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Connecting stakeholders to water information : an assessment of New Mexico's leading water resources websites

Kathryn Cydne Schulte

CONNECTING STAKEHOLDERS TO WATER INFORMATION

An assessment of New Mexico's leading water resource websites

by

Kathryn Cydne Schulte

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Committee
Dr. José A. Rivera, Chair
Dr. Judith Hendry
Dr. Robert P. Berrens

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Committee Approval

The Master of Water Resources Professional Project of Kathryn Cydne Schulte
is approved by the committee:

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Chair	Date
_____	_____
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Abstract

The State of New Mexico is in the process of developing a 2015 Water Plan. Water resource planners, managers, and other stakeholders are looking to the internet for pertinent information to aid in the planning process. However, a multitude of stakeholders historically lack a voice to participate in the wide array of water-sharing agreements. Through internet communication, government agencies and non-governmental organizations can utilize their websites to communicate, negotiate, and collaborate with stakeholders. This study applies Senecah's Trinity of Voice Theory (2004) as the basis to evaluate *access* to information on websites through website performance usability and design to promote information transparency; *standing* through online educational components to promote stakeholder participation; and *influence* through community outreach call to action to promote stakeholder collaboration. A practical tool, in the form of a website score card, was designed for evaluating water resource websites. Thirty-one of New Mexico's leading water resource websites were analyzed, evaluated, and ultimately scored using the A-F grading system. The websites were assessed based on the provision of information and the quality of education and community outreach offered to New Mexico stakeholders affected by complex water issues. The results of this study can be used for the analysis and improvement of the websites assessed; the scoring tool itself can be used for future evaluation and improvement of web-based communications within the water resource community.

Keywords: Stakeholders, Water Planning, Websites

Introduction

Fresh water is a finite resource essential for human survival. According to the United States Geological Survey (USGS) approximately 97.5% of the earth's water is salt water and 90% of the earth's fresh water is frozen in Antarctica, Greenland and North Pole ice sheets. Most of the remaining 10% of fresh water is contained in mountain glaciers, natural lakes, rivers, manmade reservoirs, soil moisture, very deep aquifers that would require costly drilling to access, and underground shallow aquifer sources. This leaves approximately 1% of Planet Earth's feasibly accessible fresh water available for human use (Figure 1). Even though this amount is considered renewable through rain and snowfall, its limits are determined by the water cycles and the variable demands placed upon supply within a specific geographic location.

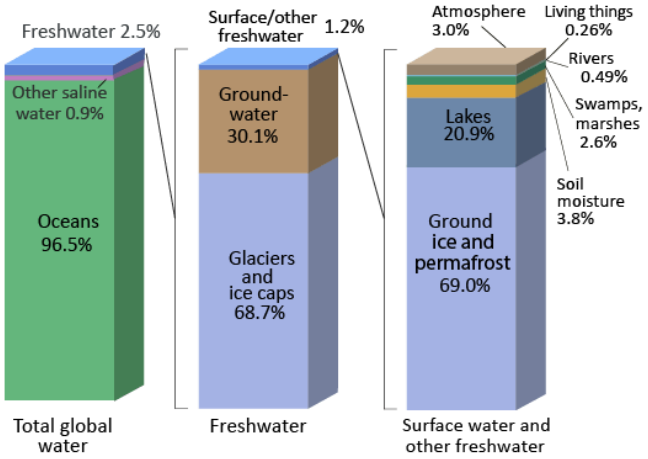

Figure 1: Percentages of Fresh Water on the Planet (Source: USGS, 2015).

The future health and welfare of New Mexico is dependent upon a continuous supply of uncontaminated fresh water. According to USGS (2015) in the arid and semi-arid regions of the Southwestern United States, the Upper Rio Grande Basin, and the State of New Mexico as a whole, the projected demand for water has exceeded available supplies. The past five years of data from the USGS confirm that reservoir levels are down; snow pack and earlier seasonal runoffs are reduced (USGS, 2015). The Southwest region has been in a drought cycle for nearly

a decade. Though science can make educated predictions of the length and severity of these drought cycles, and modern projections about industry, agriculture use and population variability continue to improve, the droughts themselves remain inevitable.

According to the U.S. Environmental Protection Agency (USEPA) severe droughts are already a part of New Mexico's climate. Human-induced climate change has already greatly reduced snow pack, altered rainfall patterns and river flows, and has added additional stress to the fresh water supply. The competition for water resources is likely to increase across the states, tribes, and even between the United States and Mexico leading to water-sharing conflicts. Tensions are already rising among fresh water stakeholders. Political tension is a modern reality in the Southwestern United States and the Rio Grande Basin. Disputes over water rights are becoming more prevalent as upriver uses increase, leaving less water for those downriver.

Pumping the aquifers is also problematic because groundwater storage is equally limited in the region. Increasing demands in New Mexico and surrounding states that share fresh water could greatly limit the available water supply as well (USEPA, 2015). Given the development of modern industry, agricultural expansion, and population instability, coupled with impacts of climate change, stakeholders face a very complex challenge in managing this precious resource. Many questions arise in preparing for and ultimately dealing efficiently with these variables. Water managers, policy makers and other stakeholders must learn to optimize the use of available internet tools and information online while developing water-sharing agreements such as viable water budget and a State Water.

This paper examines how the Practical Theory of Trinity of Voice (TOV), as defined by Senecah (2004), strengthens the water planning and management process through stakeholder access, standing, and influence. Using these TOV key elements as a framework, a website score

card was designed and used to analyze and score the information provided on leading water resources and related websites currently available to stakeholders in New Mexico. The score card was designed using the TOV Principles of access, standing, and influence as the primary basis of comparison. The chosen subject matter for this study was: *access* to information on websites through website performance usability and design to promote information transparency; *standing* through online educational components to promote stakeholder participation; and *influence* through community call to action to promote stakeholder collaboration.

Can modern internet technologies help water resource agencies provide an opportunity for stakeholders to achieve TOV during the process of water planning and management by improving their websites? Can the assessment tools themselves be evaluated and improved? The objective of this project was first, to catalog websites that New Mexico stakeholders, including planners, managers, and/or the public, can visit to obtain water information and second, to provide a useful assessment tool; in this case a website scorecard. The water resource websites reviewed included those of New Mexico federal and state government agencies, non-governmental organizations, primary municipal water authorities and special purpose districts, and research centers. The websites were analyzed, graded and finally scored based on the TOV criteria.

The criteria and score card can be used by water management agencies to improve the delivery of information available to the water planners of the sixteen regions developing the 2015 New Mexico Water Plan. In addition, the scorecard can be used by other stakeholders including citizen groups, advocates, educators, policymakers or the water resource agencies providing websites to conduct periodic assessments.

Background

Current Water Resources Issues in New Mexico

Rain, snow, and river flows that travel south from Colorado are New Mexico's primary source of fresh water. Ground water is New Mexico's secondary source of fresh water but represents nearly half of New Mexico's total fresh water supply (USGS, 2015). According to the USGS (2015), agriculture accounts for approximately three-fourths of the State of New Mexico's water use, leaving the remaining one-fourth available for public, domestic, commercial, industrial, irrigation, livestock, mining, power generation, and other purposes (Figure 2).

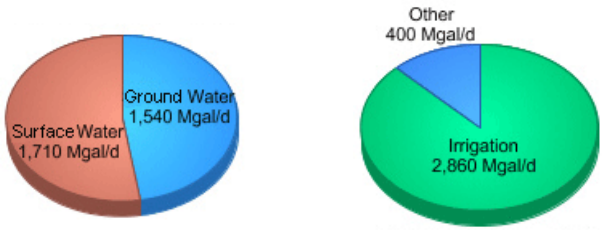

Figure 2: Percentages of Fresh Water Sources and Uses in New Mexico (Source: USGS, 2015).

Of the fresh water received each year in New Mexico, an estimated 97% evaporates or is transpired by plants; the remaining 3% is what we use to help meet human, economic, legal, environmental, and groundwater recharge needs (Montoya- Bryan, 2014). The state also has a legal obligation of required annual downstream delivery requirements to the bordering states into which each of its major rivers flows.

The New Mexico Environmental Law Center (2015) asserts that New Mexico surface waters are over-appropriated, and water users have become increasingly dependent on ground water and reservoirs. New supplies from water projects are costly or non-feasible, and interstate stream compacts and Indian water rights cause additional constraints.

According to Gutzler (2012), predictions for the 21st century show climate change will cause an overall decrease in flow in New Mexico's snow-fed rivers (Figure 3). Climate change

has already resulted in a significant decrease to New Mexico's water supply and will likely continue to stress groundwater-based systems and result in decreased groundwater recharge.

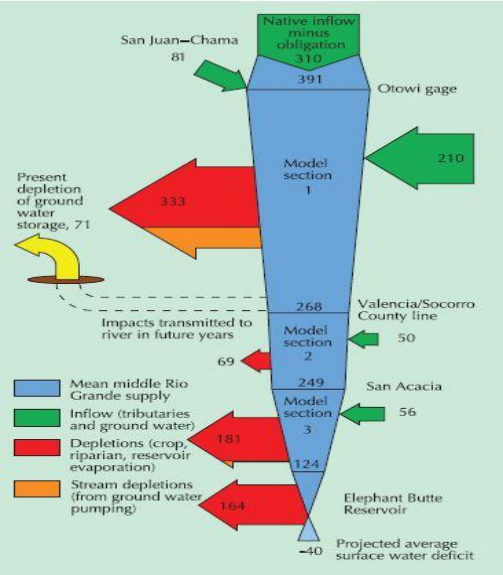

Figure 3: Future Water Budget for the Middle Rio Grande. (Source: New Mexico Earth Matters, 2007; Hathaway and McClune, 2007). Climate change is expected to increase depletions (the out arrows) and decrease inflows (the in arrows), resulting in lower flow in the river. Numbers are thousands of acre-feet per year.

Increased temperature has already contributed to decreases in snowpack and Colorado River flows, which are an essential source of water for the region. Increasing temperatures are projected to further reduce snowpack, which will lead to reduced stream flows, especially in the spring. According to US Global Change Research Program (USGCRP) springtime precipitation is likely to decrease significantly, making it more difficult to meet water demands during the summer, when conditions are typically driest. Temperature increases are causing frequent and more severe droughts, river-flow reductions, dwindling levels in reservoirs and increasing wildfires (USGCRP, 2009).

New Mexico is entering its fourth consecutive year of drought following one of the driest winters on record. Montoya- Bryan (2014) argues that the drought reached unprecedented levels in 2013 and nearly seventy percent of the state is still in severe drought with little promise for moisture in the spring. New Mexico's US Senator Heinrich stresses that in times of drought,

"There is no doubt that there are bigger fires and less snowpack in the winter, these symptoms which occur with drier summers can cause severe floods when it does finally rain." He affirmed the reality that in regard to water management "…things are only going to get more challenging" (Heinrich cited in Montoya- Bryan, 2014).

Over the last century, the average annual temperature has increased about 1.5°F. Average annual temperature is projected to increase an additional 2.5-8°F by the end of the century. Future warming is projected to produce more severe droughts in the region with further reductions in water supply. Future human-induced climate change is projected to worsen these conditions (USEPA, 2015). According to the USEPA (2015), spring precipitation change for 2080-2099 compared to 1961-1979, under two different greenhouse gas emissions scenarios, indicates that the Southwest region in the U.S. will be drastically impacted by climate change (Figure 4).

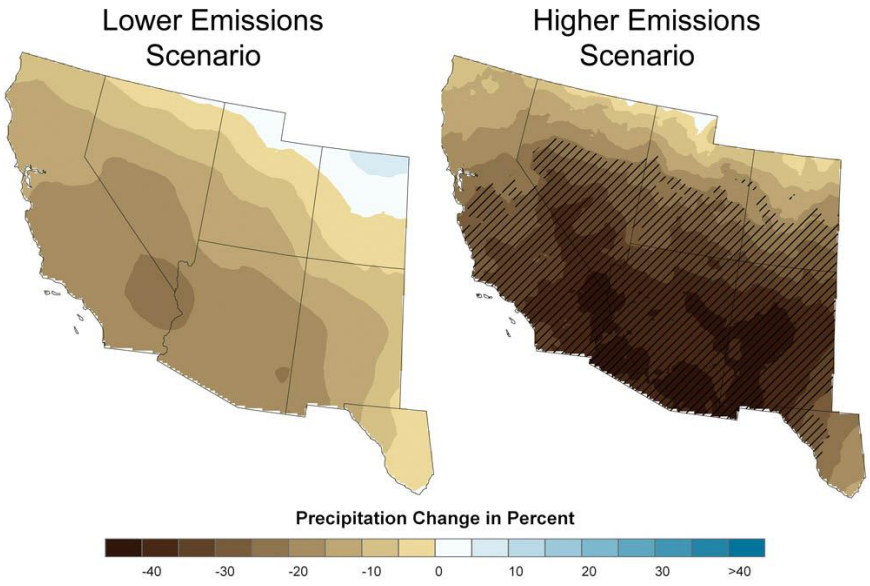

Figure 4: Climate Change Impact Causing Reduced Spring Precipitation (Source: USEPA, 2015; USGCRP, 2009). 2080-2099 compared to 1961-1979 under two greenhouse gas emissions scenarios. High confidence in the projected changes is indicated by hatched areas.

