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What is This?

Tribal Housing, Codesign, and Cultural Sovereignty

David S. Edmunds[1], Ryan Shelby[2], Angela James[3], Lenora Steele[3], Michelle Baker[4], Yael Valerie Perez[2], and Kim TallBear[1]

Abstract

The authors assess the collaboration between the University of California, Berkeley's Community Assessment of Renewable Energy and Sustainability program and the Pinoleville Pomo Nation, a small Native American tribal nation in northern California. The collaboration focused on creating culturally inspired, environmentally sustainable housing for tribal citizens using a codesign methodology developed at the university. The housing design process is evaluated in terms of both its contribution to Native American "cultural sovereignty," as elaborated by Coffey and Tsosie, and as a potential example of the democratization of scientific practice.

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Keywords

> Oh man, I haven't seen you in a long time. You made it out of the hudda?
>
> Yeah, I made it out of the hudda. Going to school now and trying to find a good place to stay in town. Can't live in the hudda.

"Hudda" is a word used to describe tribal housing funded by the US Department of Housing and Urban Development (HUD) and another way of saying "Indian ghetto." (The terms "American Indian" or simply "Indian," although debated as colonial misnomers, are commonly used in federal and tribal programs today.) The popular imagination among non-Indians is probably worse than the reality—dilapidated homes, garbage, tall weeds, and so on. But two centuries after the US government first expressed commitments to provide housing to Indian people (Davis 2002), and a decade and a half after the passage of the Native American Housing and Self-determination Act (NAHASDA), Indian housing still elicits feelings of "just barely enough," of containment and marginalization.[1] Most people from the Pinoleville Pomo Nation (PPN) and the other tribes the authors work with are glad to have a roof over their heads, but would like housing to be more "aspirational,"[2] to provide a home that nurtures hope and energy and solidarity to get things done for individuals and the tribe, a home that reinforces tribal values about culture and nonhuman environments.

In this article, the authors report on a project to codesign culturally inspired, sustainable housing for the PPN, a small, federally recognized Native sovereign nation in northern California. The first purpose of this project was to build better tribal housing for the PPN, and in so doing, create a narrative for individual Pomo families and the PPN about the way housing can embody Pomo social norms and values, cultural beliefs, and practices. A second purpose was to help *all* tribes advocate for more culturally appropriate housing within a shared context of tribal-federal relations within the United States (Baker 2012). The authors shared their experiences of the project with other tribes, federal agencies, builders, and academics, hoping to create institutional space for tribal experimentation in housing and to offer a viable model of a codesign process that other tribes could adapt to their needs. Meeting these first two purposes, however, required careful

reflection on how designs should be created on the part of the authors, tribal citizens, tribal government, and other participants in the project. Together, we articulated conceptual frames; undertook technical evaluations and social analyses; arranged for in-person information sharing, debate, and discussion; and facilitated the joint evaluation of all of these knowledge-generating practices among those involved in the project. The authors consider this research in a tribal mode—collaborative, self-reflexive, grounded in a tribal framework for communication styles and in tribal venues, with research activities directed by tribal government.

The codesign process pursued in this project, described in more detail below, is intended to engage an array of stakeholders and actors with different knowledge, skills, and experiences, as well as different resources, sources of power and prestige, and interests in the project. The intention of the project was that tribal government would determine when and how the actors would work together and to what ends.

In general, the project included the following stakeholders and actors: elected officials of the PPN tribal government; employees who serve in the PPN administration; people who are officially enrolled as citizens of the PPN; professors from the Mechanical Engineering department, Architecture department, and Energy Resources Group at the University of California (UC), Berkeley; and graduate and undergraduate students from the Community Assessment of Research Energy and Sustainability (CARES) organization who were affiliated with the above mentioned Berkeley academic research departments and groups. It should be noted that not all the employees who serve in the PPN administration are PPN citizens; some employees, such as David S. Edmunds, the Environmental Director of the PPN at the time of this research, are not Native American. However, each participant in the codesign process was motivated by the principal goal of cocreating and implementing a product, in this case sustainable housing, that would meet the PPN's cultural sovereignty, political sovereignty, environmental, and economic goals. Many of the undergraduate student researchers in this research partnership were first exposed to the PPN during the 2008 Engineering 10 (E10): Introduction to Engineering Design and Analysis class offered at UC Berkeley (Oehlberg, Shelby, and Agogino 2010; Shelby, Perez, and Agogino 2011, 2012). E10 is an entry-level engineering course designed to expose first-year students to the profession of engineering. It fosters the development of technical and professional skills such as analytics, leadership, teamwork, and communication with multiple stakeholders (Oehlberg, Shelby, and Agogino 2010; Shelby, Perez, and Agogino 2011, 2012; Shelby et al. 2013). Students in E10 worked in three-

to five-person teams on self-selected sustainable design projects ranging from pesticide protection to bicycle transportation to sustainable building design for the PPN. In order to meet the PPN's various goals and aspirations for this partnership, participants from both Berkeley and the PPN together addressed which knowledge production processes should be used and how the concept of sustainability should be framed.

Defining the Research Component of the Project

To codesign Indian housing means also thinking about the purpose of knowledge and how it is produced. As Deloria, Foehner, and Scinta (1999) have noted, for tribal peoples the purpose of knowledge is to live rightly, with care and reverence. Inquiry and observation contribute to the generation of proper narratives about individual lives, communities, and locales. Abstract theorizing through general concepts detached from particular experiences is much less compelling to many Indians. Bracketing out sources of knowledge because they are not rational, replicable, or even material is not acceptable.[3]

At the broadest level, we use qualitative methods discussed in the literature on participatory action research, where tribal citizens, students, planners, engineers, and other professionals move through a spiral of collecting data, reflecting on it, and planning and implementing specific on-the-ground actions (Whyte 1990). The "spiral" is now in its fourth year and has shaped other project proposals both at the PPN and nationally.

