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**SOCIAL IDENTITY AND COOPERATION IN THE COMMONS:
EVIDENCE AND REFLECTIONS FROM A FIELD STUDY**

by

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Evidence and Reflections from a Field Study¹

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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 from the laboratory 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).

Such a field test which was conducted as part of a recent study of the small-scale fishery at Lake Chapala, Mexico. The study explored the relevance of selected factors to individual cooperation and collective action to resolve problems associated with CPR use (Pomeroy 1993). Simple measures of association (i.e., Spearman's rho and Pearson's r) were used to analyze the relationship between individuals' social identity as a fisher and cooperation in the commons. The study found only moderate correlations among the four indicators used to measure social identity 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 individual might have and 3) social identities and their salience likely changed over time, and therefore likely influenced changes in individuals' behavior in the commons.

This paper focuses on the conceptualization, operationalization, and measurement of social identity, and the test of the relationship between social identity and cooperation 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 a better understanding of social identity as it pertains to CPR situations and relates to the Institutional Analysis and Development (IAD) framework (Ostrom 1990,1992) which was used to guide the research. First, I discuss the concept of social identity, and experimental and empirical evidence regarding its influence on cooperation in dilemma situations generally and more specifically among fishers. Then I briefly describe the Lake Chapala fishery, the study design, and general demographic background on the fishers with whom the relationship between social identity and cooperation was tested. Next I turn to the operationalization, measurement and testing of the relationship between social identity and cooperation. I present the results of univariate analysis, then those of the hypothesis test. Discussion of these results follows, and focuses on the complexity and difficulty of operationalizing, measuring, and determining the salience of social identity as a CPR user in a field setting. I conclude with comments regarding lessons learned from the hypothesis test described, brief discussion of my present consideration of additional data from the Lake

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Chapala survey as possible indicators for social identity, and suggestions regarding the implications of my findings for future research and application.

Social Identity and Cooperation

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). 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 (Heckathora 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 commons dilemmas. 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 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. The researchers 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 interdependency (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.² 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 one type of social identity. In the case of an occupation involving direct use of a CPR, identity as a user of the shared resource may complement and add strength to occupational identity (and *vice versa*). 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. Also, 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 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, where independence is defined as the propensity to think and behave free of the influence of others (Poggie 1980). This suggests that those who identify as fishers may be less likely to cooperate than those in other occupational groups, especially in situations calling for collective action (e.g., institutional supply and maintenance).

Institutionalist Approaches to Social Identity

Researchers and theorists studying institutions in the field have tended to focus on group identity in terms of homogeneity and 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

² When one's identity or accountability is submerged in the group, such that one appears 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).

for poorer sectors of society (Esman and Uphoff 1984, p.160).³ The group focus and the assertion that homogeneity among its members 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).⁴

Among the "new institutionalists" attention has been directed toward the individual. For example, the IAD framework includes sets of internal (i.e., to the individual) and summary (i.e., of the group) variables which affect individual and collective behavior in CPR situations. Internal variables include individuals' 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, the internal variables in particular have received considerably less attention and development than summary or situational variables, due largely to the complexity of their internal, subjective nature and the difficulty of measuring them (Ostrom 1990, p38).

Nonetheless, 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' time 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, pp34-5). 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, p35).⁵ These comments suggest a positive relationship between individuals' social and economic ties to the CPR and cooperation in the commons, and reflect an assumption often found in other research of CPR institutions.

Yet, such assumptions (based largely on experimental evidence) may be inappropriate to the prediction of individual behavior and collective outcomes in field situations. This problem, together with the experimental and field evidence discussed above, led to the formulation of the hypothesis for the Lake Chapala study that those fishers who identify more strongly as fishers will cooperate more in the commons

³ See Blanchard, Adelman, and Cook (1975), cited in Brewer (1979), for experimental evidence in support of this assertion.

⁴ 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.

⁵ 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 50 to 15,000 individuals who are heavily dependent on the CPR for economic returns" (1990, p20). Specifying these scope conditions limits the generalizability of her findings to cases that meet the same criteria.

than those who identify less strongly as fishers.⁶⁶

The Lake Chapala Study

This hypothesis was tested as part of a recent study of the small-scale fishery of Lake Chapala, Mexico. 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 and the Chapala Cooperative, both located in the town of Chapala, and the San Pedro Union of San Pedro Tesisitan (all in the state of Jalisco, Mexico), and their 184, 35, and 19 members, respectively (see Figure 1).⁷ Data were collected through participant observation, informant interviews, documentary and archival research, and a survey interview, guided largely by the IAD framework and Ostrom's design principles for successful CPR institutions (Ostrom 1990,1992). The survey interview was used to collect data systematically to measure social identity for 127 individuals. 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 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%.

