

Introduction

Despite the rise of alternative news sources and the reduction of traditional news outlets, local and regional newspapers, with their associated online content, remain critical for public awareness of environmental challenges (Pew Research Center, 2019). Local journalists not only keep the public informed of environmental issues affecting their communities, but they illustrate for readers how changing environmental conditions affect the things they value. Journalists have the ability and influence to turn an increase in water contamination into a story of economic impact, human health risk, or ecosystem degradation. In doing so, journalists create reader interest that can motivate communities to make behavioral and political choices oriented toward protecting natural resources (Bechtel et al., 2015; Brewer 2002; Davis, 2016; Lakoff, 2010; Mossler et al., 2017; Nelson & Oxley, 1999). Given the influence that local and regional newspapers wield, it is important to consider the extent to which environmental news frames are likely to resonate with the diverse value orientations held by the public.

Values, as defined by Schwartz (1992, p. 21), are “desirable goals, varying in importance, that serve as guiding principles in people’s lives.” Values, therefore, stimulate interests, attitudes, and behavioral intentions (Liu et al., 2019; Steg, 2016; Stern, 2000; Stern & Dietz, 1994). And it is values to which journalists appeal when creating a compelling narrative around water and other natural resources. But individuals are diverse in the values they find compelling. The literature on environmental communication asserts and empirically demonstrates that individuals possess at least three different value orientations that determine how and if they are motivated to environmental action (de Groot & Steg, 2008; Stern, 2000). The three environmentally relevant value orientations are egoistic, social-altruistic, and biospheric (de Groot & Steg, 2008; Stern, 2000). While each of these orientations can lead to pro-environmental behavior, they do so in fundamentally different ways. Those individuals with strong egoistic orientations are most likely to engage in pro-environmental behavior when doing so yields a personal benefit, such as individual financial gain or a personal reduction in disease risk. Social-altruistic oriented individuals are most likely to engage in pro-environmental behaviors when the benefit is accrued by human beings in general. This could be in the form of a community financial gain or statewide improvements in human health. Finally, those with strong biospheric orientations are most likely to engage in pro-environmental behavior when the benefit is realized by ecosystems or nonhuman species.

An individual can be motivated by more than one type of value appeal; often, all three values are compelling to some extent (de Groot & Steg, 2008). Yet, an individual’s dominant orientations may be most behavior determinant (Stern et al., 1993). Therefore, if news outlets fail to appeal to any of the three value orientations, they risk not only decreased reader engagement with the news, but also decreased reader engagement in pro-environmental action. The benefit of diverse value appeals is recognized in the environmental communication literature, with some studies demonstrating that reframing the inherent value of nature as a personal or human benefit can increase public support for pro-environmental action (Crompton, 2018). Yet, also important to public engagement, and particularly to long-term pro-environmental action, are appeals to biospheric values (Crompton, 2018).

In the absence of frames that associate environmental conditions with nature’s wellbeing, biospherically-oriented individuals, in particular, may be less interested in the topic (Conte et al., 2021; Kohler et al., 2019; Steg, 2016). It may be assumed by communicators that a story about

water is inherently a story about ecosystems, but if this connection is not explicitly made, readers may not make the connection on their own (Steg & de Groot, 2012). Daniel Kahneman, decision-making and judgment psychologist, described this effect as “what you see is all there is” or WYSIATI (Kahneman, 2011, p. 85). If, for example, a water issue is framed as an economic concern, a news consumer may never consider the implications for the welfare of wildlife or the maintenance of special, natural places. The only considerations that affect behavior are those that are cognitively available to the individual (Kahneman, 2011).

Attention to biospheric values also increases the odds that pro-environmental behaviors will be engaged in the presence of competing value appeals (Steg & de Groot, 2012). Consider, for instance, a program that would increase river water quality and, as a result, increase the health and abundance of river flora and fauna. The program may provide little direct welfare benefit for humans and, in fact, the program’s implementation may come at an economic cost to the community. In this circumstance, a person with strong biospheric and social-altruistic values is faced with a conflict. While the individual may desire to protect the river ecosystem, and therefore desire to support the program, this benefit must be weighed against a desire to avoid economic harm to other people, which would suggest the person should oppose the program. This weighing of values could result in support for or opposition to the program based on the relative perceived strength of benefits and drawbacks. However, if biospheric values were never prompted and, correspondingly, if ecosystem implications were never considered by the individual, it is more likely that the pro-environmental choice would not be selected. Without biospheric framing, tradeoff evaluations are more likely to be skewed.

Identification of imbalances in the values associated with environmental news may be identifiable through qualitative content analysis. Often the values expressed are not explicit, but incorporated in multiple ways through frames in communication – the words, emphases, and other message components used to convey information (Chong & Druckman, 2007b). In combination, these framing components make certain aspects of an issue more salient “in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation” (Entman, 1993, p. 52). In other words, frames in communication influence what issues are perceived as deserving attention and what actions people believe should be taken in response. When a frame has this influence, and a person’s thinking or behavior is changed as a result, a “framing effect” has occurred (Chong & Druckman, 2007a; Hartman & Weber, 2009). Framing effects vary across individuals based on many factors including, as the research described above suggests, the alignment between values evoked and the person’s value orientation.

In our review of the literature, we were unable to identify any studies evaluating news content through the lens of environmental value orientations. Given the empirically identified importance of environmental value orientations on perceptions and behavioral intentions, this is an important gap in the literature that, if examined, could reveal imbalances in journalistic interest appeals across egoistic, social-altruistic, and biophysically oriented individuals. Moreover, prior content analyses of water and other environmental topics have often been narrow in scope, examining a specific issue rather than the spectrum of environmental news coverage (a preference that may coincide with journalistic preferences for exceptional events of human interest as opposed to ongoing environmental challenges and underlying issues) (Major & Atwood, 2004; Sandman et al., 1987; Singer & Endreny, 1987). Broader scale analysis is important for identifying news factors, such as environmental values, that are conveyed and emphasized over time through thousands of small decisions made by many environmental

communicators. Where relatively broad water framing studies have been conducted on other framing variables, they have exposed imbalances in the types of impacts reported (Altaweel & Bone, 2012; Schmid et al., 2007), stakeholders views (Hurlimann & Dolnicar, 2012), and attention to topics such as habitat and water quality (Altaweel & Bone, 2012).

In this study, we examine value frames across the range of water issues faced by a region. We aim to determine what values are prioritized and, as a result, whose interests are attended to, and whose interests are minimized, in news coverage. In effect, it is an assessment of news inclusivity on the basis of value orientations.

Research Objective and Study Context

The objective of this analysis was to examine how water topics have been presented in the past to support consideration of how water topics should be framed in the future. Specifically, we aimed to identify the reasons put forth by journalists and their cited sources, for readers to care about regional water issues and to assess the extent to which those reasons and the values they imply align with egoistic, social-altruistic, and biocentric value orientations.

