Social Identity as a CPR User: Reflections from a Field Study

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Introduction

Among factors found in laboratory studies to enhance cooperation in social dilemmas is shared social identity (e.g., Brewer and Kramer 1986). In experiments simulating social dilemmas of both common pool resource (CPR) use and public goods (PG) provision, individuals have cooperated more when their identity with others in the situation is made salient. Evidently, shared social identity can lead individuals to view others' interests as similar to their own, and to consider others' well-being in their decisions regarding the use and provision of shared resources. In an empirical setting such as a common pool fishery, shared social identity would be expected to enhance cooperation in terms of both resource use and provision and maintenance of institutions for coordinating that use. Yet evidence of a relationship between two variables does not insure that such a relationship holds in field settings. As Feeny notes, however, experimental research provides an ideal environment to ascertain the efficacy of selected factors under controlled conditions, to then enable testing under more realistic conditions in the field (1992, p.275).

A recent study of the small-scale fishery at Lake Chapala, Mexico explored the relevance of selected factors to individual cooperation and collective action to resolve problems associated with CPR use (Pomeroy 1993). The objectives of the study were to assess fishers' perceptions of resource conditions, to identify social dilemmas related to CPR use and their feasible and actual solutions, and to explore the relevance of selected institutional and individual factors to fishers' decisions to cooperate in the commons. The research focused on three fishers' organizations: the Chapala Union, the Chapala Cooperative, both located in the town of Chapala, and the San Pedro Union of San Pedro Tesistán (all in the state of Jalisco, Mexico), and their 184, 35, and 19 members, respectively.[1] Data were collected through participant observation, informant interviews, and documentary and archival research, and a survey interview, guided largely by the Institutional Analysis and Development (IAD) framework and Ostrom's design principles for successful CPR institutions (Ostrom 1990,1992).

As part of the study, the relationship between individuals' social identity as a fisher and cooperation in the commons was explored. Simple measures of association (i.e., Spearman's Rho and Pearson's r) were used to analyze the relationship between each of four social identity indicators and cooperation. The study found only moderate correlations among the social identity indicators and weak and ambiguous correlations between the indicators and cooperation. These results suggested that 1) social identity was indeed a complex concept, difficult to operationalize in a field setting, and 2) isolating a particular social identity and determining its *salience* for behavior in a field CPR was quite difficult given the multiplicity of social identities (e.g., as member of a family, a neighborhood, a soccer team) an individuals might have. Nonetheless, the study was a valuable first effort to operationalize and measure social identity and analyze its relationship with cooperation in a common pool fishery.

This paper focuses on the conceptualization, operationalization, and measurement of social identity in the study of organized fishers at Lake Chapala. The purpose is to describe and reflect upon these steps to explain the observed outcomes and to move toward more accurate exploration of the concept of social identity in future field experiments. First, I briefly describe the Lake Chapala fishery, its organization, and the dilemmas faced by fishers and their organizations. I also provide an overview of the study's purpose, scope, and methodology. Second, I discuss the concept of social identity along with experimental and empirical evidence regarding its influence on cooperation hi dilemma situations. Third, I explain the operationalization and measurement of shared social identity for the fishers studied. Fourth, I present the results of univariate and bivariate analyses of the four indicators. The discussion of these results focuses on the complexity and difficulty of operationalizing, measuring, and determining the salience of social identity in

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[1] The three organizations were chosen to represent varying degrees of autonomy from relevant government authorities in order to test the hypothesis that those fishers' organizations with greater autonomy will demonstrate better institutional performance than those with less autonomy (see Pomeroy 1993). Fieldwork was conducted from October 1991 through April 1992.

a field setting. I conclude with comments regarding lessons learned from the Lake Chapala effort and possible alternative approaches to testing this variable in future field experiments.

The Lake Chapala Fishery

Lake Chapala, located 48 kilometers southeast of Guadalajara, Jalisco, is Mexico's largest lake and the focal point of the five-state Lerma-Chapala-Santiago watershed (see Figure 1). The system provides water, waste disposal, and energy for a variety of industrial, agricultural, and municipal uses. In addition, the lake supports tourism and a small-scale commercial and subsistence fishery that involves an estimated 3,000 fishers (PESCA 1990).

The majority of Lake Chapala's fishers use gillnets, traps, and long ones to catch tilapia *(Tilapia aurea),* carp *(Cyprinus carpio)* and catfish *(Ictalurus dugesi* and I. *ochoterenai).* Others use the *mangueadora* (anchored seine) or the *attaraya* (cast net) to catch the small whitefish called *choral (Chirostoma* spp.). Most fishers sell their catch to buyers who then market the fish whole, eviscerated, or fileted to local consumers; a small fraction of the catch also is sold in the region's urban areas including Guadalajara, Jalisco and Zamora, Michoacán. Fishing may be characterized as regulated open access [cite], with the exception of the *rancho charalero* (charal ranch) fishery. Charal ranching occurs on parcels of submerged lakeshore land and adjacent upland that fishers lease from the government. The ranches are considered extensive aquaculture by local and state fisheries authorities; leaseholder have exclusive use rights for these areas (Ortiz 1989).

Most fishers are members of state-mandated fishers' unions or cooperatives. With few exceptions (including the Chapala Union, discussed below), these organizations were formed by fishers in the mid-1980s in response to PESCA policy. Individual permits were issued to fishers until 1989 when the agency replaced them with species-specific group permits.

