Research, part of a Special Feature on Implementing Participatory Water Management: Recent Advances in Theory, Practice and Evaluation

Social Learning through Participatory Integrated Catchment Risk Assessment in the Solomon Islands

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ABSTRACT. In developed countries a social learning approach has been shown to support Integrated Water Resources Management (IWRM) by fostering stakeholders' understanding of system complexity, recognition of mutual dependence, appreciation of others' perspectives, and development of the capacity to work together and to create mutual trust. Much less is known about social learning's potential in less developed small island states, particularly postconflict island states, where integration must navigate prescriptive management, limited resources, widely differing world views, a history of adversarial relationships, and unsuccessful attempts at government-community collaboration. This paper analyzes the transformative aspects of a social learning experience that occurred during research facilitating participatory integrated catchment management in the Pacific. The study elicited community and expert knowledge to create systems understanding to generate and analyze complex scenarios for integrated catchment risk assessment in the Kongulai catchment, Solomon Islands. Separate sequenced and then combined discussions led to facilitated exploration of others' subjective assessment of catchment risks and management options. Issues of transparency, trust, accountability, and mutual responsibility were explored in carefully created discursive spaces, assisted by the immediacy of personal contact and the absence of complex bureaucratic structures. Despite historical difficulties, through the use of bridging individuals, participants were generally able to transcend the constraints of their individual knowledge cultures, expand awareness and appreciation of the complexity of human-environment systems for IWRM, and envisage new opportunities for productively working together in integrated catchment management.

Key Words: *catchment risk assessment; collective social action; deliberative democratic theory; developing countries; Integrated Water Resources Management, IWRM; knowledge systems; social learning; Solomon Islands; Pacific Islands*

INTRODUCTION

The Pacific Island nations are currently developing national Integrated Water Resources Management (IWRM) plans, identified in the 2002 Pacific Regional Action Plan on Sustainable Water Management (Pacific RAP) as a solution to managing and protecting water resources, improving governance arrangements and thus water supply and sanitation (SOPAC 2007). IWRM, and its catchment-scaled variant, integrated catchment or watershed management, advocates a strategic and integrated approach to allocating water, subordinating the needs of individual sectors and user groups to the larger goals of the society and vital ecosystems. It specifically focuses on establishing and improving the linkages between land and water management, competing sectors, government agencies, civil society, and the private sector (SOPAC 2007).

Some critics claim IWRM is ill-defined and ambiguous (Medema et al. 2008), has delivered few of its anticipated benefits (Jeffrey and Gearey 2006, Varis et al. 2006), and presents almost insurmountable implementation challenges in integration and institutional change (White 1998). Biswas (2004) proposes that it would be better labeled 'collaborative, cooperative, or coordinated' water resources management and that instead of distributing responsibilities for water management, it centralizes them. Molle (2009) considers IWRM

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to be a potential "political technology", a term used by Foucault to describe devices by which political issues are framed in scientific and technical terms to appear neutral or objective. Molle claims that IWRM obscures the highly political nature of water management and the irreconcilability of its multiple goals of "economic efficiency, social equity and environmental sustainability" (2009:67). Nevertheless, IWRM has been considered by many to expand the awareness and engagement of multiple sectors and successfully guide strategic and operational planning, leading to more sustainable management of water resources (Dukhovny 2004, Lamoree 2004, Mitchell 2004).

IWRM requires collaborative action across government departments, the private sector, and civil society, in the process validating diverse values and mobilizing the knowledge and expertise of governments, community, and other partners. This approach reflects contemporary approaches toward more consensual governance with broad and systematic interactions between government and civil society (Edwards 2001).

Because biophysical environmental problems are often based in socio-political issues (Keen et al. 2005), both productive relationships and shared knowledge are required for successful IWRM (McCool and Guthrie 2001, Bouwen and Taillieu 2004, Pahl-Wostl and Hare 2004, Mostert et al. 2007). In 'small island' developing states particularly dependent on their own limited resources and with a narrow range of options, the pressures and challenges for effective IWRM can be even greater (Keen 2003). Limited land and even more limited fresh water resources, pressures from increasing population, and economic development coupled with climate variability and change, make water shortages, flooding, soil erosion, contamination, and salinization daily realities for many users (Dray et al. 2007, SOPAC 2007) demanding cross-sectoral attention and resolution. This situation is further complicated when, as is common in the Pacific, rapidly urbanizing areas make claims on water resources sourced from traditional lands where water rights are intertwined with custodial land and thus resource rights (Keen 2003, White et al. 2008). Failure to understand and work within existing social and institutional contexts means that any solutions will be short-lived.

Like modern approaches to sustainability, successful use of IWRM management instruments,

i.e., plan development, demand management, social change instruments to encourage a water-oriented civil society, conflict resolution, data collection, information management and exchange, requires diverse groups to understand and learn from each other to work together meaningfully. 'Social learning' refers to what takes place among individuals and groups as they work together to improve a common situation through collective action (Keen et al. 2005, Measham 2009).

Social learning is commonly applied to collaborative actions to bring about sustainable environmental governance. Elements include authentic dialogues to reveal epistemologies, shared reflection, systems thinking, and network building. Keen et al. (2005) identify participation, reflection, systems orientation, negotiation, and integration as central themes for social learning, whereas Pahl-Wostl and Hare (2004) focus on appreciation of system complexity and of mutual interdependence, awareness of others' perspectives, learning to work together, the creation of trust, and the exchange of soft data (Pahl-Wostl and Hare 2004). However, Reed et al. (2010) argue that these descriptions conflate facilitating processes with the outcomes of social learning, impeding efforts to determine when, and through what mechanisms, social learning takes place. Essential components of social learning accordingly are: "clear evidence that a change in understanding has taken place in the individuals involved; evidence that this change goes beyond the individual to be situated in wider social units; and learning is transmitted through social interactions and processes between actors in a social network" (Reed et al. 2010). This suggests an opportunity to examine the contributions of supporting processes to social learning, to improve our understanding of how social learning is generated and could be enhanced.