The study was conducted in northeast Florida and southwest Georgia. This is a region with a wide range of water challenges, making it well-suited for an assessment of water news framing. Rather than focusing on a single water issue, we assessed the breadth of regional water news coverage for a nine-year period to determine how the totality of water news was framed and how each water subtopic was differently presented within the same time and space. In addition, the range of challenges in this region provide points of comparison for communities across the United States that are confronting one or more related challenges.

Northeast Florida and southwest Georgia overlie the Floridan aquifer, a vital water resource for both states. The Floridan aquifer is the source of clean drinking water for approximately 10 million people (Marella & Berndt, 2005), sustains a major agricultural industry (Hodges et al., 2014), and supports unique ecosystems and the tourism they generate. Yet water quality and quantity challenges, amplified by population growth, agricultural intensity, and climate change, have raised concerns about the long-term ability of the aquifer to meet the region's water needs (Marella & Berndt, 2005).

In the specific region we are evaluating, the Floridan aquifer is unconfined, meaning it is not overlain by a protective layer such as clay. This geology enables water on the land surface to easily move downward and enter the aquifer. As a result, aquifer water levels can be recharged relatively quickly during rainy periods, but this benefit also poses a risk. The downward moving water can carry contaminants that degrade the otherwise high quality water supply. In combination, these factors make the unconfined portion of the Floridan aquifer of critical importance to the quality and quantity of the region's water.

Methods

The six newspapers included in the study are in close proximity to the region of interest and represent rural and urban areas of the states. Detailed in Table 1, Florida newspapers included the Gainesville Sun, Jacksonville's Florida Times-Union, and the Tallahassee Democrat; Georgia newspapers included the Albany Herald, Atlanta Journal-Constitution, and Valdosta Daily Times. Each of the papers publish in print and online, the local news formats preferred by 36% of U.S. adults (Pew Research Center, 2019).

Where possible, newspaper content was retrieved from the Access World News and ProQuest databases; articles from the Albany Herald and Valdosta Daily Times were retrieved directly from the newspapers' websites. Each of these sources was queried for articles published between 1/1/2010 and 12/31/2018. The date range was selected to include wet and dry years as well as years before, during, and after key water legislation in Florida and Georgia. In 2011, the state of Florida replaced its narrative nutrient water quality standards with numeric standards that cover the majority of Florida's freshwater streams, lakes, and springs (Florida DEP, 2022; U.S. EPA, 2012). This change provided clear expectations on the water quality and biological data to be used in the characterization of nutrient concentrations and aquatic health. In 2012, applications for agricultural water withdrawal permits were suspended in parts of Southwest Georgia in an effort to limit impacts on existing water users and to maintain the sustainability of water resources (GDNR, 2012; Turner, 2012). These two events may have increased water news coverage and the types of stories reported.

Articles were selected for the study if they included one or more of the following key words in the headline or lead paragraph: "water quality," "water quantity," "groundwater," "ground water," "aquifer," "algae," "drought," "pollution," "contamination," "water level," "withdrawal," "water treatment," "recharge," "water supply," or "water use." Articles of less than 500 words were excluded to provide ample article content for framing analysis. News articles, opinion pieces, editorials, and lifestyle articles were all included because of the potential for each to influence public perceptions.

As detailed in Table 1, there was a substantial difference in the number of articles sampled from the six newspapers in the study. This difference is likely the result of the size of the readership, the proximity to impacted water resources, differences in foci between states and across cities, as well as other factors. In the analysis, we have taken care to report framing approaches that are representative of regional reporting as a whole and not an isolated news source; however, the large difference in sample sizes across news sources is a limitation of the study.

Table 1.

Newspapers Included in the Sample

Newspaper	City	City characteristics^a	Sample source	# Articles^b
Albany Herald	Albany, GA	Small city	Newspaper website	19 (15)
Atlanta Journal-Constitution	Atlanta, GA	State capital; large city	Access World News	48 (44)
Florida Times-Union	Jacksonville, FL	Large city	Access World News	91 (80)
Gainesville Sun	Gainesville, FL	Small city	Access World News	110 (93)
Tallahassee Democrat	Tallahassee, FL	State capital; large city	ProQuest	120 (98)
Valdosta Daily Times	Valdosta, GA	Small city	Newspaper website	8 (8)

^aSmall or large city designation based on population under or over 100,000.

^bFirst number includes all categorized articles. Second number includes those articles assessed for framing. Five articles appeared in more than one newspaper.

After an initial review, articles were categorized based on the reported cause or effect of the identified water issue. Articles not directly related to causes and effects were excluded from further analysis. In addition, to ensure an ample sample size for the evaluation of frames, those article categories with fewer than 20 articles were excluded from subsequent analysis.

Ultimately, the article categories undergoing framing analysis included: agriculture, algae, energy, fecal matter, industry, municipal, residents, springs, and weather.

Articles were then coded using the constant comparative method which is designed to bring forward “properties and hypotheses about a general phenomenon” including causes, “conditions, consequences, dimensions, types, processes, etc.” (Glaser, 1965, p. 438). Codes were assigned at the sentence level based on the frames utilized. As codes were assigned, they were compared to previous code assignments to gradually home in on the attributes that define each code. In this process, codes were combined, collapsed, and in some cases dismissed due to low prevalence.

The codes developed were applied by a second coder, blind to the results of the first coder, who read and independently coded 35 randomly selected articles (10% of the reduced sample). Code assignments from the two coders were compared and differences used to increase the specificity of code definitions and assignments. Intercoder reliability was not calculated because the constant comparative method is interpretive and not intended to ensure that multiple coders generate the same results (Burla et al., 2008; Glaser, 1965).

Results

The original sample included 391 articles. Article counts by category and coverage type are illustrated in Figure 1 with category descriptions provided in Table 2. Standard news articles were more frequent than opinion, column, lifestyle, or editorial pieces in most categories; however, there were exceptions to this overall trend. Articles on residential water impact and springs appeared primarily as alternative article types.