Commons Dilemmas

Fishing conditions at Lake Chapala have varied as water quality and quantity have fluctuated in recent history (Guzmán, unpub.). Between 1979 and 1989, the lake lost about 50% of its volume and 15% of its surface area (Limón and Lind 1989) due to both natural and anthropogenic causes. The lake's deterioration contributed to a number of problems in the fishery including reduced sizes and numbers of fish, habitat loss, and crowding associated with the loss of lake surface from which to fish. Following heavy rains and the release of water from Lerma River dams during the summer of 1991, however, water level and quality increased substantially. Nonetheless, problems associated with use of the common pool fishery persist.

Many of the problems identified during the study may be termed commons dilemmas, or commons situations in which individual actions lead to unnecessarily suboptimal outcomes (Gardner, Ostrom, and Walker 1990). Gardner et al. (1990) provide a typology of commons dilemmas that distinguishes between problems associated with CPR use (appropriation problems) and those related to the maintenance of the CPR and institutions for coordinating its use (provision problems). The former consist of stock and technological externalities, and assignment problems; the latter include problems of institutional supply, credible commitments, and mutual monitoring, At Lake Chapala, stock externalities were evident in fishers' comments about undersize fish and insufficient numbers and variety of fish. Although some fishers complained of others' gear interfering with their own, which prevented them from catching more fish, an understood rule (in some cases formally adopted by members of an organization) helped limit such technological externalities. Assignment problems were more pervasive, and involved all three organizations studied. Among many fishers there was a notion that each community of fishers had an exclusive fishing "zone" that extended about 500 meters from the community's shoreline. This idea was reinforced by the local PESCA officer's suggestion that fishers ask permission to fish near other communities. Nonetheless, the San Pedro Union in particular was plagued throughout the study by fishers from a distant lakeshore community

who came to fish in their zone. These "outside" fishers were accused of causing both stock and technological externalities as well. Also, prior to the study, the Chapala Union and the Cooperative had fought out an assignment problem in regard to Scorpion Island charal ranches. Ultimately, the dispute was resolved with an accord between the two groups that allocated the preferred Scorpion Island ranees to the larger, more powerful union, while the allotting the adjacent small and inferior "islote" to the smaller, weaker Cooperative for ranching.[2]

All three types of provision problem were widespread. Especially for the Cooperative (but also for the other two groups), problems of institutional supply were evident in fishers' failure to attend meetings, pay dues, and contribute time or labor to group activities or events. Credible commitments were a problem chiefly among Cooperative members and Chapala Union ranchers. The San Pedro Union faced these problems as well, but principally in regard to non-members who failed to join the group or respect its internal agreements. Monitoring was a problem for all three groups for two reasons. First, most fishers were reluctant to monitor other members; one who reported others' misdeeds was viewed as "causing problems," and risked retaliation. Second, PESCA authorities constrained fishers' autonomy to monitor and enforce regulations and rules (see Pomeroy forthcoming).[3]

Social Identity

Social identity pertains to those aspects of one's self image that derive from the social categories to which one perceives oneself as belonging (Tajfel and Turner 1979). In the Lake Chapala study, the relevant social identity was that of fisher. One may see oneself as belonging to formal and informal categories (e.g., broad natural categories such as gender or race, and social categories such as occupation) (Abrams and Brown 1989). Group cohesiveness is not entailed in this conceptualization, although it may be a result of perceived shared social identity. According to Turner, "members of a social group seem often to share no more than a collective perception of their own social unity; yet this shared identity is sufficient for them to act as a group" (1981, p.99). Social identity is a cognitive mechanism that makes group behavior (i.e., coordination) possible.

An individual's choice behavior is a function of the social identity that is salient for a given situation (Kramer and Brewer 1984). When a particular identity is salient, goals and needs of others who share that identity can become motives for one's own behavior (Hornstein 1972). Common social boundaries reduce social distance, so that one distinguishes less between one's own and others' welfare (Brewer and Kramer 1986). The salience of social identity may give greater weight to collective gains over individual gains alone (Brewer 1979; Brewer and Kramer 1986). In addition, normative expectations may develop for others who share the identity in terms of loyalty, honesty, and trustworthiness (Brewer 1979). The strength of attachment to the social group may enable the internalization of norms for less egoistic (more cooperative) behavior (Heckathorn 1991).

Experimental research has shown that shared social identity among individuals is positively related to cooperation. Kramer and Brewer (1984) studied the effects of group identity on resource use, hypothesizing a positive relationship between shared social identity and cooperation in a commons dilemma. In one experiment, group identity was based on the shared resource. Male subjects cooperated more when the group identity was salient (superordinate group identity), than when it was non-salient (subordinate group

[2] Although the accord was signed in 1985, Cooperative fishers still resent the union and PESCA for it.

