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Ranking Texas' Environmental Risks

How Do Policy Makers, Public, Really Feel About Water, Air, Natural Resource Issues?

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How do Texans feel about environmental issues? Do most of us place a high value on preserving wetlands and pristine rivers? Are we willing to tolerate some types of pollution, especially if the alternative may affect our lifestyle or result in additional costs or regulations? Are some environmental issues more important to Texans than others? Do Texans believe air pollution is more obnoxious or health threatening than drinking water contaminants?

This issue of *Texas Water Resources* examines the broad range of issues associated with public opinion about the environment, including efforts at Texas universities.

Attention will be focused on a comprehensive effort, the State of Texas Environmental Priorities Project (STEPP) which was recently carried out by many state agencies to develop a consensus opinion about the comparative risks posed by environmental threats. As a result, priority rankings were generated about potential problems that may impact water, air, and land resources. The goal was to develop a broad-based set of priorities that state agencies can use to guide their efforts and ensure that programs and activities parallel public attitudes about the environment.

The State of Texas Environmental Priorities Project (STEPP)

STEPP was an effort of the U.S. Environmental Protection Agency (EPA) and state agencies including the Texas Natural Resource Conservation Commission (TNRCC), the Texas Water Development Board, the Texas Department of Health, the Texas Department of Agriculture, the Texas General Land Office, the Texas Parks and Wildlife Department (TPWD), and the Railroad Commission of Texas.

STEPP was carried out from 1993–1996. It was coordinated by Sylvia Amaya of TNRCC, who worked on these studies as a graduate student at the University of Texas at Austin (UT).

STEPP built upon comparative risk projects performed in Texas in 1990–91 by the EPA Regional Office in Dallas. This EPA effort evaluated 25 environmental problems in Texas and nearby states. It ranked them according to human health, ecological and economic threats. Findings from this project ranked the highest ecological risks as physical degradation of terrestrial ecosystems, pesticide application, physical degradation of water and wetlands, global warming, and stratospheric ozone depletion. The highest threats to the regional economies were classified as global warming, and ozone depletion highest human health risks were assigned to pesticides, indoor radon and air pollution, and ozone depletion.

The goal of STEPP was to utilize comparative risk principles to analyze and rank major environmental issues and problems. Since the 1980s, EPA has recommended comparative risk techniques be used to make sure regulatory programs and funds be closely matched to environmental priorities.

STEPP objectives were to: 1)

Final Rankings of the State of Texas Environmental Priorities Project (STEPP)

Very High Priority
- Ground Level Ozone (smog)
- Habitat Alteration
- Lead Contamination
- Loss of Biodiversity
- Particulate Matter
- Stratospheric Ozone Depletion

High Priority
- Air Toxics
- Groundwater Quality
- Pesticide Contamination
- Surface Water Quality
- Waste Handling and Disposal

Medium Priority
- Abandoned Sites and Spills
- Flooding
- Global Climate Change
- Indoor Air Pollution
- Water Availability

Low Priority
- Atmospheric Deposition
- Public Drinking Water Quality
- Food Safety
- Lawn Chemicals
- Radiation
- Soil Erosion

Very Low Priority
- Electromagnetic Fields
- Noise Pollution
- Odor Pollution
- Pests
- Toxics in the Home

Figure 1

quantitatively and qualitatively characterize relative environmental threats; 2) rank and prioritize environmental problems; 3) provide for increased public participation in environmental decision making; 4) produce information that can be used to educate the public about environmental risks, and 5) encourage the development of partnerships among individuals, businesses, and government agencies to solve environmental problems.

