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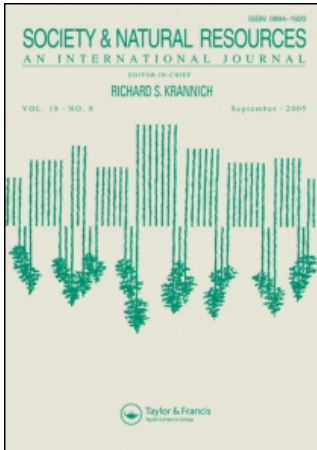
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Articles

Building Social Capital Through Participatory Research: An Analysis of Collaboration on Tohono O'odham Tribal Rangelands in Arizona

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WITH THE TOHONO O'ODHAM CURRICULUM
ADVISORY COMMITTEE

On the Tohono O'odham (TO) Nation, an American Indian nation in southern Arizona, where local institutions and community norms govern management of communal rangelands, government interventions in rangeland management have historically overlooked social aspects of management and consequently met with little success. Similarly, past research on the TO Nation has fueled resentment due to a lack of local collaboration. Participatory research offers one way to create power-sharing relationships between researchers and communities and to develop locally appropriate resource management strategies. In partnership with local groups on the TO Nation, we used participatory research to develop, implement, and evaluate a rangeland ecology and management curriculum. The participatory curriculum development and research processes led to increased social capital among participants, creation and adoption of a locally tailored curriculum, and institutionalization of participatory approaches within tribal organizations, demonstrating high levels of quality and validity according to emerging post-positivist criteria for evaluating qualitative research.

Keywords action research, collaboration, common property, curriculum development, native american, post-positivism, qualitative inquiry, rangeland management, social capital

On the Tohono O'odham (TO) Nation, an American Indian nation in southern Arizona, 11 political districts govern access to and use of collectively held tribal resources spanning a heterogeneous social and environmental landscape. In settings

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such as this, with a heritage of communal land use, social processes such as cooperation and negotiation are especially important to the management and conservation of natural resources (Blackburn and Anderson 1993; Nemarundwe 2004). With little appreciation of local institutions and their embedded social processes, and a lack of power-sharing with local organizations, past government interventions in agriculture and livestock production on the TO Nation echo the failure of development projects in rural communities throughout the world (Blaine 1981; Bentley 1987; Ison and Russell 2000). Similarly, research on the TO Nation, like that involving many American Indian groups (Hudson and Taylor-Henry 2001), often has failed to involve O'odham people in scientific inquiry beyond their roles as research subjects or purported beneficiaries of research results. In this article, we report on a participatory curriculum development and research project that attempted to overcome past shortcomings in research and development on the TO Nation by engaging O'odham community members as active partners in project implementation and evaluation. We draw on social capital theory to interpret the importance of cooperation in O'odham society and document changes in social relationships that resulted from the participatory processes. We also apply emerging criteria for assessing qualitative research to evaluate the quality of the participatory process and the validity of research findings.

A broad definition of social capital is "the institutions, relationships, attitudes, and values that govern interactions among people and contribute to economic and social development" (Grootaert and van Bastelaer 2002, 2). In this study, we use Woolcock's (1998) qualitative framework, which describes four forms of social capital based on levels of autonomy and embeddedness at the micro (individual) and macro (organizational) levels. *Linkage* is an individual's autonomy from his or her community based on relationships with people outside that community. *Organizational Integrity* is an organization's¹ autonomy from other organizations and communities based on organizational competence, coherence, and capacity among individuals within that organization. *Integration* is an individual's embeddedness within his/her community based on relationships with people in the community. *Synergy* is an organization's or community's embeddedness in society as a result of institutional relationships among communities and organizations. According to this theory, a balance of the four forms of social capital is important for optimal realization of any economic, political, or social endeavor. Too much or too little of any one form of social capital in proportion to the other forms can lead to inefficient processes such as corruption, favoritism, isolationism or duplication of efforts, which can restrict the potential for success in any endeavor. This framework can be used to identify and qualitatively compare the relative strengths of the four forms of social capital alongside evidence of successful or inefficient actions in a particular setting in order to determine where development efforts would be most effective, or to evaluate the social impact of projects with respect to relative increases or decreases in the four forms of social capital (Woolcock 1998).