But the research also involves engineering design models for community engagement, such as those developed by Ryan Shelby and his partners (Shelby, Perez, and Agogino 2011, 2012). We also have interpreted environmental and social data ranging from wind energy potential, solar insolation, and the performance of composting toilets to the structure of families and the water usage patterns of PPN citizens. These data were generated and interpreted collaboratively, often stretching engineering students in their social analysis, and PPN citizens in their technical understanding. A research contract between the PPN and the students and the university more broadly helped the PPN maintain control over what information would be collected and how it should be interpreted, shared, and put to work. Tribal control over the largest portion of funding supporting the research certainly made it easier for the PPN to demand this measure of control, but the students who worked with the project were also deeply committed to a tribally driven process, based on their personal experiences with research.[4]

The nature of the research was collaborative enough that the academic researchers are compelled to "pay in the currency" of the academy, as Louise Fortmann puts it, those tribal citizens and others who have contributed to the housing project (Fortmann 1996). This means, in Fortmann's conceptualization, sharing the byline of academic publications. Angela James, the PPN Vice Chairperson, helped write the narrative, as well as Lenora Steele, the tribe's Self-governance Coordinator. David S. Edmunds—not a tribal member but the tribal Environmental Director—is also a lead author of this article. He has a PhD in geography that helps him to take such a lead, but those of us inside the university also have to be willing to invest energy in publications in which we take supporting rather than leading roles. In addition, many others from outside the university have helped shape the conceptual and methodological direction of our work.[5]

Conceptual Frames

> It is time to reconceptualize Native sovereignty from a model that treats sovereignty as a strategy to maintain culture, to a model that analyzes culture as a living context and foundation for the exercise of group autonomy and the survival of Indian nations.
>
> (Coffey and Tsosie 2001)

At a recent listening session sponsored by the US Department of HUD,[6] tribal representatives pointed to a lack of funding, disadvantageous funding formulas, regulatory barriers, and poor federal agency coordination as barriers to improving tribal housing. These issues certainly are barriers. But we would like to discuss another—that the mental frame for tribal housing is still one generated by the federal government. This is problematic for at least two reasons (Davis 2002). First, beginning in the reservation period, but particularly in the allotment and termination periods, federal policies regarding Indian housing were explicitly tied to efforts to assimilate Native people, to distance them from traditional livelihoods, social relations, and cultural practices.[7] Second, even when the federal government was more tolerant of tribal culture and supportive of self-governance, during reorganization or even since NAHASDA, housing has been framed as a "gratuity" and not a federal obligation to tribes incurred when tribal lands were ceded. As such, the priority is to provide some housing, any housing to the tribes, even if it is of poor quality.[8]

Might tribes shift this dependency frame, making housing an expression of "cultural sovereignty?" This type of sovereignty refers to "an understanding

of sovereignty that is generated from *within* tribal societies and [which] carries a cultural meaning consistent with those traditions" and "practices" (Coffey and Tsosie 2001, 197). In this way, tribal housing might improve, perhaps rapidly, and with it, tribes' capacity to extend cultural sovereignty into other planning projects. The codesign process employed in the PPN housing effort has been replicated, more or less, in the design of public facilities, of environmental restoration projects, and renewable energy projects.[9] Enacting sovereignty in housing project design and implementation can be contagious to other projects.

The shift to cultural sovereignty as the framework for tribal design should not, however, be about a return to a static tradition, or even solely about a more recently defined set of aesthetic principles or cultural practices. The shift should be about a well-defined *group*, a tribe, with specific histories and social, political, and cultural trajectories that simultaneously involve core values and philosophies and rearticulations of these ideas in a changing political-economic context. These specific trajectories should define the agenda for housing design, more than either a federal trustee or a precontact tradition (sometimes poorly understood and often poorly adapted to contemporary tribal lives). In the case of the PPN, these trajectories are as much about increasing economic self-sufficiency and technical capacity as they are about preserving traditional building styles. The latter are important, but primarily because contemporary tribal people have made cogent arguments for them, and these arguments have swayed the political process of the tribe (Baker 2012).

Coffey and Tsosie (2001) develop the concept of "cultural sovereignty" in opposition to the conventional understanding of political sovereignty based on federal "trust" or "domestic dependency" relations between tribes and the US federal government. Cultural sovereignty implies that the norms and values of tribal people should guide how political decisions that affect them are made. The dependency that frames current expressions of sovereignty, articulated in court cases such as Georgia versus Worcester, or the Marshall Court's interpretation of political sovereignty generally, places federal agencies in the position of neutral arbiter of what is ultimately best for tribes, perhaps after a period of more or less meaningful consultation. But federal agencies have cultural norms and values too, driven by demands for bureaucratic efficiency and budgetary constraint, ever-changing administrative priorities, and scientific objectivity and apolitical decision making. Federal agencies embody dominant cultural values concerning individualism, the power of markets, and the nuclear family that may not match up well with the values of tribes and their people. Is it any

wonder that tribal housing often looks like a quick-and-cheap version of the American suburban house?

All this is not to say that formal, political sovereignty is not important or that it should be based on a romanticized, unchanging cultural distinctiveness. That is a dangerous position to take, as there are always people ready to prescribe exactly how distinct a group has to be to warrant sovereign status, often in a way that undermines tribal social and economic aspirations.[10] It is to say that a strong sense of cultural sovereignty can guide a people to interact more effectively within their formal political sovereignty, based in treaties and subsequent court judgments, and perhaps even reshape that political sovereignty to their benefit over time. Tribes should come to the table with ideas and proposals that are inspired from within their community when they negotiate (and renegotiate, repeatedly) their authorities, rights, and privileges. But we also want to extend the notion of cultural sovereignty as articulated by Coffey and Tsosie to include the economic, social, and political priorities that evolve over time from a distinct, tribal group. Traditions are a critical resource, but they do not capture all that is distinct about contemporary tribes. Tribes should be able to assert their ideas about appropriate technologies, economic development, and political process, just as much as they should be able to advocate for protecting ceremonial spaces or promoting traditional arts.[11] This more expansive notion of cultural sovereignty leads tribes to enact their sovereignty in very practical terms, in decisions that affect how tribal people live. How to nurture children and elders, how to live with the nonhuman world, and, certainly, how to build shelter are all areas in which culturally based values can have a direct and tangible impact on tribal people's lives.

