Creating Conservation through Strategic Frame-Shifting: *An* Integrated Account Demonstrating Anthropology's Contribution to the Study of Complex Cooperation

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Abstract: Accounts of complex multi-party cooperation in some social sciences focus on the political and structural dimensions, neglecting human relational and cultural aspects of cooperation. Conversely, anthropological analyses which focus on the latter aspects often minimize the former. Overall, few researchers consider the dynamics of actors shifting among multiple strategies to achieve cooperation. We provide a more integrated account by analyzing the full range of strategies used by two sets of actors in two different basins in Washington State, who were planning cooperatively to diminish the cumulative basin-wide impacts of logging on fish habitat. We analyze all the strategies used by tribal, government, and timber company actors, as well as how these actors shifted among and combined strategies to achieve success. A comparison of the strategies used in a "locally-oriented" watershed with those used in a "cosmopolitan" watershed, reveal key differences in their local effectiveness and in their ability to "scale up" outside the local area. Finally, we generate hypotheses identifying the social, political, and ecological conditions which enabled these strategies to be used. Both the analysis and the hypotheses contribute to refining the theory of complex cooperation, especially as developed in the study of common pool resource governance and co-management. In developing an integrated analysis, we demonstrate the unique theoretical and methodological contribution of anthropology to the study of complex cooperation, and how anthropology can be integrated and balanced with other social science analysis in this area.

Studying conservation and cooperation: what other social sciences contribute.
Anthropologists are still arguing over whether small-scale societies are or were ever truly conservationists, or whether sustainable natural resource outcomes, where they are observed, are felicitous by-products of territorial control, distributional equity, or efficiency (Acheson et al. 1994, Feit 199x, Ruttan and Mulder 1999, Anderson 1999?). In modernity, however, a more compelling question overshadows this ancient obsession. Given all that anthropologists know about how small-scale societies sometimes *do* achieve stable relationships with the adjacent natural resources they use, is it possible today to *design* relationships between small-scale communities dependent on resource use which result in sustainable outcomes? Such design of course would have to include the governments which regulate resource use and in many cases even the larger-scale, extra-community actors which also make claims on natural resources or dominate policy arenas.

Political scientists and institutional economists have been working on this question for two decades, focusing on political and structural aspects of institutional design which locate

incentives correctly to achieve the desired outcome in common pool resources management (Ostrom 1990, North 1981, Bromley 1989). Anthropologists as later arrivals to this scene imported our usual concerns for the human relationships on the ground, the values, norms, and symbolic practices, the factors we believe contribute especially to enduring cooperative relationship (McCay and Acheson 1987, Atran et al. 2002, Wilson et al. 2003, etc. *COURT, SOME REF ONANTHROS WORKING ON OREGON WATERSHED COUNCILS?).* Many of us had love affairs with the "new institutionalists", charmed by the rigor or their models and the fact that they too examined small-scale societies. But we have been slow to integrate these disciplines into our analyses in a manner which honours the unique importance of our own. What has been sorely needed is a proper balancing of structural, political, and cultural factors in our analyses.

The study of implementation requires a deeper and more comprehensive analysis.
Nowhere is this more evident than in the study of how agreements are achieved among multiple parties (including place-based communities) which have conflicting and competing interests in the use of common pool natural resources such as forests, fish, wildlife, and water. The forging of complex agreements are grist for the new institutionalists' mill. However, policy analysts consider implementation to be a major locus of unpredictability (Bardach 1977, Pressman and Wildavsky 1973). The study of local-level implementation of complex agreements tells the real story about what has to be done in the long run for formerly warring parties to solve complex problems cooperatively. Although some political scientists have focused on social learning or civic discovery (Reich 1988), and sociologists on conditions for inter-organizational collaboration (Gray 1991), it logically falls to anthropologists to explain how these complex cooperative relationships have been institutionalized and agreements *implemented on a continuing basis* in the long term. The study of implementation informs our understanding of how agreements function in the field and survive in the long run. The folk wisdom of managers rightly asserts that "the devil is in the details" and "the proof is in the pudding", meaning that an agreement is only as good as the people who "cook" its ingredients on the ground are able to make it. Our study demonstrates the unique way anthropology can contribute theoretically and methodologically to the study of implementation.

We study implementation through a comparison of two successful but different local approaches employed during the 1990s for implementing the 1987 Timber, Fish, and Wildlife (TFW) agreement in Washington State, USA. This historic agreement was a major step towards resolving intense conflict among treaty tribes with rights to protect fish habitat, private landowning timber companies, environmental umbrella groups, and state agencies that regulate forest practices on state and private lands (chiefly the Department of Natural Resources - DNR). The TFW agreement is particularly challenging to implement because freshwater salmon habitat is a commons *within* another commons: forests. The challenge is compounded by the fact that this *public* regulation of activities on *private* lands (timber companies are private landowners) is occurring in a state where there is a strong movement to protect private property rights against all claims concerning public goods. If multi-party cooperation can work here, there are grounds for optimism in less complex contexts!

The TFW agreement has provided a useful *state-wide* framework for such peace-making,

because it has promoted *local* flexibility during implementation. Most interestingly, a key voluntary TFW program, Watershed Analysis, convened local parties to collaborate in joint development of watershed-specific "prescriptions" for reducing cumulative impacts of forest practices (logging and silviculture) on aquatic resources. Government (mainly local DNR), timber company, and tribal actors were allowed to adopt locally appropriate approaches to forest practices regulation. We compare the effectiveness of two different strategies for implementing the agreement and its programs, one "local" and one "cosmopolitan" (Merton 1957), and we identify factors that contributed to their successes. Our analysis contributes new hypotheses to the growing literature on permitting conditions for multi-party complex cooperation and co-management of renewable natural resources.

Theoretical approach. We assume that in Washington State, successful cooperative implementation of TFW programs depended on the strategies parties used in negotiating with each other at the local level. Occasionally, local strategies were limited by interference or resistance from higher-level policy-makers if they thought local negotiations violated the spirit or principles of the TFW agreement. Local strategies adapted to this interference, too. We ask five general questions about the cases.

(1) *What strategies or combination of strategies permit actors to achieve cooperation in a complex social and natural environment?* We analyze local actors' choices of strategies by considering four general analytical "frames" that parties used to develop their strategies: political, structural, human resources, and symbolic (Bolman and Deal 1997). Organizational behaviour theorists and anthropologists demonstrate that alternating among different frames (also called "lenses", "rationalities", or "cognitive pathways") to view complex organizational or inter-party dynamics serves both as a diagnostic tool for understanding interactions and as a strategic tool for guiding one's own behaviour (Allison 1971, Morgan 1986, Bolman and Deal 1997, Scott 2001). Including the human resources and symbolic frames is particularly important, as these dimensions are seldom considered in political or structural accounts of complex cooperation. Consideration of how actors use these two frames tends to be restricted to sociologists, anthropologists (e.g. Douglas 1986, Atran et al. 2002) and social psychologists (e.g. Lewin et al. 1939, Seta et al. 2000). Yet we will demonstrate how the ability to choose the appropriate frame to negotiate in any particular situation is key to successful cooperation, and that using all four frames may be essential for long-term success.

(2) *How and when do actors "frame shift" to achieve complex cooperation?* There are few truly integrated analyses of political, structural, human resources, and symbolic frame strategies (Argyris and Schon 1978, 1996), especially ones which look at *frame shifting* in response to opportunities within complex socio-political and bio-physical problems. Actors in the two watersheds faced roughly similar problems, but adopted rather different strategies. Yet each enjoyed success in achieving their objectives through strategic frame shifting.

(3) *What dilemmas and limitations accompany each strategy?* We contrast the dilemmas faced by the "local" and "cosmopolitan" strategies, and thus the limitations of each.

(4) *What factors determine the influence of local implementation strategies and outcomes on higher-level policy?* How does the experience of success in one watershed "scale up", providing learnings for the entire state? Put another way, if we think of implementation of higher-level agreements as typically moving *top-down* from "collective choice rules" to "operational rules"

(sensu Ostrom 1990), under what conditions can successful implementation also work *bottom-up* to influence higher-level collective choice rules (for example, about decision-making procedures)?

(5) ***What key social and political conditions foster multi-party cooperation in implementing agreements?*** In addition to strategies, we consider a range of conditions which made the use of these strategies possible.

Our findings both draw on and contribute to theories of cooperation and co-management in the area of common property studies, widely applied to natural resource management dilemmas. They point to the importance of the human resources and symbolic dimensions of cooperation which operate (a) at this geographic scale: 4000-8000km2 , (b) especially at the implementation stage and (c) over a long time-frame - 10 years, in the case of one basin.

This study forms part of longer-term research on the evolution of institutions for co-management in Washington State (Pinkerton 1990, 1991, 1992, 1995, Pinkerton and Baril 2001). It also results from a fruitful collaboration between this focus of the first author and the second author's examination of the same policy frameworks using adaptive management and complex adaptive systems theory (Kepkay 2003).

Research methods.   We approach the questions above by reconstructing the development of local cooperation in two basins from the TFW agreement of 1987, through the Watershed Analysis program of 1992-99, and on to 2001. We interpret actors' behaviour as using various mental frames to strategically consider their dilemmas and to develop tactics for cooperation. Specifically, strategic and tactical decisions were required for: (a) assessment of watershed dynamics and resource sensitivities to investigate potential cumulative effects of forest practices; (b) rule-making at the operational level for forest practices regulation and fish habitat protection; (c) monitoring of compliance with rules at the site scale; (d) in some cases, monitoring of the effectiveness of the new rules; (e) in some cases, developing quantitative models of silvicultural and ecological systems. In addition, and sometimes most importantly, we consider what mental frames were used in (f) developing the informal human relations which led actors to spend more or less time working together on solutions.

