

Additional file 1: Full Interview Protocol (English Version)

A Spanish language version of the following protocol was used to guide the interviews:

Introduction:

My name is name and I am a student from institution. I am a member of the FuturAgua research project. As part of a scientific study, we are interested in knowing your views about water systems in Guanacaste. We are interested only in your opinion and so there are no right or wrong answers. During the interview, I may ask a question more than once in order to make sure that I understand what you are saying.

This interview is completely voluntary and confidential. I would like to record the interview, so that I don't have to take notes and instead can focus on what you are saying. Please do not share any identifiable information or names of people you know as examples during the interview. If you feel uncomfortable answering any question, let me know and we can skip that question and go on to the next one.

The interview will take about 1 hour. You must be 18 years or older to participate.

Do you have any questions before we start?

I will be starting the interview recording now. Is this okay with you?

Questions:

I. Stakeholder Perceptions of Water Resource SES (social-ecological systems)

The first thing I would like to talk about today is the water resources here in [local location].

1. Please tell me about the state of water resources here in [local location]. Can you tell me more about water resources here? What about in other areas of Guanacaste?

Potential Follow-ups:

- a. Tell more about whether the amount of water [from rain/in the ground/in the rivers and lakes/from the aqueduct] is enough or not enough for your needs/others/the environment? Why is the amount of water enough or not enough?
- b. What happens when the amount of water is low? Why?
- c. Is the surface water, such as in rivers and/or lakes, safe for human use? Is the groundwater safe for human use? Is the surface water safe for other uses? Is the groundwater safe for other uses? Why?
- d. Tell me more about the quality of the [specific type(s) of water resources]. Is the water clean or contaminated? Why is the water quality like this?
- e. What happens when water quality is low? Why?
- f. What do you use water for? What are the sources of water that you use and/or manage for the use of others? What could you use water resources for? What do others use water for? How is water used in the environment? How is water used in the local economy?

2. Can you describe how the amount of rainfall varies over a year?
 - a. Is this pattern always the same each year?
 - b. Has this pattern changed in the past? Has it changed over the past 10 years? How? Why?
 - c. Do you think this pattern will change in the future? Will it change in the next 5 years or next 50 or next 100? How? Why?

3. Can you describe how the temperature varies over a year?
 - a. Is this pattern always the same each year?
 - b. Has this pattern changed in the past? Has it changed over the past 10 years? How? Why?
 - c. Do you think this pattern will change in the future? Will it change in the next 5 years or next 50 or next 100? How? Why?

4. Can you explain how the current pattern of rainfall affects you? When are the most critical times of the year in terms of water resources for you?
 - a. Why is this time period/are these time periods critical?
 - b. What about this time period is/these time periods are critical (amounts of water, timing)?
 - c. Are there times that will become critical if water availability changes in the future? Why?
 - d. Is there a part of the year in which changes in precipitation would be particularly detrimental to you? Why?

5. How do you manage the situation when there is less water than you need? Why would there be less water than you need?

6. How do you manage the situation when there is more water than you need? Why would there be more water than you need?

7. Can you tell me about short term extreme precipitation or temperature events? Can you describe how they affect you/affect others?

8. How do you manage the situation when the quality of water is low or changes? Why would water quality be low? Why would water quality change?

9. Tell me how the way you [various actions depending on stakeholder: operate your business/farm your land/provide electricity/make regulations/use water resources] might affect the water resources available for everyone else. Anything else?

II. Stakeholder Perceptions and Use of Information related to Water Resource SES

10. How do you know when water resources are going to be [limited/abundant/contaminated/clean]? How do you know what impact this will have?
 - a. Where do you go to get your information from? Why?
 - b. Who do you talk to? Why?
 - c. When do you know? Why?

- d. When do you need to know? Why?
 - e. Is that always how you know? Why?
11. On a scale of 1 to 10 [describe scale], how sure are you that you know when the water resources will be [limited/abundant/contaminated/clean]? Why?

You mentioned [] as a source of information. On a similar scale from 1 to 10,

12. How accurate is that source (to what extent do you think they know the reality)? Why?
- a. Does the accuracy change depending on how far into the future these events are? Why?
13. With what certainty does that source provide information?
14. How trustworthy is that source (to what extent do you think they tell you what they really know)? Anything else?
15. Can you tell me about other ways you could know when water resources are [limited/abundant/contaminated/clean]? Anything else?
16. What else would you like to know about the state or impact of water resources that you don't know?
- a. Why would you like to know that?
 - b. Is that possible to know? Why/Why not?
17. Do you have to be absolutely sure about when resources will be [limited/abundant/contaminated/clean] in order to take actions related to water resources? Why?
- a. If not, how certain do you have to be? Why?
 - b. How certain can you be? Why?
 - c. Are different actions taken, depending upon how sure you are? Why?

III. Stakeholder Perceptions and Use of Forecasts and Scenarios

18. What can you tell me about rainfall forecasts?
- a. Over what time period and geographic scales do they cover?
 - b. How do you get such forecasts?
 - c. Who gives them to you?
 - d. What do they look like/sound like?
 - e. What do you think of them? What do you like or dislike about them?
 - f. Can you tell me about a forecast that you have seen or used?
19. Tell me how forecasts are considered when you manage water resources.
- a. If they are not considered, why and how might they be?
20. On the scale of 1 to 10, how accurate are such forecasts? Why?
- a. How accurate have the forecasts been that you have used/seen?
21. With what certainty are such forecasts presented?

22. What can you tell me about climate scenarios? What about climate models?
 - a. What time periods and geographic scales do they describe?
 - b. Which specific scenarios and models are you familiar with?
 - c. How do you get such scenarios?
 - d. Who provides them to you?
 - e. What do they look like/sound like?
 - f. What do you think of them? Do you trust them? What do you like or dislike about them? Why?
23. Tell me how such scenarios and climate models are considered when you manage water resources.
 - a. If they are not considered, why and how might they be?
24. Can you tell me about climate change?
 - a. Is climate change occurring? If so, why?
 - b. Does climate change affect you? If so, how?
25. Where do you learn about climate change from?
 - a. If scientists, how do you think scientists know about climate change? What tools do they use? How much do you trust scientists?
 - b. If media, where do you think the media gets its information about climate change from? How much do you trust these news sources?
26. Is there anything else you would like to mention about forecasts or scenarios or water resources in general?

IV. Demographic Questions:

27. What is your age?
28. What is your occupation?
29. What is your official job title (if you have one)?
30. What do you see as your professional role?
31. What kind of training do you have?
32. What education levels have you completed?
33. How long have you been in your current position?
34. How long have you been with your current organization?
35. Are you affiliated with any other organizations?

Conclusion:

36. We will be performing a larger survey related to this topic. Can you think of one question you would like to add to this survey?
37. What did you think about participating in this interview?
38. Do you have any additional questions for me?

You can contact email1 or email2 for more information about this research project. Thank you for your time.