The effort worked this way. First, 27 potential issues were identified by a public advisory committee (PAC). Then, three technical work groups consisting of ecological, human health, and socioeconomic experts commented on these items. Afterwards, the PAC integrated the rankings from the three technical work groups into an overall list of priorities. Finally, an oversight committee examined these results and evaluated environmental threats, STEPP participants then developed a consensus ranking. This effort involved taking the results from the individual groups and trying to find common grounds so that comparisons could be made between the groups' recommendations. To do this, the PAC considered such factors as whether the threats could be negated over time or were irreversible, the severity and adversity imposed by each risk, the number of people who could be exposed to the hazard, the probability or likelihood that threats will occur, and whether trends suggest that an issue is becoming more severe over time. Finally, the PAC voted on a series of "paired comparisons" to judge the severity of environmental threats. For example, PAC members may have been asked to choose whether the threat posed by flooding was more or less severe than risks presented by chemicals applied to landscapes.

Final Rankings of the STEPP Work Groups

(Note: Lower numbered items have the highest priority)

Ecological Group

1. Habitat Alteration
2. Loss of Biodiversity
3. Global Climate Warming
4. Surface Water Quality
5. Particulate Matter (Air Toxics and Atmospheric Deposition)
6. Waste Issues (Abandoned Sites and Spills and Waste Handling and Disposal)
7. Soil Erosion
8. Pesticide Contamination
9. Water Availability

Socioeconomic Group

1. Habitat Alteration
2. Pesticide Contamination
3. Abandoned Sites and Spills
4. Waste Handling and Disposal
5. Water Availability
6. Ground Level Ozone
7. Particulate Matter
8. Surface Water Quality
9. Flooding
10. Radiation
11. Lead Contamination
12. Stratospheric Ozone Depletion
13. Air Toxicants
14. Groundwater Quality
15. Global Climate Change
16. Public Drinking Water Quality

Human Health Group

1. Indoor Air Pollution
2. Particulate Matter
3. Ground Level Ozone
4. Lead Contamination
5. (tie) Groundwater Quality
   Food Safety
7. Air Toxics
8. (tie) Water Availability
   Waste Issues
   Surface Water Quality
11. (tie) Global Climate Change
    Stratospheric Ozone Depletion
13. Public Drinking Water Quality
14. Pesticide Contamination
15. (tie) Flooding
    Toxics in the Home

the extent to which these results can be used by state agencies when they consider developing new regulations or modifying existing statutes.

A few clarifications need to be made regarding STEPP. First, the project focused only on "residual" risks, which are defined as those threats that can be reduced through management strategies. The TNRCC defines residual risks as those hazards which exist due to the absence of a program to protect ecosystems, human health or socioeconomic welfare; risks that remain after regulatory programs are implemented, and risks that result when regulatory programs fail. Each work group developed and utilized its own criteria and system to rank risks. Therefore, the results of the three groups are independent of one another and difficult to compare.

The rankings by the three groups are revealing from a water resources perspective, in that they present an objective picture of how experts view water issues related to other environmental concerns (see Figure 2).

Once each work group had identified and prioritized

The result of these composite Statewide rankings (see Figure 1) is somewhat surprising, because no water-related issues were ranked as "very high."

Initially, a goal of STEPP was that each state agency was to use STEPP results as a tool to shape individual risk management policies. They were asked to comment on how each agency's current priorities are affirmed or conflicted by STEPP results and how STEPP findings will be utilized by these groups. Agency staff were asked to comment on their perceptions of whether this risk assessment procedure is useful and to identify the strengths and weaknesses of this technique. It seems that little progress has been made in this regard.

Other Comparative Risk Projects

Recently, TPWD used a slightly different method to determine agency priorities. To develop the TPWD strategic plan, "the Natural Agenda," the agency first sent flip charts which include many questions about environmental issues, to re-

gional offices. At the same time, TPWD posted an on-line questionnaire on the agency's World Wide Web site.

TPWD efforts were complemented by a research project titled "Texas Outdoors: A Vision of the Future." This public opinion survey was led by Peter Witt of the Texas A&M University (TAMU) Recreation, Parks, and Tourism Sciences Department and other researchers within the Institute for Renewable Natural Resources. The goal of was to "explore TPWD needs and to identify methods for providing adequate natural, recreational, historic, and cultural resources for Texas' future." The project involved developing vision statements as well as conducting a statewide public opinion survey to gather needed information to set agency priorities. Survey results show there is widespread support for environmental and conservation programs in Texas, but roughly 66% of Texans did not identify the TPWD as the agency responsible for operating state parks and protecting fish and wildlife resources. As a result of this effort, a series of recommendations were developed addressing such issues as funding, meeting the needs of "under-served" client groups, developing joint ventures, and how to better communicate to the public.