We selected Basins A and B as our focus after consulting many individuals about the range of examples and the most successful and "leading" examples of cooperation. Over a period of 18 months in 2001-2002 the authors, usually jointly, interviewed ~ for one to four hours each ~ 48 actors performing both local and state-wide functions, including 15 from industry, 13 from tribes, 10 from state agencies, and eight from environmental organizations. We also attended meetings, workshops, and conferences, and had follow-up telephone and e-mail conversations with interviewees over a further 14 months. We analyzed historical and current documents such as field manuals, position papers, court cases, published scientific papers, and the Watershed Analysis documents themselves. We reviewed nine Watershed Analysis reports in total. Concurrence of opinion across individuals in the same category and especially across categories strengthened confidence in our interpretations. All our interviewees were invited to review this paper, and with those who did we had further email or phone discussions. These have led us to feel a high level of confidence in our findings.

How the four frames were used in the 1987 TFW agreement. Bolman and Deal (1997) make a useful distinction between decisions based *on political* considerations and those based on *structural* considerations. Political strategies and decisions are informed by an assumption of enduring fundamental differences among parties and conflict "resolved" through the use of power. Structural strategies and decisions are informed by the assumption that an appropriate coordination of formal rules, roles, and responsibilities will allow any given task to be completed as intended. The TFW agreement resulted from a power stalemate in Washington State. By the mid-1980s, the timber companies' traditional domination of state forest policy had become balanced by a tribal-environmental coalition which had come to exercise significant countervailing power. Court decisions recognizing the treaty tribes' constitutionally-protected rights to protect fish habitat and heightened environmental awareness played an important role in this shift (Halbert and Lee 1990, Pinkerton 1992). Tribal and timber industry visionaries persuaded their constituents to move their strategic thinking from a deadlocked *political* frame into a new *structural* frame based on an agreement about how to resolve conflicts among timber, fish, and wildlife uses of the same landscape.

The TFW agreement consisted of a set of shared general goals, interim forest practices rules, and new process forums and methods to work jointly and rationally toward the goals. Of the five general goals, three are central to this discussion and illustrate the balance participants hoped to achieve: (1) protection of long-term habitat productivity for natural and wild fish, and hatchery water supplies, (2) protection of water quality and water quantity needs of people, fish, and wildlife, and (3) protection of the continued growth and development of the state's forest products industry (TFW 1987). They aspired mainly to reduce the impact of logging on fish habitat and water resources without economically unacceptable curtailment of industry activities (Halbert and Lee 1990, Pinkerton 1992). TFW participants also agreed to a set of "meet or beat" standard forest practice rules (governing how logging and silviculture would be conducted), and additional guidelines for voluntarily going beyond the minimum.

A new science-based policy process was envisioned. Participants believed that a correct *structuring* of the forums in which parties would come together to rationally reach agreement on the science would enable decisions leading to more balanced compromises between the parties' competing goals. State agencies received funding from the state legislature to enable them to participate in new policy and scientific forums. Tribes received federal funding, and environmental groups were able to raise their own funding for at least the first five years. The first set of TFW forums were formally given advisory status relative to government, yet consensus agreements among formerly warring parties were expected to create their own power. By any measure, the task was great, and would involve considerable change in operating procedures at all levels. The incentive which was to keep TFW participants on task was that the costs of political conflict prior to the agreement had been enormous for all parties. The memory of those costs, it was hoped, would keep participants from reverting to the political frame.

Two of the new forums designed to produce non-political solutions were centralized and met regularly on a statewide basis: the Policy Committee and the Cooperative Monitoring, Evaluation, and Research (CMER) committee. CMER was structured as a set of specialized

technical and scientific sub-committees that shared and advanced policy-relevant science.

A third forum, one central to this discussion, was decentralized and specific to a site of proposed forest practices. Local "interdisciplinary (ID) teams" were called together by the local DNR to evaluate individual forest practice applications when they were considered sensitive or controversial. ID teams brought together representatives from the local tribe, the timber company landowner, DNR, and usually a local environmental representative. These parties often jointly visited the site, shared expertise and information, and recommended by consensus to DNR how to put conditions or limits on the forest practice or even whether to deny the permit.

By 1992, the TFW parties had developed a fourth forum. "Watershed Analysis" had been envisaged in the early TFW negotiations and several small policy experiments of the 1980s. This program encouraged participants to plan permitted forest practices more holistically than ID teams, on a mid-size sub-basin scale (50-200 km2). This scale of analysis and regulation allowed parties to account for and reduce cumulative impacts on water resources, fish habitat, and public infrastructure. Industry usually (DNR less often, or occasionally tribes) paid for the process, since it was expected to streamline the permitting process and increase certainty in planning. For a sub-basin of interest, Watershed Analysis brought tribal, industry, and DNR and other agency scientists together to conduct scientific assessments of the sensitivity of resources to several watershed processes, each in a separate "module": mass wasting (landslides), soil erosion from roads, hydrological flow, wood inputs to streams, and so on. Then the assessments were integrated for a holistic understanding of the likely cumulative effects of forest practices on the entire sub-basin. Based on this synthesis, a manager team (often including scientists from the assessment phase) developed consensus prescriptions for where, when, and how logging could occur and what protective measures were necessary to conserve fish and water quality. Watershed Analysis thus encouraged much more comprehensive data collection, analysis, and synthesis than had been possible using ID teams on individual site-scale forest practice permit applications. Assessment modules were mostly not an advance in science per *se,* but rather an advance in integrating science into the management world.

The methods and regulations governing TFW standard rules, ID teams, and Watershed Analysis were adopted by the state Forest Practices Board and state legislature and put into the Washington Administrative Code (WAC 222-22). Thus TFW created new *structures* in which rational analysis and persuasion would prevail over the former political struggle. Staying in the structural frame, or at least staying *out* of the political frame, was the lynchpin of what made TFW work.

But this is far from being the entire story. Although not obvious in written documents, all parties at all levels in the system acknowledge that the way in which TFW participants departed from the old political frame was not simply to adopt a rational process with a straightforward cost-benefit calculus. The new approach also often included valuing and cultivating *human resources.* Human resources were valued both instrumentally, for what they contributed as additional energy and talent for solving problems, and intrinsically, for what they contributed to participants' morale, self-esteem, and satisfaction with learning and expanded horizons. For example, participants working at the state-wide policy level valued the experience itself of

"group interaction in groping with complex problems". People at the local level valued the "tremendous amount of effort put into early TFW":

> ... a lot of meetings, a lot of training that if you took it seriously, I think would make it possible to function together....[it] would tend to increase mutual respect among different parties, respect for their knowledge, openness, and listening to each other....[A DNR forester] took the whole TFW adventure to heart and was extremely active in keeping it going. [He was] cooperative with everyone. (Tribal scientist)

Locals also recognized the financial efficiency of combining the skills and knowledge of tribal, industry and DNR actors.

> The tribes gave us their expertise. The landowner didn't need to go out and hire a soils person, which the department would have forced them to do. [The tribal soil scientist] was super. He would look at it and give you, not a personal opinion, but the science.... He is doing his job by working with people.... I learned a hell of a lot from him and the tribes that I didn't know prior to '86.... (DNR forester)

Finally, TFW participants sometimes operated in a *symbolic* frame. The process of working toward something they valued in a relationship of cooperative respect with others gave meaning and value to their lives because of its resonance with various larger values they held about the public good, civic duty, democracy, justice, environmental sustainability, and creativity. TFW activities had *symbolic* value which went beyond the intrinsic or utilitarian value of any particular activity.

> I got a reputation with many of the landowners for trying to be fair and practical. I really enjoyed it a lot. It made you feel like you were a bureaucrat but you have some respect from a lot of the loggers and a lot of the landowners. And I learned something new every day. (DNR forester)

Some participants simply enjoyed feelings of individual learning, creativity, and self-efficacy. Others felt they were making history and creating a better society. A charismatic industry leader exhorted them to "go where the truth leads us", and this expression was repeated as a reminder of the importance of all parties working together to reach a higher level of agreement on what constituted the best available science. They were excited about the creativity they could exercise in using new tools and creating new models which were on the cutting edge of a new way of doing business. For example, the "watershed stampedes", held the during the first few years of the Watershed Analysis program, brought together participants in a lively learning event where they networked, exchanged ideas, heard technical and whimsical presentations, drank together, and generally experienced the warmth of an expanding community of people working on similar problems. Such activities exemplify both the human resources and the symbolic aspects of TFW.

> The watershed stampedes were really fun! ... We were attempting to find out the problems and we were attempting to learn from one another.... I think the first couple were successful. We were all very glad to see each other and they were a lot of fun .... We always seemed to have a good sense of humor.. . . We launched this thing, DNR did this big training thing, all these people trained ... it just felt like there was this cattle herd running towards something, but we didn't really know where we were going, exactly. (Industry scientist)

For many participants, collaborative relationships were galvanized by such gatherings and by the memory of the inspirational ideas.

In the analysis below, we consider how various players used—and strategically shifted among—the political, structural, human resources, and symbolic frames at various points in their crafting of complex cooperation at the basin scale. Understanding how the human resources and symbolic frames were used is particularly important, as these dimensions are not well documented in the literature on complex cooperation.

