Hard paths, soft paths or no paths?
Cross-cultural perceptions of water solutions

Drew Blasco[1], Hannah McAtee[1], Amber Wutich[1], Alexandra White[1], Christopher Roberts[1], Dave White[2], Kelli Larson[3], and Alexandra Brewis[1]

[1]School of Human Evolution and Social Change, Arizona State University, [2]School of Community Resources and Development, Arizona State University, [3]School of Geographical Sciences and Urban Planning, Arizona State University

Introduction

Cross culturally it is increasingly likely that "soft path" (e.g., behavioral or regulatory) approaches to water management will be suggested as solutions to the availability of clean, safe water. In this study we examined cross cultural preferences for soft path vs. hard path (e.g., infrastructural) solutions.

We evaluate three research questions:
1) How do people conceptualize water solutions (hard paths, soft paths, no paths) cross-culturally?
2) What role does development status play in shaping how people conceptualize water solutions?
3) What role does water scarcity play in shaping how people conceptualize water solutions?

The purpose of the cross-cultural perceptions of water solutions study is to contribute to up and coming theories on how socio-economic conditions shape people's views toward hard path and soft path water solutions cross-culturally.

Data Collection
- Four sites were selected based on their diversity in development status and water scarcity (Figure 1)
- Participants in each site were given a survey on water institutions, water quality and availability, climate change, and basic respondent demographics.
- Three open-ended questions, which included information about local sources of water in their community, threats to each water source, and solutions to these threats, were also asked and responses were recorded verbatim

Data Analysis
- 135 respondents participated : 41 from Bolivia, 37 from Fiji, 27 from New Zealand, and 30 from the USA.
- 630 statements were coded
- Using a content analysis approach three mutually exclusive codes were assigned to each response: hard path, soft path, and no path (Table 1).
- Each site was then given a score for developmental status and water abundance
- Chi-squared tests for independence were used to test the relationships between our codes and the characteristics of each site.

Figure 1. The four sites chosen for this study, based on their development status and water scarcity.

	Cochabamba (Bolivia site)	Viti Levu (Fiji site)	Piopio (New Zealand site)	Phoenix (U.S. site)
Hard Paths	Build infrastructure (Build water storage tanks) (Build distribution infrastructure) (Build wells) (Cover water sources)	Build infrastructure (More water projects) (Build water tanks) (Build a purifying system) (Update infrastructure) *Build more reservoirs*	Build or improve dams	Build dams and reservoirs Extend sewage systems Build water treatment plants *Route water underground*
Soft Paths	Restrict dumping Contract water caretakers Clean tanks and wells Purify contaminated water *Match water uses to quality*	Boil water Change farming practices (Fence the spring) (Tie up animals) (Build pens) (Limit fertilizer use) Stop polluting (Consensus building) (Laws and fines)	Add more restrictions (Limit farm runoff) (Restrict industrial pollution) (Regulate tourist behavior) *More fencing* *More monitoring* More education (Public education) (Increase awareness) Reduce global warming	Add regulations and restrictions (Ration water use) (Limit population growth) (Regulate overconsumption) (Regulate chemicals/dumping) Add oversight and monitoring Voluntary measures (Conservation) (Limit pollution voluntarily) Alternative energy *Education*
No Paths	We can not do anything We just have to endure it We don't know	*It can not be solved* *I don't know*	*Nothing* *Pray*	*Let nature take its course*

Table 1. Water solutions in four cross-cultural sites: a summary of themes, subthemes (in parentheses), periphery themes (in italics).

Findings

Developmental Status
- Respondents from less developed sites suggested hard path solutions significantly more often than their counterparts (X^2 = 5.18, p = 0.02, ϕ = 0.22)
- Soft path solutions were suggested significantly more often at more developed sites (X^2 = 6.50, p = 0.01, ϕ = 0.25).
- Respondents from less developed sites were also significantly more likely to suggest no path (X^2 = 5.19, p = 0.02, ϕ = 0.22).

Water Scarcity
- Respondents from water-scarce sites were found to be no more likely to suggest hard path solutions than those from water-rich sites (X^2 =2.03, p = 0.15, ϕ = 0.14).
- Soft path solutions were suggested more often at water-rich sites (X^2 =19.65, p < 0.001, ϕ = 0.42)
- Respondents from water-scarce sites were significantly more likely to suggest there were no paths to water solutions (X^2 = 5.98, p = 0.02, ϕ = 0.24).

Conclusion

Developmental status does affect how people conceptualize water solutions, as people at less developed sites were significantly more likely to suggest hard path solutions than those from more developed ones. Water scarcity, on the other hand, has a limited impact on whether respondents identified hard path or soft path solutions.

Water scarcity does play a role in conjunction with developmental status, as people from developed, water-rich sites suggested a greater number soft path solutions than their counterparts.

Encouragingly, no path to water solutions was rarely suggested in comparison to hard path and soft path; however, those respondents in water-scarce and less developed sites were more likely to suggest that no solution might exist to mitigate their threats.