Participatory research, which aims to involve local people in the research process to focus research efforts on locally relevant issues, has the potential to shift knowledge creation from a one-way extraction to a two-way co-learning model (Kawagley and Barnhardt 1998). Challenging the divide between researchers and research subjects, participatory research seeks to empower marginalized groups, enabling participants to share information and to find their own solutions to address local concerns (Reason and Bradbury 2001). Johnson et al. (2001) describe a continuum of power-sharing relationships that characterize participatory research, from

functional participation, which improves the quality of the research through participant input with little involvement in decision making, to empowering participation, which involves participants as co-researchers with the goal to build local capacity and continue innovation beyond the scope of a single research project. While empowering participation is often viewed as the ideal, in practice it can be difficult to achieve and even inappropriate depending on the specific research goals and local context. For example, researchers who already have clearly defined goals and methods may not have the flexibility to engage in the participatory process, or research topics that are technically complex may limit the ability for laypeople to participate on an equal footing with researchers.

Community-based and participatory approaches to natural resource management are growing in popularity. However, there is still a lack of power-sharing in the research process, and the majority of self-identified participatory research projects utilize only functional participation. Empowering participatory research in natural resources is most common in Africa, Asia, and Latin America, and stems from a strong emphasis on decentralization and democracy among international development agencies over the last few decades. However, there is great potential for expanded use of participatory methods in the United States and elsewhere to improve understanding of the interaction of social and ecological systems (Gasteyer and Flora 2000; Kruger and Shannon 2000), evaluate participatory and adaptive management strategies (Everett 2001; Pound et al. 2003; Ison and Russell 2000; Pretty and Frank 2000), and explore the social dynamics of collaborative management (Chuenpagdee et al. 2004; Lynch et al. 2004). Results from these projects demonstrate positive social impacts of participatory research, such as increased trust and communication (Everett 2001), initiation of management partnerships (Chuenpagdee et al. 2004), and participatory monitoring to address environmental issues (Gasteyer and Flora 2000). Yet there are still relatively few published studies of empowering participatory research in the natural resources literature, despite growing interest within the discipline.

As participatory research is scaled up to the level of large international organizations and national governments, several scholars have raised the need for a discourse on quality and validity in participatory research, in part to avoid cooptation of "participation" by top-down bureaucratic processes (Cooke and Kothari 2001; Gaventa and Cornwall 2001). The notion of *quality* in participatory research refers to the quality of the participatory process, which includes the number of participants and their gender, age, culture, and socioeconomic diversity, but goes beyond those criteria to describe the sincerity and thoughtfulness of participant engagement in the research process (Kvale 2002; Lincoln and Guba 1990). The creation of social capital is one measure of quality participation that reflects the social impact of participant interactions.

Validity refers to the accuracy or truthfulness of research findings. In contrast to positivism, post-positivist approaches to qualitative inquiry emphasize the importance of confirmatory evidence and critical self-reflection in establishing validity. Validity in qualitative participatory research can be gauged by (1) the craftsmanship of the research process designed to systematically check and cross-check data to build grounded theory and test assumptions, (2) communication and confirmation of findings with academic and community peers, and (3) action demonstrating knowledge tested in real world applications, referred to as catalytic validity (Kvale 2002; Lather 1986; Lincoln and Guba 1990; Reason and Bradbury 2001). The evolving theory and guidelines for quality and validity in participatory research are rooted in applied social science fields such as education and public health (Lather 1986;

Lincoln and Guba 1990; Minkler 2004). Few studies have applied these concepts to participatory research in natural resource fields.

In an attempt to shift the emphasis of development and research efforts toward local needs and interests on the TO Nation, we² partnered with local organizations to collaboratively develop, implement, and evaluate a natural resources curriculum through participatory research. We piloted the curriculum as a series of interactive workshops on a variety of topics related to rangeland ecology and management. The action-oriented component of this project used participatory research to integrate O'odham and scientific knowledge into a locally relevant curriculum, while the research component used participatory research to reflect on the successes and limitations of the participatory processes of collaboration and research. The objectives of this study were to (1) analyze the diversity of participants based on culture, geography, gender, age, and profession and their contributions to the curriculum and research project, and (2) apply Woolcock's (1998) social capital framework to compare initial levels of social capital to changes in social capital due to the participatory process. A further goal of this article is to clarify and apply the emerging concepts of quality and validity in participatory research to a natural resource management context.

