

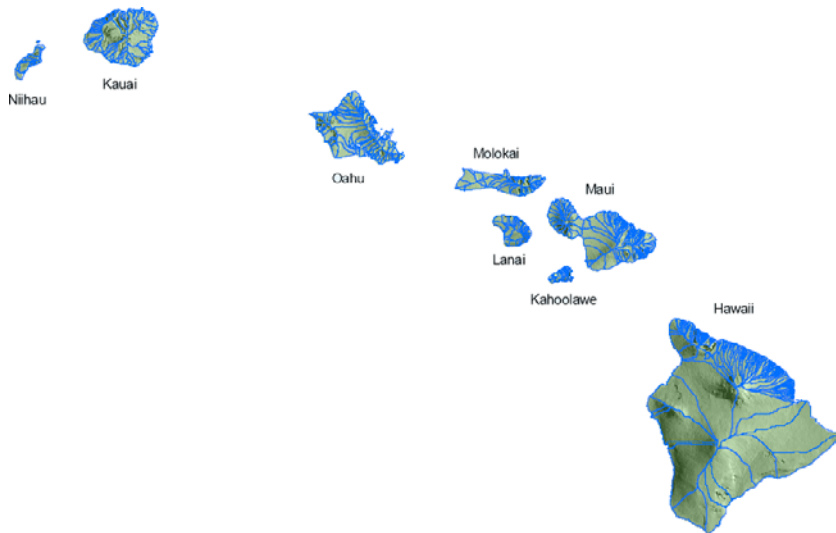


**Cooperative Extension Service**  
College of Tropical Agriculture and Human Resources  
University of Hawai'i at Mānoa

# Water Issues in Hawaii

## A Survey of Public Attitudes

Luisa F. Castro





# Water Issues in Hawaii, A Survey of Public Attitudes

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In this report, readers will learn about Hawaii residents' awareness and attitudes about and actions taken concerning water quality. Prior to this survey, no baseline data existed on the public's perceptions regarding water issues in the state of Hawaii. This report will help the Cooperative Extension Service and other public service agencies to determine potential audiences and educational needs to better plan for the future of their programs.

## Summary

Drinking water, as an issue, has almost universal support among Hawaii residents. Our research found that almost all respondents (98%) believe that clean drinking water is extremely or very important. Over 80 percent of respondents are satisfied with their water quality, and 89 percent feel that their home water source is safe to drink.

Hawaii residents are evenly split about water *quantity*. Half of the respondents consider water quantity to be a problem, while the other half believes there is enough water in the area where they live (8% of respondents were unsure).

Just over half of the respondents (50%) do not believe the environment is receiving enough emphasis from the Hawaii state government, 26 percent believe state government is doing enough, and 20 percent are unsure.

The majority of respondents indicate they presently conserve water by engaging in behaviors that might improve the environment.

## Introduction

The Hawaii Regional Water Quality Program (RWQP), in conjunction with the United States Department of Agriculture-Cooperative State Research, Education, and Extension Service Southwest States and Pacific Islands Regional Water Quality Program, has conducted a survey of water issues in Hawaii. The purpose of this research is to help the Hawaii RWQP with their understanding of the public's awareness and attitudes about and actions concerning water quality. Surveys were also

conducted in the states and island entities within the Southwest States and Pacific Islands Region (EPA Region IX) including Arizona, California, Hawaii, Nevada, American Samoa, Guam, Marshal Islands, Federated States of Micronesia, Commonwealth of the Northern Mariana Islands, and Palau. However, only information for Hawaii will be presented in this report.

The survey questions were divided into five sections: (1) how the participant feels about the environment, (2) what the participant thinks about various water sources and their condition, (3) who the participant thinks should be responsible for water issues, (4) the participant's environmental perspective, and (5) the participant's water quality education level and sources of information. In addition, demographic information, including community size, Zip code, length of time residing in Hawaii, gender, age, and educational level, was also collected from the survey respondents.

## Research objectives

The primary objectives of the research were to measure attitudes and perceptions among the general public about water issues, to benchmark water conservation behavior, and to evaluate the potential effectiveness of communicating water issues using different media.

## Research method

### *The survey*

The 37-question survey was designed using a set of questions initially provided by water quality coordinators in the northwest states and then modified as a result of advice from the Hawaii RWQP Coordinator. It was designed to be broadly consistent with the surveys conducted in the Pacific Islands to allow comparisons to be made. Although results presented here are for Hawaii only, additional survey summaries are available for the Southwest States and for the Pacific Island territories and Freely Associated States.

The survey was mailed out to 322 residents randomly selected from Hawaii phonebooks. A total of 161

completed surveys were needed for a 50 percent return rate. Three mailings were used to achieve this return rate. The survey was completed by 163 Hawaii residents in early 2004. The data collected were analyzed using the SAS procedures at the University of Idaho. The University of Idaho was involved because it piloted the use of this survey in the Pacific Northwest and was experienced with the data analysis.

The demographic information collected served two main purposes. The first was to see how closely the sample represented the known population. The more closely the demographic distribution of survey respondents matches the population, the more confidence can be placed in the data. The second purpose was to allow analysis of subgroups of those responding to the survey.