Although the issues range over supply, demand, conservation, technology and policy, the reality is clear: it is likely going to be drier in New Mexico in the decades to come than it has been in decades past. Historically, New Mexico has weathered drought through piecemeal responses, such as temporary water-sharing agreements and watering restrictions, but in 2014 Albuquerque Town Hall organizers urged for solutions to be more comprehensive and coordinated (Montoya- Bryan, 2014). After enduring years of extreme drought and the state's driest decade in sixty years, water shortages are becoming a harsh reality for many communities across New Mexico. Several communities have had to haul in water the last few years to meet needs. Future water scarcity will be compounded by the surrounding Southwestern United States Region's rapid population growth, which is the highest in the nation (USEPA, 2015). Adapting to drier, hotter conditions necessitates tough, future-oriented decisions in this time of uncertainty and change. Increased consumption and dwindling supply are leading the state to a crisis in water availability for residential, industrial, agricultural and environmental uses (Lindsey, 2013; Udall, 2012).

The Southwest region's water supplies are constrained under current climate conditions. U.S. Senator Udall (2012) asserts that the future water supply will not meet future water demand in New Mexico given current trends and trajectories. Water sharing might be improved in the future by conservation, improved policy and management, and new technologies, but to meet the constraints placed by diminishing future supplies, significant reduction in demand will be essential at the possible cost of less water for agriculture, in-stream flows and other needs. State water managers must plan for population changes, economic development, ongoing depletion of surface and ground water reservoirs, and an endangered riparian environment, as they manage water rights within the established legal framework (Gutzler, 2012).

New Mexico Water Planning History

A sustainable water resource plan is essential for New Mexico. The State of New Mexico is in the process of developing a 2015 Water Plan. There are currently sixteen water-planning regions in the State which interact continuously for water planning purposes (Figure 5). The first New Mexico State Water Plan was created in 2003 after The New Mexico State Water Plan Act of 2003 (N.M. Stat. Ann. § 72–14–3.1) was adopted to encourage stewardship of the state's water resources and to establish comprehensible policies and strategies for management of the state's water.

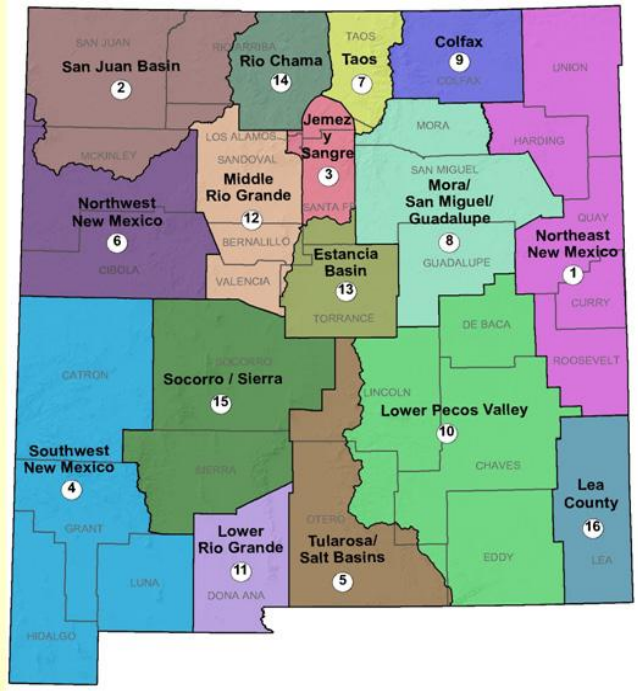

Figure 5: New Mexico's Sixteen Water Planning Regions (Source: ISC, 2015).

Regional water planning began in New Mexico in 1983 after a lawsuit that the city of El Paso, Texas filed against New Mexico, *El Paso v. Reynolds,* finding that "the state may restrict export of water only to the extent necessary to protect human survival" (Water Matters, 2013). In 1985, the New Mexico legislature enacted a statute providing guidance to the Office of the State Engineer (OSE) on the process for out-of- state uses of water that led to the 1987 law requiring

regional water plans. Regional water planning began in an effort to balance current and future needs for each region the state (Water Matters, 2013).

Internet technologies were not readily available to the public then and the only avenue agencies and stakeholders had to share information was through hard copy documents that were difficult to obtain. Communication in this regard was sub-par; data were recorded and distributed on paper. In 1987, the Office of Science and Technology designed a national US research and education network. In 1991 the establishment of this network was enacted by Congress and the first web page was developed (Zakon, 2014; Curtis, 2013).

New Mexico regional water plans were developed within a template from the regional water planning handbook. The handbook was developed by the Interstate Stream Commission (ISC) in 1994 in collaboration with regional water planners. According to Fleck (2013), one problem with the first wave of New Mexico water plans was that data were often inconsistent. It was difficult to compare the information between the various regional plans due to varying data formats and inconsistent details from one area to the next. For example, definitions were inconsistent; as some regions used the term "depletions," while others used the term "withdrawals," thus creating confusion and uncertainty. Much of this was due to perception gaps within the agencies authoring these documents; which modern information-sharing technologies might have closed the gaps, had such technologies existed at that time.

In 2003, the ISC pursued a historic public involvement campaign to support the State Water Plan Act of 2003, which set a goal of integrating regional water plans into the State Water Plan (Water Matters, 2013). According to Water Matters (2013), the State Water Plan's main purpose was to integrate water data from different agencies accumulated under different methodologies, assumptions, and time frames in a manner that allowed decision-makers to see

the big picture of water supply and demand. It was not until around 2006 that New Mexico government agencies started to switch from using hard copy data-sharing to digital data-sharing. This change inspired pioneering attempts to get local and regional water users and providers to cooperate on trans-boundary planning efforts to protect the common supply. By 2009, ISC was finally able to send out extensive email invitations to attend their public meetings, and posted other planning-related documents, such as brief reports and water plans, on the Office of State Engineer/Interstate Stream Commission Website (Bordegaray, 2009). Bordegaray (2009) asserts that the historically significant public involvement campaign was successful in initiating an understanding of basin-wide issues and concerns with efficiency never before experienced by the New Mexico water community.

Currently, approximately 85% of the 7.1 billion people in the world now have access to the Internet (Curtis, 2013). In early December of 2013, the ISC was able to post to its website the Updated Regional Water Planning Handbook Guidelines. These guidelines were aimed at preparation for the 2015 New Mexico Water Plan Update. In June of 2013, the Interstate Stream Commission reported to the Legislative Interim Committee on Water and Natural Resources that one of its goals for 2014 was to revise the Regional Water Planning Handbook to provide consistency and accountability in updating the regional water plan.

The Internet can now provide a tool for agencies to deliver large caches of data for stakeholders to access and unpack, allowing for education and feedback. For example, when the ISC releases future water plan updates, the Internet can be used as a mechanism for distributing information and obtaining feedback from public and agency stakeholders in real time. In 2014, the ISC Water Planner released a "State and Regional Water Planning Work Plan" for Fiscal Years 2015 and 2016, which can be accessed by stakeholders through the Regional Water Plan

(RWP) online portal. The ISC has also posted on its website as a "working draft," an RWP Update Schedule for 2014-2015-2016. Internet-based communication is now the primary means of information transfer for the New Mexico water planning, policy and management communities and is increasing in popularity and application (Figure 6).

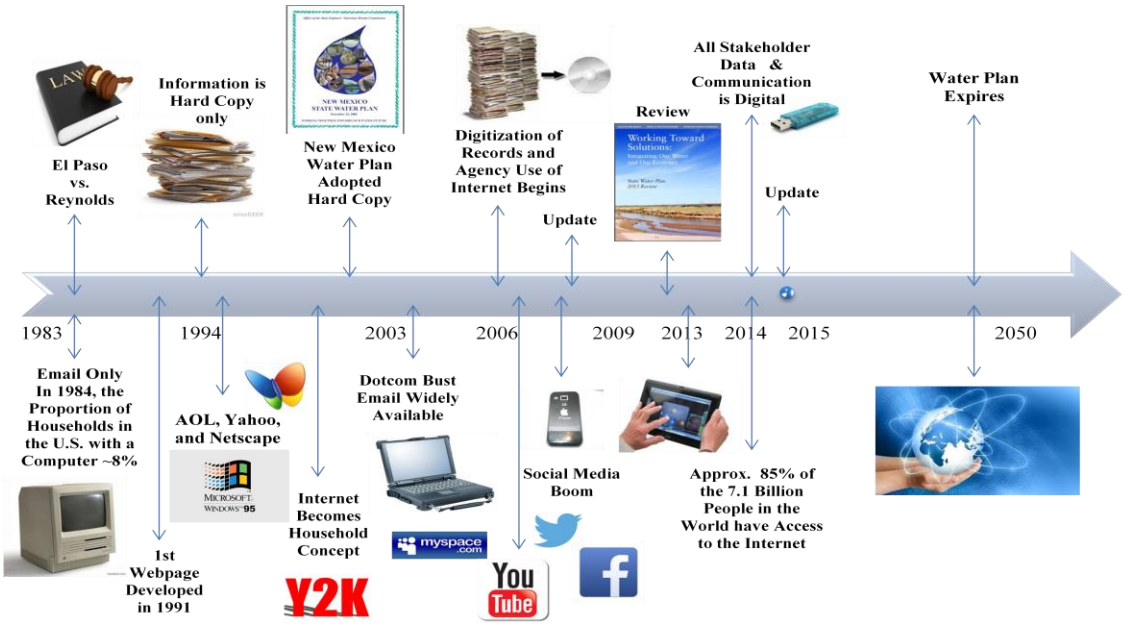

Figure 6: Timeline (Not to Scale) Water Planning in New Mexico and Use of the Internet
(Source: Schulte, 2015; Modified from the History of the Internet Timeline on www. malonemediagroup.com).

According to the Water Matters (2013), compilation of the sixteen Regional Water Plans indicated that growth projections will result in more than 700,000 acre-feet of new diversions in 2040, compared to Year 2000 diversions. This increase reinforces the need for the state of New Mexico to update long-range water planning activities.

Literature Review

Policy Tools for Water Planning and Management

New Mexico's State Water Plan is essential in leading the state into the 21st century. During this period of updating New Mexico's Water Plan 2015, "stakeholder participation" is a primary goal for water planners (Bordegary, 2014). Challenges facing water management stem

from integrating not only physical and biological factors, but also political and socio-economic ones (Voinov and Costanza, 1999). Water management requires collaboration through coordination of activities between and across stakeholders to produce mutually desired outcomes. In New Mexico, states, tribes, local governments, acequia associations, interstate associations, intertribal consortia, and Non-Governmental Organizations (NGOs) all need practical tools that can provide a framework for regulation, monitoring and assessment, restoration, water quality standards, public and private partnerships, and cross-agency coordination. How does such a large and diverse group of stakeholders efficiently reach water-sharing agreements? The literature suggests that the process requires a significant reduction in the overall stakeholder risk of uncertainty. Only mutual trust among stakeholders that their interests will be protected can inspire willingness to negotiate with each other and reach consensus around a "collective conceptual model" (Gupta et al, 2012).

Vignola, et al. (2013) establish that some of the basic elements necessary to accomplish successful water policy, management and planning must include an array of topics ranging from assessment of local geography in relation to land use, laws, incentives, markets, trans-boundary agreements, funding, and conservation programs, to dynamics of sediment transport, climatic watershed conditions, precipitation, and climate change. However, in a variety of stakeholder partnerships and cross disciplinary teams among farmers, scientists, and policymakers that address water planning and management problems, potential conflicts may occur. When stakeholders can identify solutions to conflicts over partnership roles and problem identification, they can more successfully collaborate and contribute to water planning processes and management plans.

Practical Theory of Trinity of Voice. Senecah's (2004) *Practical Theory the Trinity of Voice* (TOV) provides a framework for designing and evaluating the efficacy of collaborative processes. TOV was developed by Senecah for the structure and analysis of public hearings (Table 1). TOV stresses the importance of public empowerment and focuses on the practical process of collaborative governance. Senecah (2004) argues that "the key to effective [decision making] process is an on-going relationship of trust building to enhance community cohesiveness and capacity" (pg. 23). The approach rests on three concepts -access, standing, and influence - that need to be in balance to prevent tensions, limited effectiveness, and escalating conflicts (Stöhr et al., 2014; Senecah, 2004). According to Senecah (2004), the opportunity for access, standing, and influence must be present to build and maintain trust. Access, standing, and influence not only allow existing processes to be monitored, but make it possible to design better processes as well as facilitate a benchmarking system in which to plan or evaluate participatory processes regarding contentious issues. TOV can play an additional transformative role in building community capacity (Dukes, 1996; Senecah, 2004).

Categories	Application (creative approaches to provide voice)
Access	Willingness of decision makers to collaborate Convenient times and places Readily available information and education Diverse opportunities to access information Technical assistance to gain a basic grasp of the issues and choices Adequate and widely disseminated notice Early public involvement and ongoing opportunities for involvement
Standing	Opportunities for dialogue and deliberation Courtesy or absence of discounting behavior Early and ongoing voice Clear parameters for authority of participation Genuine consideration of other perspectives Dialogue, debate, and feedback
Influence	Transparent process that considers all alternatives Opportunity to meaningfully scope alternatives Opportunities to inform the decision criteria Thoughtful response to stakeholder concern and ideas

Table 1: Trinity of Voice Categories and Applications (Adapted from: Stöhr et al., 2014; Senecah, 2004).

Stakeholders need to know that their interests are protected; they need to be comfortable in their understanding of the data; they need to know they have a voice. Stakeholders need a means to educate themselves on the subject matter at hand, which can often be complex. Modern computing, internet technologies and access to websites have made these tools far more efficient and accessible to the layperson than the paper counterparts of the past.

Transparency, participation, and collaboration. For stakeholders to participate effectively in water policy development and the regional water planning process, they need to all have equal access to the same information and data for their own interests. More importantly, they need to engage in dialogue about how to share water supply (Rivera, Per. Comm., 2014). According to Voinov and Costanza (1999), it is important for water managers to understand that science needs to be linked to planning and that decision-making should be based on broad citizen involvement; thus it is imperative that information be openly shared among all stakeholders. Successful water planning and management requires public engagement to enhance the government's effectiveness and improve the quality of its decisions. In a letter to his Chief of Staff, President Obama (2015) stated that public engagement can strengthen democracy and promote efficiency and effectiveness in Government; therefore, government should strive to be transparent, participatory, and collaborative (Figure 7).

