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FE845

Public Opinion about Water Availability[1]

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Acknowledgments

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Introduction

This publication summarizes results of a 2008–2009 survey of a sample population of Florida residents about water availability issues. Specifically, we focus on the responses to the following questions:

A. Do you regard water quantity (having enough water) as a problem in the area where you live? (Circle one answer)

1. Definitely not

2. Probably not

3. I don't know

4. Probably

5. Definitely yes

B. The likelihood of your area having enough water resources to meet all of its needs ten years from now is:

1. High (likely enough water)

2. Medium

3. Low (likely not enough water)

4. No opinion

C. Do you think that the amount of rainfall in your area will change as a result of global warming?

1. Yes, a significant increase in rainfall

2. Yes, a slight increase in rainfall

3. No, no change in rainfall

4. Yes, a slight decrease in rainfall

5. Yes, a significant decrease in rainfall

1. This is EDIS document FE845, a publication of the Food and Resource Economics Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. This document is part of a series entitled "Water Issues in Florida, Results of the 2008–09 Survey of Public Attitudes," reporting the results of a project designed by researchers at the University of Idaho, University of Florida, Florida A&M University, and the United States Department of Agriculture's Southern Regional Water Program. Published March 2012. Please visit the EDIS website at http://edis.ifas.ufl.edu/topic_florida_water_resources for more information on Florida's water resources.

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6. I don't know

D. The likelihood of your area suffering from a prolonged drought is:

1. Increasing

2. Decreasing

3. Staying the same

4. No opinion

Results of the survey indicate significant public concerns about water. A large proportion of respondents thought that water quantity is probably or definitely a problem in their areas, that the likelihood of having enough water in their areas in ten years is low, and/or that the likelihood of their area being affected by a prolonged drought is increasing. These concerns are also reflected in state, regional, and local policies that currently have water availability and water conservation among their top priorities.

Respondents recently moved to Florida were more likely to answer *I don't know* to the survey questions about future water availability and the likelihood of prolonged drought because of lack of knowledge about Florida's water resources. Hence, special extension programs should be developed to target such Florida residents. Other factors correlated with concerns about current and future water availability and prolonged drought were age, higher educational levels, pro-environmental attitudes, greater size of the community of residence, and the residence outside city limits. These factors should also be accounted for in the design of educational programs.

Finally, a large share of respondents did not know about the potential effects of climate change on rainfall in their areas, which reflects significant uncertainty about potential effects of climate change on local climates and thus a potential need for additional research and additional extension programming.

2008–2009 Survey of Public Opinion in Florida

This publication is the last in a series of five publications describing a survey of Florida residents about water resource issues. The objectives of the survey titled Water Issues in Florida were to document public awareness, attitudes, and actions toward water resources, and to collect baseline data for evaluation of the success of future outreach and educational programs. The survey was mailed to 1,154 randomly-selected Florida residents in the fall of 2008 and spring of 2009; 523 households completed and returned the survey for a 45.5 percent response rate.

Since the sample population is made up of people from many demographic groups, statistical models were developed to determine if responses were dependent on those characteristics. In comparison with the 2000 US Census for Florida, survey respondents were comprised of a larger proportion of older, more educated, male residents (Table 1). The majority of the survey respondents were male (68%), were at least sixty years old (60%), and had at least a high school diploma (97%). Most survey respondents resided in cities with populations of at least 25,000 residents (76%), had resided in Florida for at least five years (90%), and resided in Florida year-round (89%). Differences between the total Florida population and the sample of the survey respondents indicate that survey results may be affected by a non-response bias (i.e., people who responded to the survey may be different from those who did not [Israel 2009]). Although such bias is typical for mail surveys, generalization of the survey results to the state population as a whole should be approached with caution. Nevertheless, the results from this survey can be used to understand attitudes about water resources by different socio-economic groups and to guide the development of water resource educational programs.

Fifty Percent of Survey Respondents Regarded Water Quantity as a Problem

Survey respondents were asked whether they regard water quantity (having enough water) as a problem in the area where they live. Fifty percent responded that water quantity is *probably* or *definitely* a problem, while 14 percent did not know and 36 percent did not perceive water quantity as a (probable or definite) problem (Figure 1).

The responses varied by respondents' education level and residence characteristics. Respondents with higher educational levels (specifically, some college education, college degree, or an advanced degree) were more likely to indicate that water quality is *probably / definitely a problem* (based on the ordered logit modeling results) (Figure 2). Furthermore, respondents living in larger communities (25,000 residents or greater) were more likely to indicate that water quantity is a problem (as shown by ordered logit modeling results) (Figure 3). The last result can possibly be linked to the restrictions imposed by larger municipalities

to encourage water conservation and their effects on public attitudes.

