reorganizing the Texas Water Commission to encourage water conservation and recycling, setting new water quality standards, helping bring water and sewer services to "colonias" along the TexasMexico border, restricting sites that can be chosen for hazardous waste disposal, and urging the General Land Office to implement a coastal zone management plan.

The Governor has also indirectly influenced water and environmental policy through her appointments. For example, since Governor Richards appointed John Hall as Chairman of the Texas Water Commission he has been vigorously campaigning for State management of the Edwards Aquifer and has instituted the Clean Texas 2000 pollution prevention program. Hall, in turn, has appointed four women into leadership positions at the agency. Governor Richards also appointed two women, Pam Reed and Peggy Garner, to serve as TWC Commissioners and recommended that Diane Umstead serve as a Member of the Texas Water Development Board.

Voters in more and more regions of Texas are sending women to represent them in the State Legislature, in part because of their views on water and the environment.

State Senators that are active in water issues include Cyndi Krier of San Antonio (now a Bexar County Commissioner), Judith Zaffirini of Laredo, and Peggy Rosson of El Paso.

Zaffirini and Krier have both been working to develop strategies and policies to resolve the Edwards Aquifer gridlock and to find ways to manage water in the region.

Zaffirini has encouraged county groundwater districts in the western portion of the Edwards Aquifer to work together to develop strategies to manage the aquifer at the local level. She advocates a comprehensive regional plan to manage the Aquifer. Zaffirini sponsored a bill that allowed Texas to provide partial funding for a wastewater plant in Nuevo Laredo, Mexico, that sends its effluents to the Rio Grande (the plant should help lessen pollution in that section of the river). She helped defeat a bill that would have allowed low level radioactive wastes facilities to be sited near water supplies.

Krier, whose term expired in November, was active in several issues relating to the Edwards Aquifer. She was appointed to cochair a Special Select Committee on the Edwards in 1989. She also helped pass a bill that allowed the Edwards Underground Water District to develop and enforce a drought management plan, and authored the "catfish farm" bill that placed a moratorium on the drilling of large artesian wells over the aquifer.

Rosson has been very active in support for the Economically Distressed Areas Program which increased funding to more rapidly bring water and sewer services to the Colonias in El Paso County. She has also supported efforts to expand El Paso's innovative program that recharges groundwater with treated wastewater and is a member of the Steering Committee that is conducting a comprehensive water quality study of the Rio Grande.

In the House, leading women who are active in water and environmental legislation include Libby Linebargerof San Marcos, Sherri Greenberg of Austin, and Irma Rangel of Kingsville.

Because Linebarger's region depends on springflows, she's been aggressively involved in EdwardsAquifer issues. Linebarger has supported Texas Water Commission strategies to manage pumping from the aquifer and to protect endangered species in the springs. She has also worked closely with the Barton Springs Edwards Aquifer Conservation District to protect the water quality and quantity in the northern portion of the aquifer.

Greenberg worked to prevent pollution of the Barton Springs zone of the Edwards Aquifer. Her other efforts have included increasing environmental safeguards that are required when highway construction projects cross the recharge zone, and increasing the City of Austin's authority to regulate developments that could increase pollutant runoff into Barton Creek and Barton Springs. Greenberg also cosponsored abill thatwould make it easier for local governments to prohibit hazardous waste facilities from relocating to their areas.

Rangel has been working to prevent the spread of new "colonias" along the Texas-Mexico border. She sponsored a bill that would prevent new housing developments in unincorporated areas unless adequate water and sewer services are provided. That bill would also give County governments the right to set minimum water and wastewater

standards that must be met before development could occur. She also actively supported legislation to bring millions of dollars for water and wastewater improvements to Colonias.

Women Conducting University Water Research

On campuses throughout Texas, more and more women are being recognized for their excellence in water and environmental research. Their expertise includes such diverse issues as agriculture, irrigation, politics and government, hazardous waste, public health, and many other fields.