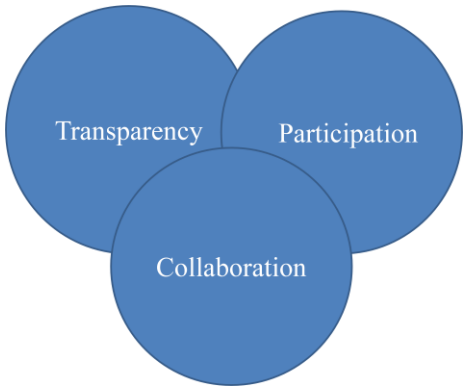

Figure 7: Preferred Characteristics of Government (Source: Obama, 2015).

By utilizing the Internet to disclose information, agencies can put information about their operations and decisions online that the public can easily obtain. This form of transparency promotes accountability and provides information for citizens about what their government is doing (Obama, 2015). Once information is online, agencies can offer increased opportunities for stakeholders to participate in policymaking and request public opinion to identify information of greatest use to the community. Participating in this process is an opportunity for stakeholders not only to influence state water management and planning, but also to learn about the complexity of New Mexico's water issues (Bordegary, 2009). Agreements can often be difficult to reach because of differences in practices, interests, values and management structures among different groups (Rathwell and Peterson 2012, Lubell et al., 2002, Ison et al., 2007, Lubell and Fulton 2008). Collaboration among these different water users in different regions usually involves overlapping jurisdictions, boundaries, and watersheds and actively engages stakeholders in the work of their government.

Reducing the risk of uncertainty and developing mutual trust. Humans are experiencing a scientific information explosion of extraordinary proportions. Today, water managers, scientists and engineers use computers to access thousands of rapidly growing data bases that store numbers, words and maps, as well as chemical and physical structures. These sources are searched millions of times per year (Molnar 1997). According to Molnar (1997), the base of scientific knowledge today is so huge it would take 22 centuries to read the compiled annual biomedical research literature or seven centuries to read a year's worth of complied chemical literature. Gupta et al. (2012) advocate the value of a collective conceptual approach and the need for stakeholder engagement and cross-disciplinary teams to comprehend this mass of data. Rivera (Per. Comm., 2014) translates this approach into "leveling the playing field" for

all stakeholders with the same access to data, information, scenarios and the like. Websites can provide a powerful tool if they are effective and meet this study's rigorous scoring criteria.

Langsdale (2008) demonstrates that both human and ecological systems contain many elements characterized by inherent uncertainties. For example, water resources systems rely on the hydrologic cycle, which is unpredictable. This cannot be changed. Human elements, on the other hand, can be changed. This change begins with collaboration. When people have access to the same information, they begin to deal with the question of how to share limited resources from a likeminded perspective. This helps to establish mutual understanding, which inspires trust. They are then able to come to the table because mutual trust is gained by those involved in the decision-making process, and the "best" plan can be implemented (Shackley and Wynne 1996 cited in Langsdale, 2008). Uncertainty raises the fundamental question of mutual trust. In meetings when people discuss how to share water and negotiate agreements, they require a certain level of trust, gained by having access, standing, and influence as asserted by Senneca's Practical Theory of TOV (2004). Often people do not always know things like what water rights they actually have. Who is most impacted? Information needs to be evenly assessable across the board to promote trust (Rivera, Per. Comm., 2014). To reduce risks of uncertainty, Gupta et al. (2012) propose that policy experts, water managers, and various stakeholders improve trust through information-sharing and the use of visualization tools to understand how the interconnected "hydro-bio-human" system might respond to possible actions. However, in order to understand these and other essential questions, those involved must first have some degree of conceptual understanding of the complexities of water management.

Molnar (1997) argues that computer modeling visualization techniques can be utilized to overcome complexity and the limits of the written word. Computer visualization not only

changes how humans see phenomena, but also how they think of it. Visualization restructures a problem and shifts perceptual systems, freeing the brain for higher levels of analysis. The computer restructures the problem into a visual model so that it may more easily be processed by the human visual and perception systems. A good example from Molnar (1997) is, biologists used to rely on the microscope and dissection to examine an organism. Today, they attain understanding by using a supercomputer to visualize and animate dynamic processes; observing complex biological patterns as they develop. These multifaceted dynamic concepts are too complex to explain using written words, equations, graphs or photographs.

Gonzales et al. (2013) explain that visualization tools are a powerful way to translate and unpack quantitative data for stakeholders to understand during water planning. Qualitative and quantitative methods are both needed to conduct cross-disciplinary efforts and can be enhanced by the use of new visualization technologies that re-translate system complexity. Visualization methodology takes abstract ideas or data and translates them into images that communicate information about the built and natural environment. When applied to water management efforts, the Internet's sophisticated processing and delivery of information greatly encourages mutual understanding among different stakeholders. Today, in addition to GIS mapping, water planners utilize a range of visualization tools such as three-dimensional modeling and geo-spatial software as a way to display graphic information that can integrate historical, qualitative, and quantitative data to model cultural landscapes (American Planning Association, 2006). In the last decade, visualization modeling has allowed water planners and decision makers the opportunity to experience the impact of policy on the built and natural environment.

Gupta et al. (2012) argue that even though scenario system dynamics are a useful tool wherein computers create visual models based on various scenarios, a drawback to system

dynamics and computer based models is that not everybody knows how to read the data. Gonzales et al., (2013) advocate for the use of conceptual visual models of the proprieties and behaviors of a system to aid in understanding a system, its components, interactions between systems, and how they influence system behavior as a whole. Visual models can provide a common understanding of complex material, thus creating a common ground for TOV to take place. With a common understanding of topic matter and a common platform for voice, stakeholders can interact as a group; their different perspectives and understandings can change into a collective tangible understanding, which becomes the basis for the decision process.

Water planning and management utilizing websites. Water has been called the bloodstream of the world because of the way it connects distant places (Rathwell and Peterson 2012; Ripl 2003). Water connects people who live in different places as does the Internet. The Internet got its start in the United States more than 50 years ago as a tool for the government; for years, scientists and researchers have used it to communicate and share data with one another. The Internet provides a modern and efficient method to deliver scientific findings and information to all stakeholders and to connect stakeholders. The Internet is equally as much of a collection of communities as a collection of technologies. Its success is largely due to satisfying basic community needs (The Internet Society, 2015). The Internet provides an open, interactive, fast, spatially distributed, hierarchical and flexible sharing environment (Voinov and Costanza, 1999). Website delivery is a trusted forum for unity in action, education, public commentary, and stakeholder commentary; it is a tool that can greatly enhance the ability to bring collaboration opportunities to the community with ease and convenience.

Society uses the Internet for almost everything; many people would have a hard time without it. Even though the validity of copyrights and authorship of websites are still very much

disputed, Voinov and Costanza (1999) argue that there are a growing number of references to web publications. They see noticeable trend toward acceptance of websites as a legitimate source of copyrighted material. According to Voinov and Costanza (1999), when water managers implement a website forum utilizing social networks, communication is markedly improved amongst stakeholders. This communication results in coordination of activities between stakeholders that could produce mutually desired outcomes. Reasons for water managers to invest time and resources into website communication include transparency, collaboration, and participation (Table 2). Transparency promotes equal access, participation promotes standing, and collaboration promotes influence. In this way the Trinity of Voice is naturally supported.

Transparency ⟶	*Access* to open sharing of information between government agencies and NGOs along with other stakeholders.
Participation ⟶	*Standing* through open dialogue. Productive communication with stakeholders using modern technologies
Collaboration ⟶	*Influence* through opportunities to inform the decision criteria and to meaningfully scope alternatives
Transparency ⟶ Participation ⟶ Collaboration ⟶	Risk mitigation and promotion of mutual trust and best practices through access, standing, and influence.

Table 2: The Relationship between the Preferred Characteristics of Government and TOV (Source: Schulte, 2015).

Websites improve communication by allowing stakeholders collectively to take in information, respond, exchange information and collaborate. A significant advantage of the web compared to other forms of media is that it is relatively inexpensive. The web offers outreach and communication to governmental, academic, non-profit, and other community-based organizations. Another advantage of the web is that it can provide direct and immediate feedback (Voinov and Costanza, 1999). According to The American Water Works Association (2014), in order for water managers to have an effective online public communications toolkit

(i.e. website), it must contain all the elements listed below. These elements were incorporated into the score card design and rating criteria utilized in this study.

- Strategic Planning
- Media Relations and Events
- Crisis and Issues Alerts
- Community and Youth Outreach
- Visualization Aids

Websites offer the ability to display information creatively, to interact with that information, and to change and modify it remotely. In this way the Internet provides a much-needed opportunity to deliver scientific findings and information to stakeholders. It also links stakeholders together, providing the information required in collective decision-making. In these ways websites can connect diverse geographic locations and varying perspectives, giving government and stakeholders a pathway to mutual understanding and collaborative opportunities (Vignola et al., 2013).

According to Voinov and Costanza (1999) the major components of water management process include data, analytical tools, and the stakeholders involved. Similar components of an effective water planning and management webpage include data, analytical tools (such as models, graphs, etc.), blog forums, and links to stakeholder social media pages (Figure 8).

Online social media is still a fairly new tool for water management, but it is becoming increasingly critical that agencies and organizations have a presence on at least one platform of social media networks. Social networks can be powerfully positioned as online bridging organizations (BrOs) to link local initiatives across entire watersheds. According to Luu (2013), 80% of businesses, 89% of NGOs, and 66% of government agencies are a part of social networks, connecting, sharing, digesting, and discussing information.

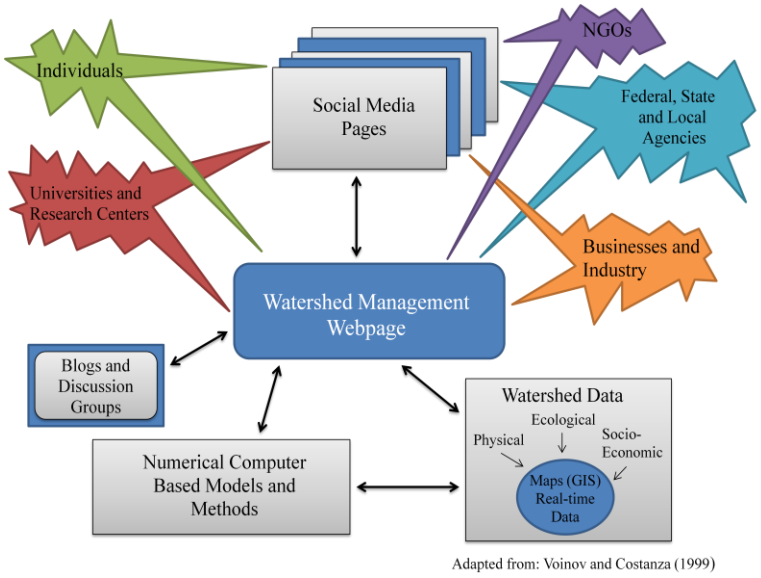

Figure 8: Conceptual Structure of an Effective Water Resource Webpage (Source: Voinov and Costanza, 1999).

Forty percent of adults go online to obtain information about the government (Luu, 2013; Lee and Esler, 2010). Research from The Pacific Institute (2014) suggests that a smaller percentage of water managers are using social media compared to the business and non-profit sectors. Luu (2013) asserts that the leading water managers that do use social sites use a combination of any of these "heavy-hitters": Facebook, Twitter, Pinterest, Instagram, LinkedIn, YouTube, and Slideshare.

Rathwell and Peterson (2012) have made explicit connections between social network structures and the ecological landscape these networks manage by answering the fundamental question: How are agencies collaborating online to address water planning and management?

a) With each other?

b) With other governmental entities, non-governmental organizations, and bridging organizations?

Their research reveals that the more agencies engage online in water management activities the more connected water managers are to stakeholders and the more water planning activities, they participate in. Online social media networks, like Facebook, represent a population of linked

communication subcultures in modern society. Websites focused on water planning and management can create these same subcultures within the stakeholder community. For instance, a website with links to various social media networking pages with individual topics and voluntary memberships brings stakeholders together to communicate in various subcultures focused on specific topics of mutual interest. In many cases these subcultures are being utilized as BrOs within the water management community. BrOs can be positioned as online social networks to bridge local initiatives done by single agencies across whole watersheds (Rathwell and Peterson, 2012).

Social media have become a permanent element of modern management. This new venue for external communications can enhance the quality of government (Lee and Elser, 2010). According to Voinov and Costanza (1999), the benefits of using social networks fall into two major categories: methodological and educational. Methodologically, the approach furthers the water management concept, offering an avenue for practical implementation of water management principles. For educational purposes, social networks are a source of data and insight serving a variety of needs at all levels. Online social media networks provide an efficient communication platform for a collaborative approach to water planning and management. Having this kind of open dialogue can also facilitate more effective communication during planning, and other events. Recent research has highlighted the beneficial role that social media networks play with management entities because they can facilitate interaction in water governance (Rathwell and Peterson, 2012). Water managers can engage more productively with their stakeholders through social media**.** Pacific Institute (2013) reports some notable examples in Table 3:

DC Water uses Twitter as a channel for customers to report problems, resulting in fewer E-mails sent to the general purpose inbox. The utility has also been able to help consumers understand where their water comes from and how it is priced, and answer questions right away.
Tacoma Public Utilities launched their *Know your H_20* social media campaign in 2010 to raise awareness of the utility's conservation programs. Using Facebook, Twitter, and other online media, Tacoma Water sent out an online survey to their customers about their water-use habits to inform their efficiency goal-setting process.
Grain farmers use Twitter to get information to help them decide how and when to market their crops and to get updates from crop scouts who share photos of crops around the country and gave basic information about insects, weeds, and diseases. The information is not only free, but also a faster alternative to the USDA's weather and crop updates.

