Can Investments in Social Capital Improve Well-Being in Fishing Communities? A Theoretical Perspective for Assessing the Policy Options

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Abstract: Over the last decade, advocates of the interdisciplinary concept of social capital have celebrated the fact that elements of local social structures--embodied in social norms, networks and organizations--can significantly affect well-being in fishing communities. But does this concept bring anything to the study and practice of fisheries management that is not already known? This paper argues that value is added to the formation of fisheries policy by viewing elements of local social structures as a form of capital. When norms, networks and organizations are analyzed, in a microeconomic context, as potentially productive assets, they can properly be valued alongside physical, human, and natural capital. The paper details how doing so can promise to further increase the probability of sustainable use of many (but not all) local fisheries through specific investments in social capital.

Keywords: Social capital, fishing communities, local institutions

1. INTRODUCTION

In Gloucester, Massachusetts, the social capital among fishers and their families is in decline: social organizations and norms among fishers have deteriorated over the last decade as fish stocks have declined and fishing regulations have increased. Since 1991, membership in the Sons of Italy and Societa Siciliana, comprised of fishers and their families, has declined by at least 60 percent (Griffith and Dyer 1996)--even while membership in the less specialized Moose and Elks associations have remained stable.[1] A leader of a local fishing association notes how these changes have affected their livelihoods:

> "People don't talk to each other anymore on the water. Everyone is so frustrated and afraid. Nobody is helping anybody out on the water anymore. This is because of the days at sea program. If I have to come in, and you go out on your block, then if you know where I was fishing, you'll get my fish. So everyone is keeping to themselves."

And since information sharing about concentrations of fish has deteriorated, there has been an increase of "brokers", fishing trips in which little or no fish are caught (Griffith and Dyer 1996).

This paper presents a theoretical framework for showing how the concept of social capital, when embedded in an appropriate micro-economic context, can add value to the formation of fisheries policy in communities like Gloucester. When elements of local social structures--including social organizations like the Sons of Italy and Societa Siciliana--are analyzed as productive forms of capital that can be augmented by specific investments, they can properly be valued aside physical, human, and natural capital.

[1] From 1991 to 1996, membership in the Sons of Italy declined from 304 to 89; from 1991 to 1995, membership in the Societa Siciliana declined from 200 to 79.

The focus of this paper is on fishing communities, defined as a set of households that have traditionally depended on a communal fishing resource for a large share of their livelihood.[2] The paper concentrates on local fisheries with the potential for co-management, defined as collaborative management among a range of stakeholders, including the fishers themselves, officials in the public sector, and other outsiders with an interest in promoting the sustainable use of communal fishing resources (for example, local or national NGOs).

In such fishing communities, what are the possible investments by this range of stakeholders? Physical capital investments might include expenditures on new fishing technologies and new public infrastructure to upgrade local ports. Human capital investments might include expenditures for training captains and their crews in new, sustainable fishing techniques. Social capital investments might include expenditures on stakeholder conferences; the training of community leaders, and support for fishing organizations.

This paper argues that stakeholders in fisheries management who are weighing the expected returns on possible capital expenditures should consider all three kinds of investments--even as they imply that such practitioners should not always be advocating investments in social capital.

The rest of this is paper is organized as follows. Section 2 presents an analytical perspective on what social capital is and how it may generally affect economic outcomes. Section 3 presents a theoretical framework on how social capital can critically affect the use of fisheries. Section 4 builds on the framework to present a set of policy options for investing in social capital. Section 5 summarizes the main policy conclusions.

[2] Note that social capital can play a role in much larger realms of fisheries management -- for example, the formation of international agreements to regulate open access fisheries. The papers in Keohane and Ostrom (1995) show how many of the lessons for governing local commons can be transferred to the international arena.

2. SOCIAL CAPITAL AND WELL-BEING

Over the last decade, many advocates of the interdisciplinary concept of social capital have documented how elements of local social structures--embodied in social norms, networks and organizations--can significantly affect the use of fishing resources. For example, Ostrom introduces *Governing the Commons*, her masterful study on the evolution of institutions for collective action, with the example of overfishing in Georges Bank. She then begins to detail the role of local institutions in the governing of local commons with the example of the inshore fishery at Alanya (Ostrom 1990).

But this fact--that elements of local social structures can affect the use of many local fisheries--comes as no surprise to anyone with a lifetime of experience in fisheries management. After all, local fisheries are classic common pool resources. Experts in this field have long since established that one of the most effective constraints to overusing fisheries are active fishing organizations and norms of reciprocity among local fishers.