Making agricultural irrigation more efficient is the emphasis of research by Rose Mary Seymour, an agricultural engineer and assistant professor with the Texas Agricultural Extension Service in Lubbock. Her efforts have included assisting in the development of a computer network that tells irrigators about current climate conditions (especially evaporation and transpiration) in their area. Farmers can use this information to adjust the amount of water they apply and save water. Seymour has also helped develop procedures to evaluate pumping plants and has conducted basic research on surge irrigation systems.

Coastal geology constitutes the research emphasis of Jennifer Prouty, an associate professor in the Geology Department and Environmental Science Program at Corpus Christi State University. Prouty has documented how sands have advanced from Padre Island into the Laguna Madre throughout this CenturyÑin part because of changing land use patterns. She is also measuring the shifting that's now taking place on Padre Island beaches. She is also studying large naturally occurring holes in limestone formations along the Texas coast that may yield clues about the climate history of the region.

Determining how fish embryos and larvae adjust to saline waters comprise the bulk of the research of G. Joan Holt, a research scientist at the University of Texas Marine Science Center in Port Aransas. She's also examined the mechanisms that larval fish use to transport themselves to estuaries and improved diets for redfish that can be used in aquaculture operations.

Gauging the impact of pollution on aquatic species that live nearby is the focus of studies by Cynthia Howard of the School of Natural and Applied Sciences at the University of Houston at Clear Lake. Howard is now investigating how trace metals and toxic substances are affecting benthic organisms that live in polluted sediments. By comparing species richness and abundance, she ranks which sites are suffering from the most pollution. Howard is also measuring stress protein levels in grass shrimp and seatrout in Galveston Bay and other waters to see if oilfield brine is causing long-term health problems in those species.

The use of microbes and other microbiological organisms to degrade hazardous wastes and other pollutants in groundwater systems is the goal of research by Hanadi Rifai, a research associate in the Environmental Science and Engineering Department at Rice University. She has also developed geographic information systems to estimate pollutant

runoff into Galveston Bay, and she helped develop an easy to use hypertext database called OASIS that provides basic information on groundwater pollution.

Studies that examine the relationship of environmental pollutants and public health along the Texas-Mexico border are the focus of Irina Cech, a Professor in the Environmental Health Department at the University of Texas School of Public Health in Houston. She is now conducting assessments of contaminants in drinking water resulting from inadequate water and wastewater treatment, microorganisms, volatile and semi-volatile organiccontaminants, pesticides, fertilizers, and heavy metals. Cech's other studies have investigated radon levels in groundwater supplies and the impact of drinking water that contains disinfection byproducts like trihalomethanes on public health. Cech has also served on Governor Richards' task force on border and environmental health issues and a National Academy of Sciences bi-national committee on water and the environment.

Teaching local elementary school students about science and working with polluted sediments are two of the efforts of Robin Autenrieth, an assistant professor with the Civil Engineering Department at Texas A&M University. Her research centers on the environmental effects of dredging polluted sediments and the use of microbes to remediate and clean-up polluted aquifers. Together with students from the Environmental and Water Resources Engineering Division, Autenrieth visits schools in Bryan once or twice each semester and teaches about such basic principles as water treatment and water testing using computer simulations and other methods.

Farida Saleh, an associate professor, is the Director of the Environmental Chemistry Laboratory at the University of North Texas in Denton. The lab is part of UNT's Institute for Applied Sciences. Her research interests include the fate and transport of contaminants in the environment and the analytical chemistry of pollutants. Some of her recent studies have concerned the influence of rainfall runoff on the water quality of the Elm Fork of the Trinity Riverthat Dallas uses fordrinking water supplies. She currently teaches graduate courses in environmental and analytical chemistry.

Policy issues are the emphasis of research by Susan G. Hadden, a professor in the LBJ School of Public Affairs at the University of Texas at Austin. Hadden recently completed a comprehensive study that evaluated how effectively Federal, State, and local agencies are regulating Galveston Bay. Previously, she's researched citizen's "right to know" laws and the impact of pesticides on the health of farm workers.