The concept of locals vs. cosmopolitans. Sociologist Robert Merton (1957), followed by Gans (1967) and others (Bell and Newby 1973), made a classic distinction between the orientations of two classes of individuals who might live in the same community. "Locals" take as reference points for their values, attitudes, norms, and social networks the residents of the geographic community or local region in which they live. Their interest in the outside world is propelled chiefly by what significance that world has for the local community. "Cosmopolitans", while possibly maintaining a long term geographic residence in the same community, orient themselves with reference to the values, attitudes, norms, and sometimes even social networks of like-minded individuals who might reside largely outside the geographic community. These ideal-typical categories are at least partially isomorphic with the distinction between "community of place" and "community of interest" or "epistemic community" (Haas 1990, McCay 2000).

In applying these concepts to our two focus basins in Washington State, we first identified as "locals" those who considered learning from ID teams and Watershed Analysis to be very site-specific and difficult to generalize beyond a particular basin. Locals feel that their main contribution is to a local basin, because their knowledge, which is complex and highly detailed, is not easily transferred to other basins. It is about how *this* basin functions.

> I don't see myself as raising the level of understanding in the whole state. I don't have any
> insights. I know this basin....and local knowledge lets you concentrate on the unknown and add to
> the knowledge. [Industry engineer] knew every road like the back of his hand...[The DNR forester]
> knew practically every tree in the watershed. (Tribal scientist)

In addition, locals tend to develop systems of communication which build on trust and reputation. Just as they prize their own deep wells of accumulated knowledge, they value the information, expertise, and judgments of other locals they have come to trust. Likewise, they often develop a set of shared symbols which associate meaning with landscape features (see also Basso 1996). Locals rely largely on this shared pool of local knowledge and meanings to improve forest practices.

In contrast, "cosmopolitans" are interested in general principles which can be extrapolated from local experience into models which can be applied everywhere. In this case, they are most interested in the principles of the scientific method: if local knowledge is used in developing management practices, then it should be documented and subjected to external review and replication. Transparent, formal standards are the foundation of effective regulation.

Locals and cosmopolitans also experience different connections to the local landscape and human communities. Locals may hunt and fish in the local area, and this is another means of generating knowledge of that area. They also care about the sustainability of other locals' resource use - not only in terms of the health of the resource, but also in terms of community economic survival. Members of the community are, after all, their reference group and support group. In contrast, cosmopolitans are more concerned with how local events relate to higher-level policy - for example, in setting precedents with implications for other areas. Their dominant interest is in improving and applying the broader society's standards for ecosystem management and conservation. Working in a local basin may be experienced as a sacrifice if there is a high level of conflict and little local support. Cosmopolitans compensate by depending on their extra-local networks for support and affirmation.

> In the ground zero TFW world, we were all close. Like [different tribal scientists around the state], all people who were sharp and motivated to get stuff done. We didn't have the policy support we needed. And it was up to us to hold the line and get stuff done. We stayed with it for five years and dealt with a lot of adversity. That's along time for most people. There was that bond. We were our own support group. Talked to each other all the time. Did field trips together by just inviting each other to come join our trips. People who were footsoldiers in TFW and Watershed Analysis and were not getting any credit.... An awesome brain trust. (Tribal scientist)

Biophysical characteristics of the two basins, {to be revised when get rest of data}:
Basin A is 7800 km^2; 68% of basin is in federal park or forest. 240,408 acres or 97,290 ha of industrial forest land **salmon habitatkm not available, have to recheck Beechie et al.]** Basin supported in 1992 all 6 species of salmon and that there are 7 healthy stocks (2 chinook, 2 chum, 1 pink, 2 steelhead), 4 depressed stocks (3 chinook, 1 coho), 1 critical (sockeye), 7 of unknown status (1 chinook, 1 chum, 1 coho, 4 steelhead).
Basin B is 4640 km^2 and has 1097 km of stream known to support 5 species of wild salmon. There are 11 healthy salmon stocks spread across all species and 6 of depressed or unknown status. 200 miles of accessible river used for spawning and rearing, **[how much forest land? How much industrial forest in all? How much in federal park or forest?]** (Weyco Snoqualmie tree farm is 453km^2 or c. 10% of the basin), major floodplain modification impair function, wetlands, lost c. 50% of chinook and coho habitat. Increased conversion to commercial/residential development. Extreme loss of channel complexity, cover, bank stability, and pools in most of watershed. LWD poor to absent in majority of watershed. Will take 80-120 years to restore.

The dynamic driving cooperation in Basin A (the "local" example): characteristics of core players. This basin is characterized by the unusual length of experience of the major players and the stability of their geographic residence and job positions. The key relationship that created the core of cooperation was that between the tribal TFW fish biologist, who began work in 1988, and the DNR forester, who first volunteered for the Forest Practices program when TFW began in 1987. Both of these individuals were in their mid-40s when they began these jobs, and they have stayed with these positions to the present date. Thus, they began with enough maturity to appreciate the opportunity to build cooperation as an escape from unproductive conflict, and they had enough experience and job stability in the same place to figure out how to do it over time. They both were able to exercise considerable autonomy in making field-based decisions, as

discussed below. They both embraced the spirit of TFW enthusiastically, and then proceeded to reinforce each other in multiple ways. This mutual reinforcement bolstered the self-confidence of each.

> [Tribal biologist] and [DNR forester] have been around long enough, and they've been running parallel tracks. What [tribal biologist] wanted meshed pretty well with what [DNR forester] thought was needed. It's a nice collaborative relationship they've had over the years. It's been very successful. Both were very sure of themselves, and wouldn't take no. (DNR scientist)

The strategies used to achieve cooperation in Basin A. The Basin A actors' achievements were based on their ability to operate most of the time in the human resources frame. However, this strategy could not have flourished by itself. It was supported by the periodic use of other frames and strategies by various players. We now turn to an account of the range of strategies employed.

Strategic use of political frame enables shifting to other frames. First, the political strategy of the local tribe functioned, through TFW and other processes, to establish the power and stance of the tribe, and to steer relationships clearly into the structural frame. The tribe had a dedicated policy person in the early years who signaled to other TFW actors that he had a bottom line and he would protect the tribal field people from unreasonable uses of power (i.e. reversion to the political frame) by industry and DNR. This approach is consistent with game theorists' proposition that a clear signaling of consistent and predictable intentions assists in the development of cooperation (Axelrod 1984). The following quote illustrates how a political strategy enabled the shift to a structural frame and eventually to the human resources frame.

> So when I came here, we met with industry, and we said we're not going to shoot blanks: if we ask for something, it means we need to have it. We will insist on it. Let's not kid ourselves. We're serious about this stuff. We said that to DNR, and it's worked well. That set the framework, but it wasn't just a threat because we're the tribes. We backed everything up with a fair amount of data....And there's also been engagement at the policy level in what I like to think is a rational way. If [tribal biologist] has a problem, I try to work with [the DNR Regional Manager].... So we say "We have a problem. Here's the data. What do you want to do?" They know we don't ask for ridiculous things. Over time, you build up credibility....So it's important to be right. So we're very cautious about the claims we make. We comment on everything that has to do with our interests, and we work with applicants to find solutions. So there's a responsibility for the tribes not to just throw darts and complain. (Tribal policy)

The tribal policy person's actions were not always appreciated by the tribal field people who were successfully working in the human resources frame. They did not wish to be reminded of the political frame in which the policy person often had to act in order to protect them from political pressures. Nonetheless, the strategic use of the political frame was very important in establishing more egalitarian tribal relations with industry and upper-level DNR in the beginning. This tribal "middle manager" also worked as a communicator linking the tribal field level to the tribal policy level, in a manner considered key to organizational learning (Westley 1995). In this second function, the middle manager was able to operate structurally to facilitate the integration of field learning into policy and vice versa. This situation was envied by a tribal scientist in another basin:

> [Tribal policy person in Basin A] has an incredible ability to focus on detail. It's like the kind of thinking that goes into physics or microbiology. Where you get into the nitty gritty and then pull back and see the whole picture. He bothers his technical people a lot. That's good....What you need from your policy people is not "we'll sue you!", but to engage in policy discussion. Get back to the technical people to check out possible solutions. Say, "Give me some analysis on this option". My definition of a manager is somebody who takes care of the people working for him, so bureaucracy doesn't get in the way. (Tribal scientist)

Over time, as relationships among the tribe, DNR, and industry became institutionalized in a cooperative mode, use of the political frame became largely unnecessary. The TFW staff became a separate program with their own applied research capacity and occasional policy function.

Compliance monitoring - a key activity serving multiple frames. However, a key aspect of the political frame did remain in the form of tribal monitoring of industry compliance with the rules agreed to on sensitive sites. The tribe was very careful to review every one of approximately 200-400 forest practices applications by industry every year. Field checks were common before, after, and sometimes during operations. Industry in this watershed knew that if it made an error, there was a good chance of being detected by the tribe. This knowledge alone encouraged compliance. The **capacity for monitoring** is considered a fundamental design principle in the creation of institutions for cooperation (Ostrom 1990). However, in the context of good use of human resources, compliance monitoring had benefits that exceeded the watchdog aspect of the political frame. Monitoring provided a forum for developing site-specific practices, through a combined use of structural and human resources frames. For example, when the tribe did identify non-compliance, it contacted industry first, and tried to work out a solution without calling in DNR (which would have been a political move). For example, if an operator had cut too far into the previously agreed riparian forest buffer on a stream, he might agree with the tribe to replant with a desirable species and to leave the cut trees on the ground.