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 41.5 years. Fishers had

⁶ In addition to the hypothesis regarding social identity and cooperation, the study also explored the relationship between economic dependence on fishing and cooperation. Although economic dependence will be discussed in regard to social identity and its relationship with cooperation, the direct test of its association with cooperation will not be described here (see Pomeroy 1993).

⁷ 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.

⁸ Although organization membership fluctuated over the course of the study, membership lists maintained by each group proved far more reliable than those of the Fisheries Secretariat as a source for the sampling frame.

⁹ Sample size was calculated using the formula devised by McNamara (1978). A higher confidence level (.07 versus .05) was used as suggested by Gregoire and Driver (1987) who advocate using a higher confidence level for calculating sample size in exploratory research. While the higher α -level increases the probability of Type I error, it decreases the probability of Type II error, and enables the exploration of potentially fruitful lines of research where an α 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 α level.

Calculated sample size for the Chapala Union was:

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

Given the difficulty of locating some fishers during the pretest, 11 additional 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. Non-respondents included three refusals, and three with whom interview arrangements were difficult to coordinate.

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 6.5 persons. More fishers owned (47%) than borrowed (13%) or rented (12%) their homes. The remainder (24%) lived with 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 respondents 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

The Lake Chapala Fishery

Lake Chapala, located 48 kilometers southeast of Guadalajara, Jalisco, is Mexico's largest lake. It is the focal point of the five-state Lerma-Chapala-Santiago watershed (see Figure 1), which 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 longlines 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 a 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, with the exception of the *rancho chalero* (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 Secretariat (PESCA) authorities; leaseholders have exclusive use rights to 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.

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

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).

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, thereby preventing them from catching more fish, an understood rule (formally adopted by members of some organizations) of setting one's gear 50-100 meters from others' gear 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 visitors ask resident fishers for permission to fish within 500 meters of their shore. 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 ranches to the larger, more powerful union, and allotted the adjacent small and inferior "islotte" to the smaller, weaker Cooperative for ranching.¹²

All three types of provision problem were widespread (see Pomeroy 1993 for detailed examples). 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).¹³

Operationalization and Measurement of Social Identity and Cooperation

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 fishings 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

¹²

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

¹³ These provision problems may be explained in part by the circumstances of these organizations' establishment. Although members ran (operated) the organizations, they had been created at the behest of an external authority rather than by the fishers themselves. 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.

of the Lake Chapala fishery.

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. Individuals who reported fishing as their principal work were assigned a value of 2, indicating strong social identity as a fisher, while those who reported principal work other than fishing were assigned a value of 0 for weak social identity as a fisher. Those who reported both fishing and non-fishing as principal work were assigned a value of 1 to indicate moderate social identity as a fisher. 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-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 calculated as reported number of years fishing divided by the result of 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).¹⁴ 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 the 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.

Initially, cooperation was operationalized as restraint in taking from the common pool, and as contributions to the provision of institutions for CPR management. A fisher could cooperate by limiting his take if fish were scarce, abiding by agreed upon rules, and participating in collective efforts to resolve other CPR problems. Whereas measurement of the former two for statistical analysis proved difficult, however, it was possible to measure the latter as individuals' contributions of time and money to selected group activities based on each organization's records of dues payment and participation in group activities (e.g., a community service project), and observation of group meetings and other activities.¹⁵ Cooperation was measured as an

¹⁴ 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.

