

Prepared for delivery at the Workshop on the Ostrom Workshop (WOW6) conference,  
Indiana University Bloomington, June 19–21, 2019. © Copyright 2019 by author(s)

A Beyond-Harvesting Approach to Common-Pool Resources: An Empirical Illustration  
from Fishing

Xavier Basurto<sup>1\*</sup> Abigail Bennett<sup>2</sup> Emilie Lindkvist<sup>3</sup> Maja Schlüter<sup>3</sup>

<sup>1</sup> Duke University Marine Lab, Nicholas School of the Environment, Duke University, Beaufort, NC, United States of America

<sup>2</sup> Department of Fisheries and Wildlife, Michigan State University, East Lansing, MI, United States of America

<sup>3</sup> Stockholm Resilience Centre, Stockholm University, Stockholm, Sweden

\* [xavier.basurto@duke.edu](mailto:xavier.basurto@duke.edu)

ORCID ID: <https://orcid.org/0000-0002-5321-3654>

## **Abstract**

Harvesting has received most theoretical and policy attention towards understanding common-pool resource dilemmas. Yet, pre-harvesting and post-harvesting influence harvesting outcomes as well. Broadening the analytical focus beyond harvesting is needed to imagine new ways of theorizing and governing the commons. Fishing—which is synonymous of harvesting—is a case in point. To illustrate our argument, we analyzed the effect that fishers' organizational choices and their available alternatives to access fishing means of production have on harvesting and fishers' well-being—two key outcomes for the realization of the United Nations' Sustainable Developments Goals. We deploy qualitative interview data and two quantitative longitudinal datasets from Mexican small-scale fisheries, as well as concepts from common-pool resources theory to illustrate the benefits of broadening the scope of inquiry and move towards a fuller understanding of commons dilemmas and beyond a narrow policy attention on harvesting.

## **Introduction**

Understanding how to govern harvesting of common-pool resources (CPR) has been a central concern for the development of CPR theory scholars since its origins (1). In certain types of commons like fishing, the label is synonymous with harvesting. The image of men on a boat on the water is immediately evoked when thinking about commercial fishing. Yet fishing starts at home cooking the food needed for the outing, or in the negotiation for access with authorities, or with those in control of the fishing means of production and commercialization channels. Indeed, although harvesting is only one aspect informing how users structure and govern their interactions, regulations tend to focus on issues related solely to harvesting (i.e., regulating access to harvesting or harvesting methods). Is this policy-making focus on harvesting at the expense of pre or post harvesting well warranted? We argue that it should not be the sole focus, and the goal of this paper is to offer avenues towards broadening the scope towards a 'beyond-harvesting' research agenda for CPR and policy analysis.

Theoretically, we call attention to the concepts of 'constitutional choice' (2) and 'chains of action situations' or 'networks of action situations' proposed in the past (3) as two examples of ways to move beyond a narrow harvesting policy focus and towards a fuller understanding of commons governance. We illustrate these issues in the context of small-scale fishing and argue that taking a beyond-harvesting approach expands our ability to ask better questions about why CPR users in general, and SSFs in particular, organize and operate the way they do.

The focus on small-scale fisheries is particularly salient today because their potential contributions to food security, poverty alleviation, and sustainable livelihoods have been ignored in global policy discussions until recently. Yet, it is estimated that small-scale fisheries account for over 90 percent of the world's commercial fishers, and when processors and other persons

employed along the value chain are included they sum over 108 million people (4). In this estimation, roughly half are employed in the ocean and the other half in inland fisheries, making small-scale fisheries far and away the ocean's largest employer (greater than oil and gas, shipping, tourism, etc.) (5). This level of activity translates into a large portion of the global fish catch: an estimated 46 percent of the total, and 38 percent of the fish caught in the ocean (5). While more reliable global estimates of the contributions of small-scale fisheries to food security, poverty alleviation, and resource sustainability are yet to come, there is increasing consensus that they are larger than previously acknowledged (6). Governance stands as one of the main challenges for fishers' ability to secure their livelihoods, ensure food security, and strive for better resource management around small-scale fisheries (7). In the SSFs literature the attention to the topic of 'governance' has centered in harvesting, as if were the main or only activity to be governed around CPRs (7). A recent deductive discourse analysis of the literature conducted by Smith and Basurto (8) shows that in the 1960s-1980s the main governance problem was described as a problem of "under-exploitation" or a missed opportunity to secure food and income. In the 1960-1980s, it was articulated as a problem of "over-exploitation" of the resources, and in the 1980-2000s in terms of "conflict over the value and use of resources" (8).

Moving beyond a harvesting focus on CPRs is often challenged by the sheer diversity of organizational forms and activities encompassed worldwide, and this is particularly the case for small-scale fisheries. Indicative of such diversity is the agreement among scholars and practitioners that a universal definition of 'small-scale fisheries' is neither possible nor useful (9). Instead, scholars point to some of their varying characteristics: their dynamism, labor and gender roles in different pre-harvesting, harvesting, and post-harvesting activities in marine or

inland waters, labor intensity (e.g., full, partial time, or just seasonal) and movement (resident or migratory), and the different administrative and managerial strategies to organize production such as self-employment or as part of a cooperative among others (10). Given the diversity of activities described above, it is reasonable to ask, how can one make headway in building a science and art of association, to paraphrase Tocqueville (11), that is appropriately suited for the context of small-scale fishing? Is it possible to find commonalities and order among the complex governance arrangements we see? Or is SSFs just a broad term encompassing a myriad of different forms of production in aquatic environments intersecting a number of sectors and challenges (e.g., fishing, food security, poverty, forestry, aquaculture, etc.) that need to be considered separately, particularly for systematic policy analysis?

The remainder of the paper is organized as follows. In the following section, we describe the theoretical background and approach we propose to move away from a dominant focus on CPR harvesting. Next, we ground our discussion in the Mexican commercial SSFs context, providing empirical attention to two opposing forms of self-governance: fishing cooperatives and patron-client relationships, to illustrate how pre-harvesting decisions influence governance of harvesting activities. Our empirical data shows that failing to include pre-harvesting decision-making and the resulting institutional arrangements precludes better understandings of harvesting outcomes. We conclude by exploring the implications of our findings for future CPR theorizations and governance of small-scale fisheries more broadly.