Within water resources management, conditions and components of social learning have been synthesized from an analysis of successful integrated management of 10 European river basins under the HarmoniCOP case studies (Craps 2003, SLIM 2004, Tippett et al. 2005, Mostert et al. 2007, Pahl-Wostl et al. 2007), deduced logically from the requirements of successful IWRM (Pahl-Wostl 2006), and analyzed against sustainability learning (Tàbara and Pahl-Wostl 2007). The majority of studies however address social learning in river basin management in developed countries, particularly European river basins. Far fewer studies

reflect on the specific challenges and opportunities in creating successful social learning opportunities in developing countries (cf. Craps et al. 2004, Dewulf et al. 2004, Varis et al. 2006, Kumler and Lemos 2008) and traditional societies where challenges may be heightened by widely differing knowledge cultures and worldviews, as well as less developed participatory institutional arrangements than in the developed countries studied so far (Keen 2003).

Much of the social learning literature focuses primarily on the events that transpire, e.g., agreements reached, trade-offs achieved, with little investigation into the meaning or significance of the social learning experience to the actors themselves. However, understanding the significance of the shared experience of intersubjectivity throws light on why and how social learning processes are transformative and indicates where further social benefits may be obtained.

This paper reports on an evaluation of a participatory research process that was conducted to develop a catchment risk assessment to improve natural resource and water management in the Solomon Islands (Chan et al. 2010). The evaluation framework shares common features with the Canberra Protocol (Jones et al. 2009) assessing the research processes' influence on sharing information and developing cross-sectoral relations among participants but focusing specifically on social learning outcomes of the particular tools used. As Measham (2009) points out, program evaluations can be developed as social learning experiences. The paper first reviews our research process, with a focus on the activities and arrangements designed to foster effective engagement in our participatory process, and thus minimize anticipated barriers to effective social learning. It then describes the evaluation process, discusses the evaluation findings, and proposes additional opportunities for a social learning approach in developing countries.

The research process

In 2006, coinciding with Pacific Island Countries' initial mobilization to develop IWRM plans, the Australian Water Resources Facility (AWRF), an AusAID research initiative with the International WaterCentre, began to develop and trial an integrative conceptual framework to support more effective development assistance for water management in the Pacific. The framework's purpose was to promote interdisciplinary understanding of the linkages between the ecological, social, and economic components of human-environment systems across scales of governance, geography, and time. The framework was used in two case studies, in the Solomon Islands and Vanuatu, to address real life water resource planning and management issues, exploring the feasibility of using participatory catchment risk analysis as a focus for improved catchment, i.e., watershed, management.

It soon became clear that this interdisciplinary research was piloting collaborative processes that could significantly assist in building capacity for the subsequent development of each country's national IWRM Plan, because the research activities appeared to strengthen awareness and dialogue, share understanding of ecological and socioeconomic impacts of water reform, and improve collaborative societal governance of water resources, capacity for risk management, and decision making under uncertainty. Although this had not been an original focus, the research team determined to facilitate and support the social learning process.

Research followed the following stages, illustrated in Figure 1:

- Develop an interdisciplinary conceptual framework

- Undertake a situation and stakeholder analysis, and begin relationship building among the relevant parties

- Elicit and augment a whole-of-water cycle systems understanding of catchment processes and risks through participatory methods

- Facilitate development of a risk assessment model using both community and expert knowledge to generate scenarios, testing ideas for improved management

- Produce a synopsis of the process for wider application.

Chan et al. (2007, 2008, 2010) provide more detailed descriptions of the development of the catchment risk assessment model.

Fig. 1. Research stages and time line.
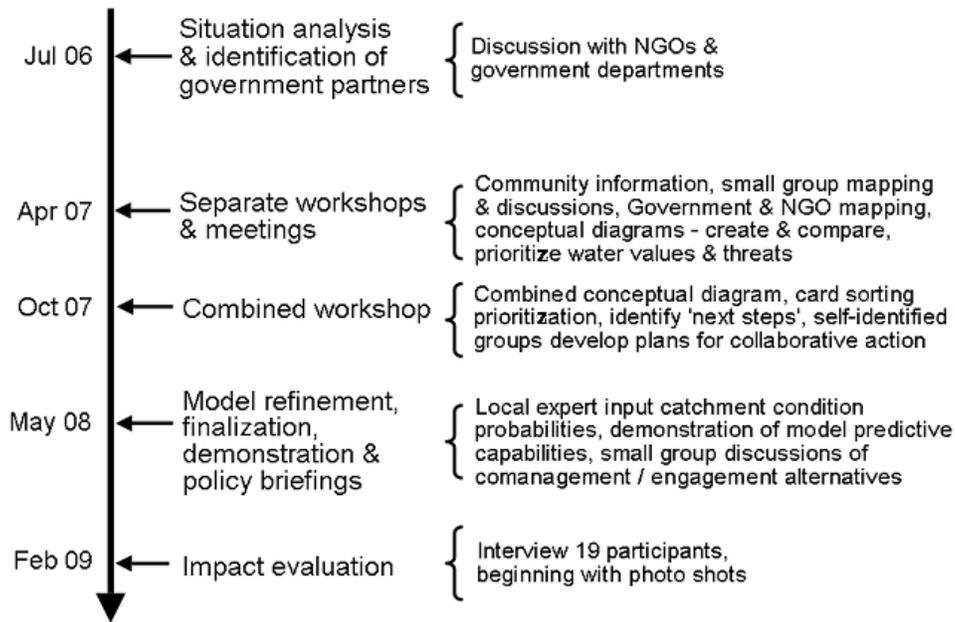
A situation analysis, conducted in an initial visit, defined the current situation of water issues, water research, and development in the Solomon Islands and identified key groups with which the AWRF could form a long-term research partnership. These groups recommended the Kongulai Catchment as a priority catchment for management improvement, with significant scope for risk management and social uptake of research activities.

The karstic limestone catchment, approximately 50 km², sits above the capital city Honiara and provides about 60% of its water (Wairiu and Powell 2006). Responsibility for water management is divided between several institutions. The Water Resources Division of the Ministry of Mines and Energy admits that much is still unknown about water flow through the karst landscape, the integrity of catchment boundaries, and even the usefulness of a catchment concept given the extensive intermingling between surface and ground water. Significant water infrastructure, i.e., bores, supply pipes, and pumping station, is managed by the Solomon Islands Water Authority (SIWA) but the main water source is on customary land. As in many Pacific Island catchments, ownership of the resource is contested between the state and the customary land owners. A third organization, the Department of

Lands, Housing and Survey is responsible for a lease agreement for use of land involved in SIWA's water extraction and storage. This was signed with the affected customary landowners in 1990, but circumstances have changed significantly over the intervening years and review of that agreement has been long overdue.