¹⁵ Initially, two survey questions were used to measure reported cooperation: one asked the number of monthly meetings attended (of a possible 12) in 1991, and another asked if the respondent attended the most recent meeting. However, these survey-based measures proved unreliable and were dropped in favor of nonreactive measures. Although the Chapala Union had approximately 12 meetings during 1991, the other two groups met less regularly, making consistent, reliable measurement difficult. Cross-checks of fishers' reports of their attendance at the last meeting revealed that several fishers had lied and had provided socially desirable responses instead.

index of fishers' demonstrated contributions of time, labor, and money to group activities.¹⁶ The index differed among groups due to the differences across groups on requirements (see Table 2). Each index was converted to a ratio value to enable analysis of the fishers surveyed as a single group for the hypothesis test. Before doing so, the indices were examined for internal consistency, and were found to be internally consistent with Cronbach's a's of .87, .79, and .72 for the Cooperative, and the San Pedro and Chapala unions, respectively.¹⁷

Results of Univariate Analyses

The results of measurement of the four indicators of social identity (principal work, reason for fishing, percent adult life fishings and extent of family involvement in fishing), correlations between indicators, and results of efforts to construct a social identity index composed of the four indicators are presented here. 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 respondents 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."

For percent adult life fishing ("time fishing"), respondents had a mean of 73% (standard deviation 31%, range 0 -100%) and a median of 88%, indicating relatively strong social identity as a fisher. 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 should be noted that this measure, which was based on reported number of years as a fisher (broadly

¹⁶ Although some activities were not related explicitly to resource use or the maintenance of CPR institutions they were included because each could be viewed as a demonstration of cooperation in support of the organization. Informants were mixed in their attitudes toward group requirements; Cooperative and Chapala Union fishers noted differences between the two groups. The former said they preferred to be in the Cooperative rather than the Union because they did not have "so many requirements." In addition to union dues and permit fees, Chapala Union members were required to contribute to an annual festival in which the group played a large role, and to participate in "parades" and "campaigns" (i.e., local political events). Complaints by some were countered by others' comments that these "cooperations" were important for the assurance they provided. Should the group some day need help from local authorities, it could be expected. Yet, it is not clear this insurance policy worked. For example, several street vendors who were Union members had been harassed by local officials, participation in parades notwithstanding.

¹⁷ Carmines and Zeller recommend an alpha of .8 as a reasonable standard of reliability of such measures (1979, p.51). The formula was:

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

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

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 fished. 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 (see Tables 3 and 4). 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 (see Tables 5 and 6). The correlations were small but 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.

These low correlations suggested the indicators might have measured different aspects of the concept and led to the development of a social identity index composed of the four indicators, 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 index had a mean value of .59, standard deviation of .21, range of .09 to .95, and median of .60. Two-thirds (67%) of those surveyed had index values between .51 and .90. Visual inspection of the distribution of index values suggested a relatively normal distribution. When the index was evaluated for internal consistency, however, the resulting Cronbach's α of .46 suggested the index was internally inconsistent, and therefore an unreliable measure of social identity. 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).

The mean level of cooperation was 62%, with a standard deviation of 34% and a range of 0 to 100%. The median measure of cooperation was 78%, and the mode occurred at the 81 - 90% interval, which accounted for 22% of those surveyed. As with economic dependence, the distribution was U-shaped. The second highest frequency of the cooperation measurement occurred at the 91 - 100% interval, with the third at 0 - 10%. (See Table 7.)

The Hypothesis Test

Simple measures of association were used to test the relationship between social identity and cooperation. Although cooperation (the dependent variable) was measured as a ratio, social identity as principal work and reason for fishing were nominal measures, so the relationship between each of these indicators and cooperation was tested using Spearman's correlation coefficient (ρ). Because social identity as percent adult life fishing and family involvement in fishing were ordinal measures, Pearson's correlation coefficient (r) was used to measure association between each of these measures of social identity and cooperation. For all four indicators, the tests were expected to indicate a significant and positive correlation

between social identity and cooperation.

Results

Results failed to provide consistent support for the hypothesis that social identity as a fisher and cooperation in the commons are positively correlated. Measurement of association between social identity and cooperation showed weak support for three of the indicators, and lack of support using the fourth (Table 8). The hypothesis was not rejected when social identity as a fisher was operationalized as principal work, reason for fishing, or family involvement, but it was when time fishing was used as the indicator. The strongest correlation was found between social identity as principal work and cooperation, but it was only .1040. Social identity as time fishing showed both the weakest and the only negative correlation (-.0086) with cooperation. Whereas those who identified strongly as fishers in terms of principal work, reason for fishing, or family involvement cooperated more than those who did not, those who had fished for longer cooperated less than those who had fished for less time. This test provides weak and equivocal support for the assumed relationship between social identity as a resource user and cooperation in the commons.