## **Theoretical Background and Approach**

The iconic work of Garret Hardin (12) brought attention to the regulatory importance of harvesting in CPR settings and has had tremendous policy impact around the world (1). This is particularly salient in fishing. Perhaps because the label itself is a verb and the term is literally synonymous with harvesting, theoretical and policy-making attention has overwhelmingly focused on the harvesting part of the fishing process. This is evidenced by the tremendous theoretical and policy-relevant influence of the paradigmatic work on fisheries economics by Gordon (13) and Scott (14), who called attention towards harvesting dynamics and the tragedy of the commons, that would ensue without attention to harvesting controls. A look at dominant conceptualizations of policy tools for fishing, generally fall into three broad categories: output or catch controls; input or effort controls; and technical measures (15). Yet, a careful review of the CPR literature would show the field has encouraged broad attention to the institutional, cultural, and biophysical elements that interrelate to create patterns of production, not only harvesting. For instance, Lin Ostrom's well-known design principles for long-enduring CPRs (16) encompass this broader focus. Some of the design principles refer to processes that take place pre-harvesting, such as the need for clearly defined (social and biological) boundaries of the CPR itself, or the need to have collective-choice arrangements in place where individuals affected by the operational rules can participate in modifying those rules. Other design principles refer to processes that take place post-harvesting such as having in place conflict-resolution mechanisms or graduated sanctioning procedures so that fines or penalties match the offense. In order to further encourage a beyond-harvesting approach, we draw attention to two different conceptual devices anchored on institutional analysis and the Institutional and Analysis Development (IAD) Framework: constitutional levels of analysis and linked action situations. The IAD Framework provides a structure for analyzing institutional arrangements in which the

action situation constitutes a focal unit of analysis, and is defined as the situation where "two or more individuals are faced with a set of potential actions that jointly produce outcomes" (17).

We bring back attention to the 'constitutional level' of analysis, a component of Ostrom's well-known levels of analysis scheme (17). In small-scale fisheries the constitutional level often does not take place far removed from the operational arena because it is the process itself of constituting, forming, or starting an interaction between fishers or fishers and a patron. As such it provides information about the motivations that individuals find to come together to transact with each other in the first place, as formal or informal as their association might be. The 'constitutional' layer provides information about the informal contractual arrangements underpinning group formation and thus influencing the structure of operational and collective-action rules and activities. This concept seems to have been forgotten as it has not received sufficient attention in the CPR literature as of late.

The second conceptual device follows McGinnis (3) by identifying a core set of linked actions situations characteristic of commercial CPRs like small-scale fishing. Conceptualizing small-scale fisheries as composed by an array of linked action situations offers a straightforward way to move away from powerful imaginaries of fishing as harvesting. This imaginary obscures considerations of activities and decisions that take place before and after harvesting, that are inherently important in understanding how harvesting is governed (8).

### Constitutional Choice in Informal Settings

Back in the 1980s Vincent and Elinor Ostrom offered three distinct levels as lenses under which collective action could be analyzed: the operational, collective-choice, and constitutional levels

of analysis (2). Where the operational level is articulated as the arena where daily decision-making processes that allow for harvesting activities take place. In the collective-choice arena decision-making processes determine operational rules; and in constitutional-level arenas decision-making for the design of collective-choice processes take place (Figure 1).

The concept of an arena does not imply a formal setting (17), and while constitutional arenas are often exemplified through formalized bodies such as courts or legislatures in principle this not need to be the case. Constitutional-choice arenas occur whenever individuals come together to constitute themselves as a group and in the process determine the fundamental rules about how the organization will be governed (however informally) and how future collective choice decisions will be made regarding who can participate, their basic rights, and responsibilities (2). Furthermore, in many instances the same individual might be involved in constitutional, collective-choice, and operational situations(17). This view of constitutional-choice arenas is most useful for the case of small-scale fishing where most interactions take place outside formal settings. This view also brings attention to processes characterized by individual behavioral factors, salient when individuals interact with each other, like trust and reciprocity, and thus affect the emergence, structure, and performance of groups over time. In sum, we argue that by more explicitly incorporating constitutional-choice arenas and activities into notions of fishing, we effectively start moving away from the predominating notion of fishing as synonymous with harvesting.

[Figure 1 about here]



### Self-governance arrangements in chains of action situations

The notion of linked action situations (3) is another theoretical device from CPR theory useful to help us move away from centering the governance of CPRs solely on harvesting activities.

Recall that an action situation is conceptualized as an analytical unit of analysis where the time-space continuum are bounded and in which individuals (acting on their own or as agents of organizations) observe information, select actions, engage in patterns of interaction, and realize outcomes from their interaction (17). From this perspective, all action situations can be described using a common set of variables. Ostrom (17) describes them as the set of participants, the positions to be filled by participants, the potential outcomes, the control that an individual has in regard to this function, the information available to participants about actions and outcomes and their linkages, and the costs and benefits assigned to actions and outcomes.

Using this conceptual lens one can view small-scale fisheries as composed of a number of linked action situations that can be categorized broadly as pre-harvesting, harvesting, and post-harvesting action situations. In Figure 2 we present a basic chain of action situations common in commercial SSFs that any observer of fishing activities in the field will be familiar with regardless of the particular way fishers associate with one-another, or the contextual setting in which they may be embedded. Figure 2 is presented as a circular representation to highlight a ‘typical’ fishing cycle or event. Obviously, like in other common-pool resources, fishers are confronted on a daily basis with chains of action situations linked to each other in complex and non-linear ways.

A complete analysis of all action situations in commercial SSF would require book-length treatment. Here we only discuss the action situation where actors negotiate access to capital,

physical fishing means of production, and property-rights (Figure 2), as a way to illustrate the crucial role pre-harvesting constitutional-choice arenas have in establishing relationships between fishers and fish buyers and the resulting harvesting behaviors we observe in operational arenas.

[Figure 2 about here]

As in other common-pool resource settings there is a variety of ways in which resource users can access capital, physical means of production, and fishing property rights. In the simplest possible configuration, a fisher owns his own boat and gear and harvests fish for household consumption or local sale. In contemporary small-scale fisheries it is less and less common for a fisher to be in control of all inputs needed for fishing. Increasingly fishers need to access these inputs from a capitalist, often the fish buyer to whom fishers sell their catch. In Mexico for instance, the fish buyer is typically either a fishing cooperative or an individual entrepreneur. If fishers are organized as a fishing cooperative, property rights and capital are usually owned collectively and are accessible only to members. If, however, fishers are working on their own through verbal short-term contracts with a fish buyer (i.e. a patron-client relationship), fishers often need to access capital to pay for short-term expenses (i.e., gas and food for the fishing trip) or pay rent for the use of the boat and fishing gear.

For the purposes of this paper cooperatives and patron-client arrangements are similar in that fishers receive capital, property rights, and inputs for fishing from a corporate agent, which binds them to land their catch with that same entity as a way to pay back for the received inputs. This is most common in contexts where there is under provision of basic formal legal, political, and

economic resources needed for commercial fishing to take place. This is typical of developing countries in tropical latitudes, where SSF is a particularly salient economic activity not to mention its food security and poverty alleviation role (7).

We define a fishing cooperative as “an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise” (18). In contrast a patron-client arrangement is a relationship where capital, financial resources, and property rights (when they exist) belong to a patron and fishers do not join in collective activities (19) and commercialization is often controlled by the patron (20). Johnson (21) describes this form of self-governance as “common economic arrangements...that link powerful individuals with numerous subordinates. In exchange [for] favors, including loans, protection, or intermediation, patrons receive labor, goods, political support or other benefits.”