Table 3: Water Managers' Engagement with their Stakeholders Online (Source: Pacific Institute, 2013).

According to Luu (2013), social media engagement allows water utilities to meet and exceed their goals to provide improved service to their clientele. It also gives the utilities an opportunity to find out what works and what areas could be improved. However, Waller (2010) argues that the use of social media networks does not imply that agencies neglect their website for social media. Some agencies may feel locked into using their current website or feel unable to invest in a new site. Social media links used in addition to websites provide a variety of the features, such as easy updates and shared information, posting photos, video, starting discussions that these websites may lack. Ultimately, stakeholders will need to be directed to the official site or agency office. A problem may arise when people become accustomed to media outside the agency website rather than directing them to it. What happens if [an agency] has been relying on Facebook or Twitter for the majority of information dispersion and one or the other is no longer the social media flavor of the day (Luu, 2013)? Thus, social networks become customer service and marketing tools. They should not be the anchor of an agency's or organizations online presence. Ultimately, a website is the most stable communication tool. Social media should be used in partnership with the website for effective communication and marketing. Websites should remain the primary directive of government agencies, NGO's, BrOs, and stakeholder

traffic, but these websites should utilize and include online social media network links to expand function.

Study Design

Based on the framework of Senecah's Practical Theory of Trinity of Voice, this study was designed to analyze and score water resource websites in New Mexico, ultimately creating a useful tool for management agencies, water managers, and other stakeholders. This tool could improve the provision of information to these stakeholders. Companies that design, build, and rate websites were used as references to design this study's scoring system (100bestwebsites.org, Arizona State University, ebizmba.com, Management Centre International Limited 2014, Mequoda Daily, 2015; 2014; Test and Try Software 2014, and The Webby Awards 2014). Through analysis of the criteria demonstrated by the above-referenced companies to the TOV principles of access, standing, and influence, dominant attributes of a good website emerged demonstrating three categories (Further discussed in the following Methods section):

- *Access* to information on websites through website performance usability and design to promote transparency.
- *Standing* through online educational components to promote stakeholder participation.
- *Influence* through community outreach call to action to promote stakeholder collaboration.

Dominant attributes emerged from each of these categories which were applied to the score card presented in this study (Appendix II). For example, in the Access category Performance Usability and Design emerged and ten dominant attributes considered most important. In the Standing category, Education emerged with nine dominant attributes. In the Influence category, Community Outreach/Call-to-Action emerged with six dominant attributes.

With respect to TOV Practical Theory, website performance, usability and design create *access* for the user through transparency, while education is a basis for *standing* through understanding and participation. Ultimately, community call to action is an invitation for stakeholder's to promote *influence* through collaboration (Figure 9).

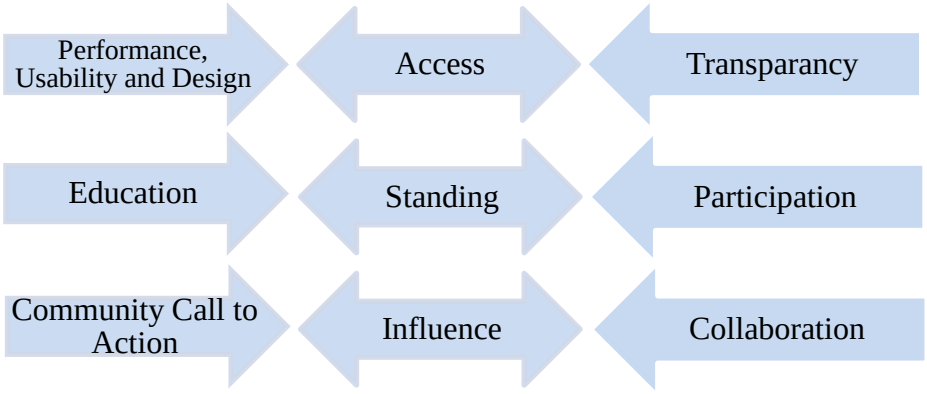

Figure 9: Study Design. (Source: Schulte, 2015). Website performance, usability, and design create *access* for the user through information transparency. Education is a basis for *standing* through participation, and ultimately an invitation for a stakeholder is community call to action to promote *influence* through collaboration.

Websites that were assessed were chosen through extensive research to determine the leading internet sources used by stakeholders as common resources for water information in New Mexico's present policy, management, education, and research environments. The websites included federal agencies, state agencies, primary municipal water authorities and special purpose districts, non-governmental organizations, and research centers (Appendix III). Once selected and categorized, these websites were rated through a tally system in the score card based on the three criteria categories: Access through Performance Usability and Design (A-PUD); Standing through Education (S-ED); and Influence through Community Outreach/Call-to-Action (I-CO/CA). The perfect website would have all of the attributes in this study, and therefore meet the TOV criteria.

The following steps were completed to form a basis of subtext leading to a list of detailed criteria to form a final grading system within the three TOV categories:

1. Research and catalog the leading websites currently available to New Mexico stakeholders to access water information.
2. Assess the basic performance areas of each website to determine areas which need to be addressed in further detail.
    1) Analyze the ease and simplicity of the website's interface.
    2) Analyze the design, i.e., the look, feel, and structure of the website.
    3) Analyze the availability and understandability of educational content.
    4) Analyze links to social media, blogs, public forums & other relevant websites.
    5) Analyze the content of the website to determine what degree of community outreach and activism are promoted.

Through this process the necessary details emerged to create the final scorecard for the comprehensive study of the subject websites. The subject websites, or units of analysis, were then re-analyzed in more detail, scored via the score card, and ultimately given a grade. The grading system used in this study is adopted from the common system used by western academia: the A - F grading system from Yale University (Schneider and Hutt, 2013). The grade earned by each website gives it a solid basis of comparison against the other subject websites.

Website Score Card

Data were collected from the 31 leading New Mexico water resource websites including federal and state agencies, non-governmental organizations, and research centers (Appendix IV). Each group included the primary agencies and organizations within that category that provide water information to stakeholders in New Mexico. The website score card was designed through the methods described above to evaluate attributes based upon the specific criteria presented in this study. Once the data were assembled, scores were added up to arrive at a cumulative score. A "perfect" website's score was 100 points. The agencies were ranked from highest to lowest

based on the numerical value they received and compared within their category and cross compared with the other categories. The goal was to emphasize the importance of a balanced website (Mequoda Daily, 2015). Websites that earn points in all areas, rather than overemphasize a single area or two and omit other areas completely, received higher grades. Based upon these criteria, the scoring value system was created assigning four points for each of the 25 criteria equaling 100 possible points.

- Ten criteria were assigned for the A-PUD section, at four points each, equaling a total of 40 possible points.
- Nine criteria were assigned for the S-ED section, at four points each, equaling a total of 36 possible points.
- Six criteria were assigned for I-CO/CA section, at four points each, equaling a total of 24 possible points.

The total possible number of points was 100 points equaling 100% using the Yale A- F grading system.

Methods for Scoring Websites

Many different ideas exist about the contents of a website. This study refines a combination of information obtained through research into specific criteria. Each criterion is specific and demonstrates a component that should be consistent in website standards (100bestwebsites.org, Arizona State University, ebizmba.com, Management Centre International Limited 2014, Mequoda Daily, 2015; 2014; Test and Try Software 2014, and The Webby Awards 2014). These attributes were chosen based on their specific relationship to and applicability of TOV. A grading scale was created to qualify the usefulness and efficiency of these websites through the three distinct categories: *website performance, usability and design,*

which creates stakeholder access; *education*, which creates stakeholder standing; and *community outreach*/*call to action*, which promotes stakeholder influence. The criterion in the scoring system quantifies specific attributes of each website and tallies the criteria into a final score using the website score card. The final score of each website provides a basis of comparison which defines the attributes and deficits of the New Mexico resource online presence. Scores can be utilized for future reference and improvement.

Stakeholder Access through Website Performance, Usability and Design (A-PUD)

A-PUD criteria imply that the site loads quickly and completely. A fast-loading home page, ideally less than 30 seconds is critical to the success of any website. If visitors have to wait for large graphics to download, they are likely to become discouraged and leave. Navigation choices should be clear. The home page should be well-organized, easy to read and understand, logical, consistent and have relevant content available on every page. The site should appear consistent in the leading browsers (Explorer, Firefox, and Google Chrome). Usability refers to ease of reading, based on relatively short lines of text and freedom from distractions like bright colored backgrounds or distracting textures. Bulleted or numbered lists also permit visitors to grasp an article's contents at a glance. The typefaces and font sizes should be easy to see and read.

Desired information, such as editorial content, service information, costs or a desired e-mail address should be easy to locate. Information is less useful if it cannot be quickly and easily located. If information is organized in a logical and meaningful fashion, it is easy to find within three clicks. A search engine must be included to provide quick, concise, and accurate results; and there should be a site map for finding further results. The site should be free of broken or bad links, or other error messages. The web site should have some of the latest technology and utilize sound, video clips and animation. Technology, such as sound, video clips and animation should

be used appropriately to increase the site's information value, to enhance rather than hinder communication.

The webpage should have a unique design, appropriate for the agency or organization the website serves. Layout, colors and typefaces determine the site's personality and image. If the website has a plain white background with just the text, it is an uninteresting site; it does not catch a reader with just words on the page. Graphic files need to be small enough to download quickly. Screen elements, such as animated gifs are effective without being distracting. The pages should fit completely within the browser with no need to scroll in order to see an entire page.

Stakeholders often view websites on their phones; thus, websites should be Mobile ready. Smartphone’s already have large displays but unfortunately have serious problems with the correct navigation at most sites. Ideally, the A-PUD section of a website should include all of the following:

1. The site loads quickly and completely within 30 seconds.
2. The site looks consistent in leading browsers (Explorer, Firefox, and Google Chrome).
3. Navigation choices are clear, logical, consistent and available on every page. Easy to find what you are looking for within 3 clicks.
4. A search engine is included and provides quick, concise, and accurate results.
5. A site map is available.
6. The site is free of broken or bad links or other error messages.
7. The site utilizes sound, video clips and animation.
8. The site is mobile ready.

9. Graphic files are small enough to download quickly. Screen elements, such as animated gifs, are effective without being distracting.
10. The pages fit completely within the browser (minimal scrolling to see entire page).

Stakeholder Standing through Education (S-ED)

In order for an organization to have an effective online public communications toolkit, its website must include educational content. This content could include a tutorial, web seminar, continuing education, classes, a how-to section, or tips. Educational content could be information that every person should know, or random facts that are fun to know. The website should be up to date and should contain facts rather than opinions. The Credibility plummets if the home page promotes an event that occurred two months or years ago. Websites should be considered "works in progress" that are constantly updated.

The agency or organization's services or goals should be immediately obvious; activities that the agency or organization engages in, and whom they serve, should be clear. Viewers should immediately be able to understand the benefits or information the agency or organization offers. Stakeholders should immediately be able to see how a relationship with the website offers both short term and long term benefits. Newsletter and/or publications are important to keep readers informed, engaged, and up-to date. Archives are will keep this information readily available to anyone interested in viewing past documents.

Since stakeholders in many cases are laypersons in the field of water management, and scientific data can be complex and difficult to understand, information should be downloadable and interpreted. Data should be displayed through visualizations rather than statistics to make it more user-friendly. Visual aids could include, but are not limited to: maps, charts, diagrams, plots, pictures, etc. Scientific technical data should be presented in a way that can be understood by all stakeholders. Some tools historically used for such education and communication include

visualization tools, hypothetical scenario modeling tools, scales and graphs. These should be presented in an understandable fashion and delivered in basic layperson's terminology.

For example, in 2011, The Department of Agriculture (USDA), in compliance with the Plain Writing Act of 2010, committed to improving service to their stakeholders by writing in plain language. They started using plain language in all of their new or substantially revised documents that:

- provided information about any of their services and benefits;
- was needed to obtain any of their benefits or services; or,
- explained how to comply with a requirement that they administered or enforced.

They pledged to provide stakeholders with information that was clear, understandable, and useful in every paper or electronic letter, publication, form, notice, or instruction they published. All websites should adhere to this policy (USDA, 2015).

Data may include, but is not limited to: statistics, figures, records, assessments, technical reports, monitoring, compliance information and rules. Real-time data is a new but increasingly popular tool. For example, DC Water changed all the meters in their system to a fixed network, radio technology system called the automatic meter reading (AMR). This program provides a new state-of-the-art technology that allows actual reads from meters without dispatching meter-reading personnel. Unlike the old system, which sometimes depended on estimated readings, the new AMR system assures virtually one hundred percent accuracy every month. Real time could also include live podcast, live webcam, or Google-live. Information-sharing is another important tool because it gives people the ability to share relevant information with others who might not have seen it otherwise. Ideally, the I-ED section in the scorecard should include all of the following:

1. Information on the site is timely (It is relevant and up-to-date).
2. Data is provided on or through the site (information, statistics, figures, records, etc).
3. The site provides Real-Time Data.
4. There are visual aids to help clarify information (map, chart, diagram, plot, etc.).
5. Data and information is comprehensible in layperson's terms.
6. The site has training available (e.g. a tutorial on how to interpret data or fill out a permit).
7. The site provides links to other relevant websites.
8. The site provides the ability to "share" information.
9. The site provides a newsletter/publications and/or archives.