Table 2

Article Category Descriptions

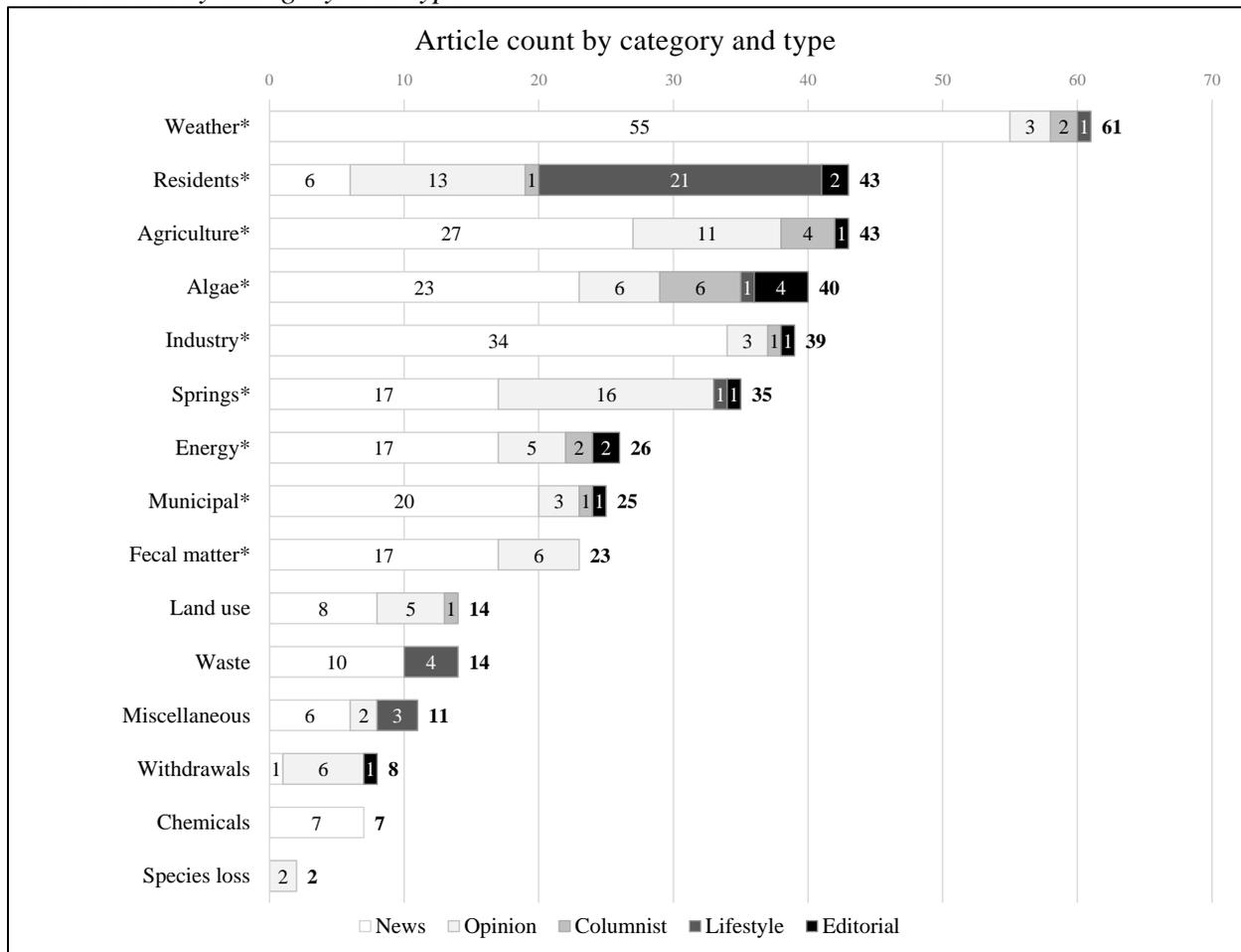
Article Category	Description
Agriculture*	Agricultural water permits, practices, water use, and crops.
Algae*	Algae conditions on coastal and inland waters caused by various factors.
Chemicals	Chemicals from sources not related to other categories.
Energy*	Power plants, coal ash, fracking, and gas pipelines.
Fecal matter*	Sewer, septic, and animal fecal matter. Articles referring only to contamination from farm animals were not included in this category but in Agriculture.
Industry*	Industrial impact exclusive of agriculture, energy, and tourism. Includes water use and contamination from manufacturing, industrial development, and mining.
Land use	Land use, purchases, and sales affecting water conditions.

Miscellaneous	Articles not otherwise categorized.
Municipal*	Development, infrastructure, municipal pumping, and runoff.
Residents*	Private lawns and gardens; personal conservation and stewardship.
Species loss	Decreasing numbers within species.
Springs*	Condition of aquifer-fed springs caused by various factors.
Waste	Trash, landfills, and incineration.
Weather*	Drought, weather, and climate change.
Withdrawals	Withdrawals not related to a specific use.

Note. Those categories designated with an asterisk were included in the framing analysis.

Figure 1

Article Count by Category and Type



Note. Articles in the original sample, prior to category reduction, by category and type. Those categories designated with an asterisk were included in the framing analysis.

Designated with an asterisk in Figure 1 and Table 2 are those categories that included more than 20 articles and were, therefore, included in the framing analysis, 335 articles in total. The subsections that follow assess the framing of water issues in this smaller article subset. By category, the reported issues are described followed by the value frames used to characterize the issue. Value frames consisted of three dominant types: human health, economics, and ecosystems. Human health and economics are both human-centric. Thus, individuals who are strongly egoistic or social-altruistic in their value orientations could find them compelling. Egoistic individuals could be interested in the reported water topic because of the implications for them personally, while social-altruistic individuals may be interested due to the implications for humans in general. On the other hand, ecosystem value frames speak primarily to the interests of biospherically-oriented individuals.

Weather

Value summary. Weather articles were dominantly framed using economic values; ecosystem implications were employed as a secondary value frame.

The issue. Drought was the most frequent weather concern, with the majority of articles in this category were published during dry years (2011-2012 for Florida; 2011-2012 and 2016 for Georgia). Drought magnitude was expressed using severity scales, comparisons to years prior, and depictions of parched conditions. Common descriptions included current and projected changes in water levels, such as,

despite gains from Tropical Storms Beryl and Debby, experts with the Suwannee and St. Johns River Water Management Districts said the low volume of water in the upper Floridan aquifer is still of concern and likely will be unless more storms deluge the area. (Swirko, 2012)

Value frames. Economic implications for water-dependent industries were put forth as the primary reason for concern about weather. In dry periods, agriculture was depicted as taking the hardest hit, with effects that rippled through the broader economy: “A lot of people don't realize that agriculture is the number one industry in the state and it is suffering. Without agriculture, Southwest Georgia, in particular, would just dry up and blow away” (Gosajon, 2016).

With the possible exception of springs articles, stories of drought's impact on farmers were the most emotionally charged of the study. Personal stories were frequently used to illustrate the connection between water and economic survival. For example:

For Crawford County farmer Jimmy Moncrief, this year's drought proved too costly before he even broke ground. He abandoned one field this spring after deciding he couldn't afford to irrigate it. He's been a grower in and around Roberta, 30 miles west of Macon, for more than three decades. These dry days, Moncrief wonders why he bothers. ‘It's so time-consuming and stressful,’ said Moncrief, 63. ‘Farming's not an occupation; it's a disease.’ (Davis, 2012)

Some farmers expressed the need “to spend more money irrigating their crops” (Burlaw, 2011). Others were unable to irrigate “because you're not allowed to draw water when the streamflow is that low” (Thompson, 2016b). Less intuitive financial implications

were also explained including the need to “purchase hay” and cull animals when “the grass isn’t growing enough to sustain [them]” (Leslie & Judd, 2012).