### **Analysis**

Survey answers were coded. Missing data were assigned the number nine on the coding system and excluded from the analysis. The data were analyzed at two levels using SAS (Norusis 1986). The first level of analysis was a basic data summary. This analysis showed both the total number and percentage of respondents who answered each question with a specific answer. The second level of analysis involved using cross-tabulation, or contingency tables, to isolate how specific subgroups of survey respondents (e.g., demographic groups such as gender and education level) related to specific questions. Significance ( $P < 0.05$ ) was tested using a chi-square distribution (Babbie 1983).

### **Bias**

The survey estimates are subject to sampling errors and other systematic errors and biases. For example, non-respondents may have been generally less concerned about the environment, and this may have introduced a bias into the results.

Poor questionnaire design (e.g., leading questions) can also influence the results and encourage respondents to give answers they think are expected of them. Efforts were made to limit such problems.

### **Survey demographics**

The water issues survey achieved a return rate of 50.6 percent (163 fully or partially completed and returned out of 322 surveys). Sixty-five percent of the survey respondents were male. Over 35 percent of survey respondents lived in communities of more than 100,000 people. Conversely, 17 percent of residents lived in towns less than 7,000 people. Forty-four percent of respondents had lived in Hawaii all of their lives, and 85 percent had lived in Hawaii for at least ten years. Eighty-nine percent of survey respondents were high school graduates or higher; the breakdown was elementary or some high school 8%, high school graduate 11%, some college 29%, college graduate 29%, and advanced college degree 24%. Overall, the demographics of the survey respondents (except for gender) closely resembled the actual demographics of the state based on Census 2000 data for Hawaii.

**Table 1. How important is each of the following water issues to you? (Responses to Questions 1 to 11 in ranked order of "Extremely or Very Important.")**

Water Issue	Importance (% of responses)	
	Extremely	Extremely or Very
Clean drinking water	88	98
Clean groundwater	62	97
Water for household/private sector	55	95
Clean rivers	52	93
Protection of aquatic organisms	42	83
Water for agriculture	32	83
Watershed restoration	50	81
Destruction of wetlands (riparian areas)	45	78
Water for commerce/industry	20	66
Water for power generation	22	58
Water for recreation	22	56

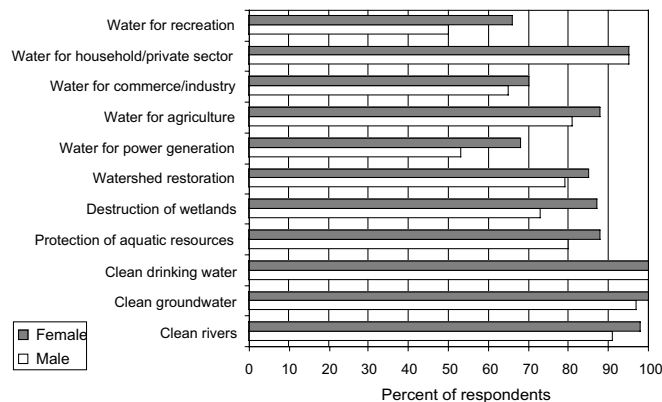
**Summaries of responses to survey questions**

**How do you feel about the environment?**

Survey respondents rated the importance of 11 water issues (Table 1). Clean drinking water is the most important issue in Hawaii: 88 percent of respondents ranked the issue as extremely important, while 98 percent ranked it as either extremely or very important. Other water issues that were considered as either extremely or very important by over 90 percent of respondents included: clean drinking water, clean groundwater, water for household/private sector, and clean rivers.

Gender affected how people viewed water issues. For instance, for 9 of the 11 questions, females were more likely than males to rate issues as very or extremely important. Everyone, male or female, agreed that water for drinking is the most important water issue, while 95 percent of both males and females agreed that water for household and private sector use was the third most important water issue.

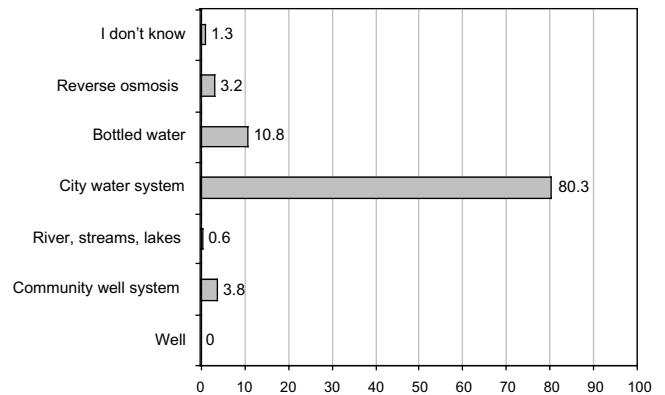
**Figure 1. The importance of water issues, by gender.**