Assimilating and interpreting public opinion about water and the environment is the goal of Tarla Peterson, an associate professor in the Speech Communications Department at Texas A&M University. Peterson has recently conducted studies to determine what sources (for example, agricultural fertilizers, pesticides, hazardous and toxic chemicals) Texans perceive are the major threats to the safety of their drinking water . She's also trying to determine which sources people rely on to form their opinions.

Texas State Agency Appointments

For the first time in history, the majority of the members of the Texas Water Commission are women.

Both Pam Reed and Peggy Garner were appointed to the Texas Water Commission by Governor Richards. Reed, a land developer in Austin, has been especially interested in helping the Commission develop a comprehensive water management plant that emphasizes conservation, the transfer of waters from areas with surpluses to regions where water is scarce, and improved management. She has also worked to speed up policies aimed to provide better water and wastewater services to colonias. Garner is a rancher from Rankin in West Texas. Before she was appointed as a Commissioner, she worked to form a local groundwater management district. She has emphasized the need for local control of groundwater resources through water districts. Garner is especially involved in such issues as nonpoint source pollution and inventorying and capping abandoned wells.

Diane Umstead is one of the Members of the Texas Water Development Board that was appointed by Governor Richards. An attorney, she is particularly interested in promoting and implementing urban waterconservation measures and in bringing waterandwastewater services to the colonias. Previously, she chaired the City of Houston's Environmental Committee.

Why Aren't More Women Involved in Science? A Historical Background

Many scholars contend that women have had a difficult time entering careers in research ever since the "scientific revolution" began in the 1800s (Zuckerman and others,1991, Kahle, 1985). In fact, as of the early 1900s, only one woman scientist, Madame Curie, had achieved great fame. The National Academy of Science d,dn't elect its first woman (anatomist Florence Sabin) until 60 years after it had been formed.

Even as we speak, the numbers of women are still low even though some progress is being made. The most recent figures, based on data from 1984, show that women comprised only 13% of the scientists and engineers in the U.S. In 1974, only 6% of people in these careers were women.

It's hard to develop specific figures on the number of women scientists in waterrelated fields in Texas, in part because water is such a diverse subject and isn't easily categorized in any academic discipline. However, one way to develop a rough estimate is to look at the women that are included in the Texas Water Resources Institute's database of researchers at Texas universities. That report shows that women account for only 5% (25 out of 500) of the scientists.

Today, women are still less likely than men to hold advanced degrees in science and engineering. Although 19% of men now in these fields have earned Ph.D.'s, only 11 % of women have done so. The number of women earning doctoral degrees in all fields has risen from 7% in 1970 to 24% in 1985, but fewer women still receive Ph.D.s in science and engineering disciplines. In Civil Engineering (a field closely tied to water resources)

women earn only 13% of the B.S. degrees, 10% of the M.S., and a scant 5% of the Ph. D.s that are granted (Darby, 1992). On the other hand, it should be noted that roughly 40% of recent graduates in environmental engineering are women. Also, women now comprise 45% of all recent graduates with B.S. degrees in science-related fields.

What factors have kept more women from pursuing careers in science? There are many possible answers. First, many more women college students enter careers in social sciences than in physical science and engineering. This could be because of their elementary and high school experiences or because they may believe that good jobs for women scientists simply are not out there in the real world. Other factors that have been suggested include a lack of role models, the emphasis on basic rather than applied research, and the extreme level of competition in many majors.

In general, once women begin scientific careers, many women have to interrupt their careers while they are pregnant or at home with infants and young children. Studies by Zuckerman (1991) show that women scientists at universities are generally less likely to publish and are less likely to be promoted than their male counterparts, in part because of family obligations, stereotypes encountered by most male administrators, and obvious or indirect forms of sex discrimination.

Summary

As we've shown in this article, more and more women are pursuing professional careers and are taking leadership positions in a variety of fields, dealing with water and the environment.

We hope this sends a strong signal to Texas youth that a young girl can pursue any kind of careerthat she wants, including those in science, politics, and policy making. We encourage all Texans to follow their dreams and to study those fields they want to pursue.

Certainly, women are today a vital part of addressing many of the issues Texas is facing. They will be an invaluable part of the solution to these issues.

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