The effect of atmospheric conditions on agriculture was almost exclusively a bad news story, receiving attention only when low water availability stressed operations. The effect on tourism and recreation, however, was presented in bad periods and good, the tone changing in accord with water levels. In bad periods, readers were reminded of the importance of tourism to the region’s economy, recalling for example the “2007-09 drought’s impact on Lake Lanier—when lake levels fell to 50-year lows” and resulted in an estimated “\$87.6 million reduction in 2008 recreational spending” (Wickert, 2016). The repercussions of drought on recreation and tourism did not draw on emotion to the extent observed with agricultural coverage; however, emotional volume increased as water levels rebounded. Businesses were then depicted as thriving with “boat sales up and the slips staying busy” (Scott, 2011) and there was optimism for the future. “The state’s largest lake is at levels not seen in 10 years, and those who depend on it for their livelihood are buoyed by prospects of large crowds this weekend for the unofficial start of summer” (Fox, 2013)

Where wildlife implications were noted, the coverage depicted death and struggles to survive. Fish kills were mentioned but rarely further detailed or explained. Infrequent depictions included low levels of dissolved oxygen (Swirko, 2011) and low water levels that can “have a significant effect on fish spawning” (Stepzinski, 2011) and “fish passage” (Curry, 2011). The prominence of the regional oyster industry made shellfish a species of atmospheric concern due to the “amount of fresh water [required] to preserve the ecosystem (and) the oysters” (Burlew, 2011). Wildlife experts occasionally reported “a toll” on other wildlife including birds, “butterflies, bees and other common insects” (Seabrook, 2011). Periods of water rebound brought depictions of nature’s renewal, such as “the Okefenokee [...] getting to be a swamp again” (Dickson, 2012a).

Residents

Value Summary

Articles highlighting residential water behavior can be divided into two subcategories: water use and water contamination. Residential water use articles were dominantly framed using economic values, while articles on residential water contamination were dominantly framed with ecosystem values.

The Issue

Unlike other article categories, the impact of residential behavior on regional water conditions was rarely conveyed in news articles, but instead in opinion columns and lifestyle pieces that offer homeowner advice. The water impacts were described vaguely, but included declining aquifer levels and spring flows, the introduction of nutrients into surface and ground water, and algae growth. Conservation was positioned as a means to “extend the life of the aquifer” (Kitchen, 2017).

Value Frames

Articles pertaining to residential water *use* called for reader concern regarding present and future water supply. Here the stated economic implications of residential water conservation were altogether positive. Through personal choices, residents were said to be “making sure our future water supply keeps pace” with population growth (Conservation is the best answer, 2014) and ensuring “adequate water supply, knowing periods of drought are inevitable” (Austin, 2015). Residential conservation was also positioned as the economical choice, “our lowest-cost water supply” (Kitchen, 2017).

On topics of residential water contamination, preservation of place value and protection of wildlife were frequently promoted reasons for pro-environmental behavior. “It's a matter of choosing whether it's more important to protect green lawns that can be found anywhere or the crystal-clear springs that help make this region special” (Conserving water, 2013). Xeric landscaping, rain gardens, and native plants were encouraged, not only because they are environmentally beneficial, but also because they are aesthetically pleasing, providing “a much more interesting view” (Piotrowski, 2017) and a landscape that is more “individualized and colorful” (McGann, 2016).

Agriculture

Value Summary

Articles relating agriculture to water impacts dominantly used ecosystem value frames and secondarily employed economic values.

The Issue

The impact of agricultural operations on water was presented in two very different ways. One set of agriculture articles detailed severe offenses committed by specific operators, often labelled, or implied to be, large “factory” farms. Pollution depictions were vivid at times. For example, “An abandoned lagoon [...], was breached last week and sent more than 6 million gallons of hog urine into a creek that feeds the Chattahoochee River” (Chapman, 2013). In another instance, “Large chicken parts, such as legs, were seen being dumped into lines leading to water treatment on the site” (McCaffrey, 2015). Receiving the most news coverage during the study period was an agricultural water permit request for a large ranching operation that opponents argued would severely impair both the quality and quantity of water in a nearby spring.

A second group of agriculture articles did not examine the actions of specific farms, but instead the broad implications of agricultural operations. In these articles, the presence of agriculture in the region was associated with non-point nutrient pollution, reduced water levels, and spring degradation; yet, unlike the first group of articles, farmers and ranchers were typically presented as taking proper steps to use water efficiently and minimize nutrient leaching.

Value Frames

Of all categories, reasons for reader concern were least clearly conveyed in articles of agricultural impact. Though changes in water quantity and contamination were routinely described, they were infrequently associated with consequences of direct human interest. Most noted, however, were implications for the place value of springs, for instance:

The outlook for the springs, which have attracted visitors worldwide, is bleak. Bubbling up from the Floridan aquifer, the flow of the springs was once 500 million gallons of crystal clear water a day. During the last five decades, that has dropped by 50 percent. At

the same time, the nitrate load in the springs, which produces damaging algae and comes from fertilizer and animal waste, has increased tenfold. (Littlepage, 2012)

Springs provided specific examples of what was being lost or put at risk by agricultural operations. That loss included not only springs as natural places, but springs as components of the regional history and culture. For instance, opponents to issuance of an agricultural water permit were concerned “that further aquifer withdrawals [for agriculture] will simply compound problems at the Silver Springs, which was a tourist mecca decades before Disney World opened and a site where Tarzan movies and television shows featuring underwater sequences were filmed” (Patterson, 2017a).

Farm economics, a second reason for reader concern, was predominately expressed in rural newspapers serving farming communities. Here the focus was on profitability and farm survival in an industry where financial risk is linked to water availability. Article topics included steps to increase efficiency and mitigate water risk through crop choices, crop insurance, drought concerns, and new technologies. The advice was practical,

[forage sorghum is] a nice fit for those cattlemen who are stretched thin. In some areas, they can't water well enough to produce a top-notch corn crop. Forage sorghum might be a very good option because of its greater efficiency in using water. (Thompson, 2016a)

Algae

Value Summary

Algae-focused issues were dominantly framed using economic values, secondarily using human health and ecosystem values.

The Issue

The years encompassed in the study included “one of the worst, if not the worst” algal blooms on Florida’s record (Samples, 2018) with “[t]wo kinds of toxic algae [...] blooming, one in freshwater, one in salt” (Bennett Williams, 2018). Red tide was present on “all coasts” of the state, while blue-green algae “covered 90 percent of Lake Okeechobee,” and extended into connecting waterways (Samples, 2018). The blooms were depicted as resulting from “an overabundance of nutrients—nitrogen and phosphorus” (Bennett Williams, 2018) from a variety of human activities. Though reporting on algae was most abundant in years with severe outbreaks, concerns were repeated throughout the study period due to algae becoming “a recurring summer nightmare” (Staletovich, 2018).