**Water issues**

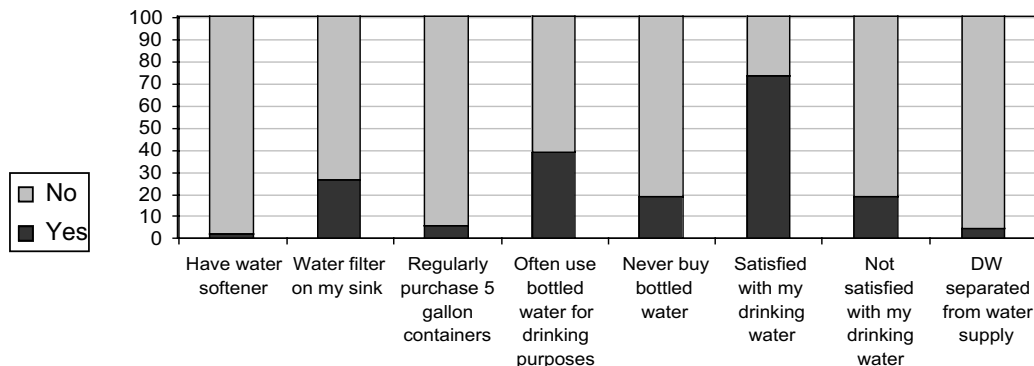
In order to measure consumer awareness of general drinking water issues, respondents were asked if they could identify the source of their drinking water. The source of water can be an important factor affecting water quality. Figure 2 shows that over 80 percent of the respondents identified the city water system as the source of their drinking water.

**Figure 2. Where do you get your drinking water? [Responses to Question 12]**



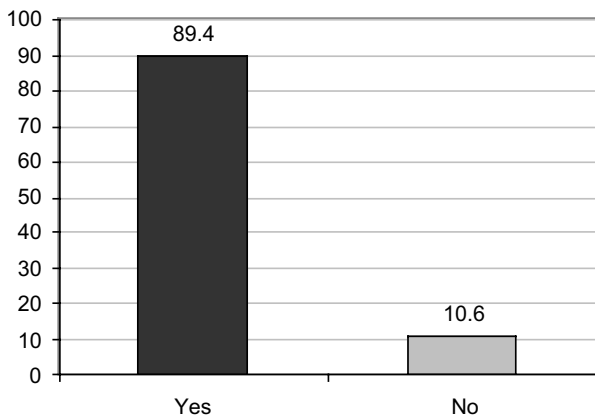
Respondents were also asked to check off what things applied to their home drinking water system. This question looked at how many respondents use one or more home water treatment method and/or purchase bottled water on a regular basis. Figure 3 summarizes the responses and shows that 73 percent of the respondents are satisfied with their water quality. Only a small percentage of respondents have added some type of treatment or opted to purchase bottled water. Unlike their mainland counterparts who spend billions of dollars on all manner of home water filtering gear, Hawaii survey responses show that less than 2 percent of respondents use water softeners, 26 percent use water filters, and 5 percent are purchasing 5-gallon containers of drinking water.

**Figure 3. Please check all of the boxes that apply to your home drinking water system. [Responses to Question 13]**



Eighty-nine percent of survey respondents feel that their home water source is safe to drink, while only a little over 10 percent do not, as summarized in Figure 4. The demographic factors of state of residence, community size, age, education, gender, and occupation do not impact answers about the safety of drinking water. A significant number of U.S. residents drink tap water: 82 percent (which equates to 231 million nationally) drink tap water, according to an Environmental Protection Agency commissioned Gallup poll conducted in 2003 (EPA 2003).

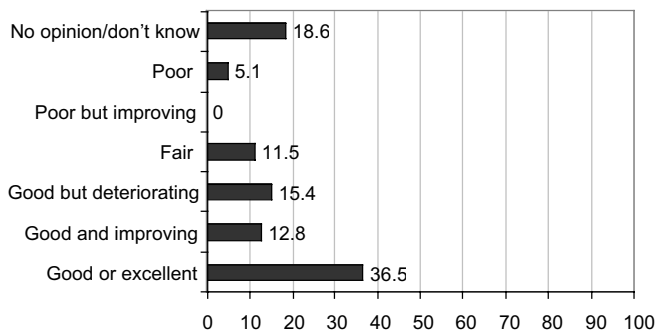
**Figure 4. Do you feel your home water is safe to drink? [Responses to Question 14]**



Hawaii has 376 perennial streams, 457 ground and surface water sources, and 150 water delivery systems to support a population of 1,244,898.

Compared to the mainland states, Hawaii has very few groundwater problems due to a long history of land use controls for groundwater protection (EPA 2000). Sixty-five percent of respondents consider groundwater quality to be good or better (sum of “good or excellent,” “good and improving,” and “good, but deteriorating” in Figure 5); however, there is some concern that the quality of this resource is slipping.

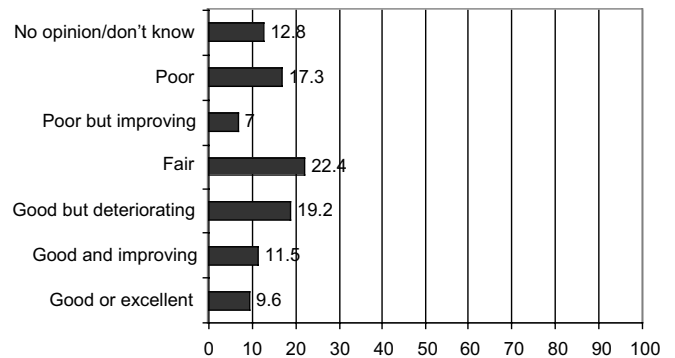
**Figure 5. In your opinion, what is the quality of groundwater in your area? [Responses to Question 15]**



Only 5 percent of survey respondents rated groundwater quality poor. Almost 19 percent of those surveyed did not have enough information to give an opinion.