A similar test was conducted to determine the relationship between economic dependence on fishing and cooperation in the same study. (See Pomeroy 1993 for a detailed description of this test.) Given the conceptual overlap between economic dependence and the social identity indicators, correlations controlling for the effects of each variable on the other were run (Table 9). Correlations between social identity and cooperation controlling for economic dependence were lower for principal work, reason for fishing, and family involvement than without the control; only the correlation between time fishing and cooperation was stronger (and still negative). The most notable change was the reversal of direction for principal work. Whereas alone social identity as principal work was associated positively with cooperation, it had a negative association once economic dependence was introduced. These findings indicated an interaction between economic dependence and social identity (as operationalized in this study) and further specified the association between social identity and cooperation.

Finally, the relationships among social identity, economic dependence and cooperation were examined further using linear regression. Regressions were run with each of the four social identity indicators combined with economic dependence and an interaction term. Although the results of each run were highly significant ($p \leq .001$), high variance inflation factors (VIFs) indicated extreme multicollinearity among terms, and rendered the results untrustworthy (Sokal and Rohlf 1981). The interaction term was dropped, and the VIF decreased to 1.0 to 1.2. Subsequent regression runs showed a statistically significant ($p \leq .001$) relationship with cooperation (see Table 10). The R^2 for the equations ranged from .1060 to .1311, meaning that together economic dependence and social identity explained at least 10% of the variation in cooperation. The highest significance level occurred when principal work and economic dependence were paired; economic dependence had the highest level of significance compared to its role in the other equations, and the social identity indicator approached significance ($p = .0563$). Economic dependence maintained its high significance except when combined with family involvement. Although this equation had the lowest overall explanatory power (R^2 of .106), it was the only case in which social identity was statistically significant and economic dependence was not. As occurred in the partial correlations, principal work and time fishing had negative coefficients (i.e., varied negatively with own economic dependence).

Discussion

Univariate analysis of the four social identity indicators suggested each tapped a different facet of the concept of social identity. 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. These indicators also lead to differing

interpretations. Time fishing, for example, 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 social identity measures became evident in the measures of association between social identity and cooperation and in the subsequent analyses. These outcomes may be understood best through attention to the regression results and qualitative evidence from the study. Regression results indicate that respondents who had low social identity as a fisher measured as principal work but greater economic dependence demonstrated more cooperation than those who were less economically dependent and identified more strongly as a fisher. When asked what it meant to be a fisher, some informants cited the importance of knowing the fish and how to catch them, their habits, and the changeable environment. The benefits of being a fisher were that one had no boss, and the time and effort requirements were small for the pay, especially when compared to other work. Still, many respondents said they could not "maintain" themselves solely from fishing; several had had to look for alternative sources of income. Although they considered themselves fishers by principal work, they were not (any longer, for some) as economically dependent on fishing as they had been previously. Perhaps as their relative dependence on the fishery decreased, they continued to consider themselves fishers, but saw less reason to contribute time, labor, and money to groups which had less salience for them than previously. For those who identified as non-fishers, but had high economic dependence on fishing, cooperation may have been a demonstration of their need for continued income from fishing. Such a demonstration was important during the study period, when groups tried to eliminate those who did not cooperate or "comply" with group requirements.¹ One's lack of social identity with other fishers created an element of uncertainty regarding continued acceptance in the group; if one was economically dependent and wanted to avoid being expelled from the group, it was best to comply, and "avoid problems."

likewise, regression results of time fishing and economic dependence on cooperation indicated a weak negative correlation between the independent variables, and the social identity indicator had no significant explanatory power regarding cooperation. A possible explanation for this finding is similar to that offered in the case of principal work. Fishers reported an average of 19 years fishing experience, and often included time fishing during childhood. Over this long-term exposure to the fishery, they may have accumulated experience and knowledge about fluctuating resource conditions. In response to the contingencies of resource use at Lake Chapala, many fishers were occupational pluralists (i.e., derive income from at least two jobs), so fishing was a continuing and important but not necessarily a dominant source of income. If fishing shared importance with other activities, and its reliability as a source of income varied variable, fishers may have come to believe that cooperation with other fishers was not useful, because it could not eliminate the instability of resource conditions. Conversely, the significant relationship between higher economic dependence on fishing together with lower social identity as time fishing and cooperation may be explained using the same argument given for the regression results regarding principal work. That is, fishers with less time fishing may have compensated for their lack of social identity with longer-term fishers by cooperating to insure their continued membership and access to a fishing permit.