Value Frames

The visual aesthetics of algae were emphasized throughout news coverage. Blue-green algae was described as “ghoulish” (Call, 2016b), a “cesspool” (for example, McNally, 2013), “a sickening smoothie” (Staletovich, 2018), and frequently, the “Green Monster.” With red tide, visuals such as “a fresh wave of dead fish washing up” on beaches were complemented by descriptions of the “noxious smell” (Anderson, 2018). Though algae diminished the aesthetic value of natural places, the primary concern was associated impacts on the tourism economy, the

“economic lifeblood” of Florida (McNally, 2013).

Aesthetic impacts translated into reduced recreational value, with watercraft rental cancellations and projections that algae will “kill our recreational fishing” (Waymer, 2016). Reports of declining hotel, restaurant, and other tourist-driven businesses were routine. A Florida scientist was quoted, “Who wants to come to South Florida with green, yucky water?” (Bauerlein, 2016). The large dollar amounts necessary to correct conditions and prevent future crises furthered the economic frame. Stated costs included outlays for “cleanup and wildlife rescue” (Bennett Williams, 2018), the conversion of septic systems, water treatment plant improvements, and emergency tourism advertising.

Human health risks from contact with algae-ridden water and the consumption of local seafood were noted but not in comparable measure to economic risk. Ailments named included red eyes, burning throats, and vomiting. Lifeguards were depicted as leaving “their posts after experiencing respiratory problems” (Samples, 2018) and a kayaker described that his “eyes got very itchy and [his] lips got a funny taste to them” (Patterson, 2018b).

Wildlife, said to be “dying in droves” (Bennett Williams, 2018), provided a final though less pronounced reason to care. The “heartbreaking” harm (Gillis, 2018) to wildlife included “manatees struggling to breathe” (Dockery, 2016a), sea turtle and dolphin strandings, and the deaths of shorebirds and “prizesized sport fish” (Waymer, 2016).

Industry

Value Summary

Industrial water impacts were dominantly described through human health values, secondarily through economic values.

The Issue

Industry, as a generalized activity, was not presented as a threat to the region’s waters. Rather, the threat was presented as the product of specific industrial bad actors, many of whom are no longer in operation. The contamination, in many instances, was described as having gone unchecked for decades. Toxaphene, for instance, a pesticide produced in the region “from 1948 until 1980 to kill cotton boll weevils,” was banned from production “in the 1980s as a possible carcinogen, but it has persisted on [...] plant grounds and [in the water]” (Dickson, 2017). At another location, chemicals “including benzene, arsenic and polycyclic aromatic hydrocarbons [...] released from [an] old hotel site and an old food service company [...] ‘migrated’ onto city property” (Patterson, 2013).

The risks to surface and groundwater from industry were said to have expanded over time. As a Florida Department of Environmental Protection official was quoted, “Depending on site-specific conditions, soil contamination may leach into groundwater, and groundwater contamination may migrate through the aquifer to spread contamination across property boundaries” (Waters, 2016). In the case of a fertilizer plant “opening near the start of the 20th century, chemicals had seeped into roughly 30 acres just south of the Jacksonville Port Authority’s Talleyrand terminal. The contamination had spread through groundwater and into the riverbed nearby” (Patterson, 2014b). The risk from legacy industrial contamination was considered high. An Environmental Protection Agency official described the site of a former

chemical plant as the “poster child of contamination in the Southeast” (Dickson, 2012b).

Value frames

Human health was put forward as the dominant reason for reader concern about industrial impact. The names of “toxic” industrial contaminants such as arsenic and mercury, which alone can evoke health anxieties, were associated with maladies including cancer and organ damage, as well as reproductive problems, “possibly extending [health implications] to future generations due to genetic mutations” (Kyler, 2015). The magnitude of contamination was contextualized using “fishable” and “swimmable” standards. Where these criteria were not met, the real world consequences were sometimes left to readers’ imaginations with depictions of ongoing recreational water activities, such as the source who had “seen people fishing, swimming and boating in every single location this report lists as a major violator” (Patterson, 2018a). Even accounts of water quality improvement conveyed risk, such as an improvement in creek conditions that changed a fishing advisory “from ‘do not eat’ to ‘limited meals per month’” (Dickson, 2015).

The impact of industrial contamination on wildlife was routinely noted, but concern for animals was overwhelmed by the use of animals to convey ominous human implications. PCB-contaminated dolphins, for example, were occasionally presented in terms of animal welfare such as, “These are our dolphins and it’s a shame how badly we’ve cared for their well-being” (Morrison, 2014). But such sentiments were more frequently tied to human welfare, “We’ve got the most toxic dolphins found anywhere in the world and people are asking, ‘What does this mean for us?’” (Chapman, 2014). Wildlife health essentially served as a proxy for human health. Cities’ economic futures provided a second reason to care. Specifically, contamination was described as restricting communities’ ability to grow. For example, a Jacksonville article suggested, “the Superfund label near the city’s heart would be hurtful to plans for the area” (Patterson, 2014a). In such circumstances, the removal of contamination was posed as a double-edged sword. Failure to remove the contamination could affect “the viability of future on-site uses” (Pearce, 2010). Yet, remediation plans stoked concerns about cleanup costs that could be borne by the government and, more specifically, by taxpayers. Economic concerns were also expressed for privately held properties that could diminish in value due to the actual or potential spread of contaminants across property lines. It was an issue of fairness with “property owners [...] left with the stigma of contamination along land that would otherwise be extremely valuable” due to circumstances beyond their control (Dickson, 2015).

Springs

Value Summary

Springs articles dominantly emphasised ecosystem values and secondarily emphasized economic values.

The Issue

Springs were almost exclusively depicted in a state of severe degradation. Changes in water chemistry caused by nitrate pollution were said to be driving the “replacement of native

species by smothering algae and fast-growing exotic plants” (Pennington, 2014), creating a “biological desert” (Stevenson, 2016). Identified sources of nitrate included septic tanks, agriculture, residential behavior, municipal wastewater systems, storm-water runoff, animal waste, and golf courses. Water flow reductions at springs were a secondary but also prominent point of concern. Flows and levels were described as “drastic” and “plummeting” (Knight, 2013) to “below sustainable levels” (Williams, 2012) and even “drying” up (Knight, 2016). Associated with the decline were water withdrawals for agriculture, public supply, power plants, and mines. *Value frames.* Springs articles passionately promoted the value of unique, natural places as the reason for concern about water conditions. Springs were equated with treasure, described as “diamonds” (Williams, 2012) and “wonders of the natural world” (Knight, 2013). Yet metaphors of riches often served as foils for frames of loss. The following is representative of the tone:

When I was growing up in Florida, springs were magical aqua blue pools of sparkling light, bubbles and white sand bottoms. They were stunners in the world of natural resources. Now they are sorry pools of polluted water that hold no attraction. (McVety, 2014)

The depicted loss was anthropomorphized, with springs “suffering” (Saving the springs is unending battle, 2017) from a “negligent homicide” (Hiers, 2014) as algae “chok[ed] the life” out of them (Andersen, 2010).