[3] These problems may be explained in part by the genesis of these organizations. Although members ran (operated) the organizations, they had been created at the behest of an external authority. A local cacique (political boss) and former fisher established the Chapala Union. Upon his death, PESCA usurped control of the organization, and played a strong role in the creation of both the Cooperative and the San Pedro Union

identity), although the hypothesis was not supported among female subjects. In a second experiment, the researchers added the condition of resource depletion, and found support for the initial hypothesis across both genders; all subjects reduced their take from the declining common pool to sustain its use. In a third experiment, group identity was operationalized as common fate among subjects, with the result that participants reduced their take from the common pool. They attribute this last outcome to the lesser incentive under the common fate condition compared to the shared resource condition to compete (Kramer and Brewer 1984). In addition, they note that their results raise questions about the adaptiveness of different levels of group identity (Kramer and Brewer 1984; see also Brewer 1979). They comment on the expansion of individuals' units of identification in connection with changing levels of interdependence (e.g., regional, global) and ask whether there are "inherent limits on individuals' ability to adopt correspondingly higher levels of social identification" (1984, p.1056).

In subsequent research, Brewer and Kramer (1986) focused on the effects of social identity, group size, and decision framing (public goods versus common pool) on individuals' choice behavior. From prospect theory (Kahneman and Tversky 1979), they expected more cooperation in a commons dilemma than in a public goods situation. In a commons dilemma, individuals begin with nothing. As risk-averse actors, they opt for a small, short-term, certain gain over a large, long-term, uncertain one (Brewer and Kramer 1986). The contextual factors of large group size and social identity with the group were added to examine their potentially conflicting effects. The large group size treatment was expected to result in reduced cooperation in connection with a decrease in individuals' expected pay-offs, and an increase in deindividuation and diffusion of responsibility.[4] Group identity introduced the possibility that individuals might value collective identity and collective gains over their own, and be more likely to cooperate, as suggested in previous work by Brewer (1979). Shared social identity overcame the negative effects of large group size in a commons dilemmas, but not when the problem was framed as one of public goods provision. When information regarding depletion of the shared good was introduced, subjects in the public goods situation contributed less (defected), while those in the commons restrained their take (cooperated). In the public goods situation, those in small groups with shared social identity cooperated more than those in large groups. The researchers also made subjective measures of the effects of social identity on individuals' 1) sense of efficacy and confidence, 2) reciprocal trust, and 3) resource use decisions. They found that social identity with the group had a positive effect on the first two; there was no direct effect of social identity on resource use decisions. In conclusion, Brewer and Kramer assert that social identity is relevant with resource depletion, but not when the resource supply is ample.

Self-categorization as a member of an occupational group is another type of social identity. In the case of an occupation involving direct use of a natural resource, identity as a user of a shared resource may complement and add strength to occupational identity. In the case of fishers, their psychological characteristics, norms, and behaviors have been studied to enable researchers and policy makers to define fishers as a social group, and to explain and predict their behavior. Yet, these findings lead to contradictory predictions regarding the relationship between social identity as a fisher and cooperation in the commons. On the one hand, a distinct "sub-culture of fishing" has been identified (Poggie and Gersuny 1974; see also Creed 1988), whereby social identity as a fisher has salience in a variety of social settings. The strength of social identity associated with the occupation of fishing, in turn, suggests a greater likelihood of internalized group norms and identification with fellow fishers' goals and needs. Fishers have been shown to have a deferred gratification orientation compared to factory workers, cane cutters, and small-scale entrepreneurs (Pollnac, Gersuny, and Poggie 1975). Poggie defines deferred gratification orientation as "the tendency to postpone immediate desires to obtain more substantial rewards in the future" (1978, p.116). While the general notion of deferred gratification orientation is disputed in sociology, it is possible to interpret it as a

[4] When one's identity or accountability is submerged in the group, such that one appeals to have greater anonymity, the effect is called deindividuation (Festinger, Pepitone, and Newcomb 1952), This large group effect was found in experiments by Jerdee and Rosen (1974) and Hamburger, Guyer, and Fox (1975).

low discount rate, by which one values future as well as present returns. A low discount rate diminishes the effects of a time lag between an action and its consequence, and suggests that fishers may be better able to overcome such commons dilemmas. On the other hand, fishers have been characterized as significantly more independent than members of other occupational groups (Poggie 1980), where independence is defined as the propensity to think and behave free of the influence of others. This suggests that those who identify as fishers will be less likely to cooperate than those in other occupational groups, especially in situations calling for collective action.

Other Approaches to Social Identity

More generally, field researchers and theorists studying CPR institutions have focused on group identity in terms of solidarity as a factor in the success of CPR institutions. Esman and Uphoff (1984), for example, devised a continuum of heterogeneity for characterizing local organizations. In an analysis of several case studies of local organizational development, they rated organizations' memberships for heterogeneity on selected social and economic factors. They found only weak correlations for several measures of organizational success. They note the discrepancy between their findings and a consensus in the literature that homogeneity of membership is more effective in local organizational development, especially for poorer sectors of society (Esman and Uphoff 1984, p.160).[5] In subsequent analyses of case study evidence specific to CPR management, however, the group focus persists, as does the belief that homogeneity among resource users is integral to the success of local CPR institutions. Sugden (1984) argues that the more homogenous a community, the more likely are optimal outcomes; the more heterogenous, the more difficult coordination becomes. Berkes and Kence (1987) cite heterogeneity of interests as one factor in the failure of institutions for CPR management. Heterogeneous interests may result in factionalism, which could inhibit coordination and cooperation among resource users (Ostrom 1990).