The DNR also used compliance monitoring in the political and structural frames, with the goal of moving into the human resources frame.

> And what we would do is check up on people. Did they abandon [their roads] before November 1 ? Did they use clean rock fill and keep the stumps out?....And you get to a certain level, you would then use that in prioritization for compliance work [monitoring]. Some you check every day; some get a spot check every week. And when we had most of the big players feeling like we had a high level of trust, that's pretty cool. We were blessed in this area, I think, having a lot of people that were trustworthy. (DNR senior manager)

The previous examples illustrate another key aspect of compliance monitoring. Both the tribe and DNR were *forgiving,* in that they let go of past mistakes, and did not assume they were intentional. In this way, even compliance monitoring and rehabilitation of mistakes operated partly in the human resources frame, because industry was grateful for the flexibility and friendly problem-solving attitude of the tribe and DNR. This strategy built trust and effective collaborative relationships. Forgiveness has also been identified by game theorists as an important factor in developing cooperation (Axelrod 1984), although game theorists see forgiveness as a *structural* aspect of cooperation. Reframing allows us to see the human resources

dimension of forgiveness.

Deliberately shifting among frames. A third way in which judicious use of the political frame enabled local actors to operate most of the time in the human resources frame was simply the tribal and DNR actors' embracing the concept of balancing fish habitat protection with timber industry viability. In addition to being a core principle of the TFW agreement, this balance was supported by all actors' distaste for other major land uses in Basin A. In comparison to agriculture or conversion for development, the relative impact of forest practices was perceived to be low. This was an important factor maintaining cooperators' focus on industry viability. The DNR and tribal approach was to have a clear and firm bottom line about protection while considering industry a friend and valued partner. Both tribal and DNR actors had strong self-confidence about where the "firm bottom line" lay. It was based on the minimum standards of the TFW agreement, exceeding those standards where warranted by science about which there was already strong agreement among both the state-level and local parties. Legal clout, "high-certainty" science, personal authority, and powers of persuasion all helped to move industry past disagreements.

> [DNR forester] isn't a real technical person, but he looks at an area and intuitively knows what needs to be done for resources to be protected. He's really good at that....He is a people person, really good at pulling people together and getting consensus. He believes very firmly in his role as a regulator, but at the same time believes you don't have to have this wall between the regulator and the regulated. He can be very friendly with industry while at the same time maintaining a really firm stand with them....His success is trying to strike compromise, bring industry along. And he's been very successful. (DNR scientist)

> I've got one forester who's been here for 30 years. And people call him when something goes wrong. Because they know if he finds out the shit's gonna fly. But if they call him first and tell him what's happened . . . they're gonna work it out. (DNR senior manager)

> I put a stop to that [industry newcomer keeping tribes off their land]. I told the [timber company] I'd hold up their stuff [forest practice permit] till hell freezes over....They can't afford delays....They're willing to do it for the working relationship. Because I can okay permits two weeks ahead of time [if they cooperate]. (DNR forester)

In Basin A, the DNR's ability to bring industry to agreement about regulation was based, on the one hand, on a strong vision of what was necessary (buttressed by support from the tribe), and on the other hand, a willingness to spend an enormous amount of time on communication (three-quarters of his time, according to the DNR forester). The DNR forester was thus able to *frame shift* adroitly between (1) threats or implied threats to industry in the political frame about "holding up permits 'til hell freezes over", (2) while holding out a friendly hand in the human resources frame through frequent and persuasive communication and giving the message that "the relationship" was important and beneficial to both industry and DNR. It is notable in the examples above that this strategic shifting between the political frame and the human resources frame could happen within one conversation with the same person, as well as across conversations with different individuals at different levels of power and authority.

The DNR forester also used his personal authority to steer relations with local

environmentalists away from the political frame. He invited environmentalists to the ID teams, and demanded that they deal directly with him instead of sending letters of protest to DNR headquarters. He thus challenged environmentalists to develop a strong understanding of the local issues, and to object on specific local grounds rather than on general principles. Local environmental groups in this basin had no funding to hire their own scientists. They eventually concluded that forest practices were reasonably well regulated in this watershed and were much less a threat to environmental values than other land uses. They eventually ceased to focus on forest practices. In this case, DNR's willingness to invest in communication was effective in avoiding conflict. This consistent communication discouraged the environmentalists' initial attempts to act in the political frame and re-defined the relationships within the structural frame.

Recognition of benefits of staying in the human resources and symbolic frames. A fourth factor which reinforced the strength of the core DNR-tribal relationship, as well as the relationship of both with industry, was a recognition of the benefits of sharing human resources among all three parties (industry, DNR, tribe). The most important sharing was in expertise, especially tribal expertise in fish habitat and soils.

> [Tribal biologist] gave us their expertise. The landowner didn't need to go out and hire a soils person, which the department could have forced them to do. Because [tribal biologist] was a bio, and they had [tribal soil scientist]. You couldn't find someone that young, and that full of common sense....the tribes are doing a hell of a job....You got all walks of life and you can't snub 'em. I've learned a hell of a lot from [tribal biologist and soil scientist] that I didn't know. And they've learned a lot about forestry. (DNR forester)

> Probably the [Tribe in Basin A] is best. And that's because they had [tribal biologist and soil scientist]. Both are very well-educated, reasonable people to work with....But the majority of the large timber industry in our area was fairly acceptable. And some of that is just the relationships you build over time. When you work with them, and you're sharing research, sharing fire suppression, sharing vehicle storage....When we asked for some engineers to help in a watershed, they donated them. If we had ID teams, they'd offer someone, even if it wasn't their own land. (DNR senior manager)

> We are realizing that we as land managers or forest engineers or layout people don't know everything and don't recognize things. So I think that philosophy over the last 10-15 years has changed. And people realize they benefit by turning to experts....knowledge sharing is working well here....Because we've built a good relationship with most of the players....[Tribal soil scientist] really knows his stuff....I know most of the players, having been here a long time. We have good exchanges with experts at DNR, good exchange with DOE....TFW started in a fairly cloistered manner, but now there's a lot of sharing of information. I'll share whatever information we've got. So will the tribes. (Industry manager)

In addition to the technical benefits of sharing, players in the human resources frame valued the effects of joint problem-solving on human relationships. "Trust", "respect", "good relationship", or "job satisfaction" were terms used by most interviewees in this watershed.

> And when things click like that, it's a pleasure to go to work. You don't feel like you're on the take. You're in a position to try and get rid of some bureaucracy, protect the resource, help them make money. And that feels good. You get a lot of respect. And you actually develop a level of trust....The big thing for me is trust. You have to earn it. So [gaining trust] it's based on time.

(DNR senior manager)

> [Timber company] is good people. I've always had a good relationship with [company manager].
> We don't always agree, but it's okay, we'll always sit down and have a cup of coffee and talk about
> it. (Tribal scientist)

The forums we attended in which this trust and respect was most evident were the monthly "TFW breakfast" and the quarterly regulations workshop following it, in which all the players heard presentations on and discussed how to implement changes in state or federal regulations. The TFW breakfasts are hosted by the DNR forester under discussion here, termed "the patriarch", and they are attended by 30-60 people from both the local basin and the entire region (mainly timber companies, DNR, tribes). This event features not only the educational novelty of a guest speaker and the discussion around her/his presentation, but also the informal information exchanges and "deals" made over coffee. The relaxed banter, lively public discussion, frequent laughter, and quality of engagement in the discussion demonstrate that this forum is highly valued for its intellectual stimulation of discussion as well as for its social function. When higher-level DNR officials attempted to terminate the monthly breakfast, the patriarch successfully objected:

> DNR tried to change our breakfast meetings to quarterly meetings, and I just said "Bullshit, you
> don't run this meeting.".... It's not a DNR meeting. It's the *community* meeting in forestry....
> Industry, environmental groups, the tribes come. Sometimes the county, state lands [division of
> DNR] people are coming out: our local DNR people are showing up. (DNR forester)

Unlike other DNR regions where TFW breakfasts are held infrequently or not at all, this region, and especially Basin A actors, uses it to celebrate and reproduce the local norms, values, attitudes, and understandings that have grown up around multi-party cooperation. The breakfast has clearly taken on a *symbolic* function in addition to its human resources function. We apply this frame below.

Symbolic resonance of the human resources strategy.
The final aspect of Basin A strategies that we examine is the symbolic resonance that working in the human resources frame had for cooperators implementing TFW. They valued learning not only for the increased knowledge, but for the experience of doing something meaningful which increased their self-esteem.

> I really do mean I learned something new every day. And it was good to see maybe you could do
> better in certain areas. And when I was working a lot with information layers [in GIS], I got a lot
> of self-esteem. Because I could see all this data being layered and I could see maybe we weren't
> involved in some of the catastrophes in the environment. (DNR senior manager)

Basin A actors have developed a culture of place, in that "the people and the place aren't separate. They say, 'I got up at 5 this morning and I saw something different.'" (tribal scientist) Participants are driven to a large extent by their interest in and their caring about this specific place, and achieving a balance between the welfare of timber landowners, fish, and the welfare of the communities which depend on both fish and timber. The key players in DNR and the tribe spend much of their recreation time in the watershed and want their children to remain there. In

their identification with the place, they operate in the symbolic frame.

