

Interactive comment on “Hard paths, soft paths or no paths? Cross-cultural perceptions of water solutions” by A. Wutich et al.

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We are very grateful for the time Dr. Wolff took in reading our work and in making suggestions for its improvement. Given Dr. Wolff’s deep experience and expertise in this area, we are gratified that he found our work to be “well written” and “worthy of publication.”

We found two of Dr. Wolff comments particularly useful in guiding our revisions. First, we appreciate Dr. Wolff’s suggestion that the paper should be more direct in its recommendations to decision-makers. Second, we agree that governance capacity is a major factor in understanding why and how people are willing to engage in soft path solutions; we will clarify the role of governance in our analysis.

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We intend for the changes made to the manuscript to address nearly all of Dr. Wolff's comments and suggestions to the extent possible within the journal word limit. Below, we respond to Dr. Wolff's comments point by point.

Comment 1. "The meaning of its findings is obscure, and the authors would do well to assist readers by drawing out that meaning. As drafted, the article concludes with a call to attempt to verify its findings through a larger sample size/ data set, in future work. But why should a funder of research care? That is not clear."

Author response: While the applied implications of our findings were addressed at various points in the discussion (i.e., Section 5 p. 7828 line 2-3, p. 7828 line 12-14, p. 7828 line 18-28, p. 7829 line 16-28, p. 7830 line 4-14), we can understand how a reader may find the implications underemphasized. In our revision, we will address these issues more directly.

Comment 2. "The paper finds that soft path solutions to water problems are less likely to be perceived as relevant in financially poor or water scarce settings. But does that imply they are less likely to be adopted there?"

Author response: In our discussion of soft path findings (section 5.2), we noted that people in water-scarce sites and less developed sites were less likely to suggest soft path solutions. We do not necessarily think that they are perceived to be less relevant in water-scarce and less developed sites. In water-scarce sites, we found (p. 7829 line 13-28) that people were unable to name additional soft path solutions because the socially acceptable ones have already been implemented. In less developed sites, we found (p. 7830 line 1-14) that people were quite supportive of individual and community-based soft path solutions due to the strength of cooperative, community-level institutions in these sites. In both cases, then, we do not believe that our data indicate that soft-path solutions are less relevant or less likely to be adopted in water-scarce or less developed settings. We will make this point more explicit in the revision.

Comment 3-1. "Do the authors think the finding supports a particular policy approach

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(i.e., hard path solutions in these [water-scarce/less developed] settings), or do they believe the finding means that the soft path approach might be equally or even more valuable, but will face strong public perception obstacles in these settings?”

Author response: In both cases, we argue that soft path solutions are socially acceptable and feasible (at least from the perspective of public acceptability). In the water-scarce sites (p. 7829 line 13-28), we believe the major obstacle may be that the “obvious” soft path solutions have already been adopted (e.g., drip irrigation in the US site, matching quality to use in the Bolivia site, water markets in both sites), and those that have not been adopted are largely either logistically difficult or socially-unacceptable (e.g., elimination of irrigated green spaces in the US site, reduction of average water consumption to less than 25 lpcd in the Bolivia site). In developing sites (p. 7830 line 1-14), we believe that soft path solutions that rely on coordinated individual or cooperative, community-level efforts would be both socially acceptable and feasible. We will make these points more explicit in the revision.

Comment 3-2. “If they believe the former, then perhaps the paper is confirming something we might intuitively expect to be true; that is, that in water scarce and financially poorer settings, physical infrastructure is preferred by those who live there because it is essential as a first step. How can one create a water market, or implement water efficient end use technologies, if physical water is barely available in the first place? Of course one soft path approach – matching water quality with the intended purpose (such as untreated river water for irrigation and treated water, or a higher quality source such as a deep well, for drinking) – makes sense in relatively undeveloped settings. But even then, some water must be available, and in various quality levels. People with access only to one poor quality source of water (e.g., trucked or untreated surface water) would naturally feel a need to get more water first, and then think about how to manage it better (which is the essence of the soft path approach). If the authors believe the paper is confirming an intuition such as this one, they should say so. Science is valuable whether it confirms or rejects our intuitive beliefs. We often don’t know if our intuitions

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are correct or incorrect, and one important role of science is to tell us.”

Author response: Our study does indeed find that people in less developed sites are more likely to suggest hard path solutions than those in more developed sites, and we argue that this is due to the urgency of their need for basic water delivery and treatment infrastructure. We discuss this in section 5.1 p.7828 line 5-15, but we can see that perhaps our statements were insufficiently direct. We will remedy this in the revision.