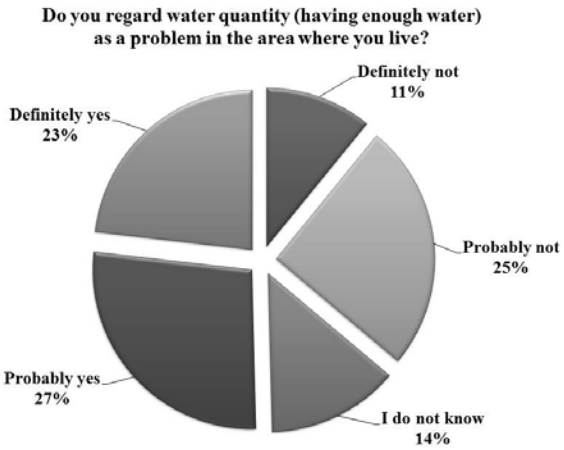

Figure 1. Responses to the question "Do you regard water quantity (having enough water) as a problem in the area where you live?" (percent respondents)

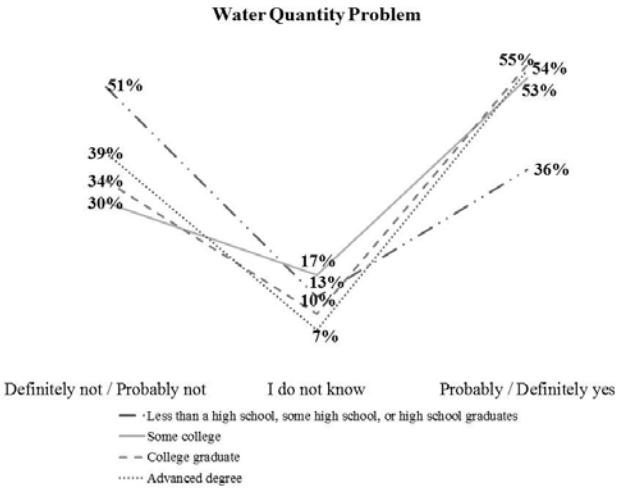

Figure 2. Differences in the perception of water quantity problem depending on respondents' educational level

Many Respondents Believe the Likelihood of Their Area Having Enough Water in Ten Years Is Low

Respondents were asked to estimate the likelihood of their areas having enough water to meet all of its needs in ten years. Almost half of the respondents (49%) believed that the likelihood is *low*, a third (34%) thought that the likelihood is *medium*, and only a tenth thought that the likelihood is *high* (Figure 4).

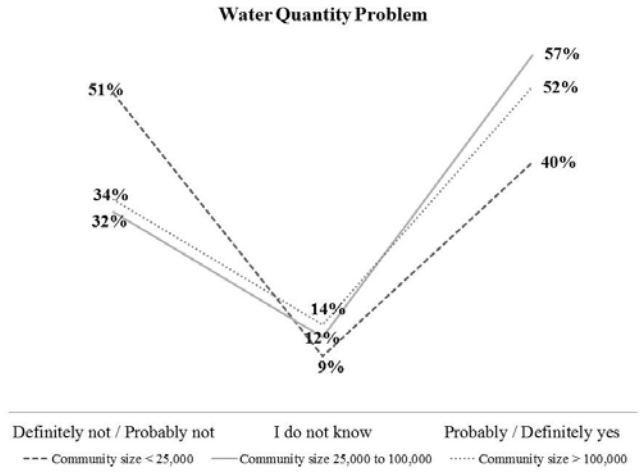

Figure 3. Differences in the perception of water quantity problem depending on respondents' community size

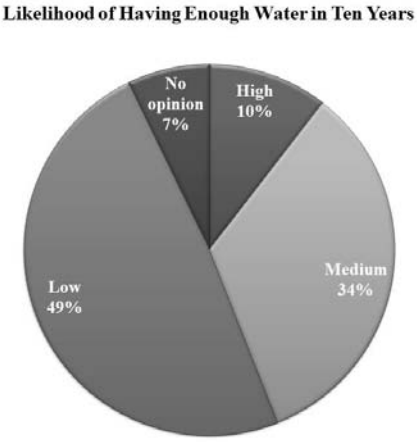

Figure 4. Respondents' opinion about the likelihood of their area having enough water to meet all of its needs in ten years (percent respondents)

Responses depended on the length of respondents' residence in Florida, with recent arrivals typically being less informed about area-specific water quantity. Specifically, 20 percent of the respondents who moved to the state less than five years ago had *no opinion* about the likelihood of having enough water in ten years (compared with 5% of respondents who had lived in Florida all their lives) (Figure 5). This implies that water resource extension programs should focus on delivering water resource information to people who have recently moved to the state.