These two forms of organizing fishing are thought to be globally ubiquitous. In Mexico, officials estimate the existence of more than 3200 cooperatives (22). In Turkey, one in every four fishers belongs to a cooperative (23) and more than 620 fisher’s syndicates are reported in Chile (24). Patron-client informal arrangements can underpin the global seafood trade of certain species. For instance, the mahi mahi fishery of Peru and Ecuador, two of the most important producers in the world, is mostly small scale and based on informal, unwritten, trust-based contracts between fishers and fish buyers. With nearly 60% of their catch exported to the US, its estimated worth

was 232 million US dollars in 2012 (25). They are also prevalent in more localized fisheries and associated markets (26, 27).

Together, patron-client relationships and cooperatives are often the main pathways for low-income individuals in rural, developing country contexts to secure their livelihoods through gaining access to capital to afford the upfront costs of fishing trips (e.g. gas, bait, and food), fishing means of production (e.g., boat, motor, or fishing gear), property rights to the fishery (e.g., fishing permits), as well as to cash for personal loans (e.g., payment of corner-store bills, health emergencies, etc.) It is well known that in rural developing country contexts, access to credit plays a key role in rural inhabitants' ability to secure better livelihoods (28).

Differently from cooperative arrangements, patron-client relationships do not suffer the transaction costs of organizing and maintaining collective action. However, both are similar in that a corporate agent provides the fisher with the fishing inputs in return for the obligation to land catch and thus, assure the repayment of fishing inputs. Given that SSFs mostly operate in a context of highly incomplete and difficult-to-enforce contracts, the likelihood of repayment is directly related to the quality of the relationship (e.g., trust) the agent has with the fishers.

### Situating our empirical analysis: How did cooperatives and patron-client relationships become dominant ways of organizing small-scale fishing in Mexico?

While much of the day-to-day activities of SSFs take place largely outside of the reach of formal State authority, national, and international political economic processes have nonetheless shaped the contemporary context within which small-scale fishers navigate their livelihoods. Over time,

States as well as international organizations have promoted different modes for distributing fishing property rights, capital, and commercialization with a variety of implications for how individual fishers engage in self-governance arrangements at the local level.

In Mexico a long and continuing history of cooperatives and collectivism across economic sectors coupled with recent transitions away from State interventionism toward private sector investment has given rise to a context in which fishing cooperatives and patron-client relationships coexist and compete for labor, market power, and fisheries resources (29). Early fisheries development in Mexico focused on the promotion of social interests and equitable distribution of resources (30-32). In this regard, cooperatives were a key tool for organizing fishing labor, vying for partisan loyalty of rural populations, commercializing fish production, and distributing subsidies, infrastructure, and capital, as Mexico sought to ramp up fisheries production and modernize its fleet. During this period, cooperatives also enjoyed preferential access to valuable fisheries resources, codified in fisheries law (33).

Beginning in the late 1980s, State support for fishing cooperatives subsided, a symptom of a broader shift toward financial deregulation and decentralization driven in part by the debt crisis and foreign debt servicing obligations. This period saw reduced subsidies to fishing cooperatives and the dissolution of the parastatal firm marketing fisheries products and the state fisheries development bank (33). The formal legal framework shifted concurrently. Amendments in 1992 to Mexico's constitution made inshore resources available for private sector fishing permits through competitive bidding processes (34) and the 1994 fisheries law eliminated cooperatives' exclusive access to some valuable species (33). These changes opened up opportunities for

individuals and private firms to play a more prominent role in the control of capital and property rights in fisheries as well as the commercialization and marketing of fisheries products.

These broader legal and political shifts have produced a context in which both fishing cooperatives and patron-client relationships coexist and often compete for labor, economic power, and access to fisheries resources. Yet, the broader legal and political context does not provide a full picture either, particularly when trying to understand how each of these arrangements is similar or different in relation to key issues such as access to capital, fishing means of production and property-rights. We argue that bringing such understandings to CPR theory are key to broaden conceptualizations of fishing governance beyond harvesting and to do this it is necessary to incorporate notions of constitutional choice.

#### Using constitutional choice to understand group formation in small-scale fishing

Constitutional choice is expressed by fishers and fish buyers when deciding how to choose with whom to associate themselves to conduct the business of fishing, whether it is in the context of fishing cooperatives or patron-client relationships. In the action situation of negotiating the terms of access to capital, fishing means of production, etc., the corporate/capitalist agent expects that in return for the provision of these inputs the fisher will land his catch to the agent at an agreed-upon price and the upfront loan will be discounted from the fisher's profit. Given that these are hard-to-enforce contracts (often verbal), each time a fish buyer makes a loan or rents a fisher his fishing permit or fishing gear, he is taking a risk that the fisher will fail to meet his obligation to land catch from which the loan and rent are paid. This risk is particularly high in contexts of price competition or where a fisher can land his catch elsewhere in order to avoid repaying the

loan or rent without facing (legal) consequences besides those resulting from direct fish buyer action. In the long run, however, meeting obligations may be of interest to a fisher who wishes to continue to have access to loans, capital, gear, and fishing permits through subsequent transactions. In any case, because the possibility of such behavior is present, fish buyers face strong incentives to identify and associate with fishers they can trust in order to increase the likelihood to attain a steady supply of fish and return on investment.

It is well established that trust and relationship-building has a key influence on the persistence and success of buyer-seller relationships (35-37). Particularly for the constitution of groups in constitutional-choice arenas where legal enforcement mechanisms are scarce or costly (38, 39), such as in small-scale fishing contexts.

To illustrate the importance of incorporating constitutional choice action situations taking place before harvesting, into governance analysis about harvesting, we take a look at these issues in the context of a fishing cooperative and patron-client relationship. This comparison illustrates similarities and differences between the two forms as two important forms of self-governance in small-scale fishing. First we examine a patron-client structure where the patron has significantly more capital than fishers and is in control of fishing property rights, means of production and access to the market. The type of cooperative we analyze is a well-functioning one in the sense that is able to keep basic record-keeping about catches and lending to its members, among other measures of successful collective action.

## **Methods**

To highlight the importance of the role of constitutional choice in the formation of fisher-fish buyer groups, we took two complementary approaches: First, we investigated how fish buyers

selected the fishers with whom to transact by conducting in-depth interviews with fish buyers. Second, we assembled two longitudinal databases related to the provision of loans by fish buyers and the reciprocating behavior of fishers. One database comprises data from patron-client interactions and the other from a cooperative.

#### Interviews with fish buyers to understand how they choose fishers with whom to associate

We asked fish buyers how they choose the fishers with whom to work. We designed and pre-tested our interviews with a key informant fish buyer. We then used a snowball sample approach to contact all fish buyers in the fishing community of Bahia de Kino (Kino Bay), an important small-scale fishing community in the Gulf of California, Mexico, and where the first author has been studying since 1999, and thus knows some of these fish buyers. Most of the interviews were conducted at the interviewees' homes.