Research Setting

The Tohono O'odham Nation is a sovereign Native American nation located on 2.8 million acres of Sonoran Desert in southern Arizona along the U.S.-Mexican border. Currently there are approximately 26,000 enrolled tribal members, with approximately 11,400 members living on tribal land in the United States and 1,800 members living on traditional O'odham lands in Mexico. With the exception of a small percentage of allotted parcels,³ the Nation's lands are federal trust lands communally managed by tribal members. With high spatial, seasonal, and annual variability in rainfall and plant productivity, O'odham culture has evolved over thousands of years to live with the unpredictability of desert resources (Sheridan and Parezo 1996).⁴ Traditionally, O'odham people gathered, hunted, and practiced desert agriculture in the seasonally flooded washes of the Sonoran desert. Families migrated according to the availability of water, plant, and wildlife resources, relying on customary access to resources in geographical areas defined by indistinct, overlapping, and dynamic boundaries. Dispersed families came together according to agricultural cycles and seasonal social gatherings, maintaining community ties (Underhill 1979). Cattle and horses were introduced to the area by Spanish missionary Father Eusebio Kino in 1698, and gradually replaced native game in O'odham diet and culture (Kozak and Lopez 1999). Subsistence production of cattle dominates on the TO Nation today. Cattle serve as an emergency cash fund and play important cultural and economic roles when exchanged as gifts or loans. Over most of the reservation, periodic communal roundups are the primary livestock management institution (Hays 2004).

In 1916, a portion of traditional O'odham territory was set aside as the Papago Indian Reservation, and in 1936 a formal tribal government was established to govern a large number of formerly independent villages. At the same time, the U.S. Office of Indian Affairs divided the O'odham Nation's land into 11 fenced grazing districts in anticipation of a permit system for livestock grazing. These divisions created deep resentment within communities because O'odham livestock management

and harvesting of desert plants depended on overlapping customary territories and cooperation among villages—some of which were now separated by district fencing (Bauer 1971; Blaine 1981; Kozak and Lopez 1999). Although the district fences still stand and the resentment of government interference can still be felt among the elders, the grazing districts have yet to serve their intended purpose as management units for regulating livestock grazing. Instead, the districts now operate as political units within the tribal government.

Despite dramatic changes in subsistence patterns and the political organization of O'odham society, O'odham culture and language remain a vital part of life on the Nation. While the O'odham people face the same modern challenges and opportunities as any other group in the United States, O'odham *himdag*⁵ still shapes the decisions of everyday life on the TO Nation.

Advisory Committee

The Curriculum Advisory Committee was established with the goal of designing and piloting a rangeland curriculum tailored to the needs, environment, and culture of the TO Nation. We initiated the committee after obtaining a U.S. Department of Agriculture (USDA) Western Sustainable Agriculture Research and Education (WSARE) grant. Partners from the TO Natural Resource Department, the USDA-Natural Resource Conservation Service, the TO Soil and Water Conservation District, several O'odham livestock associations, and the TO Community College assisted in writing the grant and continued as core participants in the Advisory Committee. Committee members included O'odham and non-O'odham individuals who work on a variety of rangeland issues on the TO Nation. Participation in the Committee remained open throughout the project. After more than a year of planning, the Committee piloted the curriculum as a series of eight monthly one-day public workshops. The Committee also oversaw the research component of the project, formulating research goals and methodology, assisting in data collection, and interpreting and disseminating research findings.

