Hydrol. Earth Syst. Sci. Discuss., 11, C1381–C1386, 2014
www.hydrol-earth-syst-sci-discuss.net/11/C1381/2014/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Hydrological, ecological, land use, economic, and sociocultural evidence for resilience of traditional irrigation communities in New Mexico, USA" *by* A. Fernald et al.

A. Fernald et al.

afernald@nmsu.edu

Received and published: 13 May 2014

Response. We greatly appreciate the detailed comments. We provide specific feedback only on the ones that appear to call for comment or revision

General comments This is an ambitious paper, and I understand that it is a discussion paper, not a standard research paper. I enjoyed reading much of the content and found it quite interesting. That said, I have two general comments and many specific ones that I think should be addressed prior to publication.

Comment My first general comment is that it is difficult to follow the course that the

article takes. Many topics are discussed, presumably by each of the different authors. I think this paper suffers from what many multi-authored papers suffer from, which is a lack continuity across the differently authored sections. -

Response: Will go through and smooth content from one writer's perspective.

Comment: As a result, it is sometimes hard to keep track of all of the questions and methods going on in this paper. Some of the language makes it sound like novel research was done for this paper, which feels odd given that it is a discussion paper. Also, the different sections are mostly unattached from each other. As an example, in section 3.1 a decrease in cattle and the implications of this for acequia adaptability is discussed. But then in section 3.2.1 we read about a shift towards a cattle-dominated system, and this is seen as an indicator of acequia strength and adaptability. How do we reconcile these different trends into one coherent story?

Response: Will switch sections to make more logical and fit together: Fig. 6 section after land use section to point out that even though cattle have dropped since the mid 1990s (Fig. 6), the overall pattern for a longer period of time (about 75 years) is that cattle have increased.

My second general comment is that this paper feels in parts more hopeful than empirical. By that I mean it feels like claims are made about the resilience of the acequias that are not necessarily supported by data. I am sensitive to this because I feel like I have seen this before, when the ecosystems service-based benefits supposedly derived from the acequias have been discussed. There is material out there that makes large claims that the acequias produce such benefits with little to no scientific documentation of this. I should say that I strongly suspect that such benefits exist, but this doesn't mean we can assume they do and claim this without doing the empirical work. I would strongly urge the authors to avoid language that makes this paper feel like a rallying cry for the acequias. Even though many of us strongly believe in their importance, in my view that is not the appropriate role for scientific papers. One way

this could be addressed is to be clear on how much evidential basis there is for certain claims throughout the paper. Do we have (1) data, (2) scenarios/simulations, or (3) hypotheses as the basis for such claims?

Response: Will try throughout to clarify the actual evidence and data compared to background or conjecture.

Specific comments There isn't really a segue into section 2.3 and it doesn't seem to fit very well with the rest of section 2 (which deals with acequia functionality as it interacts with larger-scale forces). I would try to include a better segue and make it fit better with this section, or drop it.

Response: We agree and will make better fit based on hydrologic importance to riparian areas.

Comment: For figure two I would think it would help to label when the irrigation input events occurred (one presumes before the spikes in the graphs, but it would be better not to have to assume this). Response: Title reword to avoid giving impression we are identifying every irrigation event and associated peak - Caption will instead refer to seasonal water table fluctuations in an acequia irrigated agricultural valley in northern New Mexico.

Comment: Page 1833, line 20: you say here that you found a "decrease in the average agricultural parcel size. . ." Doesn't this contradict your findings from the agricultural census data just previous discussed? How do you reconcile this contradiction?

Response: This has been reworded to indicate that the local village (Alcalde) did not follow the county wide trend for parcel size.

Comment: Page 1833, lines 26-30: you claim that a shift towards cattle production maintained the "resiliency" of the irrigation system" but I'm not sure how meaningful this statement is. In general I'm a bit fuzzy on what you mean by resiliency here, and sometimes it seems like you use it as a compliment to these systems, or an expression

of hope more than as an empirically well-measured and well-documented fact.

Response: The sentence has been reworded.

Comment Sometimes you say "resilience" and sometimes you say "resiliency." I would use only one (and I prefer resilience, for what that's worth). Response: Will use resilience throughout manuscript

Comment: Page 1835, line 14: what survey is this? And where was it conducted? How many respondents were there? Also I don't really understand the second half of this sentence . . . "strongest factors among those considered for contributing to the community's adaptive capacity, preparedness, and resilience." In general there are a lot of terms here that are used without much explanation (e.g. "strength" on line 20).

Response: Yes, agree that clarification is needed. This paragraph has been expanded to include more details.

Comment: Overall I don't really see how the concept of a "balance sheet" is needed to understand the results discussed in section 3.3. I have seen such results before, as they are widely discussed within the acequia communities and among those studying them, and I haven't seen them attached to this concept before.

Response: As to the use and application of the 'balance sheet' concept. It is true that it is not a concept commonly associated with or applied to acequia communities. The intent is to highlight that community welfare and well-being extend beyond traditional economic wealth and income measures to include 'cultural wealth' and 'environmental wealth.' The point is that important household decisions, for example, concerning willingness to sell and leave compared to willingness to hold on and remain in the community are driven by broader considerations than simple economic conditions. The balance sheet concept is meant to capture and reflect the integration of these multiple measures of combined wealth, and to highlight that flows into or out from one account (i.e., strengthen or diminish the wealth) can be balanced by activities affecting

the other accounts. Balance sheet reflects the changes in the wealth balances across categories.

Comment: Section 4.1 feels like an introduction to acequias in general, which feels odd at this point in the paper after we have been talking about them for a while. I would probably move it up towards the beginning of the paper or greatly change the language.

Response: Moved to introduction

Comment: Section 4.2: it would be good to know a bit more about how this survey was distributed and to whom.

Response: The survey was distributed to acequia officers who serve as commissoners and mayordomos as the targeted group due to their knowledge about their local acequias. In some cases individual member irrigators completed the surveys when the governing body was not available. I have added this info to a revised paragraph for Section 4.2.

Comment: Figure 7: It would probably be good to label the years associated with the two drawings at the bottom of this figure.

Response: Figure will be redone.

Comment: Figures 9 and 10: The labels for the x-axis in each of these figures are excessively cluttered. You could cut out the word "farms" and I would cut down on the number of categories.

Response: Figures are revised to eliminate the word farm so that the graphs are less cluttered. However, it is important to leave the range in farm size which gives a more accurate depiction of the data examined.

Comment: Are figures 6 and 11 telling the same story with respect to cattle? It seems like they are not.

Response: The different time scales may appear to be telling different stories, but both

figures are consistent with cattle numbers being lower in 2007 that 1975.

Comment: Figure 15: I wouldn't list every year here on the x-axis.

Response: Good suggestion, see corrected figure.

Technical corrections

Page 1831, line 15: I don't think "exemplify" is the right word here: : :.

Response: "Exemplify" has been replaced with "illustrate."

Comment: Page 1831, line 24: I don't think "morphology" is the right word here.

Response: The word morphology is very appropriate because the term relates to a common methodological framework in the field of Urban Planning and Design. We would like to keep the text as written.

Comment: Page 1833, line 11: "Begins" should probably be past tense.

Response: Word changed to past tense.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 1821, 2014.