In contrast to principal work and time fishing, reason for fishing and family involvement related positively with economic dependence in results of multiple regressions on cooperation, although neither social identity indicator was significant. 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 communities. 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. As such, the results regarding reason for fishing should be regarded with caution. The regression run that included family involvement provided the least explanation ($R^2 = .1060$) for the variance in cooperation, but varied positively with economic dependence.

Conclusion

The results of this work raise questions about assumptions in empirical and theoretical work regarding the importance of social identity to cooperation, and contradict some experimental findings. Although Kramer and Brewer (1984) found a positive correlation between social identity and cooperation in laboratory experiments, that result was not achieved consistently here. As they note in their research (1984, 1986), however, the positive relationship between these two variables was affected by other variables such as resource condition, type of dilemma (i.e., public good provision versus common pool maintenance), and nature of the tie to the shared good. It is difficult if not impossible to control for the effects of other factors on social identity in a field setting. In the case of Lake Chapala, economic and environmental conditions clearly influenced individuals' responses to survey questions and thus the outcomes on the social identity indicators.

The contradictory results of the hypothesis test for the different indicators of social identity suggest that they may have failed to tap social identity pertaining to resource use;¹⁸ 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.

The survey used to collect data on social identity included several other questions that could better illuminate the concept of social identity as a fisher that would be relevant to cooperation in the commons. Some of those questions were: From whom did you learn to fish?, Do you plan to continue fishing?, What would make you stop fishing? and Do you want your children to be fishers?". Responses to these questions are being analyzed for their relationship to each other, the indicators used here; and cooperation as a continuation of this effort to understand social identity as a fisher and its relevance to cooperation in the common.

Brewer and Kramer's (1986) questions regarding the adaptiveness of different levels of group identity may be relevant to the findings here. The weak relationship found in this study between social

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Similar caveats should be added for the measurement of cooperation used here. In commons dilemmas, cooperation pertains to restraint in resource use (an appropriation problem) as well as contributions to institutions for resource management (a provision problem). However, in this study, the former type of cooperation was impossible to measure reliably for all individuals. Only the latter could be measured reliably, and then only in terms of institutional supply and not credible commitments or mutual monitoring. Cooperation measured as institutional supply meant that individuals were engaged in instrumental (e.g., contribution to a shared or public good) rather than elementary cooperation (e.g., restraint of harvest). The risks associated with the former are less than those of the latter. The results thus reflect these limitations and suggest subsequent work could be directed toward devising ways of testing for elementary cooperation among individuals.

identity and cooperation may be related to the salience of other levels of social identity (e.g., immediate family, extended kin group), and should be examined in further research. 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 vis à vis 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. Although respondents in this study 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. The scarcity of alternative sources of income may have given the household group considerably more salience than the fishers' organization, making the latter interests subordinate to family or individual interests. Fishers appeared to be both risk averse and to have a high discount rate, although these factors were not tested in this study. These characteristics were suggested by their capture of many small fish for a small, certain return, instead of using larger gear and risking no catch; their reluctance to participate in actions that would restrict individual freedom (e.g., limiting the number of fishers) in the commons provided additional evidence. Fishers' experience as members of fishers' organizations likely affected their decisions, as they developed expectations of benefits through group membership which were not met. Individuals' sense of efficacy likely affected their decisions as well. Organized fishers' inability to control "free fishers" may have generated a sense of inefficacy, and fostered perceptions of unfairness of authorities' enforcement activities.

The complexity of the concept of social identity (and researchers' inability to settle on a single indicator) poses challenges for operationalizing, measuring and testing its relationship with cooperation in field settings, as the analyses described above indicate. The difficulties encountered are related to 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. That complexity may not be fully or accurately captured in operationalizing the concept for measurement and evaluation in a complex field setting.

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 adaptiveness of different identities at different levels.