The Solomon Islands, as a postconflict state (Wairiu and Powell 2006), is rebuilding its governance systems following the government's collapse in 2003 amidst ethnic tensions due in some part to issues around customary land ownership and uneven economic development. New governance arrangements seek to be more inclusive and responsive to all constituents. Meanwhile civil society is in transition from a subsistence to a cash economy and resource rental payments for logging rights, oil palm plantations, and water resources represent a scarce and valuable source of cash for customary landowners to meet transport, utility, and education costs. There has been a history of acrimonious dealings and sabotage of water infrastructure by customary owners protesting inadequate or late resource rental payments. Prior to our study, SIWA's limited efforts at community engagement had not been successful.

Following the situation analysis, the research team refined its initial identification of stakeholders, clarified the composition of the community of customary landowners from two subclans living within and below the catchment, and recruited a well-respected cultural guide and interpreter to help customize and conduct the participatory research approach. On his advice, two open community meetings with the landowner subclans explained what the research project was and was not about, i.e., information and data collection on water use and management rather than negotiations over resource rental payments, and resolved how the community wished to be engaged. Small community group meetings of mixed ages were then held, disaggregated by gender and lineage. During the same period, two workshops were held: one with 19 representatives from NGOs and donor organizations with connections to or interests in the catchment, and the other with 16 representatives from relevant government ministries. A list of these organizations is in appendix 1.
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These community meetings and the government and NGO workshops elicited each party's knowledge of water in the catchment. Large catchment maps with minimal features marked were used to stimulate discussion and record information about: where water appears and how it moves through the catchment, e.g., the location and behavior of rivers, sinkholes, swamps, and run off; land use and catchment features; protocols and habits for personal water collection and use and other local uses for water; water values in the catchment and any associated threats; and what relationships were understood between different factors, including identification of priority values of water and linkages between activities and risks within the catchment. Although mapping by the Department of Lands, Housing and Survey covered this area, much of the official detail had not been verified on the ground. Landowners were the only people who regularly visited the area and the elicitation activity revealed a number of discrepancies from the official maps; some rivers thought to be perennial were discovered to be intermittent and there was significant uncertainty in the location of sinkholes and springs (Chan et al. 2007).

In the government and NGO workshops, small groups constructed conceptual diagrams of linked water issues and impacts in the catchment. These workshops began by identifying priority values and threats and ended with lively discussions of similarities and differences across the diagrams. The community participants did not physically create problem trees; the conceptual linkages they recognized were captured from the records of the small group discussions and added to the amalgamated conceptual diagram.

Five months later, in October 2007, all participants were brought together into a combined workshop, which refined the merged conceptual diagram as the basis for a Bayesian Belief model that would generate and analyze defensible scenarios informing catchment management planning. A Bayesian model was used because it deals well with sparse data, high uncertainty, and incomplete understanding of the system (Batchelor and Cain 1999, Korb and Nicholson 2004).

Although the three sets of participants were aware of one another's involvement in water issues, this workshop was their first opportunity to work together. A concerted effort was made to build comfort, then structure opportunities for extended discussions to explore and exchange views. By late in the day, the participants were ready to work in self-organized mixed groups to decide how they wished to progress the issues they had identified. They proposed and developed 'next step' plans for action on five themes: "building trust," "consulting men and women separately," "creating an association of landowners/trustees to develop a partnership between the stakeholders," "catchment management planning," and "reviewing the lease agreement".

The research team returned in May 2008 to work with local experts and water managers to refine and finalize the model, and hold two reporting back meetings with all participants, one technical for government managers, focused on the model, and one more general, held primarily for the community and NGO participants. At government request, policy briefings were also provided on international best practice for community engagement in landscape management with special emphasis on collaborative management. Also at government request, models of collaboration were presented to the community, NGOs, and customary landowners, and participants discussed how they wanted to work with government in the future.

Ten months later an evaluation was conducted to assess social learning impacts of the research process on the participants and explore whether

changes in attitude or behavior had been effected. The following sections expand on aspects of the research process that were important in creating supportive conditions for social learning to occur.

Arrangements to anticipate and meet challenges for effective social learning

The participatory process was designed carefully to adapt best international practice in public participation (Buchy and Hoverman 2000, Ross et al. 2002) to the cultural and organizational setting, and to manage for possible impediments to social learning. Even in developed countries where stakeholder representatives often bring allied technical and professional backgrounds, effective social learning faces challenges in achieving stakeholders' understanding of system complexity and in fostering recognition and acceptance of mutual interdependence in the complex human-environment systems of water management. Appreciation of others' perspectives requires dialogue but in developed countries, as part of their understanding of how the world works, stakeholders often bring to the process some level of prior knowledge about an integrated water cycle, management systems, service delivery, strategic planning, budgeting, or system maintenance requirements, complemented by agency data, management, and planning systems.

In the Solomon Islands, it was clear that because of limited technical data sets, a full understanding of current water management would require pooling all available knowledge and achieving convergence on key points among stakeholders, given the distributed locus of authority for water resource management decisions at the village and individual level, and limited government resources and capacity for regulatory enforcement. With multiple and diverse values attached to natural resources, but particularly water, it was also important to avoid excluding any relevant information. However, the history of conflict between the government and the customary owners posed potential barriers that needed to be overcome to achieve communication and effective social learning. As with the Millennium Ecosystem Assessment, the research team had a commitment to resolving scale and knowledge systems issues incorporating local with global/scientific knowledge (Reid et al. 2006) to capture community information on catchment and customary management, transcend any language

barriers, and overcome significant differences in knowledge systems or cultures. Supporting arrangements included attention to format, protocols, and sequencing of meetings, accommodation to diverse knowledge systems, the use of 'bridging' individuals and of low threat elicitation and discussion techniques to reveal and ponder differing world views.