Most of Hawaii’s water bodies have variable water quality due to storm-water runoff. During dry weather, most streams and estuaries have good water quality that fully supports beneficial uses, but the quality declines when storm-water runoff carries pollutants into surface waters (EPA 2000). Forty percent of survey respondents rated surface water quality good or better (sum of “good or excellent,” “good and improving,” and “good, but deteriorating” in Figure 6). However, almost two-thirds of the respondents citing surface water quality as good are concerned about deterioration of this resource. Another 22 percent of respondents graded surface water quality as fair. Conversely, 17 percent of respondents felt that the quality of local surface water was poor.

**Figure 6. In your opinion, what is the quality of surface waters where you live? [Responses to Question 16]**



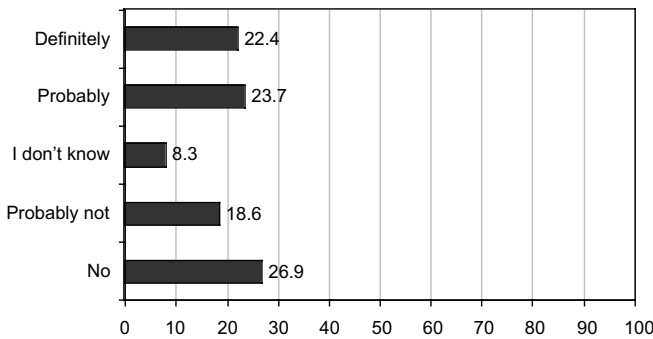
According to a U.S. Geological Service report, *Estimated Use of Water in the United States in 2000*, 4,820,000 gallons of groundwater and 7,220,000 gallons of surface water are withdrawn on a daily basis to supply domestic uses in Hawaii (Hurton et. al. 2004).

According to a survey of state water managers by the U.S. General Accounting Office in 2003, state managers surveyed in Hawaii indicated a susceptibility to regional water shortages within ten years (USGAO 2003). However, a newspaper article responding to this report stated that Hawaii water managers say they expect drinking water supplies to meet growing demands for 20 years in most areas of the state (Starbulletin 2003).

Residents are evenly split on whether or not they consider having enough water to be a problem. Forty-six percent of respondents believe their area has enough water (sum of “probably” and “definitely”) while another 46% believes their area does not (sum of “prob-

ably not” or “no”) (Figure 7). Eight percent of respondents are unsure if there is a water quantity problem in the area where they live.

**Figure 7. Do you regard water quantity (having enough water) as a water problem in the area where you live? [Question 17]**



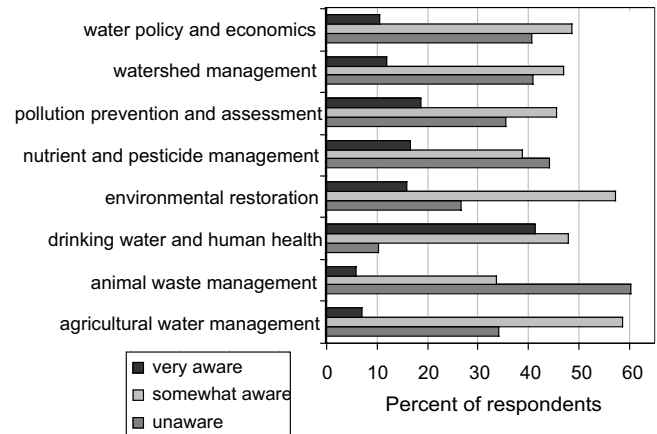
Consistent with previous questions on the importance of various water issues, survey respondents ranked drinking water as most important followed by wildlife, irrigation, power generation, and, lastly, recreation.

**Figure 8. Rank the following water uses from most important (1) to least important (5) to you. (Use 1, 2, 3, 4, and 5 only once) [Question 18]**

Item	Rank
Drinking water	1
Wildlife	2
Irrigation	3
Power generation	4
Recreation	5

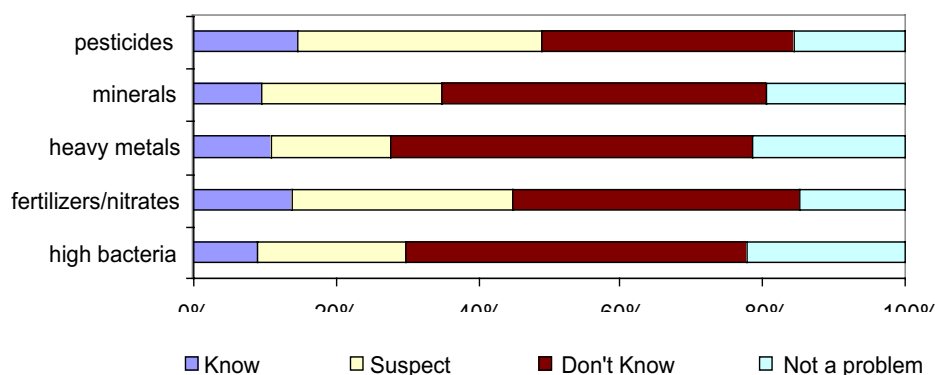
In general, participants did not claim to be very aware about any one issue when given a list of factors that affect water quality (Figure 9). They were especially unaware of how animal waste management influences the quality of water, with a little over 60 percent of respondents indicating a lack of awareness.