What, then, does the concept of social capital bring to the study and practice of fisheries management that is not already known? Paraphrasing from the conference theme, does it offer insights and perspective that enrich our understanding of human behavior and its effect on fisheries?

The premise of the concept of social capital begins with the observation that recurring and patterned social interactions within a well-defined boundary form a local 'social structure'[3], and that the characteristics of this social structure will affect many economic decisions of agents within that boundary. Specifically, the local social structure may affect economic decisions and outcomes through three main mechanisms: information sharing; the impact on transaction costs, and the reduction of collective action dilemmas.

First, social structures can affect information

[3] A social structure can be defined as "recurrent and patterned interactions between agents that are maintained through sanctions" (Swedberg 1994).

sharing among agents. When agents interact frequently in local organizations and networks and in the observance of local norms, they are more likely to observe each other's behavior (one-way information sharing) and to exchange information about their daily lives (two-way information sharing). By contrast, when local organizations, networks and norms exclude different groups of agents, they can diminish the frequency of one-way and two-way information sharing.

Second, social interactions can affect the level of transactions costs associated with many market exchanges. When agents frequently and regularly interact in social settings, they establish patterns of expected behavior and build bonds of trust. Combined with the possibility of social sanctions, this lowers the likelihood of opportunistic behavior by agents that are in the same social structure. By contrast, the lack of cooperative norms within social structures can lead to lead higher transaction costs and more inefficient markets.

Third, without selective constraints, agents in many settings will not have an incentive to participate in mutually-beneficial collective action (Olson 1965). Frequent and regular interactions in social settings lead to the development of institutions that can serve as such constraints, thereby lowering the incentives of individual agents to free ride.

As illustrated by these three mechanisms, elements of social structures often serve as constraints on economic decisions. Accordingly, a social structure can be regarded as an institution, a "set of constraints which governs the behavioral relations among individuals or groups" (Nabli and Nugent 1989). Importantly, this definition encompasses both formal institutions such as the rule of law and informal institutions such as "cultural rules and codes of conduct which … can constrain the relationships between different individuals and/or groups" (Nabli and Nugent 1989). Following this definition, local social structures which affect the optimizing behavior of economic agents and can increase (or decrease) overall levels of well-being within a community are informal institutions.

This institutional perspective conforms to the definition of social capital of Schiff (1992) as "the set of elements of the social structure that are arguments or inputs of production or utility functions."[4] As detailed below, this functional view can help policy makers in fisheries management to assess how specific characteristics of social structures may affect the stream of costs and benefits associated with many potential policies.

The expected functional relationship between elements of the social structure and an economic good--through information sharing; the impact on transaction costs, and the reduction of collective action dilemmas--critically depends on the nature of that good. Following a standard public economics framework, Table 1 in Appendix A illustrates the nature of economic goods that may be affected by elements of the social structure.

Private goods Under conditions where households face relatively undistorted market prices for the purchase of a private good, neither principal-agent problems nor collective action dilemmas will have a relatively large influence on the optimal consumption and production of most private goods.

However, in the production and consumption of private goods with large information spillovers, the potential influence of social capital through information sharing is high. Much economic and non-economic research suggests that the characteristics of social structures are critical determinants of the way that information is diffused among groups of individuals (Rogers 1995). For example, Isham (2000) finds that

[4] The complete definition of Schiff (1992) is: "Social capital is the set of elements of the social structure that affect relations among people and are inputs or arguments of the production and/or utility function." This is one of the class of 'functional' definitions of social capital consistent with the influential formulation of Coleman (1990): "Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common. They all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within the structure."

among agricultural household in the plateau zone of Tanzania, tribally-based social affiliations act as a form of social capital in the decision about adopting improved fertilizer. Such a positive externality, of course, provides an economic justification for investments in the delivery of this type of private good.

Toll Goods By contrast, in the case of toll goods, the potential influence of social capital through information sharing is relatively low.

But because of the non-rival nature of toll goods, the potential influence of social capital through transactions costs and collective action is high. Where norms of mutual trust between stakeholders that use a toll good are low, opportunistic behavior--in the form of financial corruption or shirking by leaders and public agents --will be more prevalent; community norms of reciprocity are often necessary for individual households to commit their time and resources to provide such a service.

For example, in community-based water systems in the developing world, village-level social capital is often necessary for individual households to commit their time and resources and to subsequently minimize the opportunistic behavior of community leaders (Isham and Kähkönen 1999).

Collective Goods In the case of the delivery of selected collective goods, the potential influence of social capital through transactions costs and collective action will also be high, for the reasons specified above: public agents and community leaders may divert finances or shirk in the absence of trust and selected norms of reciprocity. Since there is no rivalry in the consumption of collective goods (in the absence of congestion effects), the free rider problem is likely to be more prevalent in the design and the maintenance of a collective good as opposed to its use.