Institutional analysts studying CPRs, like their counterparts in experimental research, differentiate between individual and situational variables that affect decision-making in social dilemmas. The IAD framework (for example) identifies four "internal variables," complemented by a set of "summary variables," which pertain to CPR appropriators. Individuals' internal variables include their costs and benefits, affected by internalized norms and discount rates; summary variables include the costs, benefits, shared norms, and knowledge of other opportunities for the group (Ostrom 1990). However, these variables have received considerably less attention and development than the situational variables, due largely to the complexity of internal, subjective variables and the difficulty of measuring them (Ostrom 1990, p.38).

The IAD framework makes considerable reference to the importance of resource users' ties to the resource in their decision-making. Shared social identity with other resource users and economic dependence on the resource are noted for their positive relationship with cooperation in the commons. Social identity with the community of resource users implies a set of shared norms among them, which can deter opportunistic behavior. Shared norms can be used as social capital to reduce the costs of creating and maintaining CPR institutions (Ostrom 1990, p36). Thus a resource user's identification with a resource user community may be construed as shared social identity. The salience of that identification, and its associated norms, can enhance cooperation. In *Governing the Commons*, Ostrom alludes to the role of cultural and economic ties to the resource in connection with low discount rates: "[individuals' tjime horizons are affected by whether or not individuals expect that they or their children will be present to reap [the] benefits [of collective action], as well as by opportunities they may have for more rapid returns in other settings" (1990,

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[5] See Blanchard, Adelman, and Cook (1975), cited in Brewer (1979), for experimental evidence in support of this assertion.

The impact of heterogeneity on institutionalized cooperation in CPR and international relations (IR) settings is explored in a forthcoming issue of the Journal, of Theoretical Politics. Heterogeneity among actors is specified in terms of internal authority and decision-making structures, pay-off structures, information and beliefs, as well as pay-offs for non-agreement and various types of agreement (Ostrom and Keohane forthcoming) note that although homogeneity is often assumed in institutional settings, heterogeneity is a prominent aspect of both CPR and IR settings.

pp.34-5). In comparing local fishers to trawler fishers, she adds, The time horizons of the local fishers, in relation to the yield of the inshore fishery, extend far into the future. They hope that their children and their children's children can make a living in the same location" (1990, p.35).[6] These comments suggest a positive relationship between individuals' social and economic ties to the CPR and cooperation in the commons. This assumption is apparent in other research of CPR institutions, along with limited consideration of intracommunity variability and resultant assertions regarding homogeneity of CPR users. Yet, such assumptions may be inappropriate to the prediction of individual behavior and collective outcomes in the commons.

Given this potential problem, together with the experimental and field evidence discussed above led to the formulation of the hypothesis that those Lake Chapala fishers who identify themselves more strongly as fishers will cooperate more in the commons than those who identify themselves less strongly as fishers. The emphasis here is upon the operationalization and measurement of the independent variable, social identity as a fisher. The treatment of the dependent variable (cooperation), the hypothesis test and its results are reported in Pomeroy (1993).

Social Identity of Lake Chapala Fishers

Review of the literature on social identity suggested many possible operationalizations of social identity as a fisher. Rather than use a single indicator, four were selected for exploration as "interchangeable indicators" (Babbie 1992, p.119) of the concept of social identity. Social identity as a fisher was operationalized as fishers' 1) principal work, 2) reason for fishing, 3) percent of adult life working as a fisher, and 4) extent of family members' involvement in fishing. Literature review and analysis of preliminary case study evidence provided information to enable appropriate operationalization of the variables in the context of the Lake Chapala fishery.[7]

The four social identity indicators were operationalized and measured in a survey interview administered to members of the three organizations studied. The sampling frame for the survey consisted of 238 fishers identified on membership lists provided by a leader of each organization.[8] The two smaller organizations were censused to limit overrepresentation of the larger Chapala Union. A systematic random sample (without replacement) was drawn from the Chapala Union (after removing the 27 fishers selected for the pretest) for a total of 98.[9] Of total number of selected respondents (152), 19 were non-reachable, for a

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[6] It is important to note that Ostrom limits her analysis to case studies involving "small-scale CPRs, that is, those contained within a single country that involve from SO to 15,000 individuals who are heavily dependent on the CPR for economic returns" (1990, p.20). Specifying these scope conditions limits the generalizability of her findings to cases that meet the same criteria.

[7] The ongoing analysis of this material was integral to developing valid and reliable measures of these variables.

[8] The organizations membership list proved far more reliable than those of the Fisheries Secretariat as a source for the sampling frame, although membership fluctuated over the course of the study.

[9] A sample size of 87 was calculated using the formula devised by McNamara (1978) to permit statistical generalization at a .07 confidence level. Gregoire and Driver (1987) suggest the .10 confidence level for sample size in exploratory research is sufficient to enable analysis to proceed. While the higher a -level increases the probability of Type I error, it decreases the probability of Type II error. A "higher" confidence level enables the exploration of potentially fruitful lines of research where ana of .05 might preclude it.

Sample size (n) was calculated as: $n = (Npq) / [(N - 1) D + pq]$

where N = population size

p = proportion who are expected to answer yes to a question

$q = 1-p$

$D = B^2 / A$, where B = tolerance or precision and A - tabular value of X^2 for the selected a level.

The sample size for the Chapala union was calculated as:

$87 = [157\ C5)\ (3)] / [(157 - 1)\ (.07)^2 / 3.841 + (.5)\ (.5)]$.

revised sample size of 133.[10] The survey was pretested with a 15% systematic random subsample of the Chapala Union in December 1991, revised, and administered by the researcher and her assistant between February and April 1992. One hundred twenty-seven survey interviews were completed for an overall response rate of 96%.