In 1997, Witt and graduate student Joni Baker led a survey to compare the attitudes of individuals who regularly participate in hunting, fishing, and visiting state parks to other Texas residents. Questions were asked about whether stronger laws should be passed to protect the state's water resources, if conservation of natural resources is more important than economic development, and whether Texas industries are doing enough to reduce pollution. Survey results show that 82% of survey respondents want stronger laws to protect water resources, while 64% of those polled say Texas industries are not doing enough to protect the environment. Opinions were mixed about whether conservation of natural resources is more important than economic development, with 45% agreeing and 32% disagreeing. In many cases, there was a high correlation between people actively involved in recreational activities and positive feelings about environmental protection.

Environmental Priorities Identified by HARC Houston Foresight Project

Regional Issues	Natural Systems Issues
Highest Priority	**Highest Priority**
Outdoor Air Pollution	Habitat Alteration and Loss
High Priority	**High Priority**
Water Pollution, Flooding Hazardous Material and Waste	None
Medium Priority	**Medium Priority**
Solid Waste	Water Supply, Introduced Species
Low Priority	**Low Priority**
Drinking Water Quality	Biological Management

Figure 3

At roughly the same time that TNRCC was conducting the STEPP project, the Houston Advanced Research Center (HARC) was coordinating a comparative risk assessment of environmental issues that could affect eight counties in the greater Houston region titled "Houston Environmental Foresight." Lead HARC participants included John Wilson, Sabrina Strawn, and David Hitchcock. The first step was to identify a consensus of environmental concerns throughout the region. A report was published by HARC titled "Seeking Environmental Improvement," which contains detailed descriptions of environmental hazards and discusses their relative importance.

Individual issues were classified according to whether they may impact individual communities, the region, or the planet, as well as the impact of environmental threats on natural systems. Regional issues, as well as natural resources priorities, are shown in Figure 3. As a result of this project, HARC developed recommendations about how natural resources and environmental agencies in the region could better target their programs to meet the high priority needs identified in this effort.

Environmental Surveys

Many recent surveys and opinion polls have tried to identify how the general public feels about water resources and environmental issues. In many cases, they indicate that people, by and large, are concerned about preserving environmental quality. A few survey results are cited here, though many other significant polls have also been conducted.

Is progress being made on environmental issues? A 1995 Gallup Poll reports that most respondents (61%) believe that only some progress has been made on environmental issues since 1970, compared to 24% who stated that a great deal of progress has been made and 14% who felt hardly any positive action had been taken.

A few polls have compared how the public ranks environmental issues in comparison to other concerns that affect society as a whole. A poll conducted earlier this year by CBS News reported that the environment was rated as the top issue facing the U.S. in the 21st Century (cited by 12% of respondents). That poll revealed that 53% of those surveyed believe the environment will get worse, not better. Oddly enough, however, environmental issues were not ranked highly as a current top priority issue. A 1998 survey by *Money* magazine gathered information for a feature about "The Best Places to Live." A nationwide sampling of 512 households revealed that clean water was the most important issue identified by survey respondents. Surprisingly, it ranked higher than low crime, good public schools and low property taxes. Other environmental issues were rated as key concerns in this survey,

including clean air (third), residing near forests (26th), and living near the coast (27th).

In some cases, polls ask the public to decide how competing environmental threats should be prioritized. For example, a 1997 poll conducted for the Pew Trusts identified river and lake pollution as most important (cited by 61% of respondents), followed by toxic wastes in water and soil (59%), air pollution (47%), the loss of natural habitats (46%), and damage to the ozone layer (40%).