We interviewed all six major fish buyers for one of the key species (pen shells) harvested in the village between May 23 and June 17, 2011 and followed up with interviews with key informants on February 2nd of 2014. Kino Bay has a population of around 6,000 people, most of whom are dependent directly or indirectly on fishing, and it is estimated there are around 200 boats harvesting 66 species of fish and shellfish throughout the year (40).

#### Assembling longitudinal quantitative databases to illustrate the role of constitutional choice

##### *The patron-client database*

We gained access to the personal lending/payment logbooks belonging to one of the most important fish buyers operating in Kino Bay in terms of the value and volume of landings (estimated to be of 25-50% of the total landings in the community). Data encompassed a non-



continuous period of roughly five years (April 24, 2003 to February 25, 2009). These log books generally documented transactions on: 1) what species was bought, 2) on what day, 3) from whom, 4) and how much money he loaned out for that particular fishing trip. Log books were hand-written and data recorded in a non-systematic fashion. It took over a period of six months to stitch together six notebooks and digitalize all records. The fish buyer informant clarified any remaining questions related to his note taking quirks. Monetary data amounts about loans and payments for catch was not included due to reliability issues. We could reliably and systematically identify the date, name of each fisher working for the fish buyer, whether a loan was made to him on a particular day, and whether a catch was brought back. With these data, we build a database on the number of repeated interactions with each fisher and whether for each interaction the fish buyer made a loan to the fisher and whether the fisher brought catch back with which the loan was repaid. Thus, a transaction was defined as the act of providing a loan by the fish buyer and subsequently receiving catch (or not) from the fisher.

Once logbooks were digitalized and data was plotted (as in Figure 3), we met with the fish buyer informant to discuss data interpretation. This process reassured us the data provided an accurate representation of the types of arrangements he had developed with fishers during that time period. This interpretation is presented in the discussion section.

### *The fishing cooperative database*

We gained access to the financial records for a fishing cooperative known for keeping adequate accounting and with whom one of the authors had developed a working relationship. This

cooperative operates in the Yucatan Peninsula and the data obtained mirror that of the previously described database for a continuous five-year time period from 2009 to 2013.

## **Results**

First we report on the interview data that allowed us to identify the criteria fish buyers use to determine the fishers with whom they transact. Then we present the longitudinal dataset representing transactions between fishers and fish buyers over time.

### Fish buyers prefer to work with highly reliable fishers

In interviews fish buyers reported seeking to work with reliable fishers, defined by interviewees as those with one, some, or all of the following characteristics: 1) Fishers who go fishing on a predictable basis when the weather is good, as opposed to not going out (e.g. because of substance abuse or ill-maintained equipment). 2) Fishers who are capable of landing adequate catch because they have the knowledge and skills to do so, and 3) fishers who uphold agreements to land their catch with the fish buyer who provided loans and inputs instead of with another fish buyer offering a better price.

Fish buyers' linked their success partly to their ability to identify highly reliable fishers and develop trustworthy relationships with them and to minimize interactions with fishers behaving opportunistically. One fish buyer stated that "most fishers engage in non-trustworthy behavior 20 percent of the time and even more frequently in times of resource abundance!"

Lending money to fishers who fail to bring back catch at all, at the right time, or in sufficient volume such that the buyers cannot fulfill commitments with other clients further up the supply chain can lead to the failure of their business. Therefore, fish buyers seek to form and support a core group of reliable fishers that can provide a constant supply of fish.

Fish buyer interviewees stated that once they have identified a reliable fisher who does what he says he is going to do and brings fish regularly, they will continue to lend money and work with this person as long as they can. Cooperatives also prefer reliable members, those with a reputation of trustworthiness and positive behavior and often put prospective new members on probation before formally accepting them into the organization. A fish buyer informant characterized a reliable fisher as “someone that does not ask you for [a lot of] money, goes to work, and brings you a lot of fish.” Another fish buyer stated that reliable fishers are “responsible, hardworking, come through with their commitments, and learn my working system.” Yet another highlighted that “there are fishers that ask you for work and if one sees they are not responsible you do not lend them for gas, they better go ask someone else, it doesn’t matter that they go with another buyer...because they are not responsible, they are too much trouble, they are more of a problem than the benefits you get from their catch.”

#### The patron-client and the cooperative databases

The goals of building two longitudinal databases, one for a patron-client relationships and another for a cooperative, was threefold: 1) to operationalize the notion of reliability as expressed by instances of landing catch and paying back loans, 2) to observe differences between these two opposing ways of organizing fishing, and 3) to more generally illustrate the importance

of taking into account issues of constitutional choice into the analysis of harvesting governance in CPRs.

Each database operationalized ‘an interaction’ slightly differently based on available data. For the patron-client relationship, an interaction was constituted by the relationship between loans provided and catch returned. Thus, we analyzed the number of times a fisher sold catch to a fish buyer relative to the number of loans that same fish buyer provided to the fisher (Figure 3a and inset 3b). For the cooperative an interaction was constituted by the relationship between loans provided and loan paid back, thus we analyzed the number of times a fisher made a payment on a loan relative to the number of times he took a loan from the cooperative (Figure 4). These slight differences in the operationalization of ‘an interaction’ do not have an effect on our ability to measure reliability in these two different forms of organizing fishing.

For figures 3 and 4 the x-axis represents the number of loans given by the fish buyer or cooperative to each fisher. In Figure 3a,b, the y-axis represents the number of times each fisher landed catch with the fish buyer. In Figure 4, the y-axis represents the number of times each fisher made a payment toward a loan. The 45-degree diagonal represents where the number of loans made by the fish buyer equals the number of times that the fish buyer received catch (or a loan payment) from that fisher, a ‘wash’ in terms of debt.

[Figure 3a about here]

[Figure 3b about here]

Figure 3a and 3b shows fishers' reliability as a function of the relationship between number of times catch was landed with the fish buyer and number of loans given. Most fishers (about 80 in the five-year period) working for the patron were given a loan more times than times they landed a catch. A sizable amount never brought a catch and some received multiple loans (the 'unreliable fishers' in Figure 3b). Figure 3a shows fishers we labeled as 'reliable' and 'semi-reliable' because in comparison to the 'unreliable fishers' they brought catch in repeated occasions. 'Reliable fishers' are those with the highest number of loans and times they brought catch, and semi-reliable as those with the lowest levels of number of loans and times brought catch, likely because they have not been working with the fish-buyer for as long a time as 'reliable fishers.' Finally, Figure 3b shows a few fishers who sold catch to the buyer without taking a loan. We call them 'price seekers' because they are fishers that did not need loans from this fish buyer either because they got them from some other fish buyer (and are cheating on him) or they own their fishing means of production and do not need them and thus are independent fishers.