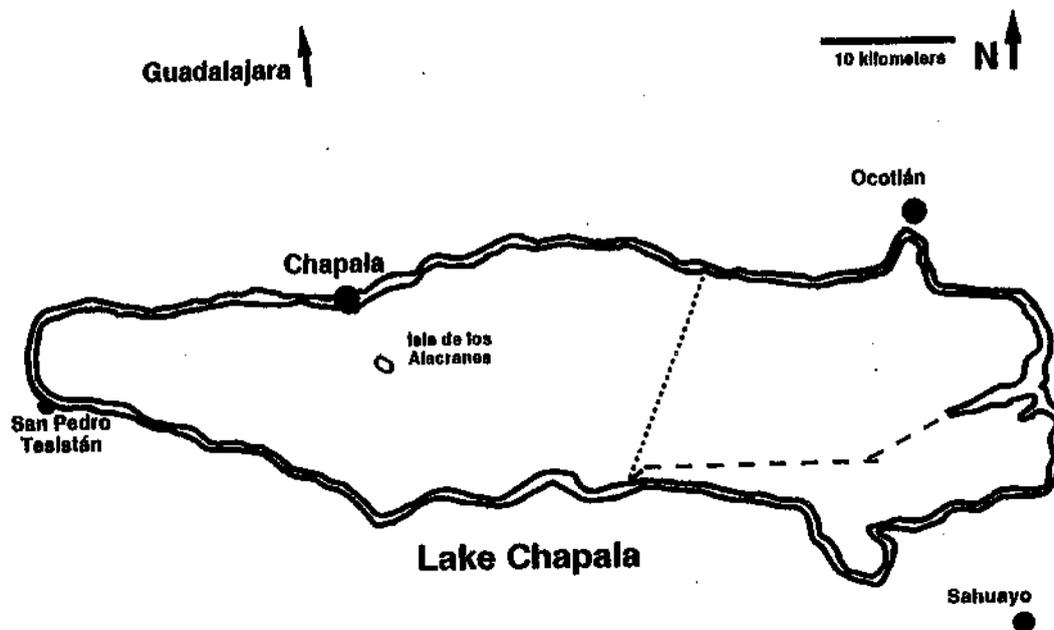
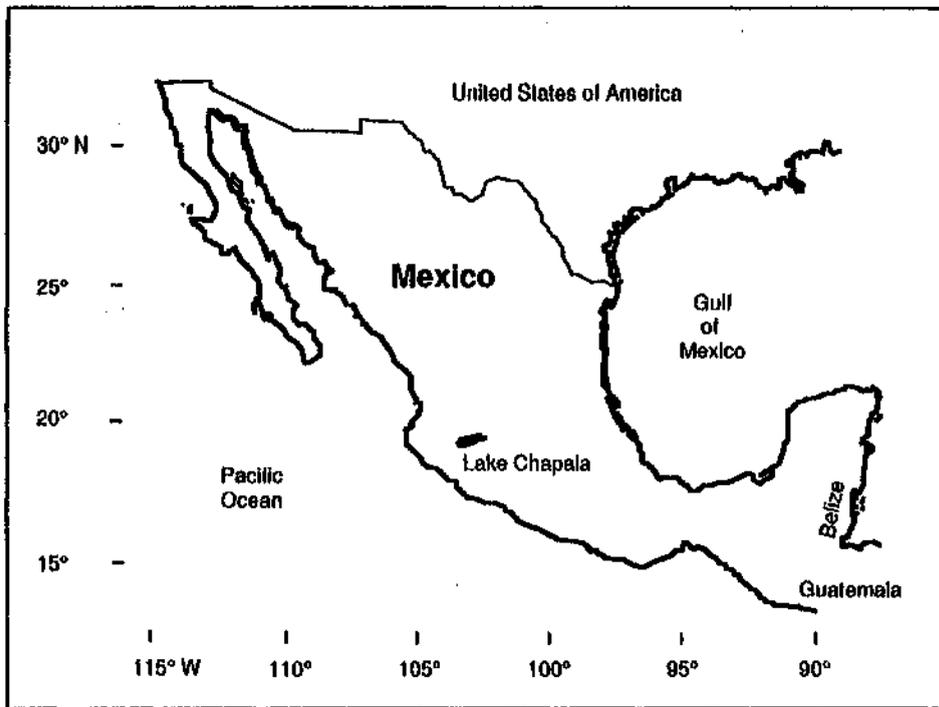


Figure 1

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	Do others in your family fish?	Ordinal	0 to 7	Ratio

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

Table 2. Indices of Cooperation for Fishers' Organizations Studied: Lake Chapala, Mexico, 1991-1992