Characteristics of the Fishers Surveyed

Demographic data were collected in the survey to describe the members of the Chapala and San Pedro unions and the Cooperative (see Pomeroy 1993). Overall, there were no substantive differences among respondents on age, education, or marital status. Respondents' mean age was 415 years. Fishers had an average of 3.1 years of education, or had completed about one-half of primary school. Eighty percent of the fishers surveyed were married, 13% single, 5% divorced or separated, and 2% in free union. Among groups, there were no meaningful differences in number of children, household size, or home ownership patterns either. Overall, fishers had an average of 5 children; total number in the household averaged from 5.9 to *65* persons. More fishers owned (47%) than borrowed (13%) or rented (12%) their homes. The remainder (24%) lived in houses owned by family members (e.g., an unmarried man usually lived with his parents or a married sibling, or more than one nuclear family shared a house).

Most fishers were occupational pluralists, that is, they combined fishing and other income-generating activities to make their living. Overall, 18% were "pure fishers," individuals whose only income-generating activity was fishing. The highest proportion (24%) of pure fishers occurred in the Chapala Union, the lowest (4%) in the Cooperative; 14% were pure fishers in San Pedro. There were two notable differences among groups on this attribute. First, there were considerably more who farmed as well as fished among San Pedro fishers than among those from the Cooperative. Second, there were substantively more who worked in construction (usually as masons) among Cooperative fishers than among San Pedro respondents. The Chapala Union was not substantively different from either group, as about 24% and 20% (27% if general laborers were included) combined fishing with farming and construction work, respectively.[11]

Measurement of Social Identity

Individuals' strength of social identity as a fisher was measured differently for each indicator (Table 1). Although most responses for principal work fell into the categories of fisher or non-fisher (e.g., construction worker), an intermediate "fisher and other" category was included in the analysis for those who specified both fisher and another occupation, and would not specify a single principal occupation. For social identity as reason for fishing, coding of responses led to a distinction between economic and non-economic reasons for (or benefits associated with) fishing. Fishers who cited an economic reason (e.g., good pay) for fishing were assigned a social identity value of 0, whereas those who cited a non-economic reason (e.g., having no boss) were assigned a social identity value of 2. Those who stated both economic and non-

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Given the difficulty of locating some fishers during the pretest, an additional 11 individuals were systematically selected for a total of 98.

[10] Of the 19 non-reachable fishers, 10 had gone to the U.S. as migrant laborers. While some of them had gone for part of the year and would return to fish, others had been gone for more than a year. Still, fellow fishers and family said they would return to fish, although they were unsure when. Non-respondents included three refusals, and three with whom interview arrangements were difficult to coordinate.

[11] The greatest variety of additional sources of employment was found within the Chapala Union, the least within the San Pedro Union. The differences in type of other work and in variation are attributed to several factors. Farming is a more likely source of work for San Pedro residents because it is an ejidal (farm cooperative) community, whereas Chapala is a developed municipal center with primary, secondary, and tertiary economic activities. Chapala's development as a tourism and local commerce center, especially since World War II, has led to the loss of agricultural land, and the growth of alternative sources of employment, especially tourism services and construction (Talavera Salgado 1982).

economic reasons were assigned a value of 1. Social identity operationalized as a fisher's percent of adult life spent working as a fisher was measured as a function of reported number of years fishing and age. It was calculated as number of years fishing divided by the result of reported age minus 16, and resulted in a ratio value between 0 (no social identity as a fisher) and 1 (maximum social identity as a fisher).[12] The fourth social identity indicator, extent of family members' involvement in fishing, was used based on the assumption that the strength of one's social identity as a fisher is positively influenced by family members' involvement in fishing. This indicator was measured using fishers' reports of others in die family who also were fishers, assigning 1 point for self as fisher plus 1 point for each kin relation mentioned as a fisher. This measure of social identity had integer values from 0 (neither the respondent nor family members were fishers) to 7 (the respondent, son(s), brother(s), cousin(s), father, uncle(s), and grandfather(s) were fishers). Cousins and uncles were included in the index because of the social and economic importance of extended family in Mexican culture. Although highly unlikely, it was possible for a respondent to score 0 on this measure of social identity if, for example, he was a non-fisher middleman whose kin also were non-fishers.

Univariate Analysis

The results of measurement of the four indicators of social identity (principal work, reason for fishing, percent of adult life in fishing, and extent of family involvement in fishing) are presented here. Univariate statistics are provided for each indicator, followed by correlations between indicators, and description of an effort to construct a social identity index composed of the four indicators.

Most respondents indicated strong social identity as a fisher in reporting their principal work. More than two-thirds (69%) said their principal work was fishing, while 14% said their principal work was something other than fishing (e.g., gardening, construction). The remainder (17%) reported themselves as part fisher, part farmer or mason (for example), and formed a "mixed" category. The high frequency of principal work as a fisher was not unexpected, but it is possible that responses were related to the context of the interview - respondents were interviewed as members of a fishers' organization.