Stakeholder Influence through Community Outreach/Call-to-Action (I-CO/CA)

The web site should reflect strategic planning; media relations, an event calendar, news updates, crisis and issues alerts, community and youth outreach to encourage feelings of belonging, enthusiasm and loyalty. The website viewing experience should motivate visitors to become involved by asking a question or contributing a comment**.** The web site should give its viewers an opportunity to get involved. A call to action should be included to encourage visitors to take the next step, such as request more information. It should make visitors want to keep reading, check something out, or purchase an item. Blog feeds and other discussion forums expand the conversation. A majority of blogs are interactive, allowing visitors to leave comments and even message each other via GUI widgets; this interactivity distinguishes them from static websites. Viewers should be encouraged to explore further information about topics that may only be partially covered by the website through links to educational sources, other related websites, community discussion forums, and social media pages.

Links to social media networks should be used to bridge local initiatives represented by a multitude of single agencies and to provide a variety of the features (easy to update and share

information, posting photos, video, starting discussions) that websites may lack. According to the EPA**,** the leading online social media networks best suited for water managers to use are *Facebook*, where users can share brief updates, photos, links, or other information; *Google+* to connect and share updates photos, links, and other information; *Instagram*, for photo and video sharing; *LinkedIn* for business-oriented social networking; *Pinterest*, for a visual discovery tool to find ideas for projects and interests; *Slideshare*, for uploading files privately or publicly in file formats including PowerPoint or pdf; *Twitter*, for users to receive brief updates or "tweets," about 150 words. *YouTube* is used for posting videos to share with others. The website should allow users to sign up for a membership and/or emails and e-alerts to further involvement. Ideally, the Community Outreach/Call-to-Action section would include all of the following:

1. The site offers a Blog, Feed, or other community discussion forum (ability to interact/leave comments).
2. The site provides an Events Calendar.
3. Crisis and issue alerts are provided on the site.
4. Community outreach (opportunities to be involved) is provided.
5. There are links to social media networks through the site.
6. There is the ability to sign up for a membership and/or future emails.

Within the categories of A-PUD; S-ED; and I-CO/CA, twenty-five sub-criteria were implemented. A scoring value system was created assigning four points for each of the 25 criteria equaling one 100 possible points.

Agencies Assessed

Thirty-one websites were chosen after extensive research and cross referenced to establish the most visited websites that are utilized by New Mexico stakeholders as common resources for the provision of water information in the present policy, management, education, and research environments. The websites included federal agencies, state agencies, New Mexico's primary municipal water authorities and special purpose districts, non-governmental agencies, and research centers. These websites listed below represent the leading water information website sources in New Mexico. Detailed descriptions of these agencies are presented in Appendix III.

Federal Agencies: Army Corps of Engineers, Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Environmental Protection Agency, US Forest Service, Fish and Wildlife Service, and US Geological Survey.

New Mexico State Agencies: Department of Agriculture, Department of Game and Fish, Energy Mineral and Natural Resources Department, Environment Department, and Office of the State Engineer/Interstate Stream Commission.

New Mexico's Primary Municipal Water Authorities and Special Purpose Districts: Albuquerque Bernalillo County Water Utility Authority, The Middle Rio Grande Conservancy District, Rio Rancho Department of Public Works, Las Cruces Utilities Water Resources Section, Santa Fe Public Utilities Water Division, and Elephant Butte Irrigation District.

Non-Governmental Organizations: American Water Works Association, Amigos Bravos, Nature Conservancy, New Mexico Acequia Association, Quivira Coalition, Sierra Club, and Water Dialogue.

Universities and Research Centers: Center for Water and the Environment (University of New Mexico), NM EPSCoR, the Utton Transboundary Resources Center (University of New Mexico), the Institute for Energy & the Environment (New Mexico State University), and the Water Resources Research Institute (New Mexico State University).

Results

The score card results reflect 31 websites that were divided into five categories; Federal, State, Local, Non-Governmental Organizations (NGOs), and Research Centers (Appendix IV). Each agency within its appropriate category was individually graded based on the presence or lack of the specific score card attributes presented in this study. The scoring basis was comprised of 25 total attributes grouped into three categories: A-PUD; S-ED; and I-CO/CA (Appendix II). New Mexico Water Websites (Appendix III) received a total overall score of 80% and a letter grade of a B-. This score results can be further utilized for comparison to other states.

Once initial website scoring was complete, three separate comparison studies were conducted. The comparison studies looked at different aspects of the results. The first comparison study was the comparison of agencies' individual scores separated by agency category. Each agency category is presented in the order of the rank it earned in this study As demonstrated below in Table 4.

Agency Category	Score	Grade
NGOs	84.5	B
Federal Agencies	84	B
State Agencies	79.2	C+
New Mexico's Primary Municipal Water Authorities and Special Purpose Districts	76	C
Research Centers	74.4	C
Total Score For the State of New Mexico	79.6	B-

Table 4: Comparison of Agency Category Scores.

NGOs ranked first with an overall score of 84.5% and they earned a letter grade of a B. Total internal category scores ranged from 96% to 72% and they earned letter grades ranging

from mid As to Cs (Appendix V, Graph I.). NGOs tended to score midrange to high in A-PUD, S-ED and I-CO/CA. The wide range of total scores is most likely due to the existence of large adequately funded organizations combined with local underfunded organizations.

Federal agencies ranked second to NGOs by a slim margin of a half a point. Overall, they earned an average score of 84% and earned a letter grade of a B. They had internal category scores ranging from 96% to 72% and earned letter grades ranging from mid As to mid Cs (Appendix V, Graph II). They tended to score average to high in A-PUD but only midrange in S-ED and I-CO/CA. The high placement is likely due to financial resources and federal mandates.

State Agencies ranked third. Overall, they earned an average score of 79.2% and a letter grade of C+. Internal category scores ranged from 92% to 76% and they earned letter grades ranging from low As to mid Cs. State agencies tended to score midrange in A-PUD; but scored low in S-ED and I-CO/CA (Appendix V, Graph III). State agencies may be underfunded and have different mandates than federal agencies.

New Mexico's Primary Municipal Water Authorities and Special Purpose Districts ranked fourth with an overall average score of 76% and they earned a letter grade of a C. Their internal category scores ranged from 84% to 60% and they earned letter grades ranging from mid Bs to D. They tended to score midrange in A-PUD; but scored low in S-ED and I-CO/CA *(*Appendix V, Graph IV).

Research Centers ranked fifth overall with a 74% and a letter grade of C. Internal category scores ranged from 88% to 64% and they received letter grades ranging from high Bs to Ds. On average, they scored mid to high in A-PUD but scored low in S-ED and I-CO/CA (Appendix V, Graph V).

The second comparison study was to compile the top ten highest scoring websites (Table 5). Of the 31 websites assessed, the overall total agency categories scores ranged from 96% to 60% and earned letter grades ranging from As to Ds (Appendix V, Graph VI). Websites with the same scores are listed alphabetically.

NM Top Ten Water Resource Website List	Score	Grade
1. America Water Works Association	96%	A
2. Environmental Protection Agency	96%	A
3. Nature Conservancy	92%	A-
4. NM Game and Fish	92%	A-
5. US Forest Service	92%	A-
6. US Geological Survey	92%	A-
7. EPSCoR	88%	B+
8. Institute for Energy and the Environment NMSU	88%	B+
9. US Fish and Wildlife	88%	B+
10. Quivira Coalition	88%	B+

Table 5: The New Mexico Top Ten Water Resource Websites

The Top Ten Agency Website list (Appendix V, Graph VII) consists of: 1) The American Water Works Association and 2) The Environmental Protection Agency, which tied in the number one spot with scores of 96% and letter grades of As. Tied in number two, with scores of 92% and letter grades of A- were 3) The Nature Conservancy, 4) New Mexico Game and Fish, 5) United States Geological Survey, and 6) the United States Forest Service. Tied in the third place, with scores of 88% and letter grades of B+ were 7) NM EPSCoR, 8) The Institute for Energy and the Environment at NMSU, 9) Quivira Coalition, and 10) United States Fish and Wildlife (Appendix V, Graph VII). It is interesting to note that all agency categories except the New Mexico's Primary Municipal Water Authorities' and Special Purpose Districts' category qualified in this studies' Top Ten New Mexico Water Agency Website List.

The third comparison study was the comparison of three scorecard categories of A-PUD, S-ED, and I-CO/CA presented in average points earned per category and average letter grade earned in each category. Table 6 shows the overall grades of the three categories.

Rating Criteria	Score	Grade
Access - Performance, Usability, and Design (A-PUD)	91%	A-
Standing - Education (S-ED)	76%	C
Influence - Community Outreach, Call to Action (I-CO/CA)	72%	C-

Table 6. Website Rating: A-PUD; S-ED; and I-CO/CA Criteria Scores.

A-PUD received an average overall score of 36 points of the 40 possible points for an overall score of 91% and a letter grade of A-. S-ED received an overall score of 26 points of 36 possible points for an overall score of 76% and a letter grade of a C. I-CO/CA received an overall score of 15 points of the 24 possible points for a total score of 72% and a letter grade of C- (Appendix V, Graph VIII).

This study reflects low S-ED and I-CO/CA features in New Mexico's water community website presence. Below are the areas of deficiencies that were most commonly seen in the scorecard results.

In the A-PUD category, some websites lacked video, sound, and/or animation. The user experience navigating the websites which included these attributes was far more stimulating, entertaining, and interesting than that of the websites lacking these attributes. Search engines made it possible to pull up desired topic matter and search the websites conveniently for specific information without manually exploring the whole site for information that may not even be present. Many of the sites studied did not include a search engine. Working links are essential, since useful and functional website templates can be easily downloaded and posted by the average person with little technological knowledge necessary.

In the S-ED category, most of the websites lacked real-time data. This is a newer technology which necessitates processing capability on both the delivery and receivership sides of the equation. Real-time data is very useful for keeping metered, graphed, statistical, and any other frequently changing information truly up to date. Information in the water resource websites studied was often too technical for easy interpretation by the general public. It is

counterproductive to deliver information that cannot be understood by the entire target audience. In other cases, even where the language was delivered in plain writing, the topic matter might be scientific or technical in nature and require training for the stakeholder audience who is new to this information. Many websites studied assumed that their audience was fully educated in the topic matter presented and failed to offer training. Additional education and training can often be accomplished by posting an external link to a website that already offers the necessary tools and/or training to bring the visiting stakeholder up to par. External links were rarely utilized by any of the websites studied, including the top scoring websites.

In the I-CO/CA category, the websites studied lacked adequate stakeholder communication platforms such as blog sites, discussion forums and social media pages with conversational capabilities. The websites which did offer communication platforms did not show signs of participating in the conversations taking place on their websites, leaving the stakeholders with a one-dimensional perspective of the website topic matter being discussed. These same websites for the most part did not offer stakeholders any outlets to volunteer their time and energy to involve themselves in improving community water resource conditions. Membership was offered to stakeholders in many websites studied but only for the sake of being part of mailing lists or news circulars. Membership for the most part also did not promote influence or response to community call-to-action by stakeholders.

This research suggests that federal agencies and most non-governmental organizations tend to have well-designed websites with many collaborative ties, while state agencies, local agencies, and research centers lack education, outreach, stakeholder participation, and information-sharing. This may be due to a lack of funding or inadequate staffing. Though

watershed analysis and water planning and management are becoming more easily available via communication delivered through internet technologies, most websites are still underutilized.

Discussion

The Practical Theory of Trinity of Voice (TOV) as defined by Senecah (2004) is based upon the principles of access, standing, and influence. This study scored the usefulness of the subject websites through criteria based on these principles. Through this study, an attempt was made to explore whether existing water resource websites utilize TOV principals to interact with stakeholders. In theory, a perfect scoring website met all of the three TOV principles, access, standing, and influence, through a three step interface process with the visiting stakeholder. In the first step, the basic design and user interface of the website represents access for the stakeholder. This is the stakeholder's point of entry. Once the stakeholder has gained access and can successfully maneuver the landscape of information provided, it should be the second step of the website to educate the stakeholder with as much information necessary to give the stakeholder a sense of standing in the selected topic area. If a sense of standing is achieved, the stakeholder is now empowered to participate as an informed person. In the third step, an opportunity for influence can be created through proactive communication forums and further opportunities for community outreach and call to action.

The original purpose of this paper was to explore how websites are currently utilized as a networking tool for communication, education, planning and management within the water community by applying the TOV Theory. Theoretically, through the implementation of TOV principles, websites could be used more comprehensively now and in the future to improve general education, common technical platforms, and trans-boundary planning and management. This would allow stakeholders in New Mexico to better understand, plan, and manage New

Mexico water resources. Websites could be used to help create a functional, single, collective state water planning initiative. This would be timely, given the current development of the 2015 State Water Plan. Theoretically, such an initiative could be utilized to address issues and create opportunities for solutions for the water resource community at large, not just the issues of the agencies hosting the websites.

Through the process of scoring the websites in this study, it became clear that the purpose of most, if not all, of the websites, was to advertise the agency hosting the website and promote the agenda which the agency represents. Websites are often designed as the interactive business card of the organizations who post them; the majority of subject sites studied here seemed to be designed with that agenda. As a result, access was well represented and was typically an area of high scoring among most websites studied; but in a number of cases education, and in most cases public outreach, were poorly represented. Therefore, TOV was not effectively accomplished.

When all stakeholders are affected by any circumstance it can be defined as "universal" in its scope. Each website in this study provides information that helps to address issues within the specific topic matter which their agency represents, but very few addressed the issues of universal topic matter within the water resource community at large.