According to a 1998 public opinion poll conducted for the Nature Conservancy, nearly all (98%) of those surveyed said they felt it was necessary to educate children about ecological issues in order to protect the environment. A vast majority of parents (96%) said they would join their children in environmental activities.

University Research

At many universities throughout Texas, researchers are gathering data about public perceptions and opinions about many environmental issues.

Some of the most wide-ranging research and data collection is now being coordinated by the Office of Survey Research (OSR) at the University of Texas at Austin (UT). OSR administers the Texas Poll for the Harte-Hanks newspaper chain. In 1997, OSR conducted a survey for the TNRCC to examine the attitudes of Texans towards environmental issues. The results show that 20% of those surveyed feel the role of the government in environmental affairs should be to encourage pollution prevention and recycling, followed by enforcement (14%), education (11%), regulation (10%), and staying out of environmental issues (10%). That poll also found that 83% of Texans believe it is "very important" to educate children about environmental issues and that aluminum cans are the most frequently recycled item in Texas (57% of respondents say they recycle them), followed by paper (39%), plastic (31%), tin cans (26%), and glass (24%). Other recent OSR environmental surveys assessed whether farmers were willing to take part in integrated pest management, how the public feels about the use of cleaner, renewable energy sources that could lessen the threat of global warming, and the attitudes of consumers regarding shellfish safety.

During the mid-1990s, Jurgen Schmandt and Susan Hadden of the LBJ School of Public Affairs at UT led efforts to identify and prioritize environmental risks. The research team investigated risks that threaten the environment, including the physical degradation of wetlands and terrestrial ecosystems, non-point source pollutants, drinking water contamination, and industrial wastewater pollution. The researchers detailed how the programs of individual state and federal agencies address these risks. The UT study produced two working papers with detailed discussions about these issues and a summary report that suggests how environmental risks may be managed. This research helped build the foundation for STEPP.

Since 1990, Stephen Klineberg of the Sociology Department at Rice University has conducted opinion surveys to learn how the public feels about environmental issues. The surveys are especially useful because they are conducted at two-year intervals. Therefore, changes in public attitudes can be easily tracked. The most recent survey was conducted in 1996. Significantly, the survey suggests that Texans are now more substantially concerned about water, air, and environmental pollution than they were a few years ago. Despite the good feelings many Texans appear to have about environmental protection, Klineberg's research suggests that Texans are reluctant to support any tax increases which would pay for pollution control; and that less than half of survey respondents (44%) would be willing to spend $200 in higher prices for consumer goods, even if those funds would directly benefit the environment. Finally, the research indicates that many Texans' awareness of global environmental needs is increasing.

Recently, Klineberg surveyed residents of the Galveston Bay region about how they felt about environmental issues and compared that data to other regions of Texas. The study was sponsored by the Galveston Bay National Estuary Program. The survey indicates that roughly 80% of Galveston Bay residents may not realize that water quality in the region is improving, and that the overwhelming majority of people in the area mistakenly believe that point sources are still the major water pollution problem. Klineberg found that Bay residents were more likely to favor limiting development in wetlands and beachfront areas, and were more supportive of the public purchase of lands that could be set aside as nature preserves or parks. When the perceptions of Galveston Bay citizens are compared to those of other Texans, a different picture emerges. Galveston Bay residents viewed water and air pollution, hazardous waste management, and the exposure to dangerous substances as more serious problems than residents in other regions of the state. Klineberg analyzed the demographics of survey respondents and found residents who lived nearest Galveston Bay were most vocal about water quality and environmental protection.

Environmental polls conducted by Rice University suggest that Texans are now more concerned about water, air, and environmental pollution than they were a few years ago, although they are reluctant to support tax increases to control pollution.