Two dilemmas around balancing the political and the human resources frames. The preceding discussion has highlighted two dilemmas which further illuminate the relationship between use of the political frame and the human resources frame. The first dilemma is about the *difficulty of acting in the human resources frame in the presence of high levels of conflict.* What is often not realized in the literature on cooperation is that the patience and fortitude required to invest in human resources does not survive well in an atmosphere of political conflict. The people who are good at mobilizing human resources and constructing good relationships may not be good at, or tolerant of, having to deal with constant conflict. The harmony of a good relationship may be as important psychologically to the regulator as it is to the regulated. Even while acting in the political frame, the regulator in Basin A longs for the human resources frame.

> It hasn't been accidental that [DNR forester] has been here so long. If he had been in a place like the South Puget [DNR Region] where they're constantly looking over your shoulder and filing lawsuits and pulling you into court, he would have been long gone. He is a very sensitive guy; he likes people to agree and he doesn't like conflict, and he works very hard to bring people to consensus. (DNR scientist)

In other words, the high level of cooperation achieved in Basin A could only flourish when all actors played by the original TFW rules, working very hard to stay in the structural or human resources frame, and refusing to revert to the political frame unless other players repeatedly betrayed trust and agreed rules.

A second dilemma is that the actors' *ability to stay in the human resources frame depends on the willingness of DNR to exert regulatory authority* (rather than to be "captured"[1] by industry or an over-valuing of timber resources). In Basin A, DNR's willingness to exert regulatory authority depended in part on the capacity of the tribe to share technical expertise and to monitor industry compliance, as discussed above. Clearly, the DNR and tribal behaviours reinforced each other. Both were able to threaten use of the political frame if necessary, and both knew how to engage in collaborative investigation as the first and preferred line of action. But these field-level capacities might have been useless had it not been for the additional tribal capacity to exert pressure on DNR at senior levels. Senior DNR regional staff had traditionally been captured by industry. The tribal middle manager not only supported field-level tribal scientists, but he also supported the field-level DNR forester when the latter risked being overridden by senior DNR staff. At critical moments, the tribal middle manager was able to go over the head of the uncooperative senior boss of the DNR forester, and appeal directly to the more senior DNR managers. In this way, the tribe pressured senior DNR people to support the local DNR forester in asserting regulatory authority over industry.

> [The DNR forester's senior boss] was bad. [The DNR forester] challenged him. The [DNR senior boss's boss] backed [the DNR forester] up. I addressed 3 to5 issues with the [DNR senior boss's

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[1] Many scholars have noted the tendency of government regulatory agencies to be "captured" by the industry they are supposed to regulate, in that their policies are often more influenced by industry than by the general public or non-industry interests such as environmentalists. See Pinkerton (1992) for an application of the concept to the early stages of TFW.

> boss] because they didn't get resolved with the [DNR forester's senior boss]. We had access to the head of DNR and others. We were able to work with the appropriate political forces. Maybe it empowered the DNR staff. They couldn't be beaten back by their folks to the same degree if we backed them up. (Tribal policy)

Without the combined uses of the political, structural, and human resources frame, it is doubtful or at best unclear whether the DNR forester could have exerted regulatory authority. The successful exertion of regulatory authority, in turn, enabled the maintenance of a stable environment in which the human resources frame could be the mainstay strategy for cooperation. Over time, this stable strategic emphasis tended to attract and retain similarly oriented individuals.

This discussion of dilemmas illustrates again the importance of the political frame for safeguarding and maintaining opportunities to interact in the human resources frame. It underlines not only frame shifting, but also the *simultaneous* use of different frames at different management levels as a major strategy for implementing cooperative agreements. When an actor at a higher level (such as the middle manager) could work in the political frame to reduce conflicts to a tolerable level, field-level actors whose talents and inclinations flourished in the human resources frame were able to spend most of their energy doing what they were good at. The dilemma could thus be avoided.

Specific benefits of using the structural frame in Basin A. Although our analysis of Basin A has focused largely on the human resources frame, the structural frame was also used for dealing with certain technical issues in this basin. Here, the majority of the salmon habitat is located not in timber lands but in the agricultural lands that dominate the floodplains and lower mountain slopes. However, slopes in the bedrock hollows, inner gorges, and incised channels of the uplands are unstable, and sediment transport from upland slope failure on logged areas can produce impacts on salmon habitat downstream. The tribe therefore asked for 50-foot-wide (16-metre-wide) riparian forest buffers on non-fish-bearing streams, whereas the standard state-wide TFW rule had no requirement at all to buffer these streams. DNR agreed to this protection, which many TFW cooperators saw as "visionary". At the same time, DNR and the tribe were flexible in permitting industry to remove selected low-risk trees and to perform enhancement plantings of conifers within these buffers.

In fact, the feature of TFW most frequently praised by all participants in Basin A is the site-specific and flexible nature of regulation. Interviewees concur that the site-specific ID team was often superior to the larger-scale Watershed Analysis program, because: "I hate standards. Aren't we a little smarter, and more adaptive?" (DNR senior manager) This flexibility could occur because landowners had enough confidence in DNR that they did not seek Watershed Analysis as a source of certainty in regulation. They believed that DNR could do a reasonable job in timely processing of permits and in fair and sound regulation. Watershed Analyses were used primarily as sources of data to inform site-specific decision-making. In addition, however, Basin A's disenchantment with Watershed Analysis was partly due to the facts that (1) only two were done in the watershed, (2) industry did not sponsor or pay for any, and (3) DNR state headquarters was slow to approve them.

The site-specific approach used in Basin A was based on accumulated shared reference points which constituted an agreed set of standards and understandings. Actors would constantly evaluate the seriousness of a problem in comparison to past examples drawn from a storehouse of shared experiences. They could thus communicate to one another: "Was it as bad as the Killer Creek slide?" The stability of the core players allowed a constant refining of communication, a honing of meanings, an increasing richness of shared knowledge. As a collaborative team, they could effectively and efficiently regulate in a highly site-specific manner.

Can Basin A learnings scale up? If Basin A had developed such a successful approach, then was this approach of any value or interest to outside areas? The DNR Region, which encompasses several basins, is the area to which the successes of Basin A were known and to which some strategies diffused. The lessons for DNR in this region were of two types. One was the concept of giving significant riparian protection to non-fish-bearing streams, which a number of TFW cooperators considered a visionary concept initiated in Basin A. The other was simply the style and approach of the "patriarch", the DNR forester in Basin A, who was well known to everyone in the region and was viewed as a role model by some younger foresters. (There were, however, other foresters who took a more distant and formal regulatory approach.)

The tribe in Basin A was also recognized state-wide for its superior technical expertise, both through scientific publications of tribal TFW staff and by reputation in the TFW networks. The tribe's basin-scale assessments of current and historical fish habitat appear to have inspired similar studies by other tribes. In addition, the tribe also occasionally brought a research finding with statewide implications to the Cooperative Monitoring, Evaluation and Research committee (CMER).[2] Both the tribe and DNR also frequently invited in tribes from other DNR regions to observe their process. In general, the influence of Basin A on other areas and the state-level policy frameworks is both limited and difficult to trace.

The role of industry in Basin A. Did industry have a strategy comparable to that of the tribes and DNR in this basin? There were one major transnational company, six mid-size companies, and many smaller landowners in the basin. The major company in 1993 fired a manager who had difficulties negotiating with the tribes. They then hired a former DNR forester who had been in the region many years. This individual took as his mission to establish cooperative relations with the tribes. In this basin, industry strategy did not drive cooperation; instead, industry responded intelligently to what it perceived as the socio-political climate for business. Industry had little incentive to pay for Watershed Analysis in Basin A, because it already had acceptable certainty about timely processing of forest practice applications and consensus around scientific models as long at it cooperated with DNR and the tribe on ID teams. In addition, industry probably recognized that there would still be site-by-site assessments in Basin A, even if they did a Watershed Analysis. Thus the benefits of collaborative investigation at the site level were too

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[2] Recent tribal research indicates that the size of catchment required to create a permanent ("perennial") stream is much smaller in Basin A than the standard rules assume. Since such findings have enormous implications for identifying fish habitat in need of special protection, the study was brought to CMER with the suggestion that it be replicated state-wide.

many to forego.

Summary of how cooperation worked in Basin A. In summary, the key crafters of cooperation in forest practices in Basin A, the field-based tribal and DNR actors, shared characteristics of age, experience, autonomy, residential and career stability and locality, and a full embracing of the human resources and symbolic spirit of TFW. These players used a combination of strategies to achieve cooperation, beginning with the political frame but coming to operate mainly in the human resources frame. After some initial work in the political frame, and with the occasional continued use of it, they were able to shift among structural, human resources, and symbolic frames in a manner which reinforced and enhanced cooperation. Frame shifting and frequent use of the human resources frame were highly successful strategies for building and maintaining cooperation.

The usual limitation of any local strategy is that it may not operate successfully if there is strong interference from extra-local parties. In this case, tribal support, DNR structure, and personal qualities allowed sufficient autonomy in this region that the DNR "patriarch" forester was not vulnerable to political pressure, either from industry or from environmental groups. It is likely that this particular individual could have withstood external pressure from industry, but possibly not from environmentalists with an agenda to stop all logging, since he walked a careful line between friendliness to industry and protecting public resources. A less-endowed individual attempting this strategy might not have been able to withstand either.

A second limitation of the local strategy is that it is not clear how much it could be successfully adopted in other regions. It is evident that the local DNR strategies and skills can be communicated and learned through training and modeling, at least within a DNR region. However, the success of this transfer depends to a large extent on the personal beliefs and skills of local forest practices foresters. Nor is it clear how these strategies would scale up to a form which could be taught to other regions or inform practices on a state-wide scale.