[Figure 4 about here]

Figure 4 shows a contrasting pattern. In the cooperative, the number of loan payments is much higher and almost all fishers paid their loans. 'Reliable fishers' are much more abundant and no 'unreliable' or 'price seeker' fishers were found in this cooperative's data-set.

## **Discussion**

The motivation for this paper emerged from the observation of the overwhelming attention that harvesting has received in the study of common-pool resource (CPR) governance. While harvesting remains a central action situation to understand collective action dilemmas, our study illustrates the importance of incorporating other linked action situations: i.e., the organizational choices fishers make (patron-client or cooperatives) and the process of accessing fishing means of production (through loans from patrons or cooperatives) that take place before harvesting. In the context of small-scale fishing, where accessing fishing means of production through loans to a patron or association is likely becoming more and more ubiquitous around the world, these considerations will allow fisheries analysts to make a more complete assessment of CPR governance processes and outcomes of interest to policy makers such as well-being and harvesting patterns.

What is the effect of the type of organization in fishers' well-being and harvesting patterns?

Overall our data in Figure 3 and 4 shows that fishers' working under a patron-client structure have less well-being, or more indebted, (measured by the ratio of loan and catch return) than under the cooperative we examined. The group of "reliable fishers" in Figure 3a are those with whom the patron interacted most frequently (i.e., high number of loans and catch landed). The patron described them as his most trustworthy labor force and saw little risk on making loans to them regularly. Overall, under this form of self-governance fishers may be particularly vulnerable to exploitation because they are often in debt to their patron and have no access to collective-choice arenas shaping their working conditions. These findings are consistent with the literature highlighting power differentials and incentives for exploitative relations in patron-client structures (41, 42). Yet, non-exploitative relationships are possible too (26).

In contrast to a patron-client structure, findings within the cooperative we examined suggests higher levels of well-being (as measured by the ratio of loan repayment). Figure 4 shows that most fishers transacting with the cooperative made payments on loans more frequently than they received loans, potentially indicating many small payments on large loans. Here, we remind the reader that the cooperative data is not fully comparable with the patron-client data because the former compares loan frequency with repayment frequency and the latter compares loan frequency with frequency of landed catch, with frequency of landed catch and loan repayment similar yet slightly different measures of reliability. Data on the monetary value of loans and levels of repayment would facilitate a formal comparison of patron-client and cooperative groups. Nonetheless, it appears that fishers working for the cooperative engaged in very frequent trustworthy behavior toward fulfilling their loans when compared with the fishers who transacted with the patron. In fact, a willingness to provide larger loans would suggest high levels of trust by the cooperative, which is only likely to emerge if fishers demonstrate high levels of reliability.

The number of unreliable fishers was also much higher in a patron-client structure than under the cooperative. What might account for this? We know this was a well-functioning cooperative, and thus it might have been related to the ability of the cooperative to pre-select reliable fishers as subjects of membership. But also it could be due to the collective-action processes already in place in this cooperative providing opportunities for reputation- and trust-building among members. Field experiments have demonstrated that members of agricultural cooperatives in the Philippines exhibited higher levels of trust and trustworthiness than non-member farmers (43).

Unlike in patron-client relationships where property rights, capital, and financial resources are private goods of the patron, in cooperatives these goods are collectively provided and owned by all the members. As a result, fishers might find more incentives for opportunistic behavior in patron-client relationships because it only violates the trust of a single individual while in a cooperative it can violate the trust of all the members. Furthermore, informal sanctioning of opportunistic behavior is more likely in a cooperative, where all members have an interest in each other's behavior (because they co-own the enterprise) than in a patron-client relationship where opportunistic behavior is a direct concern only of the patron himself. Now, we also acknowledge that there are a number of demographic factors including familiar ties that we did not measure that likely help to account for the large variation we see among subgroups of fishers, whether they are characterized as reliable, semi-reliable or unreliable.

#### What are the effects of 'reliable fishers' in outcomes?

While we observed different numbers of 'reliable fishers' in patron-client relationships and cooperatives, we cannot assume their level of reliability differs from the data we have. Instead we can say that the influence of reliability under different forms of organizing fishing affects different types of decision-making processes that affect outcomes such as harvesting and well-being.

We have argued that trust-based interactions generated at the constitutional-choice level between the patron and fishers are essential for this form of organization to succeed (44). Yet in patron-client relationships trust-based interactions only can affect operational-level action situations (i.e., harvesting) because fishers usually do not own the fishing means of production, property-rights or capital. Thus, they do not have access to collective-action arenas in which decisions



about harvesting and labor conditions are shaped, among other issues critical to maintaining the sustainability of the resource and fishers' well-being. As a result, they have no recourse to represent and defend themselves when needed. Cinti et al. (40) documented how fishers in Mexico were excluded from participating in local fisheries management because legally, their patrons owned the fishing permits under which they fish, and thus only they could participate in local collective-choice arenas about fishing.

In contrast, in cooperatives, fishers are more likely to be able to participate in shaping operational and collective-choice-level action situations, and so trust and trustworthiness generated at the constitutional-choice level can have broader effects over harvesting and fisher well-being outcomes. For the cooperative in our data set, which is constituted by a high number of reliable fishers, we have documented a number of instances in which the cooperative engaged in successful collective-action to monitor access to outsiders to their fishing grounds, negotiate, and demonstrate against the government to defend their fishing rights (45). Overall, fishers also benefit from developing a trustworthy relationship with their patrons or cooperatives because it increases the likelihood they will also gain access to credit for purposes beyond the fishing arena. Fishers reported having access to loans to fix a boat or motor, buy vehicle parts, medical expenses or payment of credit tabs for groceries and household items at the local store, among others.

The need to find reliable fishers to work with also affects harvesting patterns and fisheries sustainability. When patron-client or cooperatives do not find reliable fishers in the locality to work with, they face incentives to bring fishers from elsewhere, effectively increasing fishing pressure and the risk of overfishing. The movement of fishers is a persistent source of conflict in

fishing and has been extensively documented (46, 47). Migratory labor can threaten the resilience of well-organized fishing associations, by stressing local fishers' ability to control access of migrant fishers to their common-pool resources (29, 45), as well as the provision of other public goods like health and schooling available in rural coastal communities (Bennett unpublished data).

We should also point out that practically no fisher in our dataset was reliable 100% of the time. Although the patron we studied was one of the largest in the fishing community in terms of volume, there were nonetheless other fish buyers operating locally with whom he may have needed to compete to attract fishers to work for him. A fish buyer who is too strict about loan repayment may lose reliable fishers from his group, ultimately reducing his supply of fish. Furthermore, by allowing fishers who sometimes fail to repay loans to continue working in his group, a patron may be able to extend fishers' obligations and foster more stable buyer-seller relationships. In interviews, the fish buyer acknowledged that slippage by reliable fishers is part of the costs of doing business in these contexts, especially in situations where fishers face strong incentives to behave opportunistically, for example, in the case of income shortfalls due to a family illness. Future work should investigate the factors that influence levels of trustworthiness, including local competition among buyers and economic and environmental factors that promote opportunism.