The top scoring websites met almost all of the TOV scorecard criteria. These websites utilized links to articles, audio, video, data, and animation for access to information. These websites promoted standing through educational information in layperson's terms, training links, and further understanding of water resource information through external links. These websites offered memberships, blogs, social media discussion forums, and other forms of public outreach, giving stakeholder's avenues for influence. These websites were very good role models for their counterparts, but even the leading websites with all the aforementioned attributes did not

promote a community website network focused on universal water issues. From a technical standpoint, this oversight seems easily remedied. Improved network communication serving a universal purpose could conceivably be implemented through existing web design utilities, agency participation in web discussion forums, and broad, community-based educational approaches. The problem is not the lack of technology but may be related to the lack of state, regional and NGO mandates, funding, and general inspiration to do so.

The majority of websites studied are not trying to create this type of a community network with the goal of addressing universal water issues as well as agency-specific issues. Though many of the websites studied did offer forums for discussion of important topics through blog and social media links, only a few of them ventured outside their own agendas to create a platform addressing universal water topics facing stakeholders on a over-arching community scale. In addition, none of the websites that offered links and forums were active participants in their communication networks; they simply offered a place for stakeholders to communicate but took no apparent proactive role in the discussions among these stakeholders. The subject websites were for the most part promoting their own agencies and what their respective agencies offer.

If websites were collectively focused on community issues as well as the functionality of the agencies they represent, then theoretically a TOV network could be created. With a TOV-based agenda driving web design technologies, a framework could be developed wherein individual people, communities, and institutions could obtain access to one another allowing TOV to take place for stakeholders in a forum that does not necessitate physical presence. This could, in theory, decrease the expense and inconvenience of travel and allow for trans-boundary communication on virtually any scale. Hypothetically, stakeholders could utilize the various

attributes of access, standing, and influence in a shared set of circumstances and experiences (e.g. climate change, extreme drought, flooding, or pollution) to attain common solutions, reduce risks of uncertainty and formulate common ground from their own offices, homes or mobile devices.

Given the results of this study, many aspects of a TOV model do exist in New Mexico's water resource websites, but others are clearly deficient. These conclusions inspire the question that, if a trend could be created wherein website owners focused on addressing community issues in tandem with the promotion of their own agendas, could Trinity of Voice become an integral purpose in the design of web communication?

Recommendations

The recommendations of the author, based on what was learned from completing this study, are broken into basic categories: delivery of information; education and community outreach; and policy recommendations.

Delivery of Information

Websites could improve education, performance and usability through further use of video, audio, animation, search engines and data links. Once accessed, data delivery currently is often complex and not yet delivered in layperson's terms to accommodate all stakeholders. Information is often outdated by the time it is published. Websites can deliver up-to-date information through access to real time data. Real time data should be used more often when applicable.

Education and Community Outreach

The study reveals an obvious need for more education and community outreach online and in the general structure of these agencies' websites to accomplish TOV in community problem solving, water planning and management. Based on the findings of this study, the author recommends that agencies begin looking at websites as community communication and network tools in addition to vehicles for self-promotion of individual agency agendas. Through a focused effort to work together as a community and to address common issues, agencies should begin to form policies requiring interagency communication and information-sharing. Agencies should promote and implement interactive multiagency discussion forums and interact with their stakeholders in blogs and discussion forums. Agencies should offer membership to stakeholders. Agencies should offer community outreach programs involving stakeholders. Agencies should encourage their website visitors to visit other agency websites through data-sharing links on their websites to learn about relevant community issues not addressed by their website. More training courses are recommended to help stakeholders understand topic matter. Training can be accomplished through internal media delivery or links to appropriate external websites.

Policy-Related Recommendations

The Plain Writing Act of 2010 is committed to improving service to stakeholders by using plain language. This act has been successfully utilized by the Department of Agriculture in The Center for Plain Language Report Card. New Mexico should enforce compliance with the Plain Writing Act in agencies. Agencies should dedicate sufficient budgetary resources for employees and/or contractors to improve their websites. Legislation could allocate state and regional water planning agencies funds to fully utilize the internet, thus allowing stakeholders to help determine the direction of water use within their own region while promoting transboundary

participation among regions of the state. Internet training and regularly scheduled updates should be provided to water managers by the state through mandates and allocation of agency funds. Agency requirements should specify that individual agencies hire a webmaster. Webmasters for agencies, NGOs, BrOs, nonprofits, and other stakeholder groups should regularly re-evaluate the attributes and shortfalls of their websites' delivery of information and make regular improvements based on the criteria set forth in this study.

Suggested Further Research

New Mexico earned a total overall grade of B- for its water website presence. A comparison of the New Mexico websites studied to their counterparts in other states would bring to light the status of local, regional, and national online provision of information. Knowing how New Mexico sister states of Colorado, Arizona, Texas, and even Nevada and California scored, based on the criteria of this study, would help clarify where New Mexico stands in its online water management presence. What grades would the other states receive? Would the criteria points of Education and Outreach be higher, equal, or worse?

To improve such a study, and avoid bias, a panel could conduct the website assessments. This study was subjective because everything from selecting the websites, reviewing them, and evaluating them, compiling results, and assigning the scores was done by a single person, a graduate student. The study needs a panel of multiple judges to give it true impartiality.

Not all the criteria on the score card are applicable to each website. The scoring criteria may need to be further refined and individual criteria weighted to reflect the purpose of the website. This could be accomplished as a gradient curve prior to giving every site the same points for attributes they may not have any reason to include. Different scoring models could be considered that do not weigh all 25 criteria equally. For example, the score card could have

different relative weights assigned to the different criteria depending on the stated purpose of the websites host.

The websites assessed seem to be designed for affluent English speakers. It would again further define and refine the criteria of this study to research a variety of websites to determine the percentage that offer translation or multiple language capabilities. The Environmental Protection Agency, United States Geological Survey, Rio Rancho Department of Public Works, the Nature Conservancy, and the New Mexico Acequia Association all have language options.

Financial advantages and constraints were not among the criteria of this study. Researching how much the high-scoring agencies budget for their websites vs. the low-scoring agencies would be a worthy refinement of the scoring criteria. Do the higher scoring agencies have better results in stakeholder satisfaction and participation than the lower scoring ones? In addition, how might the purpose of the websites be evaluated? This also needs to be researched further, possibly through a publicly conducted survey of water resource stakeholders.

Study Limits

The study approaches the subject with the expectation that all websites should be maximized. Though the study certainly sets the bar for proficient, cutting-edge website implementation, it fails to take into account the initial limitations of purpose, multifaceted uses, and intentions of each subject agency in posting a website. Some agencies clearly were only using their websites for simple tasks and had no intention of meeting all the standards in this study. This is why they ultimately scored low in this study.

Many variations in web design and social media preference exist. What happens if [an agency] has been relying on Facebook or Twitter for the majority of information dispersion, and one or the other is no longer the social media popular site? Technology is ever-changing, so the

scorecard criteria need to be constantly evolving. It was difficult to define layperson terminology vs. terminology that may be too technical in nature. It was difficult to define what represents technical data.

Some New Mexico water related agencies were not represented in this study: counties, smaller municipalities and numerous NGOs. For the agencies that were assessed, the point system could be improved using a gradient scale that takes into consideration the topic matter discussed in the 'further research' section above. Also, some stakeholders still do not have reliable access to the internet; therefore, this study is of little use to them. Budgetary constraints of the agencies hosting the website were not taken into consideration in this study because they were unknown and beyond the scope of this study. These points outline the limitations experienced by this author in conducting this study.

The evaluation method designed for this study is based on the assumption that a goal of the agencies hosting these websites is to encourage and foster public participation. If that is not a goal of the agency, then the scorecard is of little value. For example, if the propose of an agency website is to simply provide information then TOV is not an appropriate evaluation tool. However, if the agency does want to use their website to encourage participation, the scorecard can be a valuable tool to help them achieve this. The website network needed to join the water resource community together, through individual agency websites, for the common goal of addressing community solutions, does not yet exist in New Mexico. Such a network would be a valuable step in bringing the water community forward into the future to fully utilize current technology. However, in order for this type of network to take place the agencies themselves would have to change their goals to prioritize public participation.

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Appendix I- Instructions for Using the Score Card

1. Check all "yes" attributes that apply. Each check is worth four points.

   "No" checks get zero points.

2. In A-PUD, there are ten possible checks. A total of 40 points are possible. Multiply total checks by four to get total. For example, if an agency has eight checks (8x4=32), the agency will receive 32.
3. In S-ED, there are nine possible checks. A total of 36 points are possible. Multiply all checks by four. For example, if an agency has six checks (6x4=24), the agency will receive 24 points.
4. In I-CO/CA, there are six possible checks. A total of 24 points are possible. Multiply all checks by four. For example, if an agency has five checks (5x4=20), the agency will receive 20 points.
5. Add total number of points. Assign grade as percentage.

   The letter grade will be assigned using this common methodology:

   0% - 60% = F, 61% - 69% = D, 70% - 79% = C, 80% - 89% = B, and 90% - 100% = A

   A=Excellent

   B=Good

   C=Satisfactory

   D=Needs Improvement

   F=Fail

Appendix II- Website Score Card

Organization Name: _____

Date: _____ Grade_____

Criteria For Agency Website Rating	Yes	No
Access **- Performance Usability and Design** 40% of total score (each is worth 4 points)		
1. Site loads quickly and completely within 30 seconds		
2. Site looks consistent in leading browsers (Explorer, Firefox, and Google Chrome)		
3. Navigation choices are clear, logical, consistent and available on every page. Easy to find what you are looking for within 3 clicks		
4. A search engine is included and provides quick, concise, and accurate results		
5. There is a site map/index		
6. The site is free of broken or bad links or other error messages		
7. Utilizes sound, video clips and animation		
8. Mobil ready		
9. Graphic files are small enough to download quickly. Screen elements, such as animated gifs are effective without being distracting		
10. The pages fit completely within the browser (scrolling in order to see entire page is minimal)		
Total		
Standing **- Education** 36% of total score (each is worth 4 points)		
1. Timely (information is relevant and up-to-date)		
2. Data (information, statistics, figures, records, assessments, technical-reports, etc)		
3. Real-Time Data (including automatic meter reading, radio technology systems, live webcam or Google-live).		
4. Visual aid (map, chart, diagram, plot, etc)		
5. Data and information is comprehensible in layperson's terms		
6. Training (tutorial/seminar/continuing-education/classes/how-to/tips) (Example: a tutorial on how to fill out a permit or interpret scientific data).		
7. Links to other relevant websites (agencies/partners/other water information)		
8. Ability to "share" information. (The ability to email or post an article or video).		
9. Newsletter/publication/archives		
Total		
Influence **- Community Outreach/Call-to-Action** 24% of total score (each is worth 4 points)		
1. Blog, RSS feed, or community discussion forum (ability for the stakeholder to interact and leave comments/report violations and/or actions).		
2. Events Calendar		
3. Crisis and issue alerts/news/announcements/press-release/notices		
4. Community outreach (opportunity to be involved) volunteer/take-action/hot-line		
5. Links to social media networks		
6. Ability to sign up for a membership and/or emails (registry/subscription) feedback		
Total		
Total Overall Rating		

Appendix III- Catalog of New Mexico Water Resource Websites

Federal Agencies

1. Army Corps of Engineers (ACE) is under the Department of Defense and it is one of the world's largest public engineering, designs, and construction management agencies associated with dams, canals and flood protection.
2. Bureau of Indian Affairs (BIA) is responsible for the administration and management of land held in trust by the United States for Native Americans in the United States. The water program functions are divided into two distinct but overlapping elements: water rights negotiation/litigation and water management, planning and pre-development.
3. Bureau of Land Management (BLM) cares for 13.4 million acres of public lands plus 26 million acres of federal oil, natural gas, and minerals**.** The Soil, Water, and Air program has a mission to minimize harmful effects to water resources from land use activities, and to improve and enhance water resources through management.
4. Bureau of Reclamation controls dams, power plants, and canals to meet new water needs and balance the multitude of competing uses of water.
5. Environmental Protection Agency (EPA) Office of Water (OW) ensures drinking water is safe, and restores and maintains oceans, watersheds, and their aquatic ecosystems to protect human health, support economic and recreational activities, and provide healthy habitat for fish, plants, and wildlife.
6. U.S. Forest Service (USFS) is engaged in a number of critical focus areas, including: Healthy forests (including mitigating impacts due to climate change, producing clean water, protecting lives and property from wildfires, controlling surface impacts from oil and gas exploration, and sustaining biological diversity), and water quality and supply.
7. Fish and Wildlife Service (USFW) manages fish, wildlife, and natural habitats.

8. U.S. Geological Survey (USGS) operates the most extensive satellite network of stream-gaging stations in the state, many of which form the backbone of flood warning systems.

New Mexico State Agencies

1. Department of Agriculture (DoA) has the Watershed and Flood Prevention Operations (WFPO) Program that provides technical and financial assistance to states, local governments and Tribes (project sponsors) to plan and implement authorized watershed project plans for the purpose of watershed protection, flood mitigation, water quality improvements, soil erosion reduction, rural, municipal and industrial water supply, irrigation, water management, sediment control, fish and wildlife enhancement, and hydropower.
2. Department of Game and Fish (NMDGF) has a mission to conserve, regulate, propagate and protect the wildlife and fish within the state of New Mexico using a flexible management system that ensures sustainable use for public food supply, recreation and safety.
3. Energy Mineral Natural Resource Department (EMNRD) directs The New Mexico Oil Conservation Division (OCD) that administers several wide-ranging water quality protection programs. These programs are overseen by the OCD Environmental Bureau.
4. Environment Department (NMED) is responsible for overseeing water infrastructure systems and water quality issues throughout the state.
5. Office of the State Engineer (OSE)/The Interstate Stream Commission (ISC) administers the state's water resources. The State Engineer has authority for the supervision, quantity, measurement, appropriation, and distribution of all surface and groundwater in New Mexico, including streams and rivers that cross state boundaries. The State Engineer is also Secretary of the Interstate Stream Commission (ISC). The ISC manages New Mexico’s right to water under eight interstate stream Basins, ensuring the state complies regulations concerning each Basin, as well as water planning.