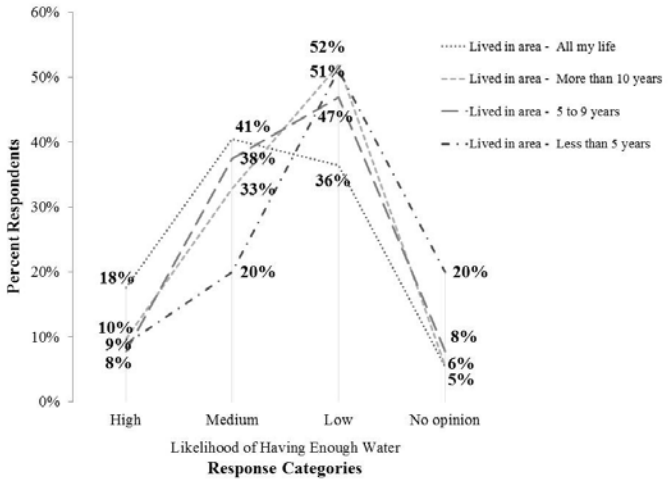

Figure 5. Distribution of responses to the question about the likelihood of having enough water in ten years, by respondents' length of residence in Florida

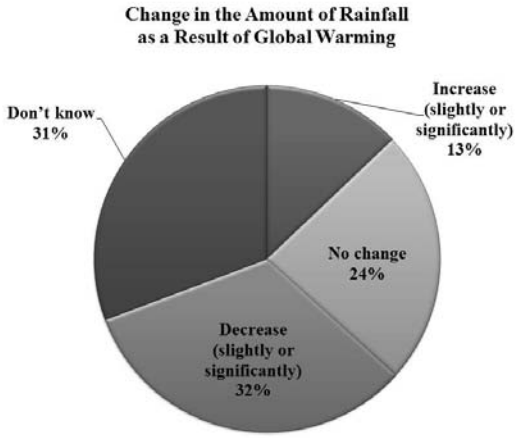

Figure 6. Responses to the question "Do you think the amount of rainfall in your area will change as a result of global warming?" (percent respondents)

Majority of Respondents Believe the Likelihood of Prolonged Drought Is Increasing

Any change in rainfall, evaporation, groundwater recharge, or runoff due to climate variability and change would affect freshwater availability and demand. For example, water demand for irrigation depends on rainfall. In addition, rainfall influences the rate of replenishment of groundwater aquifers and surface water bodies, while temperature influences water evaporation rate.

Survey respondents were asked if they think the amount of rainfall in their area will change as a result of global warming. Responses varied greatly: a third of the respondents (31%) answered *I don't know*, while another third thought that rainfall will *decrease (slightly* or *significantly)* (Figure 6). Almost a quarter of the respondents (24%) thought that rainfall *will not change*, and the remaining 13 percent believed that the amount of rainfall will *increase (slightly* or *significantly)*. Such differences in opinions may reflect the fact that scientists cannot predict with certainty the effect of global warming (also referred to as climate change) on the climate in the southeastern United States (Southeast Climate Consortium 2008), although many predict that if atmospheric concentrations of greenhouse gases continue to increase, the climate in Florida will become hotter and drier (Stanton and Ackerman 2007; Breuer et al. 2008).

No differences in answers by socio-demographic or residence characteristics were found (based on chi-square tests and logit modeling results).

Respondents were also asked about the likelihood of their area suffering from a prolonged drought. As defined by Strzepek et al. (2010), drought is a climatological term generally defined as a deficiency of rainfall over an extended period of time. A majority of the respondents (58%) thought that the likelihood is *increasing* (Figure 7). Only 4 percent thought that the likelihood is *decreasing*, while 31 percent thought that the likelihood *stays the same*, and 7 percent had *no opinion* on the issue.