In contrast, however, we did not find that people in water-scarce sites were any more likely to suggest hard paths than those in water-rich sites. For instance, water market-
sâ”tthe first soft path mechanism Dr. Wolff mentionedâ”talready exist in both water-scarce sites (US and Bolivia). We discuss this in section 5.1 p.7829 line 5-11, but again understand that readers might find additional clarification of this issue helpful. We will add this to the revision.

Comment 4. “So the authors might draw the conclusion from the data and analysis that the soft path/hard path choices make sense only after a basic level of water abundance is established, either by nature or by development. That seems consistent with the data, and suggests that future research not just try to verify these findings with a larger dataset, but also try to find the threshold(s) for how much physical water supply (basic needs met?) comes first, before the hard/soft path choices become relevant.”

Author response: In our paper, we actually argue the opposite. We find (p. 7829 line 12-27) that people in water-scarce sites have already experimented extensively with locally-appropriate soft path solutions. Therefore we believe that there were few “easy answers” to be found among the unexplored soft path solutions in these water-scarce sites. In the water-rich sites, however, very few soft path solutions had been adopted at the individual or community level (owing to the fact that there was no necessity to do so), so respondents were able to list many feasible soft path solutions. We now see that this point was not sufficiently clear, and will clarify it in the revision.

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Comment 5. “Finally, I think an important parameter that has not been discussed is the governance capacity in each setting. A financially poor water scarce setting with strong governance capacity (e.g., desert tribes with a long history of social cohesion) might very well be able to implement, and might perceive as attractive, soft path approaches at very low levels of physical water supply. . . Eleanor Ostrom’s work (and that of many who ‘followed her’) demonstrates clearly that many severe environmental and resource challenges have been surmounted by ‘less developed societies’ when the right cultural conditions exist. Governance capacity is only one of these conditions, but it seems especially relevant to the pattern of data presented in this paper.”

Author response: In our discussion (section 5.2), we examine the implications of governance capacity for the adoption of soft path solutions in more and less developed sites (p. 7830 line 4-14). Specifically, we explained that, in the less developed sites, governance capacity was very strong in cooperative, community-level institutions (similar to Elinor Ostrom’s findings). In the more developed sites, we noted that national-level governance and educational institutions had particularly strong governance capacity. We then argue that the two strengths offer different but important pathways to soft path solutions in both settings. We note that we failed to use the term “governance capacity” explicitly, and wonder if this perhaps inadvertently made our discussion of this issue less accessible than we intended. We will rectify this in the revision.

Comment 6. “The soft path often requires effective collective choice and implementation mechanisms, and it is no surprise that in Cochabamba, with a long history of weak governance, the soft path would be perceived as not very relevant, and no path would seem very relevant. Weak governance capacity is very disillusioning; whether in the face of social (e.g., corruption) or natural obstacles (e.g., drought). But when governance capacity is perceived as strong, the full range of soft path solutions might also be perceived as more relevant and likely to succeed, even in the face of poverty and/or water scarcity.”

Author response: We thank Dr. Wolff for the opportunity to address this popular mis-

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conception about Cochabamba. Due perhaps to the large amount of media attention this case has received, there is an unfortunate perception of Cochabamba as having weak water governance. It is true that SEMAPA, Cochabamba's municipal water service, historically has been plagued by corruption and inefficiency in water management (Driessen 2008). However, Cochabamba actually has a very strong history of community-level water governance, of the kind Elinor Ostrom studied. Wutich's work (e.g., 2009), based on 10 years of ethnography in the city of Cochabamba, documents how water institutions work in urban commons systems. Perreault's long-term research in rural Cochabamba (e.g., 2008) similarly documents highly organized systems of commons water management. The work of Carlos Crespo (e.g. 2001, with Omar Fernández), Rocio Bustamante (e.g., 2006, with Daniel Vega), and many others, which is published primarily in Spanish, documents the extraordinary ability of Cochabambans to manage scarce water efficiently at the community level. As we argue in this paper, it is this potential for local, cooperative, community-based governance that could be mobilized to support the implementation of soft path solutions in sites like those we studied in Bolivia and Fiji. To clarify our argument, we will address this point in greater detail in the revision.

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Driessen, Travis. (2008). Collective Management Strategies and Elite Resistance in Cochabamba, Bolivia. *Development*. 51: 89–95.

Perreault, T. (2008). Custom and contradiction: Rural water governance and the politics of usos y costumbres in Bolivia's irrigators' movement. *Annals of the Association*

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