Organization	Cooperation Indicator	Range
Chapala Union	Monthly dues (15 @1,000 pesos)	0 - 15
	San Francisco fiesta dues (45,000 pesos)	0 - 1
	Mexican Workers' Confederation dues (5,000 pesos)	0 - 1
	Meeting Attendance	0 - 1
	Total Possible	18
Cooperative	Dues (2 possible @1,000 pesos)	0 - 2
	Meeting attendance (6 possible)	0 - 6
	Total Possible	8
San Pedro Union	Monthly dues (5 @5,000 pesos)	0 - 5
	Meeting attendance (2 possible)	0 - 2
	Participation in PESCA enforcement activities on behalf of group (2 possible)	0 - 2
	Labor contribution with group to community project	0 - 1
	Total possible	10

Table 3. Percent Distribution of Fishers' Social Identity as Principal Work and Reason for Fishing: Lake Chapala, Mexico, 1991-1992

Indicator	Response		
	Strong	Weak	Mixed
Principal work ^a	68.5	14.2	17.3
Reason for fishing ^b	28.3	42.5	29.1

Note: n = 127. ^a Strong, weak, and mixed correspond to fisher, non-fisher, and mixed responses, respectively.

^b Strong, weak, and mixed correspond to non-economic, economic, and mixed responses, respectively.

Table 4. Univariate Statistics on Social Identity as Time Fishing and Family Involvement Among Fishers Surveyed: Lake Chapala, Mexico, 1991-1992

Indicator	Univariate Statistics			
	Mean	Standard Mean Error	Range	Median
Time fishing	.73	.03	0-1	.88
Family involvement	3.0	.14	1-7	3.0

Note: n = 127.

Table 5. 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 6. 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*

* $p \leq .05$. Note: $n = 127$.

Table 7. Univariate Statistics (as Percents) on Cooperation, by Group and Overall: Lake Chapala, Mexico, 1991-1992

Organization	Univariate Statistics				
	Mean	Standard Deviation	Standard Mean Error	Range	Median
Chapala Union ($n = 85$)	76.2	24.1	2.6	0-100	83.3
Cooperative ($n = 28$)	20.0	39.0	5.1	0-100	5.0
San Pedro Union ($n = 14$)	63.8	27.8	7.4	15.4-100	72.2
Overall ($n = 127$)	62.4	33.9	3.0	0-100	77.8

Table 8. Pearson and Spearman Correlations for Social Identity Indicators with Cooperation for Fishers Surveyed: Lake Chapala, Mexico, 1991-1992

	Indicator			
	Principal Work	Reason for Fishing	Time Fishing	Family Involvement
Pearson's r	.1040*	.0710*	-.0086*	.0580*
Spearman's ρ^a	.1300*	.0525*	-.0262*	.1299*

* $p \leq .05$. Notes: $n = 127$. ^a Maximum difference allowed between ties = .00001

Table 9. Partial Correlations of Social Identity Indicators with Cooperation, Controlling for Own Economic Dependence, for Fishers Surveyed: Lake Chapala, Mexico, 1991-1992

Indicator	Control				
	Own ED ^a	Principal Work	Reason for Fishing	Time Fishing	Family Involvement
Own ED ^a		.3619*	.3227*	.3262*	.3208*
Principal Work	-.0171*				
Reason for Fishing	.0583*				
Time Fishing	-.0391*				
Family Involvement	.0304*				

* $p \leq .05$. Notes: $n = 127$. ^a "ED" is economic dependence.

Table 10. Multiple Regression Results of Social Identity Indicators Paired with Own Economic Dependence, on Cooperation for Fishers Surveyed: Lake Chapala, Mexico, 1991-1992

Variables	Coefficient	Student's T	p	VIF	F	p	R ²
Intercept	.53	7.68	.0000		9.36	.0002	.1311
Own ED	.38	4.32	.0000	1.2			
Principal Work	-.08	-1.93	.0563	1.2			
Intercept	.44	7.21	.0000		7.38	.0011	.1063
Own ED	.31	3.80	.0002	1.0			
Reason for Fishing	.01	0.41	.6836	1.0			
Intercept	.48	5.68	.0000		7.39	.0011	.1065
Own ED	.31	3.84	.0002	1.0			
Time Fishing	-.04	-0.44	.6634	1.0			
Intercept	.43	5.73	.0000		7.35	.0011	.1060
Own ED	.31	3.77	.0002	1.0			
Family Involvement	.01	.34	.7357	1.0			

Notes: $n = 127$. "ED" is economic dependence.

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