Data Collection and Analysis

All project activities, participant involvement, and participant discussions were documented throughout the duration of the project, including Advisory Committee meetings in the planning phase (August 2002 to October 2003), pilot workshops in the implementation phase (October 2003 to May 2004), and additional Advisory Committee meetings in the evaluation phase (October 2003 to November 2004). Detailed notes were also taken at biweekly natural resources meetings led by project participants on the TO Nation during the implementation phase. During the second year of the project, the lead author was given office space with the TO Range Conservation and Management Program, where she spent two to three days per week for the next year. This allowed for a deeper understanding of a breadth of rangeland issues on the Nation and a chance to discuss emerging themes informally with O'odham colleagues.

Prior to the start of the workshops, we conducted in-depth semistructured interviews with seven core participants, including both O'odham and non-O'odham individuals from the Advisory Committee (Marshall and Rossman, 1999; Seidman, 1998). Interview questions addressed the participants' history of involvement with

rangeland issues, perceptions of how natural resource concerns are addressed on the O'odham Nation, observations from the Curriculum Advisory Committee meetings, and expectations for the future. Following the methods of Schultz et al. (2000), we held open discussions at the workshops centered on a variety of questions, from "How do these management options apply to your situation?" to "What do you see as benefits and limitations of this rangeland curriculum?" At the end of each workshop, we collected paper surveys and/or comment cards, switching in the latter workshops to blank comment cards in response to participants' preference for open-ended responses. A second set of interviews with six O'odham and non-O'odham individuals who took leadership roles in implementing the pilot workshops was conducted after conclusion of the workshops. These interviews focused on the participant's role in the project, his or her reflections on successes and limitations of the project, and his or her hopes for the future of natural resource education, rangeland use, and research.

Our analysis took a grounded theory approach, which requires systematic, self-critical analysis of the data to discover emerging patterns and repeatedly check them against a growing body of data to refine interpretations (Glaser & Strauss 1967). All data were reviewed and discussed as they were collected, through meetings and correspondence with the Advisory Committee. Meeting and workshop notes, observations, and interview transcripts were coded⁶ to identify emerging themes and patterns in the data to present to the Advisory Committee for discussion and further development (Glaser and Strauss 1967). We also conducted document analysis of all draft versions of the curriculum, draft research interpretations, and correspondence with the Advisory Committee to trace the theoretical contributions from various participants.

Cooperation was identified as an emerging theme in our grounded theory analysis, suggesting that social capital might provide an appropriate theoretical lens to interpret our findings. After discussion with the Advisory Committee, we chose to apply Woolcock's (1998) social capital framework to our data, coding data for examples of the four types of social capital in relation to O'odham natural resource management in general, and evidence of changes in each type as a result of the participatory curriculum project. These analyses took place in collaboration with project participants, who actively shaped the interpretations presented here both by expanding our conception of what constitutes resource management and by eliminating overly simplistic interpretations of O'odham culture. We were also vigilant to code for discrepant data that did not fit our emerging conceptual model, such as evidence that our project fueled resentment rather than an interest in collaboration. These discrepant data were discussed alongside alternative interpretations with the Advisory Committee. Final interpretations were refined during the last Advisory Committee meeting and at several public presentations of our findings.

Findings

Levels and Diversity of Participation

In the eight Curriculum Advisory Committee meetings, 39 people participated in one or more meetings, with an average attendance of 14 people per meeting. Twenty-five percent of participants in the Advisory Committee were women, including some women who took a leadership role. Invitation to participate in the Committee

remained open throughout the project, and there were new participants at all but one of the meetings. We also attended seven planning meetings with other groups that reviewed our progress, gave suggestions, signed up to receive Advisory Committee mailings, and assisted with implementation of the workshops. These groups consisted of four livestock associations, two legislative committees, and the TO Natural Resources Department. When considering the eight Advisory meetings and seven additional planning meetings, in total 94 people participated in project planning, representing 45 organizations, districts, and villages.

During project implementation, we held 8 workshops, which included 62 presentations and field activities given by 40 different presenters, with 65% of those presentations given by O'odham individuals and 13% given by women. The workshops were held at different locations in five districts, including four communities and two tribal facilities, and the lunches were hosted by nine different communities and local organizations. In total, 137 people, including 13 young people and 44 women, attended at least 1 workshop. Forty-four percent of the attendees attended multiple workshops and 13% attended more than half the workshops. The average attendance per workshop was 37 people.