What broad conclusions can be drawn from Klineberg's research? First, the Rice surveys began in the early 1990s when public concern about the environment was at its peak, due to the oil spill of the Exxon Valdez, fears about global warming, and the naming of Earth as "Planet of the Year" by *Time* magazine because of pending environmental doom. Since that time, public opinions about the environment have become less pronounced and an anti-environmental backlash has emerged. Second, despite the unwillingness of Texans to pay more out of their own pockets for environmental protection and improvement, residents of the state are becoming more concerned about a variety of environmental issues, and exhibit an increased awareness of the need for high quality water and

air resources, the preservation of ecosystems, and the development of renewable energy sources.

In 1993, Charles Samuelson of the TAMU Psychology Department and William Stewart, then of the TAMU Recreation, Parks, and Tourism Sciences Department, and Dennis Brophy of Northwest College (WY) surveyed Texans regarding the values they placed on various river uses. The survey asked respondents to rank the relative importance of irrigation, recreation, industry, and habitat for wildlife and fisheries. Irrigated agriculture was cited as the most important use (44%), followed by wildlife and fisheries habitat (30%), recreation (9%), and industry (7%). The survey suggests that there may be discrepancies between the types of water uses citizens value most and Texas regulations which regard municipal and industrial as the most important water use, but which largely ignore such uses as wildlife and fisheries habitat, instream values, riparian values, and recreation.

Recently, Samuelson was part of a broad, multidisciplinary effort that investigated whether the content of newspaper articles could yield information on the points of view of many stakeholders as to how the Edwards Aquifer should be managed. Other TAMU co-investigators included Linda Putnam, Tarla Rai Peterson, and Karen Taylor of the Speech Communications Department, and Ron Kaiser of the Recreation, Parks, and Tourism Sciences Department. The analysis of newspaper clippings suggests that environmentalists were most likely to prefer that the courts or the federal or state government resolve the conflict, while San Antonio residents were more likely to consider a diverse range of solutions.

A recent Master's thesis at Texas A&M University suggests that many residents in the Edwards Aquifer region may be willing to accept wastewater reuse and recycling, and may even prefer the use of recycled water to increasing water conservation or doing without additional water supplies.

Another public opinion survey was conducted recently at TAMU to gauge the perceptions of San Antonio-area residents about whether they would support widespread reuse of water and wastewater. This project, which involved lengthy interviews with more than 40 individuals in the region, was carried out by graduate student Michele Foss and researcher Ron Kaiser of the Recreation, Parks and Tourism Science Department. The survey results suggest that a majority of people (76%) were willing to accept potable, non-potable, direct, and indirect wastewater reuse, and nearly all respondents (96%) would accept recycled water rather than conserve more or do without. In addition, 43% of respondents said they had no concerns about drinking or using recycled water if it met current drinking water standards.

How can the way in which information is presented help shape public opinion so that miscommunication can be avoided? That was the emphasis of a recent research project conducted by Donald Vietor and Amy Thurow of the TAMU Soil and Crop Sciences Department and Andrew Johnson of the TAMU Agricultural Economics Department. The study investigated the use of a technique called "probabilistic risk assessment" to more clearly spell out specific risks associated with nutrient management from Texas dairies. Using this method, the researchers calculated the probability that different management strategies could result in a failure that could harm the environment. Vietor suggests that probabilistic risk assessment may have promise in helping the general public understand complicated scientific processes. If this method were used consistently, it could help avoid public misunderstanding of potential environmental conflicts.

Summary

Often, it's difficult to know for sure which environmental and water resources issues are most critical to address. Most of us probably feel like the proverbial Dutch boy who is trying to use his fingers to plug the holes in a dike through which water is gushing. The problem is there are too many holes, too much water, and only a few fingers. In a similar vein, water resources and environmental managers are faced with an ever- increasing list of crises which all cry for attention. The trick is finding a way to determine which issues are most critical or most pressing, and then directing resources to address the highest priority concerns and needs.

Although they are not perfect, the two techniques discussed in this issue — comparative risk assessment and the use of public opinion surveys and polls — seem to be promising methods that can help us take the pulse of the public, policy makers, and scientists regarding which problems should be the highest priorities.