This reflection on cultural sovereignty led us to ask what would happen if we tried to think about tribal norms and values from the beginning of a housing design process.[12] What would housing look like that started from a tribe's own sense of itself? We did not expect a simple answer. Traditional housing, exactly as it was prior to contact with Euro-American settlers, would be impractical for the lives of today's tribal citizens. Tribal citizens have adopted some of the cultural values of dominant American culture, including an orientation to the market and consumption. But distinct social practices and cultural values are also easy to identify. As one example, the extended family is much more important at the PPN, and most tribal nations, than federal housing policy recognizes. If we take this difference seriously, how will it affect housing design?

We also thought that a tribal government's interest in self-sufficiency and self-reliance, a political/cultural value at odds with the dependency

version of sovereignty, might change the way tribes design housing. We believed self-sufficiency could touch everything from the materials the tribe would procure, to the skills it would need to build, to the maintenance and operation of the housing. To reverse the question, could a house, in fact, become a means for nurturing strong connections within the tribal community, and a stronger position from which to encounter those outside the tribe? Could it embody an anti-assimilationist spirit, where tribes resist in a practical way, and without much fanfare, the bureaucratic inertia that even in the best of times seems to demand a great measure of conformity, of simple-to-administer project designs, applicable across many local contexts?

The PPN was fortunate to find a group of engineers and architects who were wrestling with some of these same issues—how to design products and services consistent with what people really want (Shelby, Perez, and Agogino 2011, 2012). The CARES at UC Berkeley worked through a self-reflective, multistage, two-year codesign process in order to create housing plans that meet PPN's social, economic, environmental, and cultural needs. This codesign process, elaborated in writing by Shelby, Perez, and Agogino (2011, 2012), is labor-intensive and requires careful attention to communication styles, venues and schedules, and power dynamics among the students, faculty, and tribal staff and citizens. The underlining principle of the codesign process is that the citizens of the PPN are experts on their needs and that capturing the collective intelligence of both the PPN and the CARES will result in solutions that will be accepted and used by the community. The participants in the project do not assume a neutral space for coming together, but instead try to identify main drivers and potential troubles in the codesign process and address them up front. Most of these potential troubles were identified in early conversations between university students and faculty, and PPN citizens and government staff, and included histories of exploitative research, race relations, different conceptual frameworks, and different communication styles, among others. But certainly, the authors came with expectations of troubles highlighted in the extensive literature on participatory research in their various fields.

The authors' application of the cultural sovereignty frame for understanding the PPN tribal housing project is informed by three other theoretical positions. The first is that all people (including scientists) are situated in contexts shaped by multiple aspects of their identities, their experiences, and their mental habits when they try to explain how the world works (Haraway 1988; Harding 1995). "Situated" is not a condemnation of a group or its claims, but rather an acknowledgment that all perspectives are partial, some knowledge is better adapted to particular settings than other

knowledge, and that a multiplicity of perspectives can help us reach a stronger, more robust assessment of a problem, or ''stronger objectivity'' in Harding's (1995) terms. Dialogue, investigation, and experience can lead to a better, more productive state of knowledge, but no knowledge is without cultural content, with its strengths and limitations.

For example, some of the project's engineering partners assumed that ''optimization'' and ''efficiency'' were universal values applicable to all projects. A grid-tied energy system is economically more efficient and embodies lower environmental risk, and as such is a clearly preferable choice to an off-grid system. But the tribal nation knows that service delivery is dominated by a racially inflected political system and that the tribe is vulnerable to prejudicial treatment in terms of system maintenance, cost estimates, service expansion, and so on. In such circumstances, the smartest decision for the tribe appears to be an off-grid system. To reach this conclusion, the engineering students had to open up about how they came to focus on efficiency models, how models helped them influence decisions in particular contexts, and their limited experience in applying these models to situations similar to the PPNs. The PPN's citizens, at the same time, had to share experiences with local service provision and their strategies for finding power when services are difficult to obtain.

Recognizing that scientists also bring cultural assumptions to the setting allows for a meaningful codesign process between institutions traditionally seen as oppressive to Native peoples—the university generally, university-based science specifically—and the PPN. Without this recognition, it is too easy to slip back into a public consultation process, where tribal people have to decide just how grudgingly to support a design that does not reflect their core beliefs and values, or their knowledge of how the world works for them.

A second, related theoretical resource centers on the articulation of cultural beliefs and practices. In this case, articulation theory allows us to see how the PPN might conjoin elements of what we think of as traditional housing (rounded shapes, building into the earth) with other scientifically informed housing elements (such as insulation factors and the durability of some materials) without delegitimizing the tribe's distinctiveness as a group. ''Traditional'' and ''nontraditional'' knowledges are not coherent wholes that must be maintained analytically or practically separate (Clifford 2001, 2004; TallBear 2013). Tribes such as the PPN frequently pull knowledge from multiple sources in order to solve practical problems and advance stated goals for, say, self-sufficiency, low environmental impact, or the creation of more ceremonial space within housing units. Distinctiveness emerges from a specific, shared history of a relatively well-defined group,

a history that includes political and social experiences, engagements with specific environments, and a well-documented (orally, visually, or in text) and evolving set of cultural practices and beliefs. It is not dependent on the literal reenactment of nineteenth-century lifestyles.

Third, and closely related to the previous two, Native peoples must be allowed to make technical claims about the world, and not be relegated to simply talking about aesthetics, family structures, ceremonial practices, or the usual array of topics assumed to fall neatly under the "Native culture" category. These are critically important, but they do not capture the entirety of Native knowledge production. Cultural sovereignty implies that tribes have something to say about how the world works outside the academic humanities. This might start with knowledge of natural processes in local environments, but includes observations and analyses of economies, politics, machines, buildings, materials, global climate, and other topics. This knowledge may be characterized as practical, local, experiential knowledge (Scott 1998), but perhaps university science should be as well (Watson-Verran and Turnbull 1995). What tribal knowledge may most lack are the institutional resources of modern, university- and corporate-based science, and the clout they bring. But tribal knowledge also may have some of the trappings of university science, particularly as tribal capacity and networks expand.[13]

The particular conceptual frames—cultural sovereignty, articulation, and a more fluid and situated understanding of what constitutes "science"—help the authors to demonstrate very clearly how the PPN housing codesign project is, in fact, part of a larger effort to democratize science. Tribal knowledge gained from a variety of sources—practical building experience, observation of local hazards, analysis of institutional capabilities, reinterpretations of macro data to local conditions, and even prayer and spiritually based communication about technical matters—is considered coequally with the science produced by the state, universities, corporations, and other large, well-funded institutions.[14]