## **Conclusion**

Our study makes the case to broaden the analytical scope beyond-harvesting to achieve a fuller understanding of the governance of the commons. We argue that institutional analysis concepts such as *linked action arenas* and *constitutional-choice level*, can be readily deployed.

Our empirical study in Mexico illustrated how linking *constitutional* to operational level and collective-choice activities allows incorporating pre harvesting choices that shape how harvesting activities take place. Pre-harvesting issues like available access to credit, fishing means of production, or choice of organizational structure, have often been overlooked in the literature of fishing common-pool resources, yet they shape overall outcomes, particularly in terms of the distribution of benefits generated by harvesting and fishers' well-being. Our call to extend the analysis of CPRs as chains of action situations makes explicit the need to consider action situations where negotiations of access to inputs of production are being conducted, so that their interaction with operational level harvesting activities are better accounted for. Our work resonates with Lin Ostrom's call to increase attention to the interactions resulting from different action situations (48, 49), a call that has not been sufficiently fulfilled to date. Our call to expand the application of the constitutional level to informal association has been overlooked in most CPR theory applications. Yet, it makes more visible the importance of accounting for factors such as reliability, trust, and trustworthiness that drive group formation (44) and shape actors' incentives and capabilities with regard to their engagement in operational and collective choice arenas.

In sum, we offered here two examples of conceptual strategies to more directly incorporate that decisions around harvesting practices are influenced by how fishers organize to gain access to capital, labor, and commercialization, which have always been key aspects of concern for CPR

governance and scholarship, but are not effectively incorporated when only focused on harvesting as the main analytical concern.

## **Acknowledgments**

We are indebted to all fisher informants for their willingness to share their data and knowledge with us. We thank Connie Liu and Leslie Acton for their field assistance. Michelle Loquine, Peter Zaykoski and Sam Huff for their data analysis, graphics, and editorial support. This research was supported by the National Science Foundation support to the MAREA group (Award # 1613526) (XB, EL, MS), Duke University (XB, AB), the European Research Council under the European Union's Seventh Framework Programme (FP/2007-2013)/ERC grant agreement no.283950 SES-LINK (EM, MS) and the David and Lucile Packard Foundation (Grant #2014-39664) (XB). Institutional Review Board (IRB) for Human Subjects Authorization #A0694 to Duke University. Data is available upon request to the corresponding author.

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FIGURES

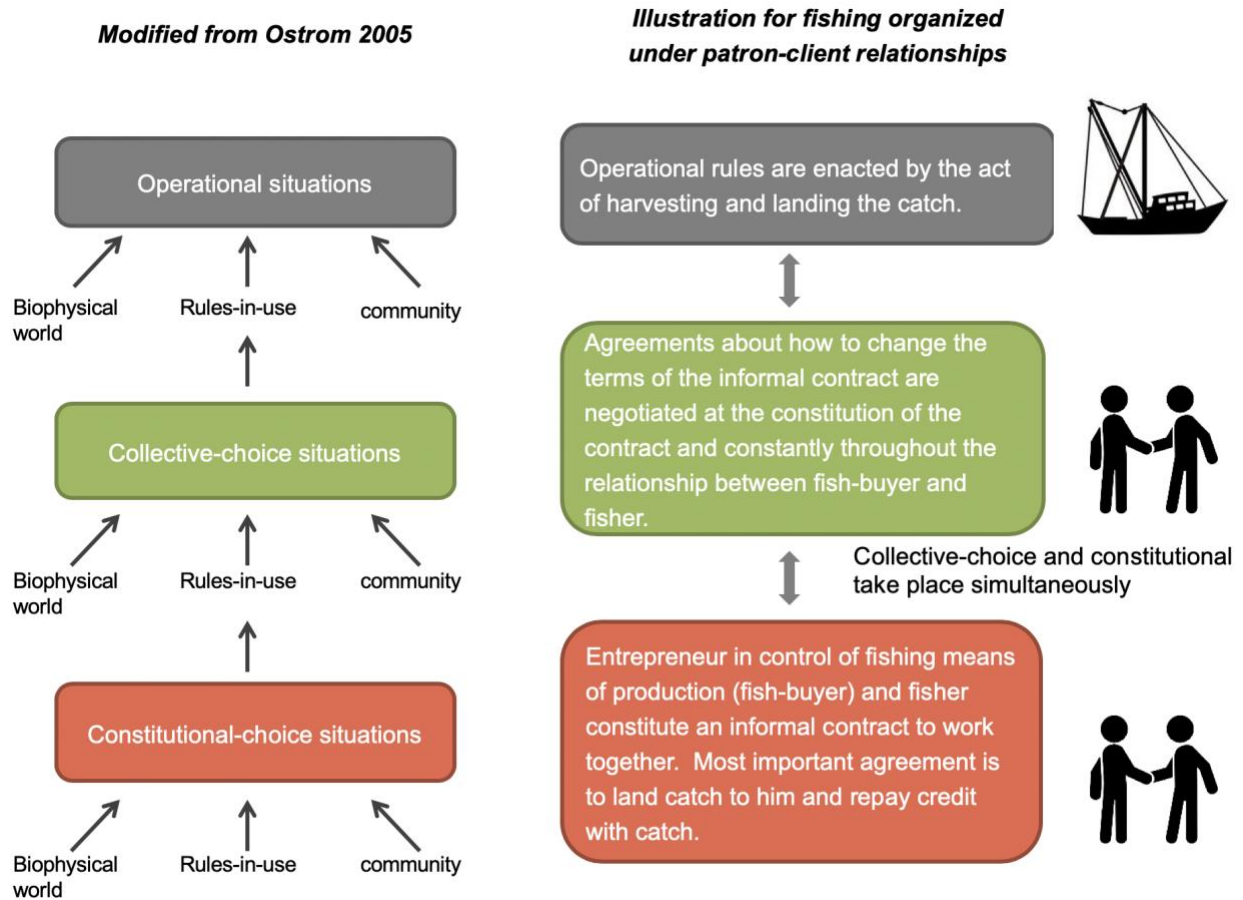


Figure 1. Levels of Analysis Proposed and modified from Ostrom (2005) with adaptation to the context of fisheries organized as patron-client relationships.