Workshop participants were diverse in their organizational and community affiliations, representing 36 different organizations and 8 of the 11 tribal districts. Even though many O'odham Advisory Committee members predicted that the majority of workshop participants would be residents of the local district, local participation accounted for only 22% of total participation. Participants from eight different districts attended workshops, although two of those districts were only minimally represented, and there were no participants from the remaining three districts. The five districts with low to no participation lie farthest from Sells, the tribal capital and the location of all Advisory Committee meetings. All but one of these districts have been historically underserved by tribal and federal natural resources programs for various reasons. Patterns of participation in the workshops, such as geographic diversity, strongly reflected participation in the Advisory Committee. Out of the 39 individuals who attended the Advisory Committee meetings, 70% attended the workshops.

Conceptual Evolution of the Curriculum Project and Research

During the planning phase, an elderly O'odham rancher stated, "You have to manage the water, land, and then the herd. Water is life. If you don't utilize every drop and you don't have any ground coverage, then it will run off and wash away the land." From this comment, we subtly shifted the content of the entire series of workshops to emphasize the importance of water in a desert environment, and the ways that management actions affect and are affected by water and drought cycles. We began the series of workshops with elders' stories of water use for traditional farming and ranching and ended the series with an O'odham presentation sharing jokes, stories, and photos related to drought, the desert landscape, and the celebratory experience of the monsoon rains. As natural resource managers and facilitators, our first intent was to focus workshop content around a series of rangeland and livestock management themes for an audience of ranchers, but the committee continually redirected and broadened our focus to include quality-of-life issues, such as domestic water availability, flooding, and erosion control, that are important resource concerns for all community members.

Similarly, we decided in the planning phase to focus the first workshop on TO history with later workshops focusing on other themes. However, after the success of the first workshop, everyone agreed that each workshop should start with the history of the local district. The history presentations, which included explanations of past management strategies, family photos from the early 1900s, and old-time stories of intervillage games and livestock roundups, set the context for the topics to follow.

The use of social capital as an interpretive lens also evolved through the process of participatory research and development of grounded theory. At the first Advisory Committee meeting, participants identified among other project goals “to incorporate values of cooperation and community, especially as it is important for effective management.” In contrast to past conservation efforts sponsored by the Bureau of Indian Affairs (BIA), current efforts under the direction of O’odham leadership acknowledge the need for cooperation in resource management. O’odham *himdag* teaches the importance of cooperation, which includes cooperation among villages, among neighbors, between political leaders and their communities, and between elders and children. This concept of cooperation was emphasized by several elders as they gave presentations and made comments throughout the series of workshops. As this concept emerged, we found that Woolcock’s (1998) social capital framework closely followed the patterns of cooperation described by O’odham elders, and we presented it for discussion during several Advisory Committee meetings and more generally within the workshops. In an early Advisory Committee meeting, an O’odham rancher criticized the use of *milga:n*⁷ theories to explain O’odham ways, but instead of polarizing the debate, his criticism initiated a rich discussion of the goals of the project and the role of research on the O’odham Nation. In the workshops, we presented evolving concepts of social capital analysis and opened up the topic for discussion to collect comments to integrate into the ongoing analysis. In the final Advisory Committee meeting, a small but diverse group of core participants refined the details of the analysis and interpretations contained in this article. These interpretations were further supported when we presented our findings in several public forums and received strong support from political leaders, elders, and other community members.

Initial Levels of Social Capital

Following Woolcock’s (1998) framework, this section describes initial levels of linkage, integration, organizational integrity, and synergy related to O’odham rangeland use before the participatory curriculum project began. The following findings are generalized interpretations designed to give a broad picture of social capital on the O’odham Nation, and given the diversity of the O’odham Nation, these interpretations do not hold true for all individuals or communities.

In general, Integration, the social capital held among community members within the same community or district, is high and characteristic of O’odham culture. Fundamental to the underlying political structure on the O’odham Nation, communities have the final say in all political matters. If the communities and districts do not agree with a policy, with few exceptions, it is virtually impossible to implement or enforce that policy. As one participant explained, “Even though it is not written in the BIA code of regulations or wherever you want to find it, it is the people who have the ultimate power.” At the core of this localized decision making are the respect and power that elders hold within their families and communities. As one participant described,

a comment from just one elder can suddenly stop a project that had been moving forward with consensus support from the community or district.