Appropriate meeting protocols

Separate meetings held with community members, government, and NGOs were designed to be inclusive, and followed principles of good public participation, including transparency, inclusiveness, and representativeness (Rowe and Frewer 2000, 2005) customized for local expectations. Status issues associated with gendered cultural roles, education, and authority informed session designs. Care was taken to recognize the differences within the customary landowner groups and their complex motives for participation while also ensuring community processes did not override existing legitimate decision making processes (Cooke and Kothari 2001). Thus a workshop format was used for government and NGOs but small group meetings in separate men's and women's groups were held for community. A workshop format presupposes participants are committed to public debate and public opinion formation, and able to put forward arguments for consideration, defend them, and negotiate their incorporation into the accepted view of social truth. Potential participants who see themselves as unable to challenge authority or who consider themselves politically powerless are unlikely to attend, or if attending, to contribute (Hoverman 1997) particularly in some cultural contexts. The identification of 'citizen' with its expectation of participation in public debate and public opinion formation has historically been seen as male (Fraser 1986). Although this has changed significantly in many developed countries, there has been less change in some traditional societies.

To cater for and facilitate the input of the less forthcoming, including youth and women who traditionally defer to tribal male elders in public, alternative, more inclusive mechanisms were needed. These included validating a range of modes of communication besides "rational/logical forms of public argument and debate" (Young 2000:57, Parkins and Mitchell 2005). The participatory process also accepted local advice that community members, lacking confidence to speak out in

combined public meetings, might simply not show up to cross-sectoral workshops, and that government officials were likely to appear only for those parts of the day's activities that appealed to them.

The community meetings were therefore highly social, held around kitchen or picnic tables to collect catchment information. The meetings and workshops were sequenced to convey collected information from community to NGOs on to government, increasing awareness of, and lending legitimacy to, local community and NGO information alongside scarce scientific data. In addition, because of past conflict, the participation process needed to work toward identifying common ground for consensus, not assuming or further entrenching opposition or conflict, potentially resulting from earlier unsatisfactory encounters (Buchy and Hoverman 2000). The traditional opening session of a discussion "Tell us who you are and what your interest is in being here" often crystallizes entrenched positions. The greater the differences, and the more entrenched and therefore defended the positions, the less likely the possibility of finding common ground on which to establish a constructive dialogue. Initial discussions therefore focused on the collection of factual data about water in the catchment and only later progressed to issues requiring opinions, such as prioritizing values and threats to water in the catchment and consideration of management systems and relationships.

Recognizing diverse knowledge systems, framing, and perspectives

Differing knowledge cultures presented particular challenges. In early meetings participants clearly operated from priorities and understandings of the catchment based on their own experiences and worldviews. Diverse forms of knowledge call upon different sources of evidence or authority. For example, an opening question of "Where do you find water in the catchment?" sent water resources representatives back to their offices to secure a dated hydro-geological map of the area. Community representatives responded to the same question with information from their brothers who had hiked through the rugged landscape, explored the karstic limestone caves, and lain on the ground listening to sounds of underground rivers. These two approaches mark 'specialist' and 'individual' knowledge cultures, two of five categories of knowledge used in Western decision making along

with local-community, strategic/organizational, and holistic (Brown 2001). A specialist culture is characterized as discipline-based or codified knowledge found in science, finance, engineering, and law, whereas individual knowledge is hallmarked by personal, lived experience reflecting identify, reflections, and personality.

Knowledge is socially constructed. People interpret the significance, validity, and usefulness of new information in the context of their particular worldviews (Brown 2001). New information is tested by comparison against direct experience, through often informal processes of hypothesizing and observation, checking for coherence against previous understandings and the collective experience of the group. Examples of local-community knowledge, generally built on shared, lived experience (Brown 2001), which surfaced in the initial community meetings, were agreed explanations for new flows in exceptionally wet seasons, flow changes, and river disappearance from seismic activity. Geological maps, hydrological tracer studies, investigations of water chemistry, electricity requirements, pumping costs, and impacts on equipment characterize the kinds of specialized knowledge brought to the workshops by government departments and statutory authorities. NGOs revealed either a lived awareness of water-related issues in this particular area, such as community access to water, and place-specific water quality effects of logging in the catchment, or fell back onto an international "de-contextualized" (Bouwen and Taillieu 2004) environmental knowledge base that claims universal applicability and authority unrelated to local peculiarities or management practices. Government entities and some international NGOs shared the use of strategic/organizational knowledge concerned with alliances, planning, policy development, legislation, and markets. Examples raised in their workshops included IWRM policy development across government, legislative requirements, or amendments and overseas development assistance funding opportunities.

Integrating individual and community knowledge that operates at the local scale and is specific, particularistic, place- and context-based with scientific/international knowledge poses particular challenges. Without care, the generalized truths of specialist knowledge are easily dismissed by communities and individuals when fine details do not accord with local detailed knowledge

(Hoverman 2006). On the other hand, the scientific community often mistrusts the contextual embeddedness of local information, questioning its universality, yet community information, being qualitatively different from expert knowledge (Ostrom and Schlager 1997), can reveal a deep understanding of landscape and offer extensive detailed information about local conditions that serves to challenge, enrich, and refine specialized explanation. For example, in the midst of the initial round of information gathering workshops, government water managers voiced concern over recent increased sediment and deteriorating quality of Honiara's water supply, but could offer no explanation for this change. Earlier, community members had independently located on the catchment map two previously unrecorded sinkholes in a newly logged area just beyond the catchment boundaries. Initial government reaction was to dismiss out of hand the possibility of unknown sinkholes but upon reflection staff agreed it might merit further investigation. Receptiveness toward considering others' worldviews was thus assisted by a facilitated safe environment that acknowledged all worldviews as valid.

Bridging individuals

The research process was customized for local conditions with the assistance of a cultural guide, and discussion in workshops was later assisted by other bridging individuals who had experience working across knowledge systems. Numerous discussions with government officials led us to a guide who was well respected, employed by the provincial government in a community capacity building role, and related by marriage to the landowner clan but without a material stake in the catchment. In addition to logistics and communication, he provided advice on balancing representation among clan factions and facilitated our contact and interactions. One current and one ex-government employee and a political aspirant with a history of bridging knowledge systems (Wenger 2000) also helped other participants translate across knowledge cultures, clarifying the purpose of strategic/organizational thinking to community, and framing the significance of community and personal experiences to specialist thinkers.