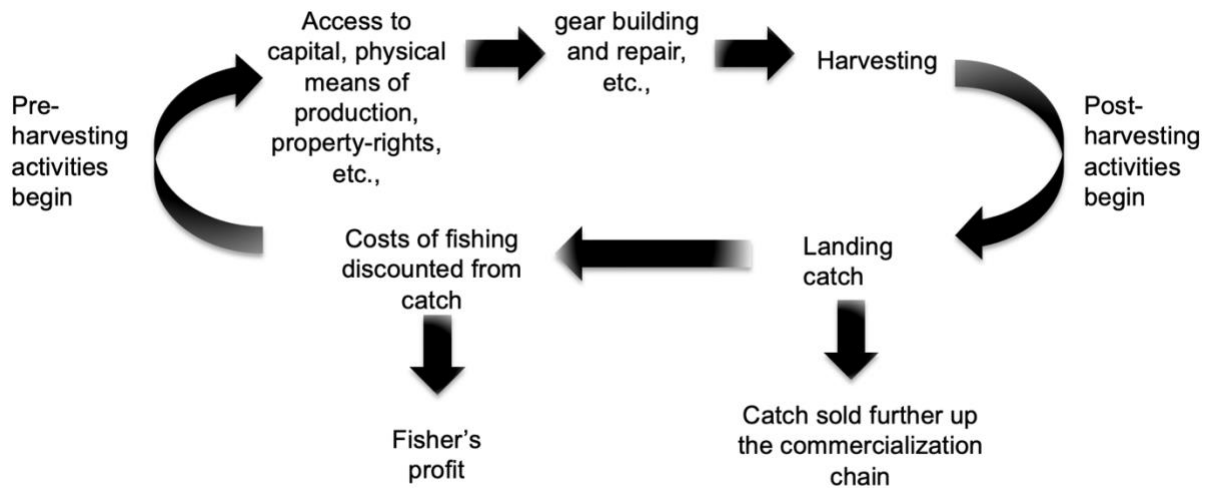


Figure 2. In the context of small-scale fishing a beyond harvesting approach to CPR governance must include considerations of pre-harvesting and post-harvesting action situations. In this paper we focus on the effects that fishers' available alternatives to accessing fishing means of production have on harvesting and fishers' well-being as measured by the ratio of loan repayment or catch return. The pre and post-harvesting action situations shown here are not exhaustive. We opted for a circular representation to highlight a 'typical' fishing cycle or event. But like in other common-pool resources, fishers are confronted on a daily basis with chains of action situations linked to each other in complex and non-linear ways.



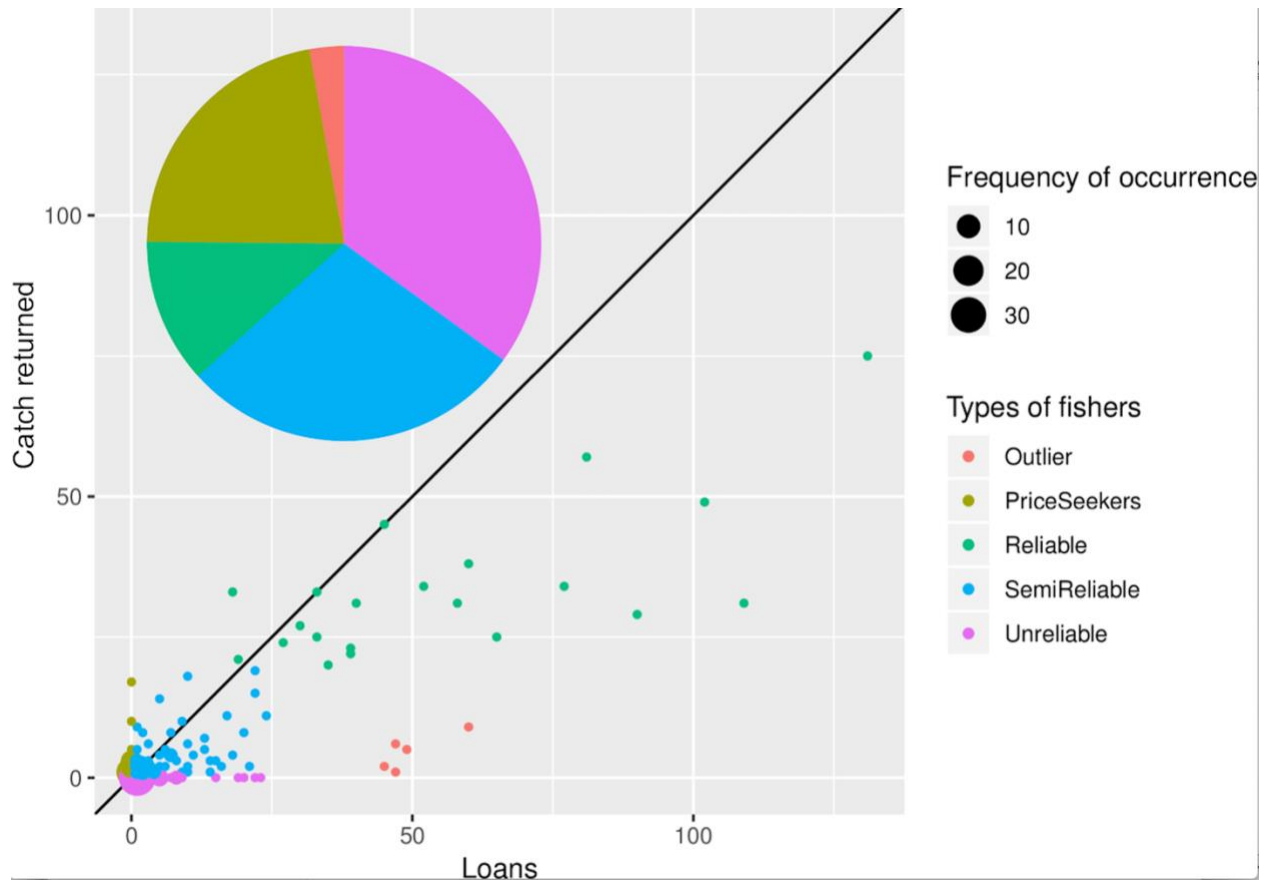


Figure 3a. Loan-catch return transactions in a patron-client relationship. Pie chart shows the distribution of types of fishers found in this dataset.