**Figure 9. How would you rate your awareness of the following factors that affect water quality? [Question 19]**



There also exists a general lack of knowledge regarding potential pollutants. Over 40 percent of respondents indicated they did not know if four out of five given pollutants affect the water quality in their area (Figure 10). Respondents were most aware of pesticides, with 49 percent indicating they “know” or “suspect” that pesticides affect their water quality. According to an EPA report to Congress (2000), the most significant pollution problems in Hawaii are siltation, turbidity, and nutrients, while occasional problems result from organic enrichment, toxics, pathogens, and pH from nonpoint sources.

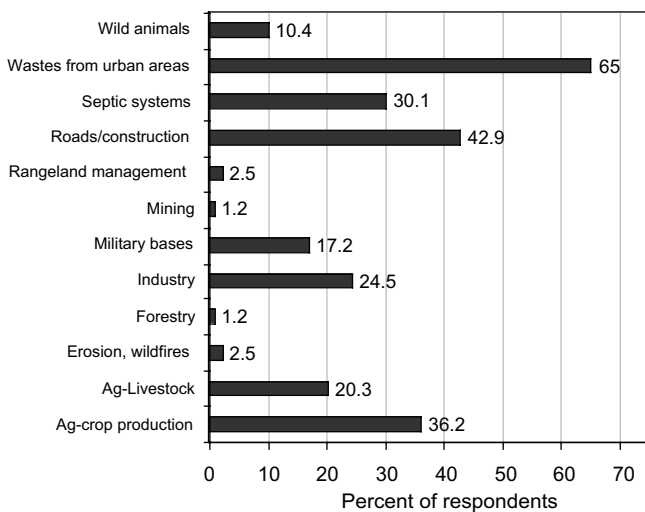
**Figure 10. Do you know of or suspect that any of the following conditions affect water quality in your area? [Question 20]**





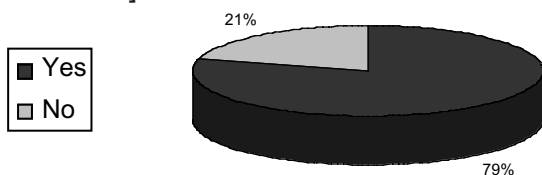
Given an option to choose 3 (from a list of 12) sources most responsible for surface water pollution, two-thirds (65%) of respondents included wastes from urban areas among their choices. Nationally, concerns have been raised about industry, agriculture, forestry, and other large land-disturbing activities as the culprits of groundwater and surface water contamination, but this was not reflected in the responses in this survey. Industry was identified by 25 percent of respondents, agriculture by 36 percent, and forestry by 1 percent. According to an EPA report to Congress, very few point-sources discharge into Hawaii’s streams; most industrial facilities and wastewater treatment plants discharge into coastal waters (EPA 2000).

**Figure 11. Which of the following are most responsible for the existing pollution problems in rivers and lakes in your state? (Select three.) [Question 21]**



A watershed is an area of land that drains into a body of water such as a stream, lake, or bay. There are 551 watersheds in the state; everyone lives, works, and plays in a watershed. When asked if they know what a watershed is, 79 percent of the participants answered “yes” while 23 percent answered “no” (Figure 12).

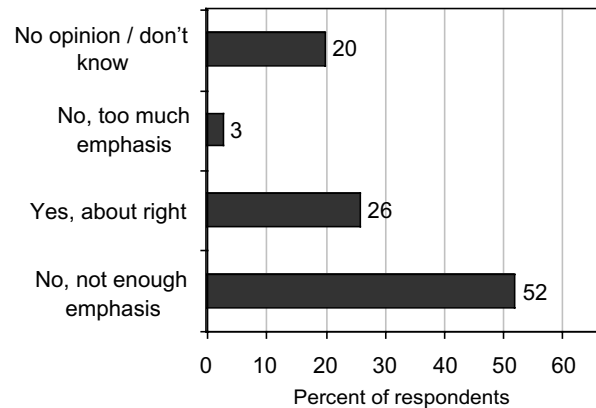
**Figure 12. Do you know what a watershed is? [Question 22]**



**Governance**

A fourth of the respondents (26%) feel that environmental protection receives about the right amount of emphasis from local government and elected officials, while over half (52%) feel it does not receive enough emphasis (Figure 13).