Wildlife depictions contributed to place value frames, again conveying both wonder and demise. Lyric phrases described mullet jumping “out of the spring, like a flying fish” (Barnett, 2015) and the “loud wails” of limpkins (Williams, 2013), all contributing to “an ecosystem unlike any other” (Williams, 2013). But then came frames of loss: “The apple snail has already left the algae-coated Wakulla. It is the primary food source for the limpkin, a bird with an iconic jungle-like cry of woo, woo. The limpkin has also left the wildlife sanctuary” (Call, 2016a). Springs degradation was further depicted as a cultural loss, with calls for preservation so that springs can be enjoyed by future generations of Floridians just as they were by the first visitors to the state. A springs task force member wrote, springs have “lured people into the north Florida jungle for at least 12,000 years” with “bones from mastodon hunted by the first Americans [...] recovered from its waters” (Stevenson, 2016). There was an expressed desire to “conserve, protect, restore and enhance” (Alderson, 2012) these parts of Florida’s “heritage” (Portman & Ethers, 2014).

In addition to place value, two additional reasons for reader concern were regularly invoked. First, springs were revered for their usefulness as early indicators of broader environmental dangers. As a cave diver stated, springs are “the celebrated coal-mine canaries, used by miners to detect dangerously low oxygen levels. The springs are our visible indicators of the aquifer’s health. And it doesn’t take an expert to see they are sick” (Andersen, 2010). Second, economic frames associated spring conditions to the regional economy. Springs were described as “economic boosts” (Swirko, 2018) and “a boon to tourism for the area” (Dobson, 2018).

Energy

Value Summary

Articles connecting energy production to water impacts were dominantly framed using

human health values; economics was a secondary value frame.

The Issue

Coverage of water impact from energy production centered on two issues: coal ash storage and the potential for increased fracking. On the topic of coal ash, groundwater contamination in the vicinity of coal ash ponds was routinely reported as exceeding regulatory limits. One article described contamination of “arsenic and other heavy metals—with toxicity levels 20 or 30 times federal standards” (Chapman, 2016b). The location of coal ash storage visually illustrated the risk, with one set of solidification pits standing “about a football field away from wetlands” and two football fields from a creek (Chapman, 2016a). The risk was both a present-day concern and legacy issue because “if coal ash is left buried in groundwater, then the contamination we see now will only get worse, and it will continue for generations” (Prabhu, 2018). The perceived danger was amplified through stories of massive disasters in other states. A recent event at the time of reporting, “the picturesque Dan River in North Carolina was hit by a devastating toxic spill that spread 70 miles downstream, poisoning the water and everything in it” (Tonsmeire, 2014). As an environmental representative stated, “If [the local] impoundment were to break it would be a repeat of the Dan River situation. It would be a catastrophe” (Portman, 2014).

Also during the study period, fracking expansion was under consideration in Florida. Those opposed to fracking described Florida as “a particularly dangerous site” due to the state’s geology and “potential pollution of the Floridian Aquifer, the primary source for drinking water in the state” (Duhl, 2016). As an opponent stated, “You’re putting chemical explosives underground and setting them off. There’s always strong potential for contamination of both underground water supplies and surface water supplies” (Burlew, 2015).

Value frames. As with industry, human health provided the primary reason for concern about contamination from energy production and exploration. Coal ash pollutants—arsenic, aluminium, barium, beryllium, copper, lead, nickel, zinc, selenium and mercury—were described as a “a witch’s brew of toxic heavy metals that poses significant health threats” (Ringenberg, 2014) including cancer, nervous system damage, heart disease, and lung disease. The risks were presented as high magnitude. One article described “samples of bright orange contamination leaking out of the pits [that] contained arsenic at levels 300 times the amount considered safe for drinking water” (Tonsmeire, 2014).

Fracking associated health risks were similarly expressed with “up to 600 chemicals [...] used in fracking fluid, including known carcinogens and toxins such as lead, uranium, mercury, methanol, hydrochloric acid and formaldehyde” leading to “problems like cancer, birth defects and respiratory illness” (Dockery, 2016b). Again, the risks were considered substantial. A fracking opponent expressed concern with vivid foreshadowing, “The oil companies state that fracking will bring some jobs. They are correct. Grave diggers, morticians, funeral-home directors and coffin makers will likely see some job growth” (Burlew, 2015).

Economics provided an additional reason for reader interest. On multiple occasions fracking was described as incompatible with “an economy founded in agriculture and tourism” (Smith, 2016). However, in response to these frames, fracking proponents described the practice as supporting future economic growth. From this perspective, fracking would enable the region to “produce jobs, become less dependent on foreign sources of oil and gas, and [...] produce that energy right here at home” (Burlew, 2015).

Municipal

Value Summary

Municipal water impact was dominated by economic value frames.

The Issue

Groundwater pumping to serve municipal populations was depicted as a contributor to regional water level declines including “falling lake levels” (Patterson, 2011) and the need for “recovery strategies” to restore rivers “to health” (Curry, 2013). The consequences of decreased water availability were not borne exclusively by the withdrawing municipalities but said to be “causing grave harm to the surrounding counties and to the health of the Floridan aquifer, upon which the entire region relies” (Knight, 2015a).

Stormwater and municipal development was associated with degraded water quality, a threat heightened by regional geology. Stormwater was deemed particularly risky because the region’s “sandy soil” allows water to infiltrate “too quickly for bacteria and other natural processes to break down the pollutants naturally” (Strange, 2017). Similarly, shopping center construction and road projects above karst cave systems were described by opponents as “needlessly risky” as they “would allow nitrate-polluted water to percolate down into the cave and flow into the spring where it would feed algae that chokes out other life in the spring's ecosystem” (Call, 2016c).

Value Frames

The most prominent reason for reader concern was the ability of municipalities to meet the water needs of expanding populations and economies. This capacity and capability were sometimes affirmed and, at other times, called into question. Whereas one utility was recognized for not applying for a water withdrawal increase “despite a projected growth in population over the next two decades” (Curry, 2012), another described needing “more water to handle a customer base forecast to grow by at least 40 percent” in the same number of years (Patterson, 2011). In Atlanta, an “aging” water and sewer infrastructure was said to require expensive improvements or else “it will continue to degrade” to a point where it “won't be able to support growth of the county” (Matteucci, 2010). Similar concerns were expressed by smaller municipalities where projected costs could leave “many communities, particularly within rural counties, struggl[ing] to identify the financial resources needed” (Curry, 2016).

Fecal Matter

Value Summary

Articles focused on the impact of fecal matter dominantly employed human health values; economic values were a secondary value frame.