The tribe affirms that fish resource outcomes are stable to improving in Basin A, so we can surmise that cooperation did not occur at the expense of degrading fish habitat. We chose Basin A as a case study because it appeared to be the most successful at carrying on the spirit of TFW in the implementation of forest practices, as demonstrated particularly in the continued interest in site-specific rule-making. We now turn to the history of cooperation in Basin B, where a different set of strengths and vulnerabilities are demonstrated.

Characteristics of actors in Basin B (the "cosmopolitan" basin). We chose Basin B for intensive study because many industry, tribal, and university scientists agree that a particular Watershed Analysis done in one of its sub-basins constitutes the most successfully innovative example of Watershed Analysis in the state. The success is attributed (a) to the parties' strategic adjustments based on the experiences of previous Watershed Analyses, (b) to the perseverance of all the parties, often in major conflict, in working toward agreement, and (c) to the successful formal modeling of complex management problems. Its value is seen to lie in the potential broad applicability of these models to other watersheds. The first notable difference between Basins A and B is that both industry and the tribe in Basin B had an intense interest in Watershed Analysis,

while Basin A actors continued to emphasize the ID teams as the major means of replicating early TFW successes. We view the two basins' approaches as contrasting strategies for solving problems in implementing multi-party cooperation.   Basin B was in some ways a mirror image of Basin A. In Basin B, industry was a clear leader in both policy and technical arenas, and DNR followed industry's lead. There was no DNR forester who played a leadership role locally, seeing tribal scientific expertise as his/her own resource for improving decisions. The tribe learned early that it had more to gain from dealing directly with industry than from trying to persuade DNR to exert regulatory authority. The major landowning forest company in this basin was also a major landowner in the state. It had its own research scientists on staff, and its own team of applied scientists did all of its Watershed Analyses across the state. The company's scientific team was accustomed to conducting Watershed Analyses fairly independently of the local DNR in regions where there had been no tribal involvement. The initiator of a Watershed Analysis not only pays for the analysis, but also hosts and facilitates the meetings, so industry naturally took the leadership role in Basin B. The tribal scientists in Basin B were sometimes considered a source of conflict more than help, since their opinions often differed from industry's, at least from those at industry headquarters who made the final decisions.

However, industry also saw Watershed Analysis as a structure for using watershed science to move beyond the high level of conflict which had characterized its forest practice applications and ID teams in this basin, sometimes resulting in appeals by the tribe and thus costly delays and uncertainty. In fact, a forest practice application appeal in this basin is cited by many as a key moment in forcing the development of the Watershed Analysis methodology. The stakes were extremely high in Basin B, because the real estate value of the forest land was much greater than in Basin A, due to the former's proximity to a growing population centre. Tribes and DNR knew that if they restricted logging too much, the land might be converted to a use far more destructive to salmon habitat. In late 2002 the entire tree farm in the basin was in fact put up for sale. The knowledge that they could do this probably made the company less willing to restrict their activities. At the same time, the proximity to denser human settlement also made the area more visible to and scrutinized by environmentalists and the general public. In fact, an environmental organization with field expertise was a strong participant in Watershed Analyses in Basin B.

The age, experience, and capacity of the major players also created a different set of conditions. The tribe had two young, energetic, creative, and highly competent scientists covering forest practices, and both were steeped in the published science literature more than their applied science industry counterparts. These players stayed 12 and five years respectively with the tribe and then moved on to other jobs outside the basin. Thus they did not have a place-based orientation in their residence patterns or career paths. DNR foresters involved in Watershed Analysis lived in communities outside the basin, partly because that was the location of DNR regional headquarters, and had little connection or collegiality with the tribes beyond what was required by their immediate tasks. The industry field supervisor participating in the Watershed Analysis of our focus was a 25 year veteran, but also lived in a distant community. Industry research scientists and applied scientists all lived in another basin, and were only called in for specific needs.

History of cooperation in Basin B: actors' strategies. In contrast to Basin A's focus on the human resources frame, in this basin, all players aspired to use the structural frame. The state of affairs before the advent of Watershed Analysis consisted mainly of industry trying to stay out of court, using the TFW structure as a less costly option, while the tribe stayed mostly in the political frame. The trust required to move toward the structural frame was relatively low.

> DNR was traditionally viewed as a timber representative. They were not willing to be strong in their regulatory arm. We argued with them all the time. Trust in DNR was low and remains low. There were never any misconceptions about [major company], but we appreciated their willingness to sit in a room with us.....We distrusted industry but it made sense to talk. (Tribal policy)

> DNR was seldom willing to set special conditions on forest practice applications during ID teams. (Tribal scientist)

Clearly, DNR middle managers and field foresters did not feel they had autonomy to exercise regulatory authority. Industry reports that local DNR behaviour changed in close correspondence with changes in DNR's elected head (the Lands Commissioner). Gne industry interviewee said that during the tenure of an environmentally inclined Lands Commissioner from 1992-2000, local DNR took "police action" against industry in this watershed. The only other reflection of this perceived local shift against industry in our interviews is a tribal scientist's report that the DNR forester during this period always followed due process carefully, calling an ID team when requested, being willing to set some special conditions on forest practices, and carefully implementing the decisions of the team. There was, however, no local leadership from DNR, and the industry reports that relations returned to "normal" when a new Lands Commissioner was elected in 2000. Our interpretation of DNR's role in this region in the 1990s is reflected in the following statement, even though this statement refers to the current decade. Comparison with statements by the DNR forester in Basin A above reveals a dramatic contrast in autonomy and strategy.

> ...we have to comply with the rules, so our personal opinions don't weigh anything. And I'm not going to voice my opinion. (DNR forester)

In contrast, the tribal TFW staff had almost complete autonomy. There was a policy-level vacuum most of the time, with no middle manager to meet with DNR and industry when needed to clarify the tribal bottom line and the consequences of conflict. Unlike Basin A, tribal staff did not review all forest practice applications as a step in consistent compliance monitoring, feeling that they could make more progress by other means. Thus there was less consistent close attention to collective science-based positions which could be backed up by political pressure. Rather than simply conscientiously implementing the widely accepted science, they focused on finding and applying new issues and new approaches. For example, one of these two scientists was an early promoter of the need to revise the Watershed Analysis methods to assess risks of deep-seated landslides.

> Where there'd be several levels of bureaucracy [elsewhere], [in the tribes], there's so much to do, my rule of thumb is to pick that which interests you, and as long as it benefits the tribes, go with it, because there's an infinite amount to do. (Tribal scientist)

The tribal scientists of Basin B did produce policy positions on issues such as resource target conditions and acceptable forest practices on hazardous terrain. Over time they learned advocacy skills and gained respect as credible scientists. They struggled to enter and remain in the structural frame, relying on transparent process, published science, and formal agreements and regulations as a basis for cooperation. But with the first Watershed Analysis in which they participated, they learned that agreements really did (as the TFW joke went) "belong to the person who took the diskette home". The formal Watershed Analysis program structure did not guarantee satisfactory outcomes. In one early Analysis, riparian prescriptions that the tribal scientists had agreed to were rewritten while they were away on Christmas vacation. On the Watershed Analysis that is our focus, they adapted their strategy to be more vigilant and more prepared in their arguments. They confronted industry with more tightly-argued scientific reasoning for the level of protection they wanted. When they got initially positive responses, but later a backtracking, they also confronted industry about who in industry actually made the decisions (i.e. not the people in the room), and got local industry's agreement that the tribe was making scientifically valid arguments for protection. The debate was intense, but parties were eventually able to accommodate each others' bottom lines by each refining their demands and clarifying their positions with reference to a range of resource situations. Transparency and formal representation of intent, rationale, and the knowledge base played a key role in building consensus around prescriptions.

> We were willing to say that... yeah, it's all important.... I'm not discounting other areas, but if I know an area is relatively more important, I would like to see more protection there than somewhere else, even though there's an uncertainty with that. So I think we did a really nice job of helping people define discrete areas as being more important than others....I always got along very well with [company] people. They respected me...And we were very sensitive to their needs as well. And made sure that there was some justification, so that if they had to defend it to their superiors, they could scientifically.... To [the company's local manager's] credit, he backed those prescriptions up and he did the right thing....The prescriptions were quite good, because there was actually some honest interaction . . . .And we gave them options.... but it needed to be structured, reproducible, defensible, and adaptable. We didn't lose our boundaries at the same time. . . .We were legal-like on prescription. We went through every sentence. We had it up on the screen, writing by committee. It was arduous. (Tribal scientist)

The struggle in this Watershed Analysis began in the political frame, and the Watershed Analysis itself was developed in part through political means. The tribes and industry moved into the structural frame to resolve the conflict. They agreed that the science justified certain prescriptions and they were "the right thing to do". In a move which symbolically invoked scientific respectability upon their innovations, the tribe invited the company's head research scientist to cooperate in what became a successful solution to the impasse in the riparian forest prescriptions. The tribe and industry jointly developed a formal model to predict what silvicultural treatments would supply sufficient habitat-building large woody debris to streams of various types. This elaboration of the prescription-writing phase of Watershed Analysis was an advance in "science-based management" — the ultimate in applying the structural frame. It achieved policy goals without creating an inflexible rule for industry. There were also gains in human resources along the way.