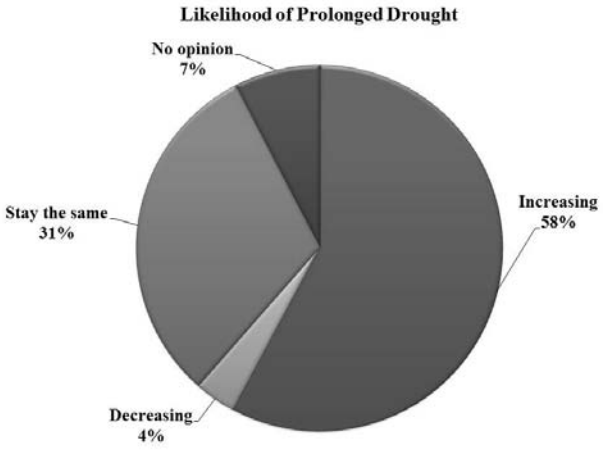

Figure 7. Responses to the question about the likelihood of respondents' area suffering from a prolonged drought (percent respondents)

Answers depended on the length of the respondents' residence in Florida, with more recent arrivals answering *I don't know*. Specifically, 18 percent of those who moved to Florida less than five years ago selected *I don't know*,

compared with only 6 percent of those who have lived in the state five years or longer.

Opinions differ significantly among respondents of different ages (as shown by the logit modeling results). Those 45 years old and older were significantly less likely to select the *don't know* answer (Figure 8). Furthermore, respondents 45–64 years old were significantly more likely to indicate that the likelihood of prolonged drought is *increasing*.

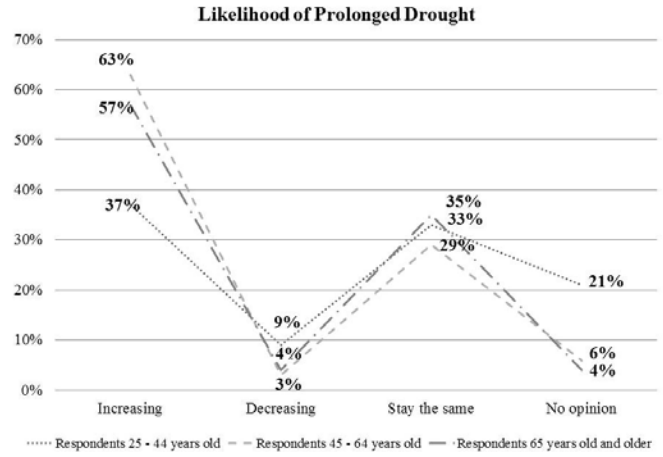

Figure 8. Opinions about the likelihood of a prolonged drought, by respondents' age groups

Other things being equal, respondents with advanced degrees, those living outside city limits, and those with pro-environmental attitudes were more likely to indicate that the likelihood of prolonged drought is *increasing*.

Water Resource Planning in Florida

Overall, survey results indicated that most of the respondents were concerned about current and future water availability and the likelihood of prolonged drought. Are these concerns reflected in the state and regional water policies?

Following state laws, Florida's five Water Management Districts, which are the state's regional water management authorities (Carriker and Borisova 2009), develop water management plans for their jurisdictions (with the support and guidance from the Florida Department of Environmental Protection). These plans identify whether sources of water are adequate to supply existing and future water uses. The plans are developed for at least a twenty-year planning horizon, and are updated every five years (Chapter 373.036, Florida Statutes). For the areas where it is determined that existing water sources do not meet existing and future reasonable and beneficial water uses, regional water supply plans are developed. Such regional water supply plans include a list of water supply development projects, such as new groundwater wells, surface water withdrawals, reclaimed water reuse, desalination, stormwater storage, rainwater harvesting, water conservation, or other projects that should allow meeting future water demands (Chapter 373.709, Florida Statutes).

The latest water supply assessment conducted by Florida's Water Management Districts showed that many areas require regional water supply plans since current water sources are not adequate to meet future water needs. Specifically, regional water supply plans are needed for nearly all of northeast Florida, as well as parts of north-central, central, southwest, and south Florida. In central Florida, in the area called the "Central Florida Coordination Area," all groundwater withdrawals are capped at the level that will be needed to meet Florida's 2013 water demands. The possible increase in demands beyond 2013 will have to be met through conservation, reclaimed water, and alternative water supplies. Additionally, areas in south and southwest Florida need "recovery strategies" to meet the legal requirement to keep the minimum flows and levels of water in the streams and groundwater to support aquatic life. Finally, in northwest Florida, coastal areas need protection against saltwater intrusion into the public water supply wells (FDEP 2010).

Overall, water resource planning and assessments indicate that the state faces the significant challenge of managing water resources, given increasing water demands, declining aquifer levels, and potential effects of climate change on water use and availability (City of Miami 2008; Dorfman and Mehta 2011). As demonstrated by the survey results, this challenge is recognized by the general public, which is largely concerned about current and future water availability.