Integration associated with the power that elders hold in their communities is still very high; however, integration associated with other family members and youth is lower now than in the past as the generation gap increases and young people become less interested in natural resources and other traditional O'odham activities. One O'odham woman commented that youth participation in livestock production is low because a lot of the older ranchers never reached out to teach the younger ones, and now the elders let the cattle out on the open range with little management because they don't have the help they need.

In other cases, integration is low where grievances have fractured the bonds between villages or families. The resulting mistrust and isolation limit the potential for cooperative action, and in the case of livestock management, this anger tempts people to use fences to physically separate themselves and their cattle from the frustrations of working with their neighbors. Although some range managers assume that fences mean better resource management (because they allow for greater control over the timing and spatial distribution of grazing pressure), when fences are used in this way to claim land or property, livestock are generally concentrated into a small area where resources are overused rather than rested and conserved. This is especially true in a desert environment where the spatial and temporal patterns of rainfall and plant production are highly variable and unpredictable.

In terms of synergy, there is a trend in recent years toward higher responsiveness of politicians to community needs and interests. Although the tribal government and constitution were established in 1936, political power remains centered at the local village and district levels. In recent times, politicians openly admit that laws and ordinances are rarely passed without the support of all the districts, and even voting by the tribal council is sometimes delayed so that political representatives can return to their district councils for direction on how to vote. In the event that a law is passed without support, it is difficult to implement or enforce. Gaining support for any law is strongly dependent on gaining support from politically powerful people in each of the villages and districts. In 1997, when a proposed Range Management Code was presented to the districts, comments were generally negative, pointing to the fact that each district handled livestock in its own way, and that the tribe would have to force districts and livestock owners to comply with a single standard. Because of this, the code has yet to be implemented.

Although synergy is typically high in O'odham culture, it is higher in relation to social and economic issues, such as health, education, roads, and economic development, than it is with respect to natural resource issues, such as livestock control, overgrazing, drought, watershed management, and animal disease management. Participants attributed the lack of synergy associated with natural resources to a lack of awareness among community members that natural resource management is directly relevant to quality of life issues such as flooding, erosion, and domestic water availability. O'odham participants attributed this disconnect to modern lifestyles favoring office jobs and indoor recreation over agricultural careers and other outdoor activities.

In addition, synergy seems to be somewhat unbalanced; natural resources programs and agencies working on the O'odham Nation seem to know more about community needs and concerns than community members know about the services that the programs and agencies offer. This is the opposite of what we expected.

Participants attributed this imbalance to the recent shift from BIA to O'odham leadership in tribal natural resources management. O'odham professionals who live and work in O'odham communities understand the social context of management better than their BIA predecessors. However, because of the time it takes to get information out to the geographically dispersed communities, a lack of public awareness persists.

In contrast, organizational integrity, the social capital that unites organizational members to effectively accomplish their shared goals, is generally lower than integration and synergy. In fact, there are cases when the pull of local political interests, often a combination of integration and synergy, is so high that it compromises organizational integrity—when O'odham individuals in leadership positions become more responsive to local political influences than they are accountable for meeting their professional responsibilities. In recent years, one district government discovered several of its employees were taking thousands of dollars of district money to give to family members, and this problem continued for another year after the first employee was charged with embezzlement. At other times, an individual may become aware of mismanagement, but is unable to confront the situation because it would disrupt the prevailing social stability important to daily interactions and long-term relationships.

Linkage, the social capital between an individual community member and other people outside the community, is generally low due to the long distances between villages and nearby cities, and due to the cultural differences between O'odham and neighboring Hispanic and Anglo communities. Linkage is highest among individuals who have attended school outside the O'odham Nation or have served in the military. These individuals are often more willing to form partnerships with non-O'odham individuals and organizations. Linkage is also higher among political leaders and tribal employees, who often attend conferences and meetings off the reservation. In cases where one community member has high linkage, there are examples when other community and district members use that individual as an indirect link to get information or establish partnerships with a broader diversity of people.