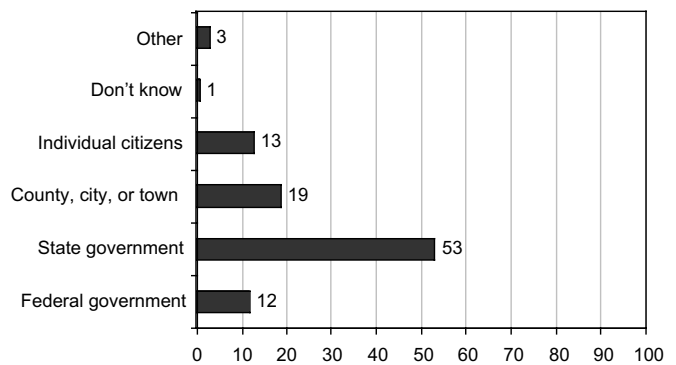
**Figure 13. In your opinion, does the environment receive the right amount of emphasis from local government and elected officials in your state? [Question 23]**



Almost three-fourths of respondents (72%) believe local government, both state and county/city/town, as opposed to the federal government, should be responsible for protecting water quality (Figure 14).

Generally, the Commission on Water Resource Management is responsible for addressing water quantity issues, while water quality issues are under the purview of the State Department of Health.

**Figure 14. In your opinion, who should be most responsible for protecting water quality in your community? [Question 24]**



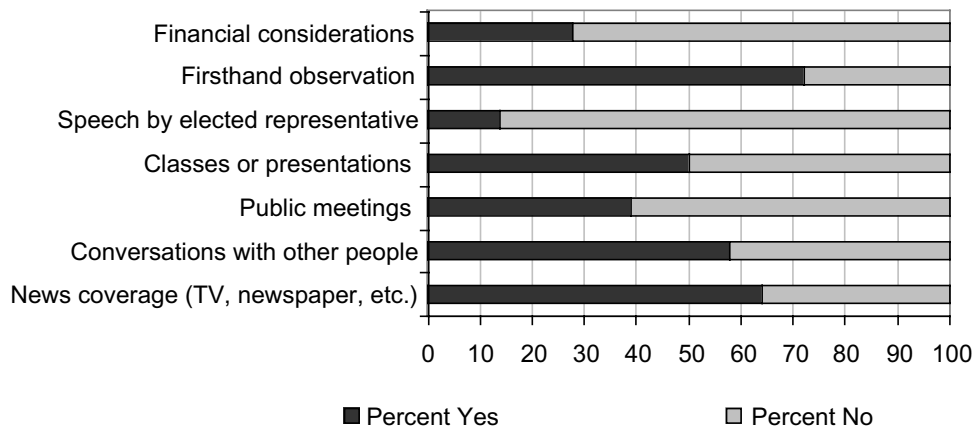


**Your environmental perspective**

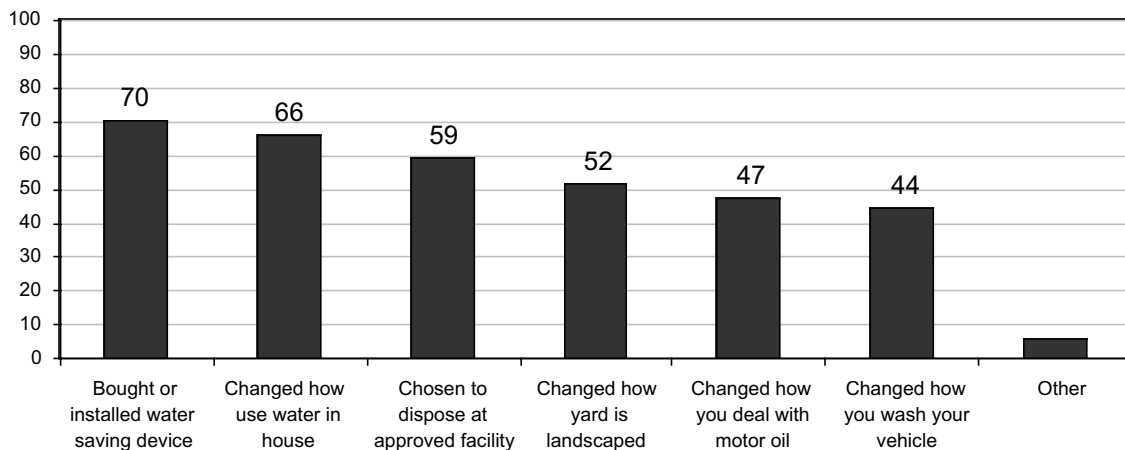
The majority of respondents (72%) have changed their mind about an environmental issue as a result of personal, first-hand observation. They were least likely to change their mind due to a speech by an elected representative, with only 14 percent of respondents indicating this.

The survey asked participants whether or not they engage in behaviors that might improve their environment. What residents do in and around their homes can affect the quality of everyone’s water. The majority of respondents (70%) have bought or installed a water-saving appliance such as a shower head, refrigerator, dishwasher, toilet, or clothes washer and/or changed how they use water in their homes (66%) in activities such as brushing teeth, doing laundry, and washing dishes.

**Figure 15. Have you ever changed your mind about an environmental issue as a result of... [Question 25]**



**Figure 16. Have you or someone in your household done any of the following as part of an individual or community effort to conserve water or preserve water quality? (Check all that apply.) [Question 26]**



When asked to rate their personal inclination towards natural resource use versus environmental protection, most of the survey participants (58%) favor environmental protection, with 33 percent of participants believing in an equal balance between use and protection (Figure 17). Only 6 percent of respondents favored resource use.