Low threat elicitation and reflection techniques

At the combined workshop, we iteratively integrated the small groups that had formed naturally as homogeneous sector-based tables and created opportunities, including social, for extended discussions over identified common concerns. For example, a card sorting prioritization activity, a knowledge management technique sometimes used in the development of expert systems (Rugg and McGeorge 1997), was used in this workshop to determine the relative "importance" of various factors. This activity provoked extended and intense discussions among participants working in small mixed groups over significance, urgency, and feasibility in the justification of priorities, serving to share knowledge and concerns, build relationships, air different world views, and stimulate intersubjectivity, the ability to see the world through someone else's eyes. Sporadic reflections and group discussions during the workshops and over lunch and dinner on the different ways that groups identified and interpreted issues helped to increase individuals' awareness of their own world views.

RESEARCH EVALUATION METHODS

The evaluation process, carried out 10 months after the final workshops, involved semistructured interviews with NGO, government, and community representatives who had taken part in at least two of the meetings. In all, 19 individuals were interviewed, including 10 community members or customary landowners. The interviews took place at locations chosen by the interviewees; for community, this was generally at their homes, often surrounded by curious family members. NGO and government officials were interviewed at their work places. The community guide/interpreter attended all community and landowner interviews and assisted as required.

A prepared question list ensured that all interviewees were asked the same questions, while the conversational nature of the interviews allowed respondents to structure the flow of information and reflection. Participants were asked about their involvement in the research process; what it meant to them to be involved; if they had encountered any new ideas; whether they had learned anything about water in the catchment, water use, or water management; and if there had been any changes including levels of awareness, thinking, behavior, or relationships as a result of being involved in the research. They were also asked to reflect on these questions with respect to the involvement of others (see Appendix 2). Interview notes were transcribed

to spreadsheets, tagged to respondent, and analyzed for key themes.

EVALUATION FINDINGS

The five major themes that arose from interview transcript analysis were:

- novelty and power of the research approach

- educational value and new knowledge

- improved communication

- effect on responsibility, transparency, trust, and accountability

- changed relationships and new ways of working

Novelty and power of the research approach

The issue mentioned most frequently was the invited participation of all stakeholders. At the time, this was also novel for most government participants because even cross-departmental meetings were uncommon. Government participants found it useful to work across departments and sectors:

The [research] involved more people and improved our understanding of what other Ministries are doing. It would be good to have a project somewhere and then to get all other ministries to [be involved with us]. (Government official)

It's not just about one group and what it's doing. It's what other groups too are doing and what they can contribute to what we are doing. (Government official)

Community members found the approach useful for access to new information, as an indicator of recognition, and for the power of collaboration:

Really interesting for people from villages, Board of SIWA and all to hear water

concerns, answering our questions... I learned a lot. (Community man)

The process – it was the first ever to come together to talk with government including women... down to grass roots to talk with government. (Community woman)

According to one NGO representative involved only at the beginning and end of the process, one of the most striking features of this participatory process was the extent and longevity of continuing community involvement and the constructive nature of the engagement. Although not new for some NGOs and donors, the approach was especially novel for most participants as a means of developing forward plans.

[We] learned how to be in a group and how to put thoughts together and come up with actions and solutions to make progress on "What can we do about it" .. [I] haven't seen that happen before. Often groups come together, lots of argument not listening to what others were saying, so this was different. We heard the government side, the NGO side and then from [community] men and women. (NGO woman)

Experience with the participatory process through the research project has made participants more confident in engaging fully:

I learned how to talk to landowners. For example, we did consultation for a [subsequent] Kongulai monitoring project - went back to Kongulai and talked with people there. AWRF research project helped us because we don't talk to landholders often. (Government official)

Educational value and new knowledge

Participants were asked if they had learned anything through their engagement in this project and later whether they had encountered any new ideas. Responses to the former tended to be items of fact whereas to the latter, new or different ways of thinking. Responses can be categorized as facts/data vs. systems understanding, with the latter further broken down into ecological systems and social systems.

Typical responses from community and NGO members focused on learning about the physical environment: how water "moves inside the ground" (underground water flows), about karstic limestone landscapes and its effects on the water source and when there is a blockage, what happens and why. Several community members said they used to consider any clear water as pure water, but now they know that there are "different things that can spoil the water". Learning also extended to insights into the patterns and challenges to the social systems managing water. NGO members developed new understanding of existing management systems, noting:

> *...an increased awareness of the role of Trustees [senior clan representatives overseeing the rental agreement] and all of SIWA and the Government.* (Community woman)

> *... better understanding of water management. It's more complex and I'm more aware of what's involved.* (Community man)

Community members' reflections also included new insights into mutual dependencies and the complexities of water supply:

> *Pipeline repair is SIWA's job [but] fixing it depends on getting in money for water payments.* (Community man)

> *We also heard SIWA's concerns – big expansion of shanty towns, behind the towns – we saw SIWA's side of it [that it's] hard to control billing of water, also...about those who avoid paying so SIWA has to disconnect -- People not paying bills, stealing water.* (Community woman)

Community members mentioned understanding the connection between social and environmental systems, particularly logging in the catchment resulting in decreased water flow during the dry season and severe, unusual flooding with heavy rain. Community discussions made frequent connections between catchment activities and water quality, for example, the management of pigs away from the water source, the careful placement of latrines and toilet areas, the potential for logging in the catchment and bulldozers to spoil the water source, and logging close to the river in combination with heavy rain leading to bank collapse. Deaths from damaging floods in villages west of Honiara just prior to the interviews underscored in people's minds the relationship between uncontrolled logging and flooding during heavy rain events. Referring to the floods, a number of interviewees said, "We are the people who did that" proceeding to talk about relatives involved in illegal logging. One young man had suspended his logging activities pending finalization of the catchment risk model, a fact noted by several interviewees.