Changes in Social Capital

This participatory curriculum development and research project increased linkage and synergy directly by providing a forum where community members, political representatives, natural resource managers, and researchers could negotiate the terms of the research process, communicate their research needs and natural resource concerns, and discuss research interpretations and natural resource solutions in a setting that valued the contributions of all knowledge holders. During the workshops, O'odham and non-O'odham natural resource managers presented information from their professional experience and training, but perhaps more importantly, they made themselves available for discussions about appropriate management options relative to local interests, environmental conditions, and land tenure. In reality, the division between “presenters” and “audience” was not clear-cut. In many cases, O'odham elders in the audience would deliver impromptu speeches explaining local concerns and historical context. These elders in essence “took the podium” and contributed greatly to understanding local resource concerns and the real-life constraints of implementing management recommendations. As one participant said, “Probably the most memorable moments [from the workshops]

were when we had questions from the audience.” Additionally, during breaks, lunches, and field trips, one-on-one conversations developed, and individuals discovered shared interests, which created opportunities for future partnerships, increasing linkage.

Indirectly, the project increased integration as communities showcased their strengths in the workshops. Out of a total of 62 presentations 65% were given by elders, community leaders, and O’odham natural resource managers on local history and local management strategies. In the workshops, people expressed pride to see local presenters and attendance of community leaders and their families.

Indirectly, organizational integrity was increased as employees from different programs within the TO Natural Resources Department coordinated to showcase their programs in the workshops. As one Natural Resources Department employee stated, “I think [this project] made us all get to know each other better and be able to get that support from one another.”

Synergy was enhanced for tribal government officials, the community college, and the university. In the workshops, political leaders from the village, district, and tribal levels listened to concerns from community members and raised their own questions related to decisions that they face in their work. Often political leaders do not have the detailed information from the communities and technical experts that they need to make policy decisions related to natural resource management, and some legislative members actively promoted the workshops as a way to educate themselves and their constituents on these issues. One O’odham legislator stated, “Right now, what I’m hearing is that the information isn’t out there. We need these awareness classes to learn these things and try to tell our districts.” For the community college, participation in the project increased the visibility of its new natural resource program and introduced community members to college staff. Building relationships between college staff and community members is crucial in getting potential students comfortable with the college and countering the “intimidation factor” that discourages many O’odham from attending college. Lastly, participation by university researchers in an informal setting, which allowed for negotiation of research roles and responsibilities and open discussions valuing different types of knowledge, increased trust in the university system and the research process on the part of tribal officials, community members, and elders, who expressed a willingness to continue working with the university to develop research projects that satisfy local needs. Several participants even expressed ideas for future research projects and an interest in developing a locally focused research program at the TO Community College. This is a dramatic change in attitude, considering the long history of resentment toward research that even we experienced at the start of the project and occasionally during public presentations of findings.

Research Findings Put to Action

Although progress has just begun, the TO Community College used the political will and locally based knowledge generated from the curriculum project to start its new TO Agriculture and Natural Resources Program. Further, the college adopted participatory methods to develop the program’s mission statement, degree options, and class content, all designed to incorporate O’odham knowledge through active participation of O’odham knowledge holders, demonstrating the implementation of our research findings beyond the scope of this curriculum project.

Staff of the TO Natural Resources Department thought the open discussions inviting community comments were the most important part of the workshops and saw this participatory approach as a tool to develop publicly acceptable policies to govern livestock management and rangeland use. Following the workshops, the department convened a series of public forums to discuss pressing issues and build policy recommendations related to livestock and grazing management, animal disease control, and community flooding.

Limitations

The primary limitations of this study and its interpretations are a lack of participation from certain underrepresented groups in the research process—more specifically, the study was limited by who was able and willing to participate. Most active members in the Advisory Committee were professional natural resource managers or educators who participated in meetings and events as part of their accepted work schedule. However, because many of these professionals were O’odham, living and working in O’odham communities, they brought a powerful blend of experiences to the table. Despite the higher attendance of professional participants, we found that O’odham elders made significant conceptual contributions based on their rich cultural and historical knowledge of the topic at hand. Similarly, there were only 33% female participants, which was expected given that ranching on the TO Nation is a male-dominated activity. Nevertheless, several female participants were dedicated organizers, influential presenters, and active participants throughout the workshop series and research discussions. Lastly, people who did not agree with the project simply dropped out or never attended. Although we talked with some of these individuals, there are potentially others whose viewpoints we were not able to include in this study.