**Water quality education**

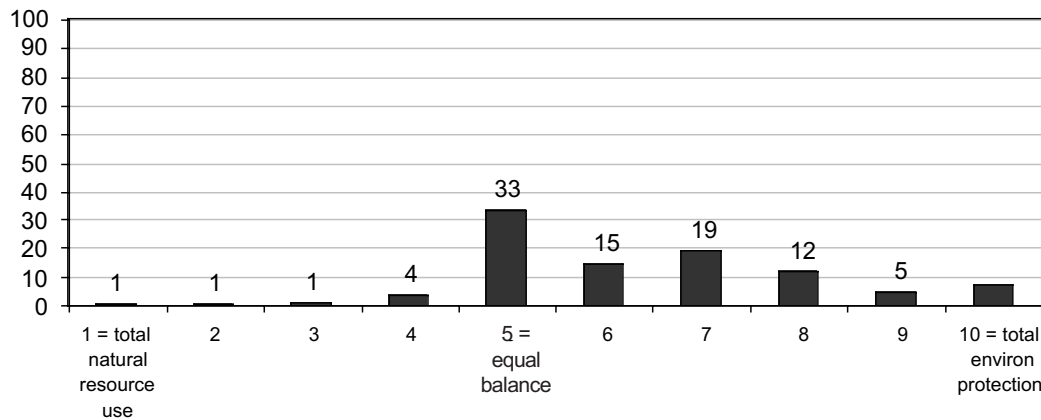
A majority of respondents have received water quality information from newspapers (76%), television (73%), and environmental agencies (58%) (Figure 18). Respondents rated the University’s Extension Service as the last source for receiving water quality information, after elementary and secondary schools.

Interestingly, 30 percent of Hawaii respondents are reading their annual drinking water quality reports or Consumer Confidence Reports (CCRs), compared to the national average of 29 percent (EPA 2003). In 1998, the U.S. Environmental Protection Agency (EPA) passed

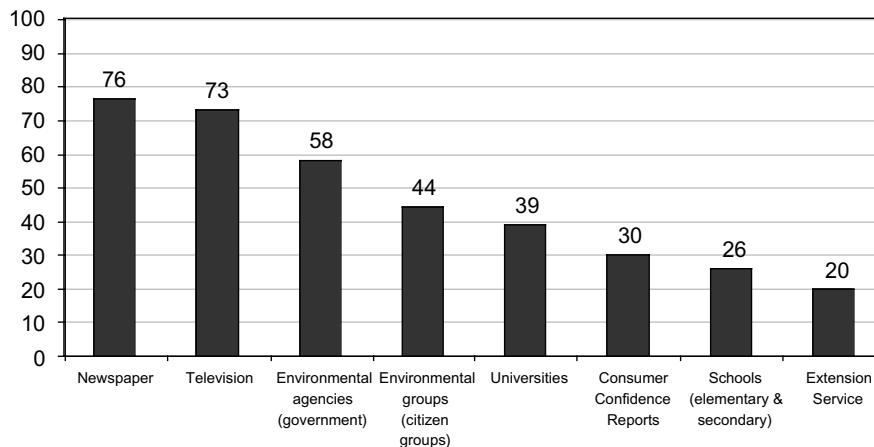
new regulations requiring that an annual report on the quality of drinking water be provided to customers by their community water system agencies. CCRs are intended to “improve public health protection by providing educational material to allow consumers to make educated decisions regarding any potential health risks pertaining to the quality, treatment, and management of their drinking water supply.” (EPA 2005).

A majority of respondents would like to learn more on the topic of drinking water and human health, with 74 percent indicating this preference (Figure 19). This coincides with the results of previous questions where respondents have rated the importance of clean drinking water either on its own, or in relation to other issues, and it is consistently ranked as the most important issue. Animal manure and waste management received the lowest rating, with only 17 percent of participants indicating their interest in this topic.

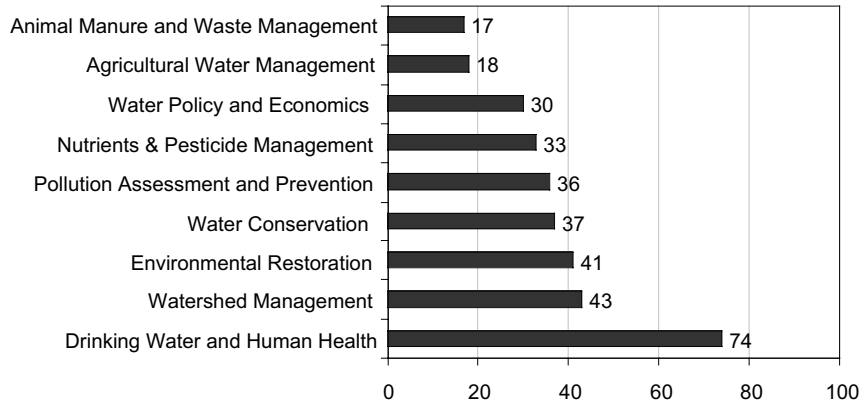
**Figure 17. Please rate yourself on how you see yourself on environmental issues. Give a number, on a scale of 1 to 10, where 1 = total use of natural resources, 5 = equal balance between resource use and environmental protection, and 10 = total environmental protection. [Question 27]**