Government officials, trained in water science, referred less to new facts acquired but appreciated insights into social and institutional aspects, e.g., affordability and accessibility of water, and into systems beyond their normal areas of expertise. For example, government officials said:

> *Useful thinking about broader issues and social elements of how water is managed. As a hydrologist, I'm involved in monitoring but management is relevant for my work too.* (Government hydrologist)

> *It was a good thing involving different sectors and the catchment together and looking at how all the issues were connected... how things all relate and how we can manage issues in the catchment.* (Government meteorologist)

Improved communication: intersubjectivity

As described earlier, workshop participants brought quite specific knowledge cultures, evident in their sources of information and in the items each group focused on to construct its conceptual diagram of causation in the catchment. Environmental Health, Rural Water Supply and Sanitation (RWSS), the departments with the longest and most intense history of engaging in constructive dialogue with villagers, had clearly pondered the challenges of communicating across knowledge cultures, recounting their initial efforts to communicate with community on issues of public health and rural water supply:

We didn't really understand each other. Landowners were thinking school fees, we were thinking good public health. When talking about development, people nod their head and agree saying 'yes', but they mean 'no'. So we need[ed] to get down and get to understand so we know what they're really talking about. We need to work at communicating better. (RWSS officer)

This involved considerable time and effort "sitting down in [quiet] dialogue to repeatedly talk over and around" the issues (RWSS officer). RWSS also admitted the need for government to learn from community:

It's not just us trying to educate but we also have a lot to learn. Along with [Department of] Agriculture we stay with the people in the villages and get right down with the people and get to appreciate the challenges in the rural area. ... we develop relationships with ordinary people and so can share ideas. (RWSS officer)

The extended project interventions appear to provide a similar opportunity, bringing people together in a safe environment to share world views. Thus, government participants mused:

The linkages [across conceptual diagrams] were interesting – to see how other people make connections. Seismic events and leadership qualities on the same diagram! (Water Resource scientist)

Conversations with landholders and project team and SIWA about how they understand issues in the catchment [has been new]... it has been good for my own experience coming into contact with the community. (Government meteorologist)

Community members also appreciated the insights and changed relationships that came from such mixed gatherings:

Iron Bottom Sound [the combined, October 2007] workshop came up with ideas that should be done together. It was interesting to hear views of different groups, NGO and Government... lots of good ideas with

different groups about how things can be managed better ... It did away with misunderstanding and confusion and opened up the relationship, helping us to look at things much more positively. (Community woman)

Responsibility, transparency, trust, and accountability

Good communication in a safe environment led to an increase in trust and recognition of shared responsibility.

Regular meetings of partnership (government, SIWA and landowners) are needed [to build trust]. A lot of communication is required from partners to know each other. (Landowner)

Unable to blame SIWA's supply difficulties on incompetence or indifference, some interviewees recognized community's part in SIWA's poor performance. They referred to community defaults on bill payments and failure to call to account their neighbors' behavior. As a result of the interactions between government and community, participants believe that there has been increased transparency and accountability, saying:

Before we came to the workshop, we didn't know who worked in SIWA and SIWA knew we didn't know. [Now] SIWA can't hide away when we all come to the workshop. This improves accountability of both parties. (Community woman)

Changed relationships and new ways of working

Some participants believe that the research encounters have enabled them to establish new relationships and have resulted in new ways of working together. Landowners and NGOs commented on the improvement in relationships which has resulted with SIWA and Water Resources and expressed a desire to institutionalize the dialogue:

I think we should have sustained discussion, not just a one-off event. It could involve the same people again in other

workshops... perhaps a distribution list for communication and continued discussion. (NGO woman)

Several departments or organizations who clearly have carried on the dialogue internally, have embarked on more participatory approaches, requesting supplementary materials from the researchers on "available standards":

We're trying to incorporate social into our engineering/ biophysical approach. Our library has a "New Engineers" book that also deals with incorporating social aspects into planning. (SIWA official)

Government officers, community, and landowners see catchment management as a potential new way of working together, though some difficulties such as legislative mandate and improved technical capacity will need to be worked through:

The experience has made me aware of other people's roles ... so water catchment areas are a way forward, especially with the landowners. (SIWA official)

The workshop made us wake up about how effectively we should manage the water and what roles we're going to play with water ... also for SIWA who admitted they should be working with the community. (Community man)

After the workshop I was concerned about people being responsible for water management and about people's attitudes toward water management ... I want to apply for money to help people in the villages to be more aware of the environment. People only care for water when they understand. (Community woman)

Village women, admittedly targets of curiosity within their extended clans, reported discussing their learning with relatives in informal venues.

DISCUSSION

Limitations of the research

Despite encouragement from our team and government counterparts, the Department of Lands did not participate in research discussions even though it administers the lease of Kongulai land on which SIWA's water extraction and storage facilities are built. Because the lease terms are controversial, this represents the absence of an important stakeholder. One of the three trustees was also often absent for reasons of health, although he regularly provided an alternate delegate.

On the other hand, this research project has intentionally not included all potentially interested parties, a precept central to best practice Western-style community engagement. We interpreted appropriate planning processes as needing to recognize that in some cultures, including this one, customary owners have rights and responsibilities for care and management of their land and water resources and maintain decision making authority for places and resources. This applies even if they no longer reside on the land. Mere occupancy does not confer the same rights or responsibilities. The inclusion of urban water consumers with only water supply interests from the Kongulai would have been meaningless. Their interests were raised by NGOs and the customary owners.

Novelty and power of the research approach

It is clear that access to new information was seen as empowering by the community, signaling respect and inclusion, and that new data was appreciated by all. Government officials were impressed with the power of an integrated water cycle approach, recognizing the merit of data gathered for the model from departments that normally guard their data sets carefully, for example, statistics on health and sanitation, rural water supply, vegetation and tree cover, land use, geology, hydrology and water supply. Subsequently, a number of similar workshops have taken place across sectors and government departments, with regard to the UN conventions, on biodiversity, water, soil degradation, and climate change.

New processes to build collaborative understanding were also appreciated. Women in particular appreciated the separate elicitation of ideas and

issues, including when the first combined workshop created an all-women's table to ensure that one of the final outputs of the day would highlight women's issues, rather than risk having these issues subsumed by more dominant voices at each table.