In contrast to the results for principal work, more fishers reported an economic reason (e.g., "because it pays well," "to maintain myself) than a non-economic one (e.g., "one doesn't have a boss") for the second social identity indicator, reason for fishing. Whereas 43% gave an economic reason, 28% gave a strictly non-economic reason. Nearly 30%, however, gave multiple reasons for fishing. It is possible that responses to this question reflected concern for being eliminated from the fishery for being an "occasional" fisher (e.g., one who fishes only during the six-week period of Lent when the opportunity for earning a profit supposedly is greater). In addition, the high frequency of economic reasons may have been related to the shortage of other work. Throughout the study, fishers noted the general shortage of alternative sources of income; in responses to this question, many commented, "at least [fishing] provides something to eat."

Fishers' percent of adult life fishing ("time fishing") had a mean of 73% (standard deviation 31%, range 0 -100%) and a median of 88%, suggesting relatively high social identity as a fisher overall. Most (58%) had spent more than 80% of their adult life fishing, so the distribution was skewed. The second most frequent values occurred between 21% and 30%, an interval which accounted for 16% of those surveyed. It

[12] The ratio value also standardized for various interpretations of the survey question, "How long have you been a fisher?", which lead some respondents to include childhood fishing experience and others to omit it. This ratio could exceed one if, for example, a fisher was 17 years old and had fished for seven years. Such values were rounded down to one to indicate the respondent had worked 100% of his adult life as a fisher. Two respondents who had been fishing "all their life," but differed in age, were assigned the same social identity value, while two who had fished the same number of years, but differed in age, were assigned different social identity values. Thus, a 30-year-old fisher who has been fishing for 14 years would be given a social identity value of 1 (from the calculation: 14 / (30 - 16) = 1), as would a 60-year-old fisher who had been fishing all his adult life. In contrast, a 60-year-old fisher who had been fishing for 14 years like the 30-year-old would be given a social identity value of 14 / (60 - 16) = .32, reflecting weaker social identity as a fisher.

should be noted that this measure, which was based on reported number of years as a fisher (broadly interpreted by respondents) and age, did not distinguish between low level or intermittent (e.g., once a week, or during Lent only) and high level or continuous fishing activity. Many fishers mentioned changes in their fishing activities over time (e.g., periods when they had stopped fishing for a while, and resumed when personal or resource conditions allowed or required).

Social identity measured as extent of family involvement in fishing ("family involvement") resulted in a mean, median, and mode of 3 members (standard deviation 1.54, range 1 - 7) of immediate and extended family (excluding in-laws and including the respondent). The distribution of family involvement was skewed, with 73% of respondents having three or fewer family members who were fishers. Only *9%* reported 6 or 7 family members, which indicated several generations and at least one member of the extended family (i.e., uncle or cousin) were fishers. No respondent reported zero family members involved; those who were not fishers had at least one other family member who was. In a few cases, non-fisher respondents were buyers; others either had stopped fishing permanently or had joined the group through connections with other family members to insure future rights to fish.

Overall, fishers measured higher on social identity as principal work and time fishing than on social identity as reason for fishing and family involvement. To examine their relatedness, then, the four indicators were compared using Pearson (for interval data, i.e., time fishing and family involvement) and Spearman (for ordinal data, i.e., principal work, reason for fishing) correlations (Tables 2 and 3).[13] The correlations were small, although significant at the .05 level. The highest correlation (.28 using Spearman) occurred between principal work and time fishing. The lowest correlation (.13 using Spearman) was between reason for fishing and family involvement.

The low correlations between social identity indicators suggested they might have measured different aspects of the concept and led to develop the development of a composite social identity index, as suggested by Babbie (1992). All indicators were transformed to ratio measures with a range of 0 to 1.0. The social identity index equalled the sum of these ratio values (equally weighted) divided by four, for an index range of 0 to 1.0. The social identity index had a mean value of .59, standard deviation .21, a range of .09 to .95, and a median of .60. Two-thirds (67%) of those surveyed had index values between 31 and .90. Visual inspection of the distribution of index values suggested a relatively normal distribution. Before using the index to test the hypothesis that social identity and cooperation were positively correlated, however, it was evaluated for internal consistency by calculating Cronbach's *a* using the formula provided by Carmines and Zeller (1979).[14] The resulting Cronbach's *a* of *AS* suggested the index was internally inconsistent, based on Carmines and Zeller's recommendation that an alpha of .8 was a reasonable standard for reliability of such measures (1979, p.51). Subsequent manipulations of the index to include two or three of the indicators failed to improve internal consistency. As a result, the index was abandoned, and the four separate indicators were used to test the relationship between social identity as a fisher and cooperation (see Pomeroy 1993).

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[13] Spearman rank correlations are used for ordinal data, where the difference between values can be ordered, but interval between values are not of quantifiable distance. In comparing ordinal to interval measures (i.e., principal work / reason for fishing and cooperation), the Spearman correlation results should be used. Pearson correlations pertain to the relationships between interval variables (i.e., time fishing / family involvement and cooperation) only.

[14] The formula was:

$$\alpha = \frac{N}{1 + \bar{\imath}\,(N - 1)}$$

where N = the number of items included in the index
$\bar{\imath}$ = the average interitem correlation.