**Figure 18. “Yes” responses to the question: Have your received water quality information from the following sources? [Question 28]**



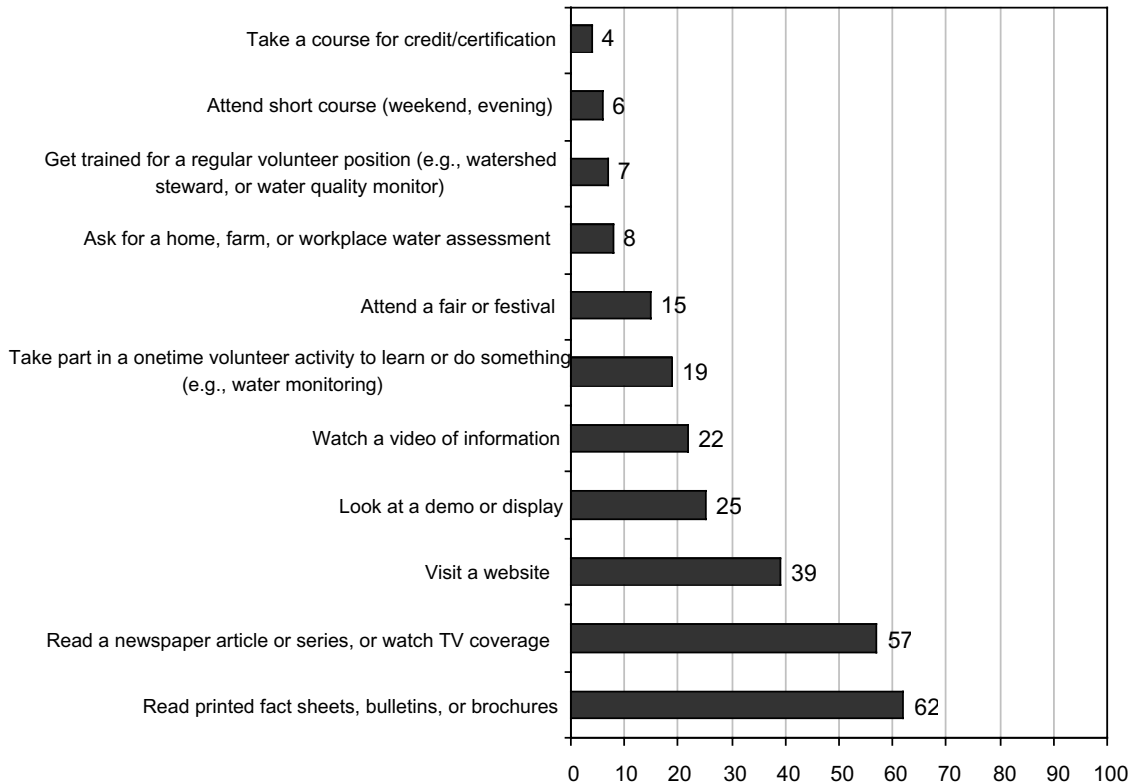
**Figure 19. Would you like to learn more about any of the following water quality issue areas? (Circle all that interest you.) [Question 29]**



When given options of how they would most likely take advantage of learning opportunities with regard to water quality issues, most respondents (62%) indicated that they would like to read printed fact-sheets, bulletins, or brochures, while 57 percent expressed an interest in reading newspaper articles/series (Figure 20). These are likely to be inexpensive methods of communicating with the public, and interested parties should

take advantage of this finding. Workshops and short-courses as educational tools to learn about water quality are not popular in the state. Participants are not likely to take an active role in learning about water quality issues, with only 7 percent opting to get trained for a regular volunteer position (i.e., as a water quality monitor) and 5 percent opting to take a short-course for certification or credit.

**Figure 20. If you had the following kinds of learning opportunities available, which would you be most likely to take advantage of for water quality issues (check up to 3 items)? [Question 30]**



## Conclusions and recommendations

This survey provided the Hawaii Regional Water Quality Program with important information that will be used to develop a strategy to meet water education needs of residents of the state. It should be noted that the survey findings are public perceptions. Public perceptions are not necessarily backed by scientific facts. In interpreting these survey results, the first step should be to evaluate the scientific data on water. If the evaluated data contradicts public perceptions, then educational programs are needed to correct public perceptions. On the other hand, it is expected that little scientific water data have actually been conveyed to the public in a meaningful way. If this is the case, future educational programs should encourage both public awareness and strategic data collection.

### Important findings include:

- All water resource issues presented in the survey were considered important by at least 50% of respondents.
- The survey respondents consider drinking water the highest priority water issue.
- There is a strong perception that Hawaii's drinking water is safe in its current state.
- Most respondents feel that groundwater quality is good, but most are concerned with deteriorating surface water quality.
- Urban wastes, road construction, and agricultural production were common pollutant sources cited as being problematic.
- Most residents have taken at least one voluntary action in the last five years to protect both the quality and the quantity of their water.

Based on this survey, policy-makers can be assured that people want this resource protected and that state and local governments are considered to be most responsible.

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