It should be noted that despite the fact that a lot of effort went into the development of STEPP, it has not seen widespread use so far. Ideally, it would be better if the comprehensive findings from STEPP could be more broadly publicized and incorporated into state agency programs.

For More Information

Amaya, S., W. Gordon, G. Davis, and J. DePenning, "State of Texas Environmental Priorities Project," (Summary and three volumes), Texas Natural Resource Conservation Commission Report CTF-04, 1997.

Foss, M., *Preliminary Examination of Variables Which Influence Public Acceptance of Potable Water Reuse Applications*, M.S. Thesis, TAMU, 1997.

Hadden, S., and J. Schmandt, *Managing Environmental Risks in Texas*, Technical Report 108, LBJ School of Public Affairs, University of Texas at Austin, 1994.

Johnson, A., A. Thurow, and D. Vietor, "Dairy Manure Management: An Application of Probabilistic Risk Assessment," *Journal of Envir. Quality*, Vol. 27, pp. 481-87, 1998.

Klineberg, S., *Public Perceptions of Environmental Issues: Findings from the Galveston Bay Area and Across the State of Texas*, Sociology Dept., Rice University, 1997.

Klineberg, S., "Trends in Stakeholder Opinions: Findings from the Texas Environmental Survey (1990-96)," *Proceedings from International Conference of Sustainable Development*, Energy and Environmental Systems Inst., Rice Univ., 1997.

Putnam, L., C. Samuelson, K. Taylor, T. Peterson, and R. Kaiser, "Media Representation of Stakeholder Frames in Environmental Disputes: The Edwards Aquifer Case," presented at Annual Conference of the International Assn. for Conflict Management, University of Maryland, College Park, MD, 1998.

Reducing Risk: Setting Priorities and Strategies for Environmental Protection, EPA, Washington, DC, 1990.

Setting Priorities, Getting Results: A New Direction for Environmental Protection, National Academy of Public Administration, Washington, DC, 1995.

"The Best Places to Live," *Money,* September 1998.

Unfinished Business: A Comparative Assessment of Environmental Priorities, EPA, Washington, DC, 1987.

Wilson, J., S. Strawn, and D. Hitchcock (Editors), *Houston Environment 1995: Results of the Foresight Science Panel*, HARC Center for Global Studies, 1995.

Witt, P., and J. Baker, "Attitudes of Texans Concerning Selected Environmental and Property Issues," TAMU Recreation, Parks, and Tourism Sciences Department, 1998.

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Plan to Attend TWRI "Water for Texas" Conference Dec. 1-2 in Austin

The program for TWRI's 25th Water for Texas Conference is now taking shape and is will be of interest to water managers, participants in the regional water planning process, policy makers, and the public. The conference will meet December 1-2 in Austin. The theme is "Water Planning Strategies for Senate Bill 1." Some of the topics that will be covered at the Conference include agency perspectives on water availability modeling, water supply options, water policy, agricultural irrigation, water supply dependability, drought planning, and water marketing. For details or to obtain a copy of the conference brochure, contact TWRI at (409) 845-1851 or twri@tamu.edu.

TWRI Helps Develop TMDL Handbook

Developing an easy-to-read handbook that guides water managers through the total maximum daily load (TMDL) process is the goal of a project involving TWRI, Tarleton State University (TSU), and Texas A&M University (TAMU). The project is led by Jan McNitt of the Texas Institute for Applied Environmental Research (TIAER) at TSU. Participants include Chris Rottler, Erinn Wilcznski, and Richard Kiesling of TIAER; Ric Jensen of TWRI; and Marty Matlock of the TAMU Agricultural Engineering Department. The project is funded by the Texas Natural Resource Conservation Commission (TNRCC). The goal is to produce a reference document to assist local governments involved in TMDL activities. The book will cover how to develop and implement TMDLs, the importance of public participation, methods to gather water quality data, monitoring watersheds, and how to identify external resources. For details, contact Jensen at (409) 845-8571 or Rjensen@tamu.edu.

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