The Codesign Process

These theoretical frames taken from the social sciences constitute an analytical toolkit (not the only possible toolkit perhaps) that works to capture robustly the codesign process that CARES team and the PPN engaged in. CARES process, on the other hand, is a combination of methods taken from engineering and product development, often referred to as an innovation workshop,[15] as well as from the environmental design disciplines known

broadly as charrettes, but where the community is actively involved in design, laying out basic principles, proposing specific design elements, evaluating and approving all design decisions. The authors note, however, that the innovation workshops facilitated by CARES deepen the democratic quality of workshops and charrettes. Rather than simply informing the public and creating discussion, the codesign process—with its embrace of different knowledge production systems, all carefully situated and offered up for analysis, encourages mutual learning among professional designers and citizens (Condon 2008). Engaging in a codesign process means that the PPN citizens have a major active influence all through the design process, from the early needs assessments to the production of the final construction drawing. The PPN are sitting in a powerful position where they are the clients, the users, and the researchers and knowledge producers, a position which, in the US construction industry, traditionally exists mostly in high-end, custom-built houses.

This condition should place the codesign process with the PPN in the highest level in Arnstein's (1969) famous ladder of citizen participation—citizen control. Making this work in practice entails great responsibility and a sensitive balance between the varieties of knowledge brought to the table by the different designers. At several points, project participants check to make sure that we are maintaining an appropriate distribution of power and authority.

The workshop starts with an icebreaker that asks everyone, tribal citizens and students/faculty, to "situate" themselves personally (where do you come from, what is it like there, and why are you doing what you do?) and in relation to technology (what is your favorite technology, why?). This is an important first step in helping all participants understand where their knowledge is limited, and how it might be shaped by personal experiences as well as the expectations that the broader social world places on each person. Interestingly, the fairly large proportion of students of color in the university group, including a few from isolated rural communities, meant that there were more shared experiences with tribal people than we anticipated.[16]

One workshop did not suffice to bring out for analysis all the ways knowledge frames were different for different people. Taking time to check and recheck these issues at each workshop was necessary. Though we can improve on how thoroughly we do this going forward, the process was strong enough to make tribal citizens comfortable. Condon (2008) emphasizes the importance of a blank sheet in the design process. While he refers to a starting point that has no design form and is open to a variety of possibilities and challenges, the authors find it important also at the social level

to have a blank starting point. The blank sheet, says Condon, symbolizes and realizes the absolute authority of the team. Similarly, the blank sheet the project team used was found important to the trust building and the shared responsibility of the group. At the same time, it is critical that all contribute democratically to filling that sheet. While the authors agree with the need to lead-without-leading leading and some need for silence from the facilitator, we would like to emphasize the importance of a balanced "multilogue" in which all codesigners have an equal voice and the learning process between professionals and nonprofessionals is mutual. Having professional designers contribute from their own personal experience of technology use in different corners of the world at first seemed irrelevant to a Native American project in the United States. But this was a critical step in breaking the historic pattern whereby professional designers are the facilitators aiming at capturing the community's unbiased view, then reinterpreting that view in light of professional expertise. Everyone "situated" their experiences more or less openly, making everyone's knowledge available for evaluation, interpretation, and appropriation (with safeguards in place) or critique.

Situating knowledges also means that project participants account for the larger institutional context in which the codesign process operates. In our case specifically, the vice chairperson of the PPN, Angela James, noted that relations between the university and local tribes were characterized by a variety of injustices, particularly the storing of human remains and associated funerary objects at the university. Native peoples in the area are dubious of the university's good will in any codesign project. Other extractive research projects, from local histories to land use studies or sociologies of tribal people, have often yielded little benefit for tribes and can leave them feeling misrepresented and stigmatized. It was critical for the university team to acknowledge this and commit to working to do things differently. It was also important for tribal representatives to see value in the skills that the university team could bring and to want those skills for their youth.

The invitation for tribal people to express perspectives on technology also began the process of valuing local technical knowledge. There is still work to do in this regard. We might have benefited from a more careful and thorough review of traditional housing styles—materials, shapes, purposes, and so on. The project team did some of this, but in retrospect, we could have done more. Our colleague from the Environmental Protection Agency, Michelle Baker, has made the point that old is new again and that reflecting on the principles of earlier housing is a great starting point for codesign

today.[17] The project team did enough in our session, however, to frame tribal knowledge as technical knowledge, as a resource for addressing technical concerns in the design process.

This emerged most strongly in the case of energy use. Tribal citizens saw a parallel between ground source heat pumps and the tradition of building homes into the ground. Local technical knowledge about wind led us to test wind power potential, even though regional data suggested it was insufficient for energy generation. The PPN found that the reservation has about twice the wind resources than regional data suggested. Tribal citizens also contributed to the discussion of local wind and flooding hazards and to the risk of poor indoor air quality based on housing design features.

After setting the ground for a codesign process, the project team began speaking of what housing should do for residents, and the community generally. Here are some of the key points raised:

- It should accommodate tribal social life. Specifically, it should address the large size of tribal families, the importance of accommodating extended family for extended periods, and the importance of hosting at the home social and cultural events with a heavy cooking demand. But it should also afford residents privacy, with single-family homes and privacy features in the landscape: something that green builders may be reluctant to do.
- It should accommodate tribal cultural practices. It should have rounded features to reflect traditional aesthetics and spiritual beliefs, be open to the east for prayer, make it easy to produce and store regalia and basketry and other arts.
- At the same time, it should be as personalized as possible, acknowledging that tribal families do not all have the same ideas and sensibilities about housing.
- It should be as "off grid" as possible with respect to water and energy and other resources, to reduce tribal dependence on potentially unreliable sources of these goods and services.
- The tribe should be able to maintain houses with their own human and material resources, to the extent possible. Some of the conversation was about rethinking home ownership—houses should be less of a "consumer item" than a "home" that requires care and attention. Tribal leaders have argued that consumer culture has "de-skilled" tribal citizens. The leadership has developed classes to teach food preparation, basket making, and sewing, and has created other opportunities for citizens to learn to gather, fish, and build ceremonial structures

in ways that date back many generations. But leaders are also keen to improve other, more recently relevant skills—such as in horticulture, renewable energy provision, and house building, all to advance the principle of self-reliance. There is a social aspect to this thinking as well, as the tribe envisions citizens helping one another with housing care, strengthening community cooperation, and solidarity.