Discussion

As noted above, social identity is a concept that may have relevance to individual behavior in field CPR settings. Yet, the complexity of the concept (and researchers' inability to settle on a single indicator) poses challenges of operationalization and measurement in field settings. The difficulties of doing so are evident in the differing results of univariate anayses of the four indicators examined in this study. In the Lake Chapala case, more respondents had strong social identity as fishers when it was operationalized as principal work or time fishing, and weaker social identity as fishers when it was operationalized as reason for fishing and family involvement. Furthermore, these results lend themselves to multiple and potentially conflicting interpretations, as in the case of social identity as time fishing. As noted previously, time fishing accounted for years of fishing experience without regard for the magnitude or variability of fishing activity over time. As such, long-term fishing may have overemphasized a respondent's social identity as a fisher, and its salience to his decision-making in the commons. On the other hand, one who measured strongly on this indicator might have weathered the variability of economic and environmental conditions, and might reasonably be characterized as someone with a strong social identity as a fisher.

The differences among measures suggest they tapped different aspects of the theoretical concept. The indicators used constituted but a few of the many possible operationalizations of social identity. It is possible also that they did not equally or adequately reflect social identity relevant to cooperation in the commons to resolve appropriation or provision problems. For example, principal work as a fisher may have failed to tap social identity pertaining to CPR use; one's principal work may not be salient for resource maintenance. On the other hand, some other aspect of social identity related to resource use may have salience for resource maintenance such as how one came to be a fisher (e.g., who one learned from, how one got started). It important to note also that differing results among social identity indicators suggest that efforts to measure the correlation between social identity and cooperation using different operationalizations will have distinct outcomes.

It is difficult if not impossible to control for the effects of other factors on social identity in a field setting. The case study evidence suggested a number of factors may interact with social identity and affect its salience in the context of CPR use. In this study, economic and environmental conditions clearly influenced individuals' repsonses to survey questions and thus the outcomes on the social identity indicators. Work was scarce not only in the fishery but in other unskilled and semi-skilled labor sectors, perhaps more so than it had been before the lake level reached its extreme low in Spring 1991. The drought affected both the fishery and the tourism industry, which is an integral part of the economy in Chapala and other north shore. The trickle down effects of lost tourism revenues and economic stimulus (e.g., through construction, maintenance, and service) coupled with general economic hardship in the region negatively affected primary and secondary sector workers in communities all around the lake. In both north and south shore towns, many residents - an estimated one-half in San Pedro - had emigrated to the United States to work because there was not enough work or income to maintain them and their families in Mexico. Fishing provided an alternative to emigration, even as a subsistence activity. Thus, given the salience of economic hardship and uncertain environmental conditions, social identity based on respondents' reason for fishing was likely to elicit an economic reason, rather than a social or psychological one. In addition, the relative frequency of economic reasons for fishing may have been in response to recent suggestions that those who fish for "convenience" (versus need) be excluded from the fishery to enable those in need to make a living from it. Other factors interacted with individuals' social identity. Some examples include individuals' experience with their fishers' organization, trust in other members, expectations regarding others' behavior; these and others should be explored in further research.

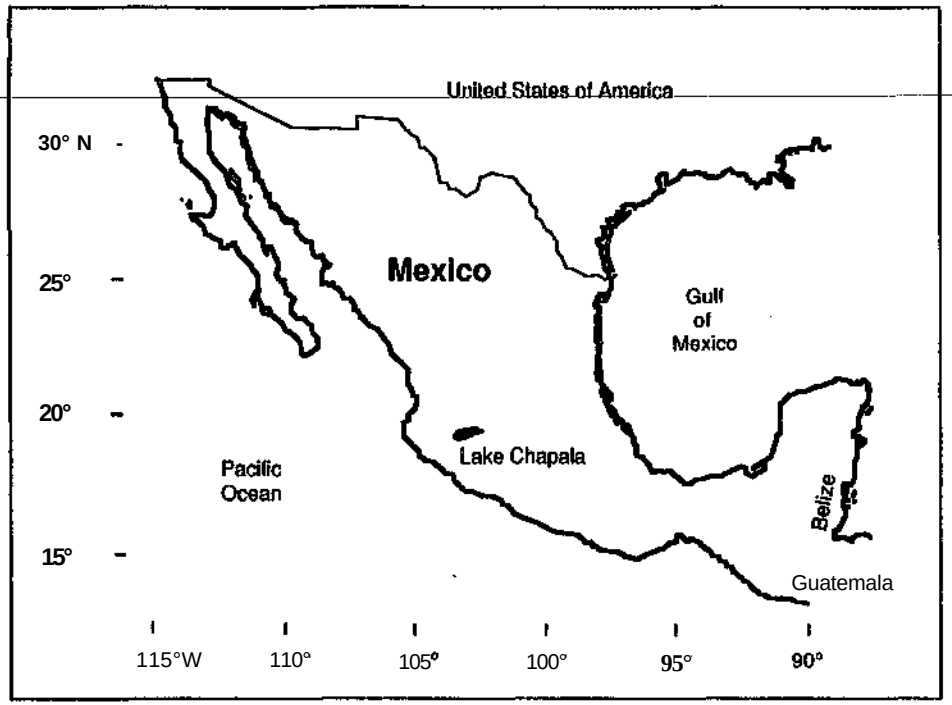
In addition, although respondents were compared to one another for strength of social identity as a fishery, the relative salience of that identity in situations involving CPR use and institutional maintenance was not examined. Other identities may have greater salience in the commons under certain conditions. For most of those surveyed, identity with family appeared to be more salient than identity as a fisher. Greater

salience of identity with family compared to identity with other fishers likely would lead individuals to act in the family's best interest regardless of its consistency with the CPR's best interest, especially under conditions of economic and environmental uncertainty.