The Issue

Fecal matter was presented as an ongoing concern, contributing both nutrient and bacterial contamination to the region's waters. Where groundwater and springs were the water bodies of interest, septic systems were implicated for "the rapid growth of algae and invasive aquatic plants" as well as changes in "the chemical balances that support a healthy and diverse plant and animal population" (Lightsey, 2013). Surface waters were described as severely degraded by both septic systems and "sewer failures" where "untreated sewage was released into waterways" (Patterson, 2010). The most reported "failure" during the period of study was the release of "22 million gallons of sewage into the Indian River Lagoon following Hurricane Irma" (Schweers, 2018). Bacterial concentrations associated with fecal matter were regularly reported as exceeding regulatory standards. As a university chemistry chair noted, "finding a waterway that actually meets state standards, failing bacteria tests less than 10 percent of the time, is almost unheard of" (Patterson, 2017b).

Value Frames

Fecal matter articles presented human health as the overriding reason for reader concern. Descriptions of sewage-tainted waters inherently suggest health risk, yet such risks were also made explicit. Bacteria from fecal matter was linked to ailments including diarrhea, nausea, vomiting, ear infections, and hepatitis A, and were described as having "threatened the lives" (Fletcher, 2018) of people, particularly those who swim in or otherwise directly interact with surface waters. Nitrate from fecal matter was described as "toxic to humans at concentrations that currently exist in portions of the Floridan aquifer," (Knight, 2015b) and was linked to diseases including blue baby syndrome, cancers, thyroid disease, and birth defects. As with industry, wildlife conditions were presented primarily as indicators of human health risk. Shellfish, for instance, were depicted as transmitters of disease: "oysters filter huge amounts of water and can ingest contamination that sickens the person who later eats those oysters" (Patterson, 2015).

To a lesser extent, economics was positioned as a reason for reader concern. Fecal contamination was described as a bane to a water-centric economy that relies on tourism and recreation. "When it's not clean, when people don't want to use it, it's bad for business" (Soergel, 2012). As in other categories with substantial public cost implications, there was considerable coverage of the challenges funding large wastewater projects. As Atlanta's City Watershed Management Commissioner described, "the problem is money—the city is getting less of it to fund the work, and officials know taxpayers are less willing to shoulder the burden" (Stirgus, 2010).

Proposed septic requirements and potential increases in sewage rates raised concerns of the costs imposed on individuals as the region pursues improved water conditions. Mandatory septic inspections, for example, were cast as financial hardships for some residents,

For people of limited means, the estimated \$150 for an inspection (and up to \$300 if the tank must be pumped out) plus a \$30 program fee may be money they don't have. And if the inspection finds that the system isn't working anymore, the cost of repairs or replacement become frightening. (Our opinion: A necessary burden?, 2010)

There were also concerns that proposed legislation could “stigmatize properties that have septic tanks and discourage buyers from purchasing them” (Rangel, 2017). In cities, sewer rates were the point of concern, particularly in Atlanta which “has some of the highest, if not the highest, water billing rates in the nation” (Stirgus, 2010).

Value Frame Synthesis

Table 3 summarizes the value frames employed by article category. Across all topics, the economic implications of water challenges were emphasized as either a dominant or secondary value frame. Human health and ecosystem value frames were utilized across an equal number of article categories. Because both economic and human health frames can activate egoistic and social-altruistic interests, every article category offers a relevant appeal to people of these value orientations. However, ecosystem frames, which are more likely to appeal to those with biospheric value orientations were not substantially utilized in over half of the article categories.

Table 3.

Value Frames by Article Category

Category	Value Frames		
	Economic	Human Health	Ecosystem
Weather	Dominant		Secondary
Residential	Dominant (water use)		Dominant (water contamination)
Agriculture	Secondary		Dominant
Algae	Dominant	Secondary	
Industry	Secondary	Dominant	
Springs	Secondary		Dominant
Energy	Secondary	Dominant	
Municipal	Dominant		
Fecal matter	Secondary	Dominant	

Discussion

This qualitative framing analysis takes a new approach to assessing potential imbalances in the reporting of environmental topics. By assessing the journalistically described implications of a region’s range of water challenges, we examined whether news coverage is inclusive in attending to the interests of the egoistic, social-altruistic, and biospheric oriented individuals. Our results revealed substantially less attention to the

concerns of biospherically-oriented individuals – those interested in and motivated by impacts to the non-human, natural world.

By conducting our evaluation across the range and volume of water reporting, and not limiting the study to a specific water issue, we identified a framing trend that may not otherwise be apparent. At its essence, a hierarchy of concerns appears to have influenced the reasons put forth for the public to care about water. At the top of the hierarchy were economic concerns, dominant in four article categories. On municipal and residential water conservation topics, the economic concern was future oriented, posing the question, will the water supply and supporting infrastructure promote or hinder development? On topics of algae and atmospheric conditions, the foremost economic concern was present monetary conditions and the associated implications for economic welfare. In all other categories, economics remained prominent but in a secondary role. As a result, reporting across water categories consistently attended to the interests of both egoistically oriented individuals (concerned with personal monetary success) and social altruistically oriented people (concerned with societal economic outcomes). Human health implications comprised the second level of the hierarchy. In those categories (industry, energy, and fecal matter) that readily connect to visceral safety concerns due to the presence of raw sewage or chemicals such as arsenic, human health was presented as the dominant reason for reader interest. In such cases, health risk overwhelmed coverage of all other implications including potential economic and ecosystem impacts. Notably, the topics of other categories (specifically, agriculture, algae, and municipalities) also pose human health risk, yet health was not presented as the dominant concern, possibly because the language associated with the risk was less palpable—“nutrient pollution,” while sometimes associated with devastating illnesses, is unlikely to evoke the same fear as “arsenic.” The implication for public interest is similar to that of economic framing – in half the article categories, egoistically and social altruistically oriented people were likely to connect to the content based on the implications for themselves or other humans.

In each of the categories discussed thus far, the identified water issue also posed substantial risk to ecosystems due either to decreases in surface water or increases in contamination; yet ecosystem risk received relatively little journalistic attention. That human health and economics together dominated value framing indicates an emphasis on human welfare, which is secured both through bodily health and economic health. Ecosystem impacts were last in the hierarchy of water concerns. Though ecosystem impacts were the dominant frame in as many categories as human health, the manner in which ecosystem implications were discussed did not convey the level of importance attributed to other value frames. As a result, the primary concerns of biospherically oriented individuals were frequently absent.

The most prominent use of ecosystem value frames was observed in the springs category. Because springs are regional recreational areas, it is not surprising that place value frames were pronounced, but the manner in which the value was conveyed was unlike the framing of any other topic. Water bodies and wildlife were not abstractly impacted, they were anthropomorphized, converting frames of place value into a form of human health. Springs did not merely decline in quality, they “suffered” and “died.” With springs, there was a clear intent to connect to readers’ biospheric motivations, with concern expressed for water bodies in a manner similar to the concern expressed for human bodies. In contrast, residential water pollution (a subset of the residential category), which also invoked place value as the primary reason for reader interest, expressed concern less for the intrinsic value of ecosystems, than for the aesthetic benefit to humans.