- It should be a source of pride. There was considerable interest in testing "cutting edge" ideas, such as composting toilets or geothermal heat pumps, so that others, tribal and non-tribal, could learn from PPN's experiences. It should demonstrate the tribe's commitment to self-reliance and care for the environment.

By these criteria, current housing was found sorely lacking. Residents sometimes felt stigmatized, cramped, and alienated by the homes, and maintenance was often poor. But the goal of the codesign process was not to dwell there. The project team instead was to figure out how to better design houses and to make the vision a reality.

Over the two years following the initial codesign workshop, PPN citizens traveled to the university on more than a half-dozen occasions to review class projects, meet with student designers, and alter the designs. Students, in turn, came to the reservation to hold workshops to critique design ideas. Working in both cultural spaces was important to maintain the sense that each participant's knowledge was embedded in a particular social, political, and cultural context. Tribal critique in the university setting also reinforced tribal citizens' sense of their own technical capacity. And as Vice Chairperson James pointed out, bringing tribal citizens to the university helps the tribe lay claim to the university and science generally as resources for its own purposes, advancing its goals of self-sufficiency, cultural integrity, and community well-being.

There was substantial revision over the entire period. The initial three designs proposed contributed different elements to the final design (see Figures 1-4). Other design decisions followed classes in biomimicry and architecture, where the original design ideas were given material form. Biomimicry was a concept intriguing to tribal citizens who participated in the review. It touched on cultural principles valued by the tribe, but articulated them with technologies and science new to most of us. The revision process was delicate. It was easy for unquestioned assumptions to creep back in, particularly as the project team brought in professional engineers who had not been through the original workshops. Tribal representatives had to be clear about their interests and fight for them energetically on several occasions. Rounded shapes and off-
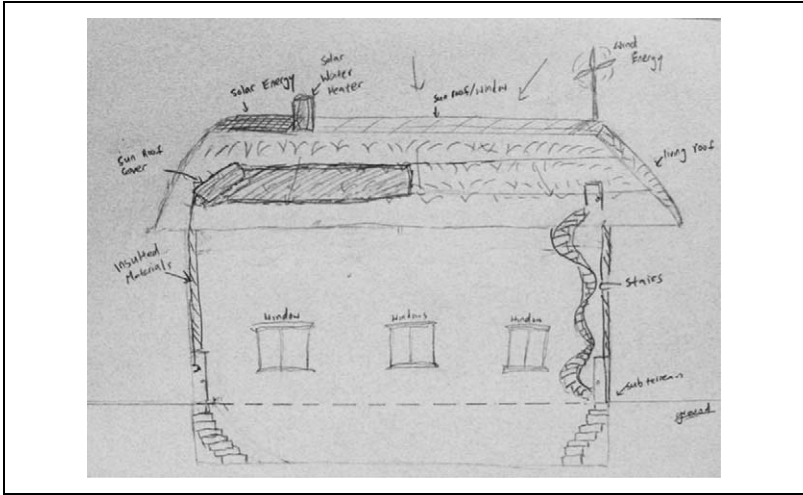
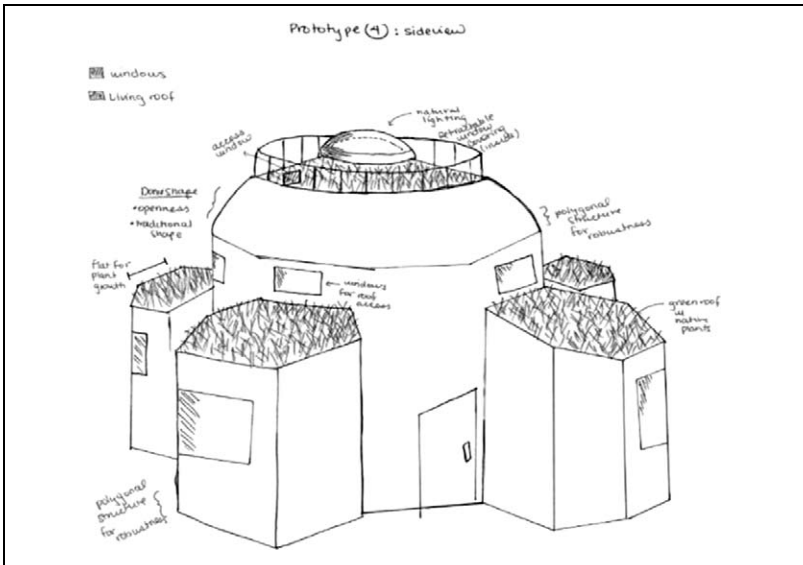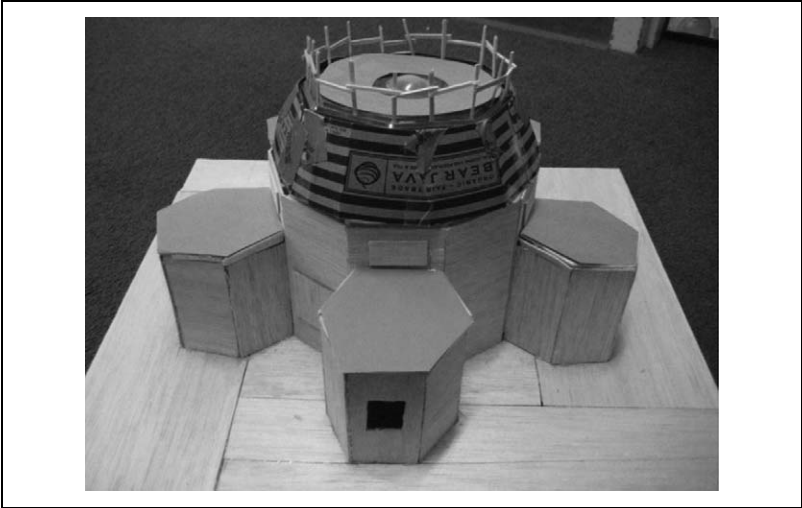**Figure 1.** Initial sketch based on Pinoleville Pomo Nation needs.