New Mexico's Primary Municipal Water Authorities and Special Purpose Districts:

1. Albuquerque Bernalillo County Water Utility Authority (ABCWUA) has a water resources management strategy that pursues conservation and the direct extraction of water from the Rio Grande for the development of a stable underground aquifer in the future.
2. The Middle Rio Grande Conservancy District (MRGCD) manages the irrigation systems and flood control in the Albuquerque Basin. It is responsible for the stretch of river from the Cochiti Dam to the Elephant Butte Reservoir.
3. Rio Rancho Department of Public Works (RRDPW) manages and repairs all water in Rio Rancho and wastewater utilities, manage rebates and water conservation programs, conduct water use audits, domestic well permits, manages Backflow Prevention, analyzes water quality information, and manages Industrial Pre-treatment program**.**
4. Las Cruces Utilities Water Resources Section (LCU) provides safe and clean drinking water and wastewater treatment services. It is divided into five sub-sections: Meter, Valve, and Hydrant; Water Line Maintenance; Water Production; Wastewater Collection; and Wastewater Treatment**.**
5. Santa Fe Public Utilities Water Division (SFPU) manages water engineering, watershed management, compliance and quality, policies and ordinances, right acquisitions, permits, wastewater, and distribution.
6. Elephant Butte Irrigation District (EBID) is where farmers can check account records, find parcel information, update contracts and water transfers, check live balances, and verify renter's agreements.

Non-Governmental Organizations (National and Local)

1. American Water Works Association (AWWA) is the largest profit, scientific and educational association dedicated to managing and treating water resources.
2. Amigos Bravos (AB) is a statewide river conservation organization guided by social justice principles and dedicated to preserving and restoring the ecological and cultural integrity of New Mexico's water and the communities that depend on it.
3. Nature Conservancy (NC) pursues non-confrontational, pragmatic, market-based solutions to conservation challenges.
4. New Mexico Acequia Association (NMAA) has a mission to protect water and acequias, grow healthy food for families and communities, and to honor cultural heritage.
5. Quivira Coalition (QC) has a mission to build resilience on the part of the environment by fostering ecological, economic and social health on western landscapes through education, innovation, collaboration and progressive public and private land stewardship.
6. Sierra Club (SC) is the nation's largest and most influential grassroots environmental organization with more than two million members and supporters. Successes range from protecting millions of acres of wilderness to helping pass the Clean Air Act, Clean Water Act, and Endangered Species Act.
7. Water Dialogue (WD) promotes the wise stewardship of water resources in New Mexico through support of community-based forums for education, communication and development of common ground.

Research Centers

1. Center for Water and the Environment (CWE), housed at the University of New Mexico, focuses on practical solutions to problems related to water availability in arid environments and in times of drought. CWE performs cutting-edge research into technological and

engineering-based solutions to problems with water and the environment, in a framework that considers social, economic, policy, regulatory and legal implications.

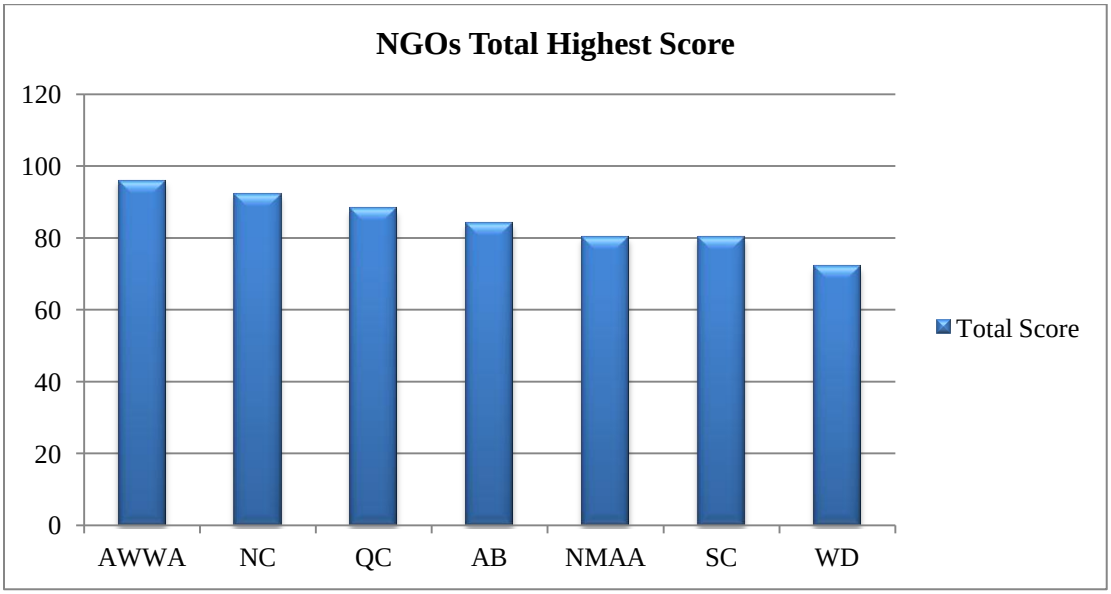
2. NM EPSCoR (EPSCoR) works to improve the research, cyber infrastructure, and human resources required for New Mexico to achieve its energy, education and workforce development potential.
3. The Institute for Energy & the Environment (IEENMSU) is housed at New Mexico State University. Multidisciplinary water, energy, and environmental research through technology advancement, industrial/academic/governmental partnerships, and human resource development.
4. The Utton Transboundary Resources Center (UTRC), housed at the University of New Mexico School of Law, addresses natural resource and environmental problems.
5. Water Resources Research Institute (WRRI), housed at New Mexico State University, supports statewide research and outreach efforts related to water resources. WRRI receives primary funding from the U.S. Geological Survey and legislative state allocations.

Appendix IV- Score Card Results

Organization *Not an independent website part of a larger municipalities or university's website	Performance	Education	Call To Action	Total Score	Letter Grade
Possible points	**40**	**36**	**24**	**100**	**A-F**
Federal Agencies					
1. Army Corps of Engineers (ACE)	36	24	16	**76**	**C**
2. Bureau of Indian Affairs (BIA)	40	24	16	**80**	**B-**
3. Bureau of Land Management (BLM)	36	28	12	**72**	**C-**
4. Bureau of Reclamation (BoR)	36	28	16	**76**	**C**
5. Environmental Protection Agency (EPA)	36	36	24	**96**	**A**
6. US Forest Service (USFS)	40	28	24	**92**	**A-**
7. US Fish and Wildlife Service (USFW)	40	28	20	**88**	**B+**
8. US Geological Survey (USGS)	40	32	20	**92**	**A-**
Federal Agencies Total Average/mean Score	*38*	*28.5*	*18.5*	***84***	***B***
New Mexico State Agencies					
9. Department of Agriculture (NMDA)	36	28	16	**80**	**B-**
10. Department of Game and Fish (NMGF)	36	32	24	**92**	**A-**
11. Energy Minerals and Natural Resources Department (EMNRD)	40	24	8	**72**	**C-**
12. Environment Department (NMED)	36	24	16	**76**	**C**
13. Office of the State Engineer (OSE) Interstate Stream Commission (ISC)	36	28	8	**76**	**C**
State Agencies Total Average/mean Score	*36.8*	*27.2*	*14.4*	***79.2***	***C+***
New Mexico's Primary Municipal Water Authorities and Special Purpose Districts					
14. Albuquerque Bernalillo County Water Utility Authority (ABCWUA)	36	28	20	**84**	**B**
15. The Middle Rio Grande Conservancy District (MRGCD)	36	24	16	**76**	**C**
16. *Rio Rancho Department of Public Works (RRDPW)	36	28	20	**84**	**B**
17. *Las Cruces Utilities-Water Resources Section (LCU)	36	24	16	**76**	**C**
18. *Santa Fe Public Utilities-Water Division (SFPU)	36	24	16	**76**	**C**
19. Elephant Butte Irrigation District (EBID)	32	16	12	**60**	**D**
Local Agencies Total Average/mean Score	*35.3*	*24*	*16.6*	***76***	***C***
Non-Government Organizations					
20. American Water Works Association (AWWA)	40	32	24	**96**	**A**
21. Amigos Bravos (AB)	32	32	20	**84**	**B**
22. Nature Conservancy (NC)	36	32	24	**92**	**A-**
23. New Mexico Acequia Association (NMAA)	36	24	20	**80**	**B-**
24. Quivira Coalition (QC)	36	28	24	**88**	**B+**
25. Sierra Club (SC)	36	24	20	**80**	**B-**
26. Water Dialogue (NMWD)	36	20	16	**72**	**C-**
NGOs Total Average/mean Score	*36*	*27.4*	*21.1*	***84.5***	***B***
Research Centers					
27. *Center for Water and Environment (CWE) UNM	40	16	8	**64**	**D**
28. NM EPSCoR (EPS)	36	28	24	**88**	**B+**
29. *The Institute for Energy and the Environment (IEE) NMSU	40	28	20	**88**	**B+**
30. *The Utton Transboundary Resources Center (UTRC) UNM	32	24	12	**68**	**D**
31. Water Resources Research Institute (WRRI) NMSU	32	20	12	**64**	**D**
Research Centers Total Average/mean Score	*36*	*23.2*	*15.2*	***74.4***	***C***
	Total	*Total*	*Total*	***Total***	***Total***
Total Average/mean Score for the State of New Mexico's Water Website Presence	***36.42/40 91%=A***	***26.06/36 76%=C***	***17/24 72%=C-***	***79.6/100 80%***	***B-***

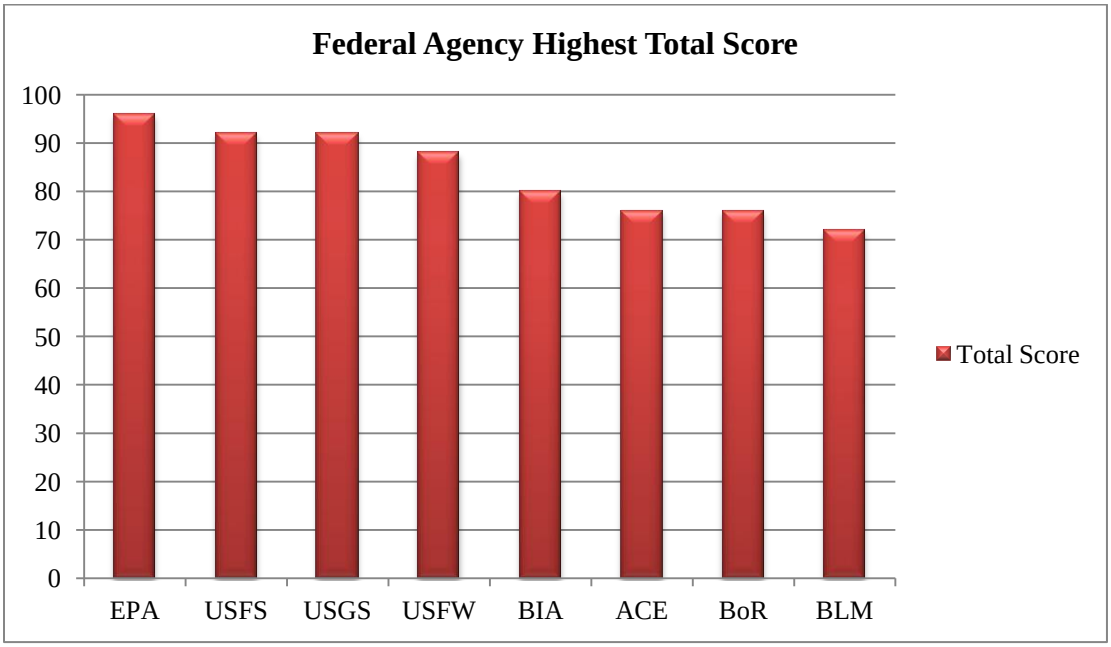
Appendix V- Graphs from the Score Card Results

Non-Governmental Organizations ranked first with scores ranging from 96% to 72%. They earned letter grades ranging from mid As to low Cs.



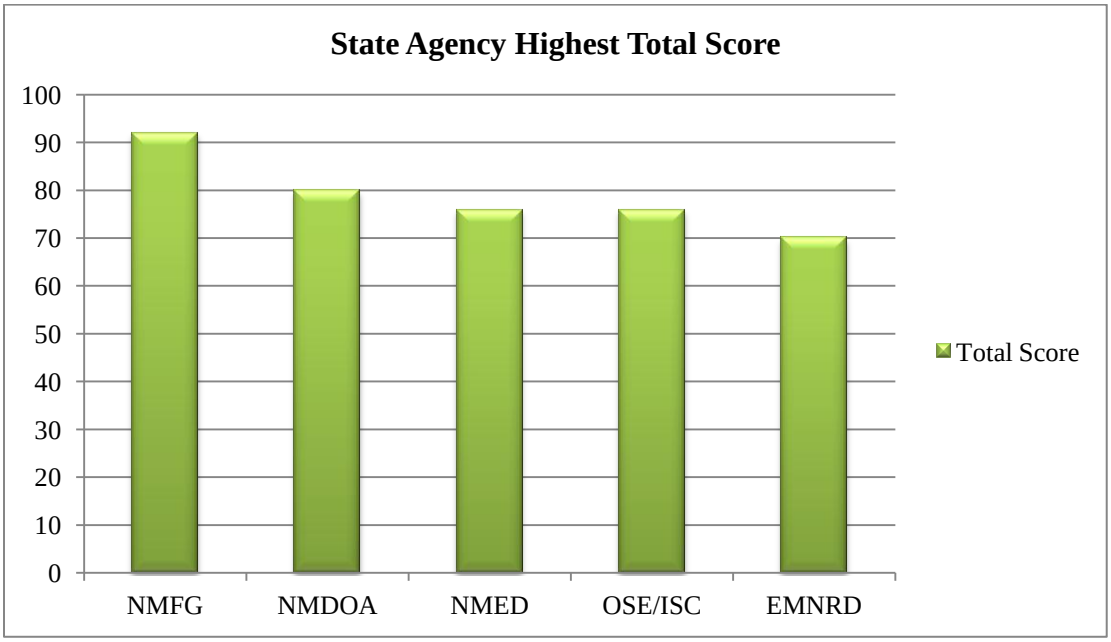
Graph I. Non-Governmental Organizations.