Some interest in participating, particularly in the initial discussions, can be ascribed to the entertainment value of participating in the research. Further, despite explicit discussions of the research purpose, it would be foolish to dismiss the likelihood that some participation was motivated by hope of resolving the long-standing resource rental issues. Nevertheless the interviews gave clear examples of significant learning and appreciation of collaborative processes and effectiveness of informative discussions across worldviews in protected environments.

Educational value and new knowledge

In general, increasing exposure to one another's views promoted a greater understanding of the complexities and difficulties of water management and planning, the interdependence of diverse actors in water management and use, and, except in two cases, an appreciation of different perspectives and priorities reflecting multiple realities tied to scale and focus.

Some concepts continued to pose conceptual challenges, such as the term 'sustainability' to traditional inhabitants and 'demand management vs. meeting demand' to water engineers. Maintaining a sustainable water supply was seen as a new concept because traditionally, water either was or was not available and accessible in particular locations. Village residents tended to make opportunistic use of access to water making no modifications to improve supply, e.g., where seeps provided a mere slow trickle of water. Geological disturbances, i.e., earthquakes fracturing sealed systems and permanently altering river flows from above to below ground, natural blockages in limestone caves changing either the direction and/ or level of flow, all historically reinforced acceptance of the opportunistic nature of water availability. Under these circumstances SIWA's concerns to ensure sustainability, that is, securing the extent and accessibility of available water, was a new and difficult concept for some customary

owners. Likewise, SIWA engineers appeared to struggle with the idea of consulting with water users to determine their most highly valued attributes of supply, e.g., exploring trade-offs between 'short supply' and 'regularity' or between 'regularity' and 'dependability'.

Improved communication and intersubjectivity

As described earlier, the participants brought quite distinct knowledge cultures to the project. Government officials concentrated on hydrology, geomorphology, seismic issues, meteorology, and climate change whereas NGOs' conceptual diagrams included a concentration of social issues: accessibility, quality of management and leadership, education, employment, and affordability. Analysis of the community discussions revealed that many of their linkages mirrored those of government and NGOs' in connecting logging with decreased flow, retention, and quality, and linking management with sustainability of catchment processes.

However, despite initial differences, a recognition and appreciation of others' focus as being valid and necessary contributions to water planning and management appears to have developed through the shared understanding of issues, values, and priorities. Just as the process of knowledge formation is a social process, so too is creating or agreeing on a new understanding of the world that incorporates new perspectives into the accepted view of social truth. Facilitated discussions therefore have the potential to perform a socially transformative or developmental role in discovering the general will through the discovery or development of shared subjectivity (Habermas 1990). The process thus presents an opportunity for participants to confront, explore, and ponder different consciousnesses in a safe setting. This lowers the risk of automatically dismissing opposing views as unintelligible or wrong-headed. Shared subjectivity lends itself to the development of empathy evident in the community's acknowledgment of the multiple challenges SIWA was facing, "SIWA can't manage the water all by themselves. We need to help them" (Young community woman).

Effect on responsibility, transparency, trust, and accountability

In partnership literature (Leach and Pelkey 2001, Felkins 2002), trust is considered fundamental to successful collaboration. One of the agreed precepts from the "Building Trust" working group, in the final, 'next steps' session of the combined workshop, was that trust formed the basis for accountability and that trust was dependent upon frequent and meaningful communication. Landowners and NGOs commented on the improvement in relationships with government and SIWA, reported initiating new interactions, and expressed a desire to institutionalize the dialogue through frequent and regular meetings.

Open, frequent communication is crucial to crafting social choices that suit the needs of all parties well. Repeated interaction nurtures trust and develops commitment to actions (Dukes and Firehock 2001, Singleton 2004). Although possibly not sufficient to effect social learning, it is certainly deemed necessary. The development of trust changes perception of others from competitors to collaborators with shared concerns and plans. Frequent information sharing and regular interaction develop common perceptions about the nature of problems and desirable solutions. Nevertheless, given constrained resources, and the challenging and expensive modes of communication in the Solomon Islands, continued dialogue will depend upon dedication and significant resources.

In developed countries with elaborate multilayered bureaucratic structures, discussions about trust between community/landowners and government must consider both interpersonal trust and institutional trust, i.e. knowing each other as opposed to having assurance that the institution will follow proper procedural norms (Parkins and Mitchell 2005). In developing countries with skeletal bureaucracies, particularly small island developing states, strong interpersonal trust may obviate institutional trust as both may reside in the character of the participating officer, facilitating subsequent collaborative action. This was the case in the Solomon Islands where government participants carried significant departmental authority.

Changed relationships and new ways of working

Some participants believe that the research encounters have enabled them to establish new relationships resulting in new ways of working together. This reflects relationships sustained over the 18 months between the October 2007 workshop and the evaluation interviews, but we are in no position to judge the longer term sustainability.

Familiarization, awareness raising, and education undoubtedly contribute to improving communication. The older customary owners expressed hope that through delegating negotiation responsibilities to a younger generation with greater exposure to western style bureaucratic planning approaches, communications between government and traditional elders will proceed more smoothly. Thus, the inclusion of young people in the workshops was vital.

New social learning opportunities in customary catchment and water resource management?

Involvement in catchment and water resource management may also provide the platform for transforming the vexed issues of water management for urbanizing areas beyond the entrenched and confrontational positions bound up in customary land ownership that currently characterize water resources throughout the Pacific. Could participation in pursuit of a common goal, catchment management, focus customary land managers' interests beyond individual concern to what is best for the entire catchment area, especially where sections of the catchment are claimed by different clans but the government is nonetheless charged with supplying water to an urban mixed population?

The participatory process offered by catchment management provides the opportunity to frame appropriate conditions to facilitate constructive engagements, something that rarely happens by chance. Engagements between various stakeholder groups are traditionally characterized by discrepancies in power, unequal access to resources, and imbalanced patronage (Hoverman 1997). The authentic search for common ground and the discovery or creation of a generalizable or common cause, requires carefully constructed conditions that suspend inequalities or neutralize their influence so that participants may confront and explore

consciousnesses different from their own, in a setting free from requirements to maintain a public persona. Such supported explorations and confrontations are necessary if one's subjective assessment of reality is to be receptive to change. A secure sense of one's subjective appropriation of reality that is immune to challenge from other worldviews, stands in the way of transformative dialogue (Kelly and Van Vlaenderen 1995). The appreciation of differences serves to shake participants out of the comfort of their unquestioned subjective take on reality, provoke reflection over anomalies, and contribute to establishing a new shared intersubjectivity. Reflection on the process of participation, and on the purposes and problematics of communication, further contributes to expanding the participants' subjective understanding of the process and facilitates the search for common ground (Kelly and Van Vlaenderen 1995).