Figure 2. Secondary sketch after meeting with Pinoleville Pomo Nation.

Figure 3. Final prototype, spring 2008.

Figures 4a and 4b. Final design, 2009.

grid energy and water systems were particularly vulnerable to challenge by professional engineering partners and by the federal agencies funding the project. They are expensive and generally do not have the same meaning for non-tribal people. But the tribe was able to maintain these features, largely because the codesign process had been clearly articulated and been allowed to mature over time. A final design was approved by the tribal leadership in early 2009, and the design was used to apply for housing funding from the US Department of HUD.

Overcoming Barriers

As Coffey and Tsosie point out, however, there are often significant barriers to enacting a vision of housing (or anything else) consistent with cultural sovereignty. The long history of tribal dependency within the tribal-federal relationship has institutionalized many of these barriers. For tribes, there is the additional challenge of asserting cultural principles that are at odds with those of the "normal" housing market, as we discuss below. Working through these barriers requires that the project team consider the "innovation system" in which the PPN operates.[18] That is, local innovation is not simply determined by local genius, or the lack of it. Many entrepreneurs and government agency staff, the media, and nonprofit organizations can facilitate or hinder the creative expression of tribal sovereignty through the practice of housing. The success of a culturally inspired housing initiative depends upon many things, including the availability, at fair prices, of technical skill, the policies, and laws that govern housing development on and off reservations, and the stories that build public support or opposition for what tribes undertake.

Working through these barriers also engages our social learning skills, encouraging us to test new options, observe and evaluate our results, and formulate new strategies based on that evaluation (Wollenberg, Edmunds, and Buck 2000). The project team intends for that learning to assure that quality housing is built under this project, but the larger goal is to practice asserting cultural sovereignty in an environment that is still not entirely accommodating.

One of the first barriers encountered was finding an engineering outfit to "stamp" the design, so that it could be built with confidence by the builder. The temptation among the engineers the PPN consulted initially was always to cut back on cultural or social elements of the design. But the tribe's representatives held firm, with support from the CARES team, and the engineering firm embraced the original vision codesigned by the PPN and CARES. It certainly helped that the firm employed a Native American planner as a senior advisor, who could explain to his colleagues why self-sufficiency, rounded shapes, and natural materials might be so important to tribal citizens. The project team has had some tough discussions, and had to give in on a few of the engineers' points, but the basic design principles have remained in place.

Another significant barrier was the total development cost (TDC) standards set by HUD. Understandably, HUD must spend money on tribal housing wisely, so as to meet in a cost-effective manner the tremendous

need for housing in Indian Country. Unfortunately, HUD's standard for TDCs—the cost no single house should exceed—does not consider full cost accounting or life cycle accounting. PPN staff noted that the tribe spends significant money on home maintenance, energy subsidies, and maintenance of septic systems, among other recurring costs. The TDCs do not account for these costs, and so investments in energy-saving solar panels, or self-maintained earthen finishes, or rain water collection tanks, are measured only by their initial costs. A full accounting would note that the cost of housing *per year of habitation* can go down with greater up-front expenses.

HUD offers a waiver from the TDC and encourages applications for waivers when energy- and water-saving technologies are deployed. However, the PPN would like to meet the TDC standard in order to be able to build more housing under the current grants and to demonstrate to other tribes the viability of building as the PPN is doing. The project team has also worked around the TDC limitations by finding subsidy programs for solar installations, creating a separate project for rain water capture, and by recruiting volunteer labor for some of the building tasks (such as stacking straw bales and putting on the plaster finish). The PPN promised that an installer would receive contacts and publicity among local tribes (and non-tribal communities) in exchange for reducing installation costs for ground-source heat pumps, because the PPN wanted to spread the word to other tribes about a technology that might suit their cultural values but that was untested in the area. The PPN hopes to do the same for other design features. The PPN has bartered for site preparation discounts and will do much of the waste disposal itself to save more money. The PPN is still at the margin of what it can afford, by the HUD standard, and may have to forego some features at some houses. These the tribe intends to build in later, perhaps using recovered materials and deploying skills learned during housing construction. But the larger point is again to challenge the dependency relationship characterizing the tribal-HUD relationship. The PPN and other tribes need to challenge the way the TDC is defined and find other resources to get done what tribes have designed, rather than simply accept the limitation, however well intended, imposed by the US federal government.

Building codes also created a barrier born of good intentions—to protect tribal citizens from poor quality work. Unfortunately, the default codes for the PPN were local county codes, and these did not address several of the key elements of housing design. Again, rather than accept this limitation and change the design, the PPN decided to develop tribal green codes. The tribe might have simply adopted a green building code already in existence,

as there are many that are quite detailed and environmentally sustainable. But tribal leadership wanted to avoid the overly prescriptive and urban-biased green codes that currently dominate the green building movement.[19] The PPN is developing a dialogue-based design process that can respond to evolving tribal notions of the good house and that is still rigorous to ensure the structure is safe for residents to live in. There is some question about how tribal citizens view risk, and what they are willing to accept in order to have the houses they want. The dialogue gives tribal people a seat at the table during the design process, and should help move the designs toward tribal visions of the good house. And as tribal capacity evolves, that cultural influence will improve, and maybe good engineering will also grow to include notions of resident buy-in, local maintenance, acceptable risk, and multigeneration, systemic risk.