Federal agencies ranked second with scores ranging from 96% to 72%. They earned letter grades ranging from mid As to low Cs**.**



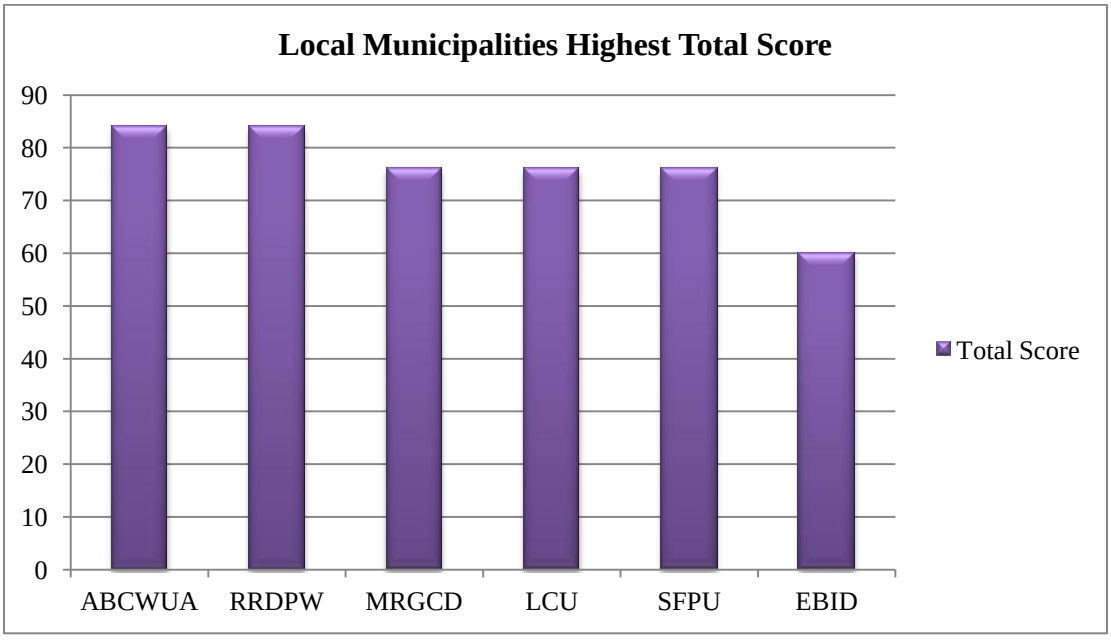
Graph II. Federal Agencies.

New Mexico State Agencies ranked third with scores ranging from 92% to 72% and earned letter grades ranging from low As to low Cs.



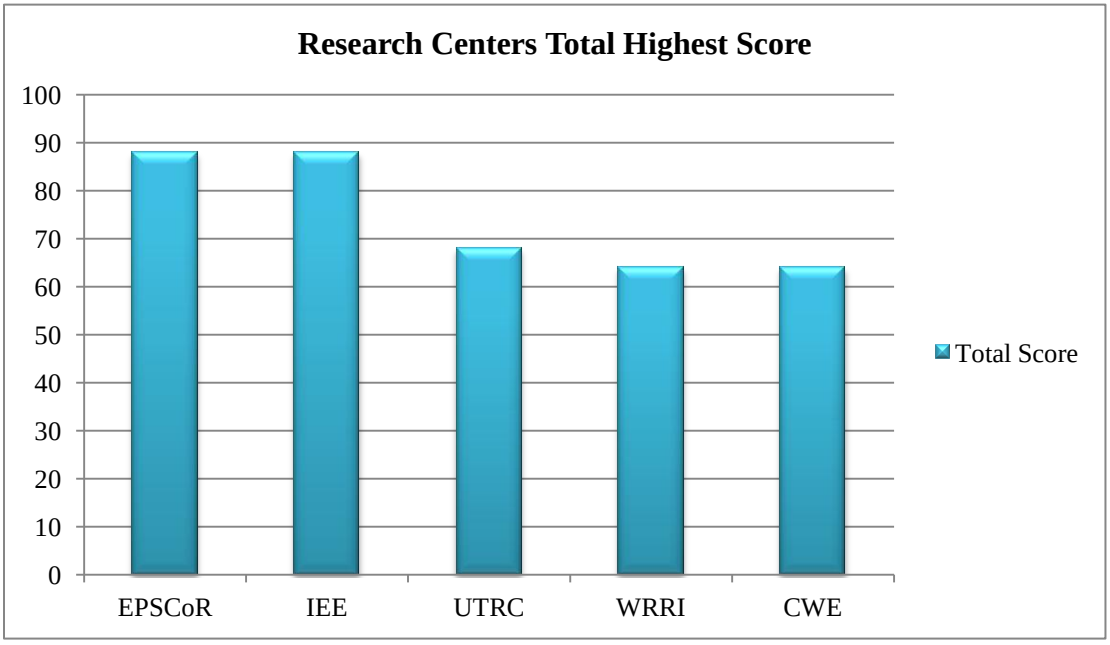
Graph III. State Agencies.

New Mexico's Primary Municipal Water Authorities and Special Purpose Districts ranked forth with scores ranging from 84% to 60% and they earned letter grades ranging from mid Bs to D.



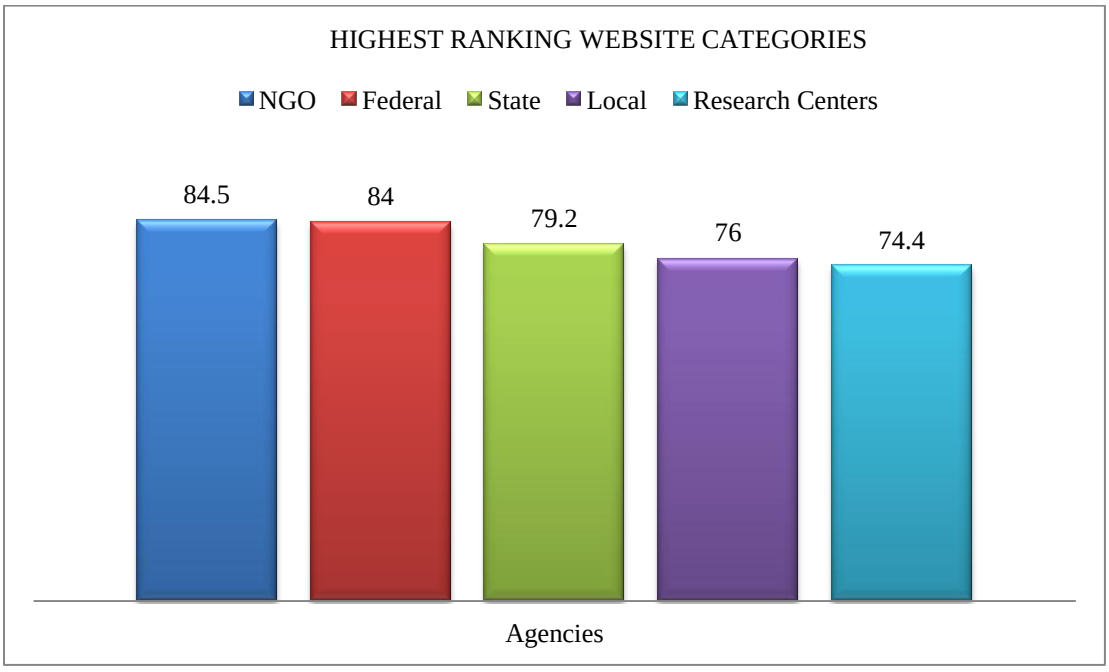
Graph IV. New Mexico's Primary Municipal Water Authorities and Special Purpose Districts.

Research Centers ranked fifth with scores ranging from 88% to 64% and received letter grades ranging from Bs to Ds.



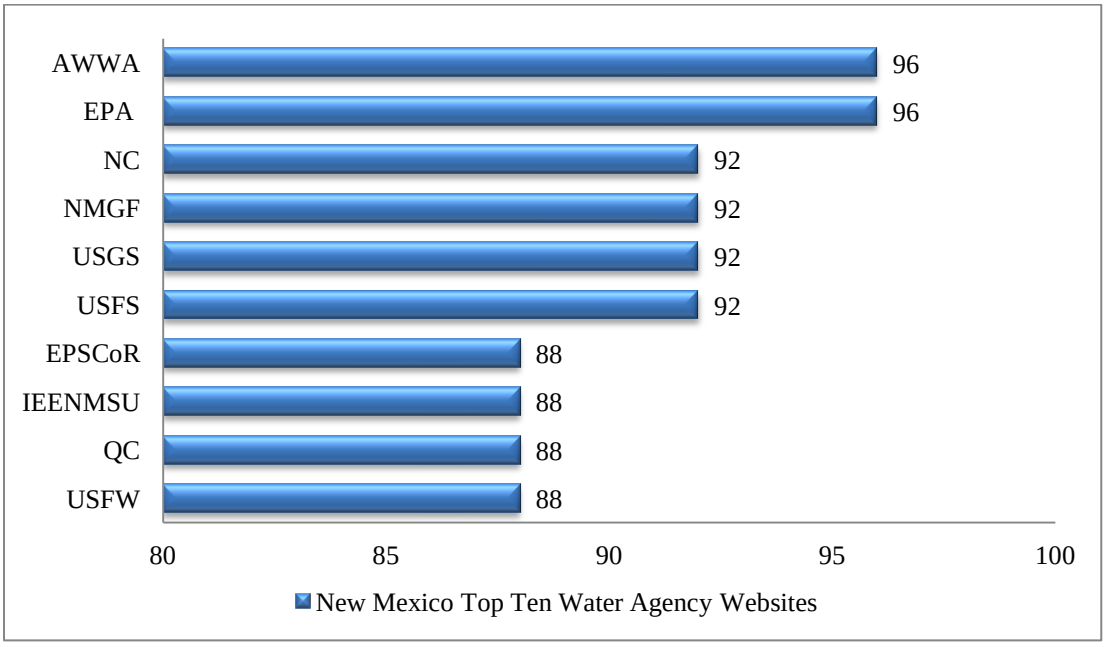
Graph V. Research Centers.

Overall, the agency category scores ranged from 84.5% to 74% and earned letter grades ranging from B to C.



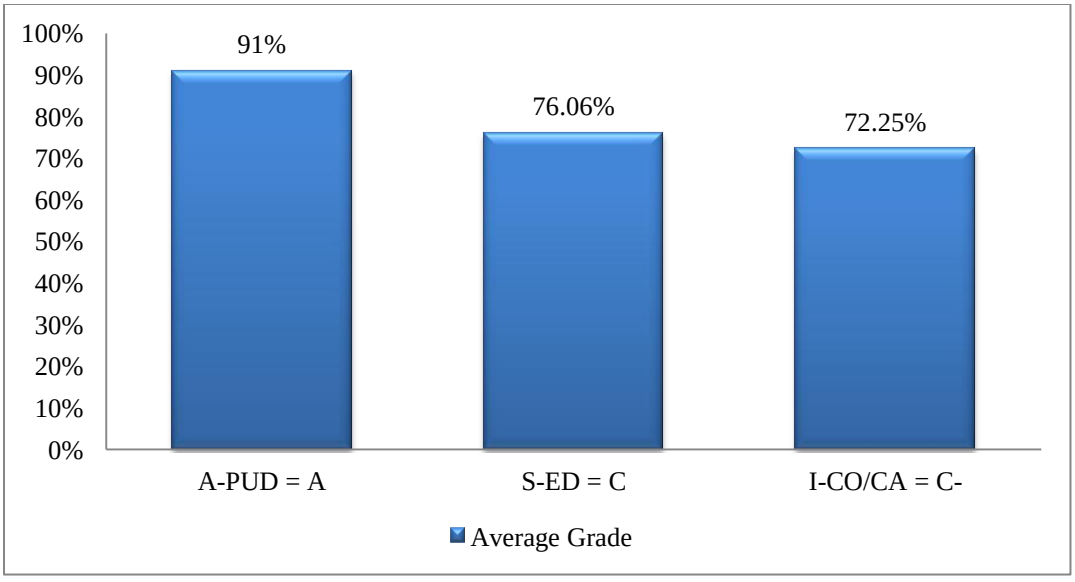
Graph VI. Agency Category Overall Scores.

The Top Ten Agency Websites list: AWWA and EPA are tied in the Lead with 96%, while EPSCoR, IEENMSU, QC, and USFW tie last at 88%.



Graph VII. New Mexico's Top Ten Water Websites.

Overall, the A-PUD category received and a score of 91% and a letter grade of A-. The S-ED category scored a 76% and a letter grade of C, and I-CO/CA category received a score of 72.25% and a letter grade of C-.



Graph VIII. Website Scoring: A-PUD; S-ED; and I-CO/CA Criteria Grades.