> So I felt pretty good.. ..I like a lot of people who work in the timber industry. We were doing cutting edge stuff....so it was not easy at that interface....You should be developing models collaboratively, instead of taking a stand and saying 'No more'... .I think there was a lot of good things that came out of it, at least locally and personally.   They even gave us money to help us [further] develop this riparian model. (Tribal scientist)

> Watershed Analysis probably has been the most constructive thing we've done. Everywhere we have an Analysis, we can make decisions. (Tribal policy)

Basin B's players progressed gradually from the political to the structural, and sometimes to the beginnings of the human resources frame as a way of interacting. However, the level of trust in Basin B was still quite low, and the rationale for using the structural frame was driven by impasse in the political frame.

Strategy of industry in Basin B. Industry's idea in initiating (and paying for) Watershed Analysis in this case was to get beyond costly forest practices appeals and delays and to cooperate on collecting data that would address problems with tribes and agencies. Their strategy was to seek regulatory predictability through acceptably small area concessions in a new political environment. Watershed Analysis was necessary precisely because the parties did *not* have a sufficiently cooperative relationship on ID teams. They could not solve problems in a highly discretionary framework based on trust, and therefore required more formal spelling out of the rules to which they could hold each other accountable. These rules were found in the Watershed Analysis state law and procedures manual.

. The environmental problem most disturbing to industry was landslides (mass wasting) on unstable slopes after logging or road building. Mass wasting was industry's largest fear because the damage may occur not only to fish habitat but also to the company's own capital investments, downslope private property, and even human life. Furthermore, mass wasting events generally occur within a few years of triggering activities, and many slides are plainly visible to the public. Under such conditions, the potential for lawsuits, or at least a tarnished public image, is high. In addition, evidence of historical mass wasting events provides a basis in local data for identifying the most hazardous areas. The mass wasting module of Watershed Analysis was considered by industry (and many individuals in other groups) to produce the greatest scientific benefits of the program.

> Within [this timber company], where I've seen them do more [go beyond the minimum] is in slope stability stuff. I do not want to come back in five years and have there be a landslide. (Industry scientist)

In this particular Watershed Analysis, industry agreed not to operate in about 3% of the watershed for reasons of mass wasting hazard, because the tribal geomorphologist was well-respected and was willing to focus on the highest-hazard areas. In this sub-basin, slopes are unusually low in gradient, and the area left unlogged was relatively small. That is, the science was widely accepted, and the potential costs of failures were high for all parties.

Industry was much less willing to make concessions on the size of riparian buffers. The

tribe often requested buffers 100 feet (33 metres) wide or more on fish-bearing streams, with no cutting at all allowed. Industry's reluctance was due in part to fears that riparian buffer agreements in one location might be taken as a precedent which could be applied to all landscapes with similar stream types. While high-hazard mass wasting areas might be relatively small in any particular watershed, every stream had a riparian buffer on its entire fish-bearing length. Several industry interviewees claim a 100-foot riparian buffer would translate to a 13-15% reduction in production.

Furthermore, a key widely accepted study in mature conifer forests of Western Washington and Oregon had found that about 80% of in-stream pieces of large woody debris had come from within 66 feet (22 metres) of the stream bank. About 90% had come from within 100 feet (McDade et al. 1990). Some of the most difficult disagreements during prescription negotiations involved questions around what percentage of "natural levels" of large woody debris is enough to create fish habitat that will support viable stocks. Industry fought to keep buffer widths at 66 to 75 feet (22 to 25 metres), and the tribes attempted to move them to 100 feet (33 metres) where specific stream characteristics warranted. Industry was less willing to accommodate tribal concerns on this issue than on the mass wasting issue, because few costs of poor management in the riparian zone would accrue to them. Capital investments were at little risk, and riparian dysfunction due to specific practices in specific areas is detectable only through careful scientific study over decades.

The twin strategies of industry in Basin B -- willingness to stay out of high-hazard mass wasting sites and unwillingness to set aside riparian zones over 75 feet (25 metres) ~ led to a predictable struggle with the tribe in this watershed. There was a strong argument to leave larger buffers in this case, because the sub-basin under consideration regularly produced a disproportionately high percentage of the entire watershed's coho salmon. In addition, the tribes argued that some stream types, such as plane-bed channels, are particularly dependent on large woody debris inputs to create salmon habitat. What industry wanted was a clearer reason *why* it could sometimes set aside 100 feet in this sub-basin, without creating a precedent which would be expected to generalize to all their timberland in the state. In addition, industry claimed that in many cases they could improve the functionality of large woody debris by thinning buffers to increase tree growth rates and converting hardwood stands to conifers - a proposal that raised suspicions in the tribe.

The impasse was broken when the company's highly respected research stream ecologist helped model the system formally. The parties were able to agree on different quantitative objectives for different stream types, and the effectiveness of thinning or stand conversion for achieving these objectives was quantitatively linked to current riparian stand conditions. Processes of tree growth, recruitment of wood to the stream, and transport of wood into and out of stream reaches were modeled explicitly. This modeling exercise allowed parties to agree that over the long term (a) functional in-stream large woody debris was not very sensitive to the size of buffers on small streams; (b) functional in-stream large woody debris could be increased by commercial thinning or stand conversion *in some areas;* (c) the small amount of areas where there were mature conifers on large streams (about 5%) should be no-cut; and (d) 100-foot buffers are required *on some streams* but not on others. This approach to resolving the impasse

gave all parties a shared means of forecasting what amount of wood would be produced from what size buffer under what kind of management, adding distinctions between different types of streams as a way of figuring out how much real habitat is produced by how much wood input. Having an explicit shared rationale for prescriptions in this watershed analysis assuaged industry's fears of setting a precedent which might be used inappropriately by parties who did not understand the site-specific issues.

At different times in the TFW history of Basin B, observers might conclude that negotiations took place in the structural frame (formal attention to scientific documentation and rational arguments), the political frame (industry and tribal bottom lines conflicting), or, less frequently, the human resources frame (acknowledging political pressures and demonstrating mutual respect in trying to accommodate them). All parties *attempted* to remain in the structural frame, using well-documented science as the basis for their arguments. Because the costs of mass wasting failures would accrue to both parties, industry probably did operate in the structural frame to a large extent for this issue, even though they diminished the size of the no-cut area on slopes identified by the tribe as unstable.

However, in the case of riparian prescriptions, a political negotiation of quantitative objectives was the necessary prelude to a structural approach and agreement. This political negotiation was complicated by the fact that industry negotiators did not have decision-making autonomy. The local manager would agree with the tribe's argument but then be overridden by his supervisors. When this power relationship eventually came to light, the tribal scientists were relieved. Making political conditions explicit helped all parties figure out a way to shift into the structural frame and a solution to the impasse. However, the shift to the structural frame was weakly focused on the players and strongly focused on the model. The dilemma of operating in the structural frame in this watershed, where stakes were high and parties demanded rules that were invulnerable to bad-faith implementation, is that the approach neglected better interpersonal relationships as a desirable outcome in itself or as a way to eventually achieve better resource outcomes. Instead, all parties satisfied themselves that there were sound enough rational scientific reasons (produced in the structural frame) for their decisions that they would not be politically compromised. While the achievement of agreement through persistence and transparent argumentation naturally tended to improve relationships among at least some of the actors, this outcome was incidental more than it was strategically sought

Scaling up from Basin B. Because of the political basis for these agreements, the tribe and industry did not go about applying the formal lessons from this Watershed Analysis to the rest of the forested landscape, as actors had in the forested areas of Basin A. Instead, the tribe's attention bifurcated into two new arenas. One was a new round of state-wide TFW negotiations of "The Forestry Module", later issuing in the *Forests and Fish Report,* to decide how forest practices would be affected by (1) the listing of salmon species under the *Endangered Species Act* and (2) pressure to implement the *Clean Water Act.* (See Kepkay 2003 for a discussion of the linkages among TFW, Watershed Analysis, and these new negotiations.) In this new forum, the formal modeling approach taken in Basin B was adapted, some say inappropriately, as an option for addressing riparian forest issues. Watershed Analyses were expensive to do individually, and in five years the program had covered less than 7% of the state's designated sub-basins. However,

once the collaborative work was done on a model like this, it might be possible to apply it across the state. Thus the learning around modeling in Basin B - both the transparently justified prescriptions and the idea itself of *how* to develop those prescriptions through modeling - did scale up to the state-wide level in a relatively straightforward manner (unlike the learning in Basin A). Instead of individuals shifting frames to relate more cooperatively in the long term to specific other individuals (as occurred in Basin A), political struggles produced scientific models with the potential to reduce conflicts everywhere. Many would argue that these gains in state-wide formal agreements (the structural frame) are the most positive and secure outcomes of TFW. But one of the early tribal policy visionaries of TFW in Basin B takes another view, having decided that the (human resources and symbolic) spirit of TFW had gone from these negotiations.

> It's kinda shifted from working with federal and state folks to local governments. Right now... we're gaining much more ground there....We don't have to worry about making an agreement with them and we walk out the door and it's changed. The local government staff are *much more knowledgeable about the area,* because that's where they work. When we come up with ideas about what they can do, and we can do and talk it out... and then they just go out and do it... .When I sit down and talk with the county council or the county exec or the staff, and explain [that we're doing baseline data on food gathering related to tribal community health], they take it very serious. They have to deal with people at the local level all the time.. .they have an understanding of the processes you need to go through to make the land use stuff work.... They see it as doable...they don't see it as far fetched or too much trouble or too difficult. When we explain what the potential is, they can relate to it... .So I'm spending a lot more time with them than I was with industry or the state....we hold monthly meetings....The county has agreed to riparian buffers where they have jurisdiction. (Tribal policy) [emphasis added][3]

Thus at least some actors in Basin B retained the vision of a process which not only improves the scientific basis of decisions, but also encourages sharing of human resources and an appreciation and respect for local people's enduring connection with resources. However, the focus of this vision in Basin B is now outside the forest practices arena. In a separate paper we discuss perceptions of trust and betrayal related to these developments.