The participatory research process has clearly provoked a consideration of others' interests by developing shared subjectivity transcending the pursuit of individual drives. Traditional democratic theory holds that through involvement in public affairs, the individual "weighs interests not his own" and "is guided, in the case of conflicting claims, by another rule than his private partialities ...as their reason for existence" (Mill 1910:217). It is through participation in diverse groups that the individual must reconcile his individual desires with those of others (Putnam 1995), considering their viewpoints, examining their reasoning, and in the process "learn to be a public as well as a private citizen" (Pateman 1970:25). Under these conditions collective decisions in which the individual has participated are more easily accepted, even if the final resolution is not the most preferred personally. The experience of participation increases the individual's sense of integration into the wider community, attaching him or her not just to his clan, but to his society. Participatory experiences promote an "active" public-spirited character (Held 1987:75), logic that underpins the belief that how public resource decisions are made, by whom, and in what context, matters in a democratic society. Could catchment management thus contribute to nation-building efforts in the Solomon Islands?

CONCLUSIONS

In this study, despite the unprepossessing circumstances of a small island, postconflict developing state and lack of previous familiarity with working collaboratively, Solomon Islanders have shown themselves receptive to engaging in social learning. They have pondered others' interests and perspectives, and been willing to explore others' understanding of the human-environment system of water use and management and to begin to appreciate interdependencies in its social, economic, technical, and ecological complexity. Assisted by the research's participatory processes with neutral focus on data and information collection, it has been possible to circumvent potential barriers that differ in degree, though generally not in kind, from those encountered in social learning in developed countries.

The evaluation shows that a customized developmental process of sequenced separate then combined engagements responding to participants' requirements has valued information from a range of knowledge cultures, accepted various modes of communication, and worked to diminish status and power differentials. This has allowed previously alienated participants to embrace opportunities to begin working together, proposing plans for extended collaboration around catchment management, and in the process promoting and reaffirming a commitment to transparency and accountability.

The entire process has been one of social learning. This has been assisted, in this case, by the carefully customized process and the use of bridging individuals in the form of a respected community interpreter and individuals prepared to contribute to integrative discussion. It has also been influenced by the parties' willingness to accept the incompleteness of their technical understanding of the catchment, and even by the skeletal nature of the national Water Resources management bureaucracy putting senior management in direct contact with community and NGO representatives. The novelty of the participatory process has clearly contributed to its enthusiastic endorsement by community and NGOs, unfettered at this stage by a history of false starts and disillusionment. External motivations such as development of a national IWRM plan and workshops on UN Conventions have also reinforced the merit of developing skills in a collaborative approach. For this reason, it is imperative that progress continues to be made because collaboration in water management can only increase in importance.

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APPENDIX 1. Stakeholder groups contributing.

Government divisions represented:

- Solomon Islands Water Authority,

- Ministry of Mines and Energy, Water Resources Division,

- Ministry of Forests, Environment & Conservation, Forestry Division,

- Ministry of Forests, Environment & Conservation, Environment and Conservation Division,

- Ministry for Agriculture and Livestock,

- Rural Water Supply and Sanitation,

- Ministry of Health,

- Honiara City Council,

- Meteorological Services, Ministry of Communication & Aviation,

- Ministry of Planning.

NGO stakeholders represented:

- Community Support Program (CSP),

- Environmental Concerns Action Network of the Solomon Islands (ECANSI),

- Greenpeace,

- Live and Learn Environmental Education,

- The Nature Conservancy,

- Oxfam,

- Solomon Islands Development Trust (SIDT),

- Solomon Islands National Council of Women,

- Vois Blong Mere Solomon (Women's Voice),

- University of the South Pacific (SI)

- World Vision,

- World Wide Fund for Nature

APPENDIX 2. Evaluation questions.

Warm Up Questions of Fact (Brief)

- Review Ethics process –

- Purpose of this interview.– **I was interested in talking with you because you took part in our research about water, water management and catchment risk in the Kongulai Catchment**. Brief discussion of interviewee's role with respect to the Kongulai Catchment.

- Walk through early meetings (to jog memory -- photos of participants in meetings & Kongulai map)

Community:	**NGOs and Government**
Community Meetings – Tangisaliu vs Taboko	First separate workshops – (photos from workshops, map of Kongulai Catchment used in workshops)
First small group meetings – Women's/Men's	

Questions of Change

- Questions about experience with water in the catchment – and connections

Thinking back to what you knew about water in the catchment before getting involved, has your awareness of water changed? Of its importance?

Connectedness to other issues?

- Water Management, Water Planning --

How has your understanding of *how water is managed* (the process) changed as a result of participating in these activities?

- How about your awareness of other people's roles (systems awareness)?

Your relationship with these roles (for Government Departments, include official relationships – other departments, community -- as well as personal relationships?)

Who and in what way? Can you give an example?

- Risk Assessment and discussion of conceptual diagram – (Show photos from workshops developing the conceptual diagram) (Government/NGO)

How useful was this process?

- Did you encounter any new concepts in the process (of creating this conceptual diagram)?

Social vs Biophysical aspects --

Comments about the process?

- Do you see Water as being more important than you did before? In what way?

Are you more aware/ conscious of water in the environment?

Questions of Participation

- How did you feel about being included in this research process?

- Has participating in this research changed the way you think about or act about water?

- Was there anything new that you learned from the process? Anything surprising?

Questions of Relationships

- As a result of participating in this research, do you think or act differently with other people/ other roles about water or catchment matters?

- Are you more involved with other parties you met at the workshops? In what way?

- [For community], do community members talk more amongst themselves about water than they used to?

- What do you think involvement in these meetings has meant to other