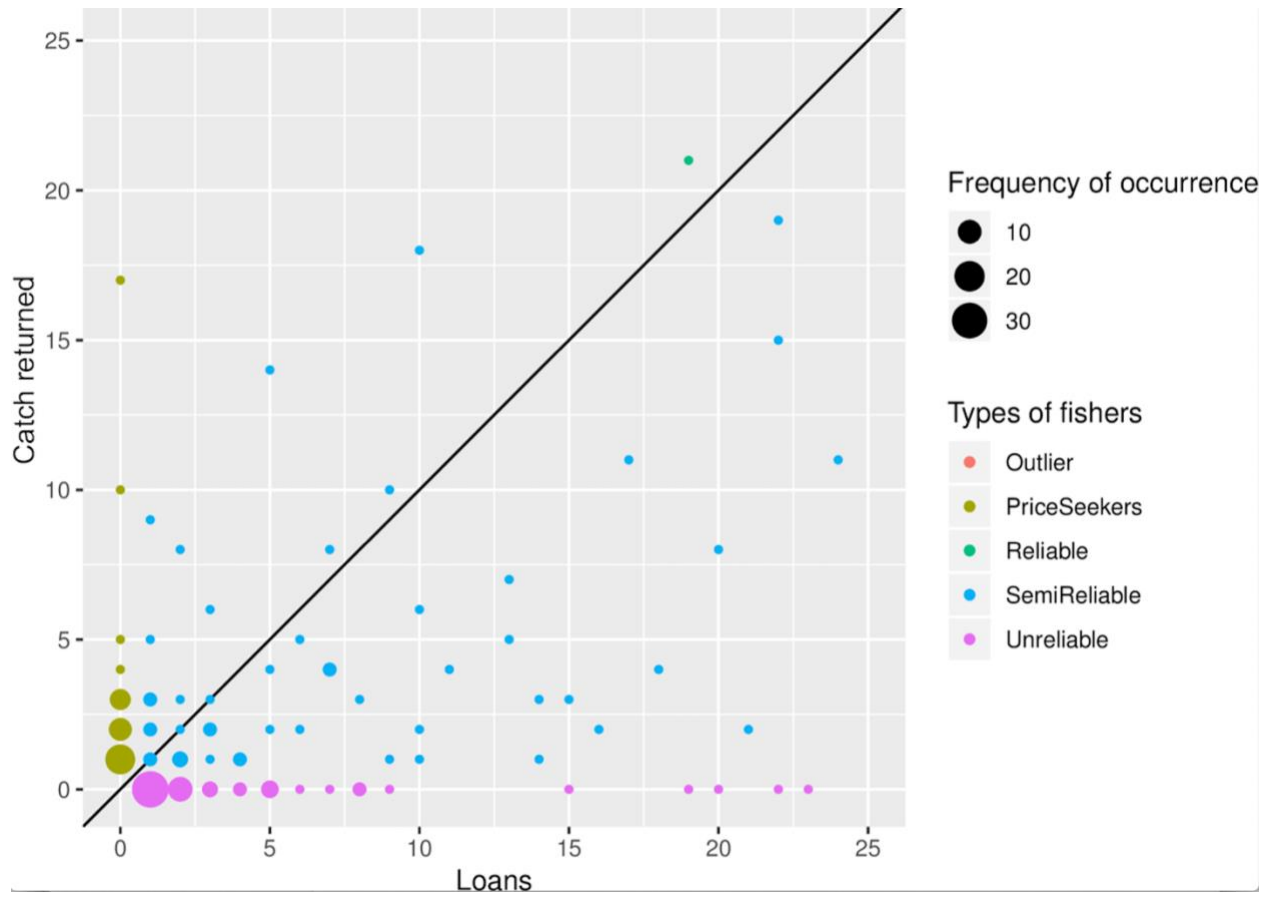


Figure 3b. Inset of the first 25 loan-catch return transactions, allows for better view of interactions with 'semi-reliable,' 'unreliable' and 'price-seeking fishers.'

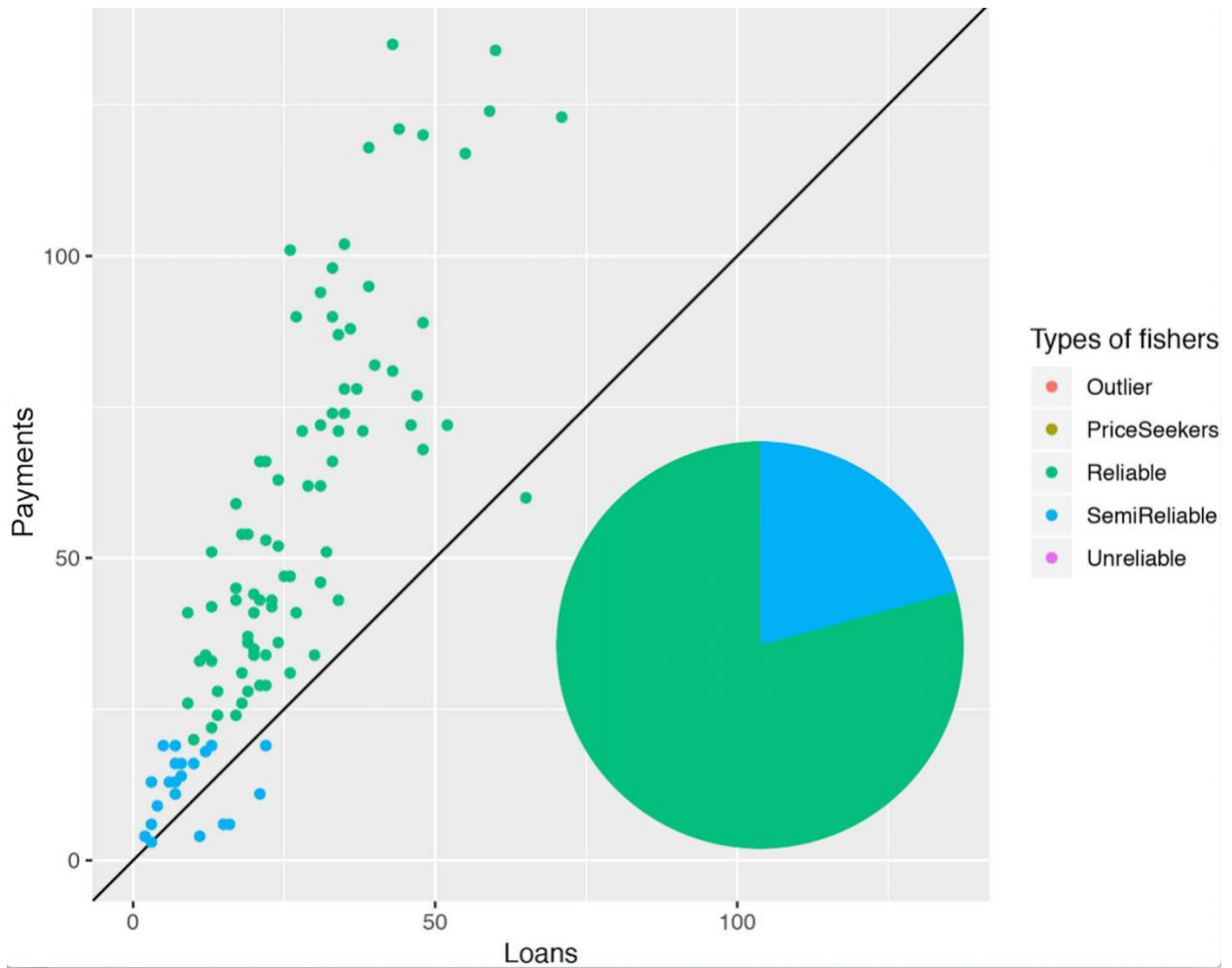


Figure 4. Loan-payment transactions in a cooperative. Data show 'reliable' and 'semi-reliable fishers' but no 'unreliable' or 'price-seeking' fishers. Pie chart shows the distribution of types of fishers found in this dataset.