To address the challenge, Florida's Water Management Districts have been developing a variety of water supply projects, including reuse of reclaimed water, construction of storage reservoirs, expansion of the surface water treatment facilities, and the development of brackish groundwater supplies to meet increased future water use (FDEP 2010). Water conservation (i.e., reduction in per-capita water use) is also a significant component of future water supply plans. Along with economic factors (e.g., higher water bills) and policy requirements (e.g., watering restrictions), household implementation of water conservation measures is largely driven by the recognition of the need to conserve water and

protect water resources. Survey responses show that the public is largely concerned about water availability issues, and this may imply that the public is largely prepared to make behavioral changes to conserve water.

Conclusions

This publication summarizes results of a public survey about Florida water resources. The respondents were asked about the quantity of water in their area, water availability in ten years, the likelihood of prolonged drought, and the effect of climate change on rainfall. Based on the survey results, we can make the following conclusions:

1. A large proportion of the respondents thought that water quantity is *probably* / *definitely* a problem in their area (50% of respondents), the likelihood of their area having enough water in ten years is *low* (49% of respondents), and/or the likelihood of their area suffering from a prolonged drought is *increasing* (59% of respondents). Such attitudes of Florida residents agree with state and regional policies that focus on water supply development projects and water demand management, including water conservation.

2. Lack of access to accurate forecasts of potential climate change impacts on regional weather and climate creates a diversity of opinions on the topic among the general public. In our survey, 31 percent of the respondents *don't know* what effect climate change will have on the rainfall in their areas, and the opinion of the rest of the respondents varied widely from *increase* to *no change* or *decrease*. Such results indicate that climate forecasts can be used as an educational tool to reduce the uncertainty about future rainfall levels. (Currently, research and educational programs focused on climate variability and changes are developed and implemented by Florida academic institutions and the Florida Cooperative Extension Service. Such efforts include the Plan of Actions for the Climate Variability and Change Extension focus team [UF 2008], climate and weather tools and publications of the Southeast Climate Consortium [SECC 2008b], and several projects of the Florida Climate Institute [Florida Climate Institute 2011].)

3. The length of respondents' residence in Florida was correlated with selection of specific answers. Specifically, those who moved to the state less than five years ago were more likely to answer *no opinion* / *I don't know* about the likelihood of having enough water in ten years and the changes in the likelihood of prolonged droughts. Therefore, special water resource educational programs should be developed to target recent arrivals to the state. Targeted workshops, mailing campaigns, brochures for new home buyers and renters, and presentations at homeowner association meetings can be used as possible venues for such educational programs.

4. Respondents with advanced degree were more likely to indicate that water quantity is (*probably* or *definitely*) a problem. They also were more likely to reply that the likelihood of a prolonged drought is *increasing*. These results are similar to the findings reported by other studies about greater environmental concerns of those with higher educational levels (e.g., Van Liere and Dunlap 1980). Further analysis is needed to explain this effect, given that higher educational levels can be related to higher income and wealth, better access to technical information, and/or higher occupational status, all of which can have an effect on environmental attitudes.

5. Other socio-demographic factors that were correlated with the answers about *increasing* the likelihood of prolonged drought were: respondents' pro-environmental attitudes, age (45–64 years old), and residence outside city limits. We also found that residents living in larger communities (25,000 residents or greater) were more likely to indicate that water quantity is *definitely* a problem in the areas where they live. Such differences in attitudes should be taken into consideration in developing water resource policies and educational programs. We did not find any statistically significant differences in responses among part-time and full-time Florida residents, or among male and female respondents.

6. Given that among the survey respondents highly educated and older Floridians were over-represented, survey results may over-estimate the proportion of Florida residents concerned with current and future water availability. Survey participation is generally more attractive for those who are the most concerned about the subject of the study, and hence, the sample surveyed can often be different from the population as a whole (referred to as "non-response bias"). Increased mailings or contact efforts is suggested as a common way to avoid (or reduce) the non-response bias (Israel 2009). However, in the study, each person in the survey sample was contacted four times. Overall response rate for the survey is high (45.5%), and further increase in contacts were judged unfeasible.

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Table 1. Comparison of the survey respondents and Florida's total population

Criteria	Survey Respondents	Total Florida Population
Sex		
Male	68%	49%*
Female	32%	51%*
Age		
60 and over	60%	22%*
Median age (years)	64	39*
Education		
High school or higher	97%	85%**

* Based on 2000 Census (US Census Bureau 2000).
** Population 25 years old and over; based on 2006–2008 American Community Survey three-year estimates (US Census Bureau 2008).