The flexible, dialogue-based approach to codes resonates in at least two important ways with Pomo cultural values. First, tribes are quite aware that they must respond to climate and other environmental change, social and economic trends, and new technologies, among other elements of their local context. They also realize that the pace of change is accelerating. Cultural dynamism has always been a part of tribal life. Pomo peoples incorporated new materials for arrow heads and basketry before colonization, moved from tule grass to redwood board building materials when logging arrived, and adapted to new foods and illnesses when settlement expanded. This commitment to adaptation must be maintained and, perhaps, undertaken even more consciously now as opportunities to achieve tribal well-being open and close rapidly. Second, housing was at one time a family and band responsibility—designs were influenced by very local contexts, including band preferences, in a very decentralized political environment. The dialogue model returns a measure of control and responsibility to that very local level, reinforcing the distinctiveness of local cultures and decentralizing power in some measure.[20]

A final critical problem was finding contractors to take on the job of building the houses. Northern California has a relative abundance of "green" builders to draw on, compared to other areas of the country; yet, there are still too few qualified bidders to create a buyers' market. Moreover, some seem to be suspicious of working with tribes on culturally inspired projects. As a result, many of the PPN's bids were high, required too much in up-front payments, or did not adequately assure the tribe of building qualifications. The PPN decided then to try to build the houses using more tribal labor, which meant having significant training sessions and workshops along the way to make sure the houses would be built well, but in exchange providing the tribe

with a skilled work force for the next tribal green building project. By summer of 2012, at least six tribal citizens had been trained in straw bale and earthen plaster construction, as well as gray water system installation, to the point of needing minimal supervision. As to design, the PPN worked with CARES to organize a codesign process for a PPN cultural center, and was able to generate design principles for a design contest, evaluate designs submitted, and is currently developing proposals to fund construction of the final design.

Building the house using local labor clearly advances cultural sovereignty as defined by the PPN: it builds tribal self-sufficiency and likely will reduce the TDC, code, and contractor constraints for future projects. It also represents at a deeper level the enactment of a fundamental tribal cultural principle—that all people live in relation with all other things, living, and nonliving.[21] These houses require substantial tribal labor to build, but also to maintain and operate. Earthen finishes will need care each season, solar panels must be washed and rainwater capture systems cleaned, composting toilets and green septic systems need to be emptied, and gray water gardens tended. These houses are not "commodities" bought off a shelf and simply used by occupants until they are thrown away and exchanged for a new one. They demand that tribal citizens pay attention to their needs and respond to them in a timely way. They embody the ethics of relatedness that are taught in the PPN's youth and Head Start programs,[22] and in conversations among older and younger tribal citizens. They reflect an "American Indian metaphysics" where the point of knowing and doing is to live well—attentively, respectfully, and responsibly.[23]

These have been significant challenges, and there were moments when it would have been easy to pull back to a conventional housing model. Indeed, in the early phases of construction, further compromises had been proposed, and a few were accepted. The intent of the PPN and its partners, however, is to work through limitations, demonstrating that with creativity and sweat equity housing can express cultural sovereignty at a deep level and not reflect primarily federal preferences. The tribe also wants to make a case that tribal governments should consider these sovereignty issues in their housing plans. While there is pressure on many reservations to build as much housing as possible in the shortest time, getting that housing right at the outset will save money and effort later. It will also build the capacity of tribes to enact cultural sovereignty outside of their housing programs. This was no small benefit at PPN and would be a welcome outcome for other tribes. Finally, the authors also wish to provoke new thinking among federal agencies about the tribal-trust relationship. There is much federal

agencies can do to enable tribes to pursue a deeper version of cultural sovereignty and develop a less dependent tribal-trust relationship. For HUD, policy makers should rethink TDCs for culturally inspired, sustainable housing, encourage and support tribes to develop their own green building codes, and allocate more resources to training tribal citizens to design and care for their own needs.

Final Thoughts

The codesign process allows tribal citizens to construct culturally inspired housing in its broadest sense, advancing tribal commitments to economic self-sufficiency and community capacity building, building on tribal knowledge of natural building materials and ground-source heating and cooling, and expressing tribal values regarding colors, shapes, and orientations. Consistent with the observations of Coffey and Tsosie, codesign allows for the emergence and the inclusion of tribal, internal, nondependent conceptions of sovereignty. Three examples stand out. First, the tribal housing acknowledges obligations to past and future citizens, carrying forward both aesthetic and technical traditions of ancestors, but thinking carefully about what can be sustained into the near future for and by tribal generations to come. Second, there is a sense of respect for other species, manifested most clearly in the interest in nontoxic materials, green septic systems, rain gardens, and native plant landscaping favored by tribal citizens. But the concept of relatedness can also be extended to other, inanimate features of the house. The point is that tribal citizens can better live in relationship with their homes if they are codesigned with the principle of extended relations (both among humans and between humans and nonhumans) in mind. Third, the tribe expresses a sense that governments may promote productive social relations among diverse groups. Neoliberal Western governments tend to protect individuals within groups from harms, but do not promote positive group-to-group relations as effectively, as the weakness of hate speech law and affirmative action demonstrates. Tribal housing is meant to protect privacy, but also to allow for collective self-reliance through shared space and shared work.

But as we have demonstrated in this article, there is a need to expand the notion of cultural sovereignty used by Coffey and Tsosie. Tribes can obviously contribute more than traditional cultural principles to house design. Tribal citizens must influence other elements of the design process—managerial, administrative, and especially technical. Critical managerial and administrative principles include economic self-sufficiency and political independence.

These are goals deeply embedded in tribal experience over the last couple of centuries, and they can put tribes at odds with federal agencies, states, and local neighbors. A full cultural sovereignty would accommodate these goals. And cultural sovereignty must allow tribes to act on their existing technical knowledge *and* to appropriate, on their own terms, the fruits of science and other knowledge developed outside of the tribal context. This is the full, rich cultural sovereignty that produces housing designs that tribal people can live with.

Declaration of Conflicting Interests

Funding

Notes

1. Ishiyama, Tsosie, and Kamata (2011) discuss the application of Agamben's notion of bare life to tribal internment camps, and beyond. While the "hudda" does not reach that level of desperation, the themes of containment and living outside the rules and norms that might apply elsewhere, both mainstream standards and those internal to tribal communities, resonate.
2. David Eisenberg has commented on the need for housing that aspires to the highest social and cultural values, rather than the minimum safety standards. Tribal Sustainable Building Codes: Opportunities and Challenges, paper presented at the National American Indian Housing Council Annual Convention, Phoenix, AZ, May 25, 2011.
3. Cash et al. (2003) make a similar point in their study of nonindigenous institutions around the world that seek to harness science and technology for sustainability. They explain that scientific knowledge is likely to be effective in influencing social responses and decision making only to the degree that it is seen as scientifically "credible," "salient" to the needs of decision makers, and "legitimate," meaning that it is "respectful of stakeholders' divergent values and beliefs" (p. 8086). Thus, it is not only indigenous communities and their decision makers that require technoscientific knowledge to take account of local knowledge and practices for its successful implementation.
4. Ryan Shelby, an African American scholar who grew up in rural Alabama, was a subject of a civil rights research process directed by a northern university when he was a young man. The research was completely extractive, and the knowledge Ryan and his neighbors provided was integrated into the

researchers' prior mental framework, and did not reflect local thinking about civil rights. Local people had no control over telling their own story, and felt dehumanized.