Discussion and Conclusions

Quality in participatory research is directly tied to who participates, how they contribute, and the enduring effects of their participation (Lather 1986; Reason and Bradbury 2001). In our role as facilitators, we attempted at every step to stretch the bounds of who participated and to encourage an open exchange of ideas among all participants. The results presented in this study demonstrate a high level of diversity among participants and thoughtful, critically reflective contributions from them.

While the questions of who participates and how are generally straightforward, the enduring consequences of participation can be more difficult to describe. In this study, we found Woolcock’s (1998) social capital framework to be a useful tool to describe the social impact of participation in terms of increased levels of linkage, integration, organizational integrity, and synergy. The curriculum itself was also an enduring product of meaningful participation that succeeded in combining different types of knowledge through the direct participation of O’odham and scientific knowledge holders.

Kvale’s (2002) notion of validity in participatory research encompasses the concepts of craftsmanship, communication, and action. Craftsmanship, like the development of grounded theory, requires a commitment to critically question emergent theories and design data collection and analysis strategies that challenge the researcher’s personal perspective. In this study, Advisory Committee members and

research facilitators discussed our assumptions, beliefs, and expectations during early committee meetings. As we gathered data from the interviews and workshops, adoption of the social capital framework and initial interpretations were discussed in the Advisory Committee meetings and workshops. Interview, meeting, and workshop transcripts were coded to look for discrepant data that did not fit our emerging theories and interpretations were further refined to account for these discrepancies.

Communication confers validity through the process of review by both academic and community researcher peers. In participatory research, the communication and craftsmanship dimensions of validity are often intertwined, since much of the checking and rechecking of data interpretation is conducted in collaboration with community research partners. In this study, the process of communication was formalized within the Advisory Committee and informally extended to workshops and public meetings. Emerging findings were also communicated to the community through local newspaper articles, brochures and displays at community events, and public presentations, all of which received popular support and thoughtful commentary.

The action dimension of validity, also called catalytic validity, is demonstrated when participants put to action knowledge gained through the participatory process. The validity of the O'odham-based curriculum was demonstrated when the TO Community College established its own natural resources program based initially on the content of our curriculum and later expanded. Our social capital analysis illustrated the importance of social processes to O'odham resource management and concluded that these processes could be positively affected by using participatory approaches. The catalytic validity of this analysis was demonstrated by the adoption of participatory program planning by the TO Community College and participatory policy development by the TO Natural Resources Department.

This study demonstrated that participatory research does not require an elaborate methodology. Instead, it relies on building and maintaining relationships, identifying mutually rewarding research and action goals, and establishing a comfortable environment for critical self-reflection and constructive criticism among all participants. Participatory research is not possible or even appropriate for all types of research. Where it is skillfully and authentically employed, participatory research can lead to community empowerment, transformed relationships among academic researchers and their community research partners, and otherwise inaccessible insights into the social processes of natural resource management.

Notes

1. In this case, organization refers to any governmental or nongovernmental body of people which has a shared purpose or set of goals.
2. At the time of this project, we were working in association with the University of Arizona Cooperative Extension.
3. Some land in San Xavier District was allotted to individuals under the federal Dawes Act of 1887. Today, the individual parcels of land are owned jointly by numerous allottees, who are the descendants of the original owners.
4. O'odham people hold rich traditional knowledge, some of which has been documented and published. Early in our project we determined that traditional knowledge would be incorporated in the curriculum through the direct participation of O'odham knowledge holders. In respect for our research partners' concerns about confidentiality and intellectual

- property rights, specific traditional knowledge was not documented or reported as part of this research.
5. O'odham word meaning "lifeways."
 6. NVivo software was used to code the data (QSR International 2000).
 7. O'odham word meaning "Anglo," from "American."

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