Agriculture was the final category to promote place value as the principal reason for concern. The relationship between agricultural water impacts and ecosystems was less journalistically established than the cause-and-effect relationships of other categories; still, the use of ecosystem frames made agriculture the one category to seemingly violate our hierarchy of water concerns, which would have predicted regional economic harm as the dominant value frame (as observed with other contributors to nutrient pollution). One possible explanation is that the degree of ecosystem impact from agriculture was more pronounced (or perceived to be more pronounced) than the ecosystem impact from other sectors. A second possible contributing factor was the portrayal of family farmers as sympathetic characters, symbolizing community and stewardship. In a storytelling realm reliant on reduced complexity, the portrayal of farmers as economic sufferers could be perceived as inconsistent with narratives suggesting that agricultural production exacts some negative economic consequences on the region.

Aside from these few categories, ecosystem concerns were not prominent in journalistic coverage of water issues, yet this was not because the risk did not exist. Water contamination that threatens human health is also likely to pose a threat to wildlife. Likewise, a decrease in the amount of water available for human use corresponds with a decrease in the surface water available to support an ecosystem's flora and fauna. It is perhaps not surprising that economics and human health were emphasized. After all, everyone has an investment in health and economics even if some individuals are more interested in ecosystem impacts. In addition, while water issues vary in the types of harm inflicted—to the economy, human health, or ecosystems—the solutions typically come with an economic cost which also affects framing choices. The issue, therefore, is not that economics and human health are emphasized, but that all three values are not represented on topics to which they clearly apply.

What then are the potential implications of a scarcity of biospheric values in the region's water reporting? To answer this question, we must begin by acknowledging that news reporting is only one of many potential factors affecting the public's water interests and environmental behavior. Personal experience, social influences, and a priori values, among other factors are likely to influence water perceptions and decisions. Moreover, when people consume the news, they do so with partiality. Selective media exposure can cause individuals to opt for news outlets and news stories that attend to their interests and worldviews (Hart & Nisbet, 2012; Kunda, 1990). Furthermore, the information consumed is selectively processed based on an individual's existing values and mental models (Hart & Nisbet, 2012; Kunda, 1990). With these substantial caveats established, we offer three important implications of relatively low news attention to biospheric values.

First, readers with strong biospheric value orientations may be unaware or inattentive to the ecosystem effects of regional water issues-based on newspaper reporting alone. More knowledgeable readers may be able to infer that a water contaminant that threatens humans is also likely to threaten wildlife, but readers would have to consciously engage this line of thinking. If news media are not explicit about ecosystem impacts, they may not exist in the minds of readers (Kahneman, 2011). Second, the types of actions deemed appropriate to address water issues depend on the problems associated with those issues. If risks to human health and the economy are perceived as the main implications of deteriorated water conditions, then steps may be taken to address those concerns without attendance to related ecological implications. Third, as a limited resource, water supply cannot always meet demand; therefore, tradeoffs are required. For example, water consumed by municipalities is not in stream for ecosystems. Similarly, water contaminated as a result of economically beneficial activity may be detrimental

from an ecological perspective. These tradeoffs can be effectively made by society only if competing value choices are “on screen” for the members of that society. At present, for many of the region’s water issues, ecological implications appear to be off screen in newspaper reporting. Additionally, a previous study in the region identified the sentiment that environmentalists’ views are extreme (Hundemer & Monroe, 2020). Based on our analysis, this perception is understandable. Extremism is the extent of deviation from the mainstream, and the mainstream news media are not substantially conveying biospheric concerns. As a result, when tradeoffs are discussed, calls for ecosystem protection with an economic cost can be perceived as unreasonable, even though the measure of reasonableness may be biased by the media and other information sources.

While environmental journalists bear some burden for ensuring diverse values are reflected in news coverage, so too do their sources. Particularly at this time when news resources are overextended (Barthel, 2019), journalists may not be fully aware of the connections between natural resources issues and public values (Archibald, 1999). News sources have the ability to clarify these connections. Ultimately, the extent to which ecosystem values are reflected in journalist-source discourse is likely the extent to which such values are reflected in reporting. Due to limited resources, journalists may be increasingly reliant on easy-to-procure content such as corporate press releases and governmental reports (Autzen, 2014). If egoistic and social-altruistic values are disproportionately represented in these resources, then, again, biospheric values are less likely to be represented in news coverage.

The emphasis on economics and human health may additionally reflect long established news values that shape story selection and framing (Allern, 2011; Galtung & Ruge, 1965; Mencher, 1994; Østlyngen & Øvrebø, 1998). For instance, economic and human health implications may be perceived by news producers as less ambiguous than ecosystem implications which can be more difficult to quantify. Measurability of economic and human health outcomes also increases the likelihood that these impacts will reach a journalistic threshold of intensity, making the topic “newsworthy.” Similarly, economic and human health effects may be perceived as more relevant and important to a paper’s readership. These news values, among others, can serve as effective heuristics for news selection most of the time, but they may not result in a balanced representation of environmental values in news coverage. As value frames are reconsidered and adjustments made, caution should be exercised to avoid unintentionally provoking water conflict between stakeholder groups. The social decisions made on the basis of value tradeoffs affect lives and livelihoods; as a result, people are highly invested in the way water issues are perceived. Decisions made on water values could determine if agriculture continues to thrive in the region, if recreational areas maintain their appeal, if new industry relocates to the area, and if people can swim in the water without contamination concerns. If water news values appear to favor one outcome over another, partisanship could heighten as could distrust in the media. Future research should examine these risks and evaluate how the framing of multiple, competing values affects societal tradeoff assessments and partisanship. This work is of particular importance as the media environment continues to shift.

Although local and regional newspapers are currently key environmental news sources, it is unclear how long they will remain so (Pew Research Center, 2019). By considering the values reflected in newspapers, society will be better equipped to address related concerns as they emerge in the media types that fill a widening news gap.

To our knowledge, the framing method employed in this study provides a new approach for assessing the inclusivity and impartiality of environmental news reporting. By associating

water value frames with human value orientations, we are able to assess whether news coverage attends to the interests of a diverse public and supports balanced tradeoff assessment. Media, new and old, are among the best positioned to make the public aware of the range of implications of environmental issues and to, thereby, support decision making in the public interest. Though broad retrospective analyses of value frames, it is possible to reveal where framing imbalances exist and to provide evidence for news adjustment.

Limitations of this study relate to the regional scope and media type examined. Many of the water challenges in the Floridan aquifer region have relevance in other locations, but the manner in which the issues are framed could vary. Furthermore, we only examined articles produced by newspapers and their associated online news sites. The public also relies heavily on television, social media, and other online news sources for coverage of local issues (Pew Research Center, 2019). Also, as noted earlier, there is a significant difference in the number of articles sampled from the six newspapers in the study, which could have led to an overrepresentation of the frames employed by most sampled sources. Finally, in the years between the publishing of the assessed articles and present day, journalistic practices in the region may have changed. We therefore suggest that the results of this study serve as a reference point for considering whether similar framing patterns exist in other regions and with other types of media.

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