Strategy of Environmentalists in Basin B. Environmentalists also adopted a different strategy in Basin B. They decided to work on issues of high scientific certainty with a straightforward basis in local field data, such as identifying fish passage blockages (inadequate or blocked culverts) and "retyping" misclassified streams. Usually retyping meant that more streams got classified as fish-bearing and therefore requiring riparian forest buffers. Industry funded the environmental group to collect data on these two issues as part of the Watershed Analysis discussed above, promising to fix all problem culverts within five years. The environmental group did this work at cost, so there was a considerable industry benefit both financially and politically from their participation..[4] The environmental group also focused attention on a

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[4] In January 2003, 20 tribes went to court claiming that blocked culverts are a violation of tribal habitat protection rights, and attempting to force Washington State to fix about 500 culverts on state roads that impede migrating fish, such as salmon. The state's timeline for fixing all the culverts is 20 to 30 years; the tribes want it done in five years. The culvert case is a sub-proceeding of *US v. Washington,* Phase II. The tribes want the U.S. District Court in Seattle, Washington to make the state protect salmon habitat so that tribes can get their fair share. The proceeding, if successful, will imply that private landowners have the same duty.

hatchery operated by the Washington State Department of Fish and Wildlife whose practices were not compatible with the agency's mission to protect and restore wild fish habitat. This attention took some of the heat off industry, and helped relieve the intensity of the political struggle in forest management issues.

The environmental group also hoped to conduct a rational public discussion about economic trade-offs to show how environmental protection can dovetail with financial viability. It hoped to be useful in finding efficiencies such as cheaper road improvements and bulk orders of bridges. The group also sought to highlight the industry benefits from environmental protection - such as the shared interest in avoiding the costs of mass wasting discussed above. They had been successful in doing monitoring in another watershed. Their field-based and diplomatic approach made a real contribution in the human resources frame and strengthened the promise of a structural strategy in Basin B. This rare example of environmentalist involvement in Watershed Analysis shows that a real contribution can be made if the organization adopts a suitable strategy. If cooperation between the tribe and industry in the structural frame had continued and expanded in Basin B, this strategy would likely have contributed to a more permanent location of cooperation in the structural frame, with the potential for eventual gains in the human resources frame.

Conclusion. This discussion provided an integrated account and analysis of complex cooperation in the implementation stage of an agreement, a stage at which possibilities multiply for relationships or agreements to get much better or much worse. Applying the framework of organizational behaviour scholars (who themselves had borrowed from anthropologists and political scientists), we have shown that actors can use at least four different cognitive pathways or "frames" for relating to each other and their problems. We have also shown that the much-neglected human resources frame and symbolic frame have a potential at least equal to the political and structural frames for maintaining agreement in the long term. Furthermore, we have documented examples of how and when actors may shift strategically among, or simultaneously use, these four frames to maintain cooperation. We have also shown that strategies actors use to elicit cooperation, such as forgiveness, which have been previously interpreted as structural, may be more accurately read as strategies also (or even predominantly) emerging from a human resources (or even symbolic) framing of the problem.

In the analysis of a locally-oriented set of actors in one basin, we documented frequent shifting among political, structural, human resources, and symbolic frames for solving problems. Maintaining agreement did not allow the actors to eschew the political frame, but it did allow them to shift out of it frequently, and to maintain themselves more of the time in the human resources frame. Our analysis documented in particular the strategic, if infrequent, use of the political frame as a mechanism allowing actors to remain most of the time in the human resources and symbolic frames. We also showed the importance of operating in the human resources and symbolic frames for moving to a deeper level of cooperation. Complex cooperation in Basin A became a form of co-management[5], in that the actors focused more on their common job as

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[5] If considered as a form of fisheries co-management, Basin A might fit into the matrix for classifying degrees of

resource managers or stewards and less on their disagreements. We identified two key conditions in the locally-oriented watershed which facilitated successful cooperation. The first was the absence of continual conflict or court challenges to decisions from outside the local network, as existed in some other regions of the state. The second was the willingness of government to exert regulatory authority on industry as a stakeholder whose rights were not greater than the tribe's.

In our analysis of a basin where "cosmopolitan" strategies were chosen, actors had to deal with both government reluctance to exert regulatory authority over industry, and also more frequent conflict and court challenges from outside the local network. As a result, actors stayed more of the time in the political frame, but could at least perform in the other frames in order to agree on rules. Although they neglected the possibility of developing the rich layers of trust and cooperation developed in the locally-oriented basin, the formal rigidity they required for cooperation allowed them to produce applied science tools which would scale up to inform policy processes at the state-wide level. This may be the cosmopolitan strategy's main advantage over the local strategy. This case demonstrates how struggles over the making of operational rules at the local level can produce higher-level collective-choice principles which provide the framework for operational rule-making. This could also be considered a case of double-loop learning (Morgan 1986), since the local actors learned how a collaborative quantitative model can integrate a set of conditions and system responses to be considered in making new rules. They learned how to learn.

Although one cannot generalize with certainty from two examples, comparing these two examples to each other and to the literature allows us to generate some tentative propositions about the key social, political, and ecological conditions which permit complex cooperation at the implementation stage of an agreement.

The first set of propositions is well-established in the literature about "local" agreements already, and we confirm them.
*Making and maintaining agreement and cooperation is more likely in the presence of stable and continuous communication among personnel from the key parties. (Axelrod 1984, Andranovich 1995)
* Making and maintaining agreement and cooperation is more likely with a greater degree of place-based orientation of actors. (Rodman 1992, Powers 1996, Nabhan 1997, Basso 1996, others? Satterfield?)
*Making and maintaining agreement and cooperation is more likely after an experience of *successful* earlier cooperation. (Pinkerton 1989, others?)
*Making and maintaining agreement and cooperation is more likely in the presence of timely monitoring of compliance and timely communication of monitoring results to other parties. (Suskind and Cruickshank 1987, Ostrom 1990, Fisher and Ury 1991)
*Making and maintaining agreement and cooperation is more likely where parties forgive other parties for breaking the rules, but continue to monitor their actions and when compliance monitoring is linked to site-specific and forgiving remediation (Axelrod 1984)
*Making and maintaining agreement and cooperation is more likely where parties use consistent,

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power-sharing and scope of activities as equally shared power in habitat protection (Pinkerton 2003).

clear, and predictable strategies. (Axelrod 1984)
*Making and maintaining agreement and cooperation is more likely where communication is frequent, so that more of the full story comes out and issues get thoroughly aired. (Ostrom et al. 1999, Susskind and Cruickshank 1987, Gray 1991)
*Making and maintaining agreement and cooperation is more likely where trust is developed over time, fostering the sharing of information (Ostrom et al. 1999, many)
* Making and maintaining agreement and cooperation is more likely during a "reform cycle" when countervailing power creates the opportunity for government agencies to regulate industry in a more principled manner (MacFarland 1987).

The second set of propositions arises from both local and cosmopolitan strategies, and is not well-established in the literature.
*Making and maintaining agreement and cooperation is more likely in the presence of strong policy-technical bridging, coordination, and buffering between field people and higher-ups.
*Making and maintaining agreement and cooperation is more likely in the presence of (a) relevant higher-certainty science, (b) processes and outcomes that are more visible, and (c) potential outcomes that carry similar costs to all powerful parties.
* Making and maintaining agreement and cooperation is more likely in the presence of a high level of personal autonomy of key actors.
*Making and maintaining agreement and cooperation is more likely where there is a high level of leadership, vision, and dedication to dealing with conflict in rule-making, as indicated by a willingness to go beyond the letter of the formal framework or official organizational policy.
*Making and maintaining agreement and cooperation is more likely where local arms of regulatory agencies are willing to exercise regulatory authority over industry.
*Making and maintaining agreement and cooperation is more likely where parties have a forum for development and celebration of common understandings (such as the "stampedes" at a larger scale) or when common meanings and values are expressed in regular and fairly frequent collective encounters (such as TFW breakfasts at a smaller scale). (various anthropologists)
*Making and maintaining agreement and cooperation is more likely where the human resources frame and symbolic frame is a major resource and the political frame is used only occasionally.
*Making and maintaining agreement and cooperation at the local level is more likely when personal working relationships among actors become primary relationships, operating in the human resources and symbolic frames.
*The degree of formality sought in negotiations increases with the degree of distrust and power disadvantage felt by a party. **(who?)**
*The willingness to invest in cooperative relationship in the human resources frame increases as the level of conflict decreases.
*At low levels of conflict, simultaneous strategic use of several frames can enhance cooperation.
* Successful uses of the structural frame are more likely than other frames to contribute to cooperative agreements in external arenas.

In the final analysis, the long-term implementation of complex agreements may happen with greatest certainty when there is corresponding cultural change, and cooperation becomes the informal norm instead of the formal result of rules. Rules may provide some assurance against mistrust and instability of social networks, but cooperation may be most rewarding and robust

when actors operate regularly in the heartbeat of human resources and symbolic frames: "the spirit of TFW" becomes institutionalized. Anthropological theory and methods are essential for documenting this phenomenon and for analyzing the set of conditions under which it can happen. Hopefully more in our discipline will turn their experience in analyzing the conditions enabling small-scale societies to act as conservations toward the study of complex agreements and their implementation.