Conclusion

The results of the univariate analyses described above raise a number of questions regarding the concept of social identity and its operationalization and measurement in field settings. Social identity has been deemed a complex concept, in part because of the multiplicity of social identities an individual has and the variable salience those identities have in connection with the individual and the context in which she acts. Furthermore, that complexity may not be fully or accurately captured in operationalizing the concept for measurement and evaluation in a complex field setting. Unlike the laboratory setting, where social identity related to the situation at hand (e.g., a CPR or PG problem) can be made salient, the field setting affords few, if any such controls. Although a researcher might seek to measure social identity viz a viz the CPR, she cannot in fact *make* it salient. Nor can she control or diminish the salience of other social identities to separate out one identity from others.

This study explored only a small subset of possible operationalizations of social identity. The many other possible operationalizations of social identity should be developed and examined for their relevance to cooperation in the commons. Attention should be directed toward ascertaining which facets of social identity enhance cooperation and which do not. Efforts to foster institutional development among CPR users could capitalize on the aspects of social identity that enhance cooperation, and work to counteract those that hinder it. Also, such research should identify the circumstances under which selected aspects of social identity are salient, as well as their relationship with cooperation. In addition, the interaction of social identity with other factors should be explored further, as well as the salience and adpativeness of different identities at different levels.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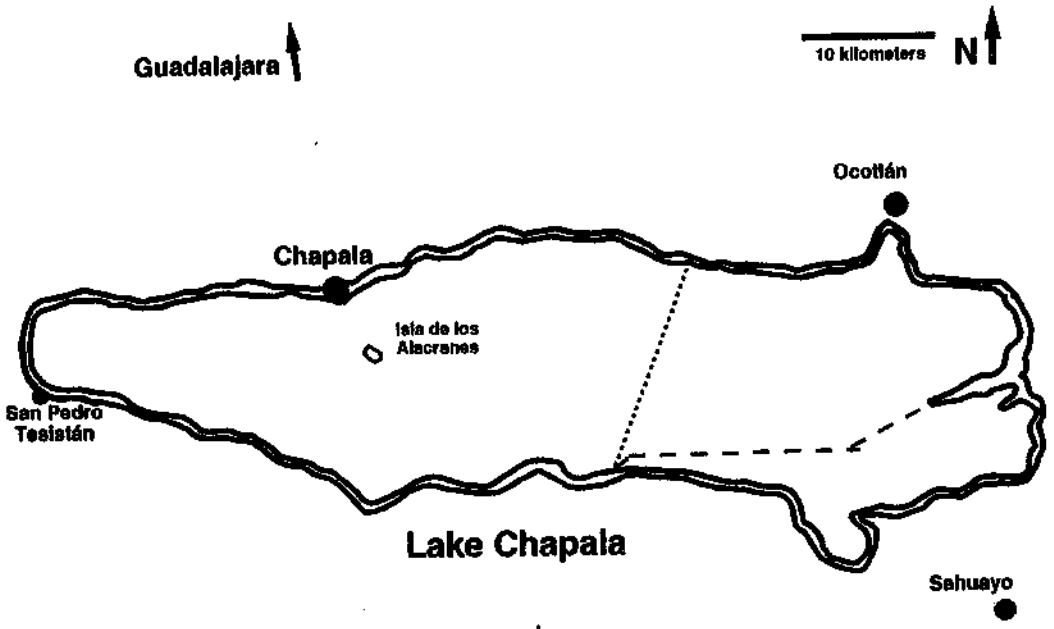
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Figure 1

Table 1. Operationalization and Measurement of Social Identity for Survey of Fishers: Lake Chapala, Mexico, 1991-1992

Operationalization	Survey Question(s)	Response Variable	Possible Values	Measure
Principal work	What is your principal work?	Nominal	Non-fisher = 0 Fisher and other = 1 Fisher = 2	Interval
Reason for fishing	Why do you fish?	Nominal	Economic = 0 Mixed = 1 Non-economic = 2	Nominal
Percent adult life fishing	How many years have you been a fisher? How old are you?	Ordinal	0 to 1[a]	Ratio
Family involvement in fishing fish?	Do others in your family	Ordinal	0 to 7	Ratio

[a] Calculated as (Years fishing) / (Reported age -16) = percent adult life fishing.

Table 2. Spearman Rank Correlation Matrix for Social Identity Indicators for Fishers Surveyed: Lake Chapala, Mexico, 1991-1992

	Indicator		
Indicator	Principal Work	Reason for Fishing	Time Fishing
Reason for Fishing	.1804*		
Time Fishing	2810*	2696*	
Family Involvement	.2128*	.1251*	.2634*

*p < .05. Notes: Maximum difference allowed between ties = .00001. n = 127.

Table 3. Pearson Correlation Matrix for Social Identity Indicators for Fishers Surveyed: Lake Chapala, Mexico, 1991-1992

	Indicator		
Indicator	Principal Work	Reason for Fishing	Time Fishing
Reason for Fishing	.1793*		
Time Fishing	3261*	.2360*	
Family Involvement	.1945*	.1087*	.1754*

*p ≤ .05. Note: n = 127.

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