5. The most active Pinoleville Pomo Nation (PPN) participants include the Chairperson, Leona L. Williams; the Vice Chairperson, Angela James; the Self-governance Coordinator, Lenora Steele; Tribal Council members, Monica Brown and Don Williams; and later, Veronica Timberlake, PPN tribal citizens on staff (Bill Williams, Deborah Smith, Erika Williams, Carrie Williams, Nancy Williams, Cassandra Steele); PPN Housing Director, David Ponton. Others who contributed at key junctures in the project include Nathan Rich, Julian Maldanado, Robert Cartero, PPN youth (Sparrow Steele, Kashia Williams, Bateeche Steele).

6. Reno, NV. December 14-16, 2010.

7. Virginia Davis, in her 2002 review, provides evidence that Dawes saw housing provision as a means to keeping Natives on allotments, and quotes several Indian agents who saw housing as the key to "civilizing" tribal people.

8. Davis also notes that the Meriam Report of 1928 notes that federally supported housing on reservations was crowded and substandard, and the move from traditional dwellings negatively affected tribal health and well-being.

9. Just in California, the authors have seen culturally inspired, codesigned building at the Potowat Village health center, and have used a codesign process to design a cultural center at the PPN. Culturally inspired plans have been developed for management of a tribal protected area by the Sinkyone Wilderness Council, and for a cultural landscape on private forest company land by the PPN. Tribes in the area also used a comanagement framework to pursue tribal harvesting rights within the state of California's Marine Life Protection Act. Nationally, there is a blossoming of culturally inspired education, food production, and health care projects. In the authors' view, building has lagged behind these initiatives.

10. Sam Deloria made comments to this effect in a 2001 Commentary on Nation-building at the Symposium on Cultural Sovereignty: Native Rights in the 21st Century, jointly sponsored by the Indian Legal Program at the Arizona State University College of Law and Arizona State University Indian Studies Program. See also McCulloch and Wilkins (1995).

11. In the PPN case, cultural sovereignty implies economic self-sufficiency, a Pomo political decision-making process, and environmental harmony, as much as traditional building styles.

12. As we discuss below, part of this rhetorical question draws on the work of Shelby, Perez, and Agogino (2011, 2012) to produce engineering that people really want and will use. But part also recalls feminist philosopher of science Sandra Harding, as she advocated starting research from the lives of women and

other subjugated groups (Harding 1995). In our case, tribal people know current housing *and* how they have imagined it to be better. Historical exclusions and silences are rich areas to look for new ideas.

13. We have some questions as to how useful the distinction between this local, practical, experiential knowledge on the one side, and "big science" on the other really is. The boundary between them is permeable, and the methodological differences seem overblown. There is, however, a clear difference in the public resources and discursive power of the two.

14. The PPN has some experience mixing knowledge from different sources. Debates over the Marine Life Protection Act in California and the national Native American Graves Protection and Repatriation Act (NAGPRA) are examples of big science in conflict with solid, well-vetted local knowledge. In each, tribes have confidently asserted the superiority of their own technical knowledge—about how local ecosystems work and about how archeological evidence should be interpreted—over abstract, generalized knowledge from other sources. In the debates over the Marine Life Protection Act, tribal citizens argued that the generalized models of the academics writing access rules did not accurately reflect the species mix or abundance of specific areas that tribal people had used over many generations. In the case of NAGPRA, tribes claimed that "unaffiliated remains," as labeled by University of California (UC) Berkeley scientists, could be accurately associated with specific tribes if tribes were allowed to review the evidence and discuss among themselves where to bury remains and how. The codesign process applies the same logic to housing: that Native peoples have something to contribute to technical discussions and not just to social and cultural decisions.

15. See Douthwaite (2002) for a discussion of innovation principles across a variety of sectors where the "users" exert considerable influence over what new technologies look like.

16. Comment made by Angela James, PPN Vice Chairperson, in Ryan Shelby and Angela James, "The Pinoleville Pomo Nation—UC Berkeley Partnership to Co-design Culturally Informed, Sustainable Housing." In the session, "Co-productions of Environmental Science, Technology, and Indigenous Governance," Native American and Indigenous Studies Annual Meeting, Minneapolis, MN, May 22, 2009.

17. Reviving the Oldest Approach to Sustainable Design: How Cultural Values and a Sense of Place Lead to Green Building Design, paper presented at the Annual International Greenbuild Conference, Phoenix, AZ, 2009.

18. The concept of innovation system is broadly discussed within the agricultural and environmental development literature. See Röling (2009), Woodhill (2010), and Klerkx et al. (2012) for a discussion.

19. Papers presented at the 2009 Greenbuild Conference in Phoenix, AZ.
20. Deloria, Foehner, and Scinta (1999) speak of the importance of very local, in-context, experiential knowledge within tribal metaphysics. No wonder PPN citizens like this dialogue approach.
21. An extended quote from Deloria, Foehner, and Scinta (1999) captures the notion of relatedness well: ''American Indians, understanding that the universe consisted of living entities, were interested in learning how other forms of life behaved, for they saw that every entity had a personality and could exercise a measure of free will and choice. Consequently, Indian people carefully observed phenomena in order to determine what relationships existed between and among the various 'peoples' of the world. Their understanding of relationships provided the Indians with the knowledge necessary to live comfortably in the physical world, and to not unduly intrude into the lives of other creatures.''
22. The PPN Youth and Head Start programs teach children about their historical relations with animals and plants in their region, and how to harvest and use them respectfully to remain in harmonious relations with them. It is not a stretch for PPN citizens to speak of housing this way too.
23. Wildcat, D. 2001. *Power and Place: Indian Education in America*, by Vine Deloria, Jr. and Daniel Wildcat. Golden, CO: Fulcrum.

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