Common Pool Resource Where projects are promoting the delivery of selected common pool resources, the potential influence of social capital through transactions costs is also high. As in the case of toll goods and collective goods, sustained management of common pool resources often depends on the performance of public agents and local leaders.

In the case of common pool resources, the potential influence of social capital through collective action is even higher because of their non-rival and exclusive nature. The presence of active local groups and norms of reciprocity will provide a critical incentive for individual households to commit their time and resources to start such an activity: such elements of the local social structure will also minimize overuse of the resources by lowering the free rider problem during the use of the good -- that is, the temptation of one household to overuse the resource. (Ostrom 1990).

The information in this table suggests that social capital will have the highest possible influence in the delivery of common pool resources--precisely those circumstances faced by many fishing communities.

3. SOCIAL CAPITAL AND FISHING COMMUNITIES

How specifically do local social structures affect economic decisions and outcomes in such communities through information sharing, the impact on transaction costs, and the reduction of collective action dilemmas?

First, social structures do affect information sharing in fishing communities: for example (as introduced above), when fishers and their families in Gloucester regularly attend the meetings of the Sons of Italy or social traditions like the annual Blessing of the Fleet, they are more likely to regularly exchange information. By contrast, when local organizations are differentiated by gear type (Griffith and Dyer 1996)), they can diminish the frequency of one-way and two-way information sharing.

Second, in the co-management of community fisheries, social interactions among fishers and government agents do establish patterns of expected behavior and build bonds of trust that lowers the likelihood of opportunistic behavior.

Hall-Arber and Finlayson (1997) detail a range of studies of fishing communities in Massachusetts and Nova Scotia which show that local fishers react to national groundfish policies according to local economic and social norms and histories. In supporting the potential for co-management of fishing communities in Canada and the United States, they conclude that "in general, federal fisheries policies work best when fishers believe they have been fully consulted in the development of fishery rules and that they have a say in the implementation of those rules. If local authorities have the endorsement of local interests, they believe they can enforce the rules" (Hall-Arber and Finlayson 1997)

Third, community norms of reciprocity can lower dilemmas of collective action--for example, by affecting the likelihood that fishers will harvest only catch above a certain mandated size. Phil Coates, director of the Massachusetts Division of Marine Fisheries, notes that the lobster fishery, with informal territorial rights, is strong in self-regulation and self-enforcement: "Lobstermen fish close together, they're on the water together, they tie up at the same dock. They can look over and see what the other guy is doing. So there is peer pressure, and there's a high level of compliance" (Corey 1997). By contrast, for selected groundfish with more unlimited access, compliance to local regulations is often not the rule.

To begin to model the importance of elements of the social structure for economic outcomes in fishing communities (and to guide the subsequent development of the arguments in this paper), equation 1 presents a functional relationship[5] to illustrate the net productive benefits for a fishing communities in period t:

$$(1) \qquad U_t = U(Y_t, X_t),$$

where U_t is the flow of net social benefits, Y_t is the harvest, and X_t is the fish population. As noted by Conrad and Clark (1987), Y_t may appear as an argument for purely commercial reasons, while X_t may appear as an argument to reflect the preservation value for the stock.[6]

For a representative fisher in the fishing community, let the harvest from fishing include a sub-function Q(.) which has as arguments a set of vectors of available productive inputs in that time period (K_t, L_t, H_t, and S_t):

$$(2) \qquad E_{t'<t}\, Y_t = A_t * Q(K_t, L_t, H_t, S_t) * X_t$$

where K_t is physical capital, L_t is labor, H_t is human capital, S_t is social capital, A_t is a (factor neutral) productivity shifter[7], and $E_{t'<t}$ denotes that this is the expected productive relationship in a previous year t'. The sub-function Q(.) is similar to 'effort' in the classic fisheries management production function; it illustrates how a range of inputs can affect each fisher's production, controlling for productivity shocks and the size of the resource base.

This equation (based on the definition of Schiff (1992) and the perspective on social capital presented above) allows one to consider alternative possibilities for the expected productive role of different elements of a local social structure alongside more standard productive inputs. Four alternative possibilities are considered below for the expected harvest from fishing.

First, if the expected direct productivity of at least one element of the social structure (S_{it}) is positive:

$$(3) \qquad E_{t'<t}(\partial Q_t / \partial S_{it}) > 0$$

then there may exist some justification for investments in that element of the social structure

[5] Building on the standard production and yield functions for fisheries management in Conrad and Clark (1987). Note, as detailed below, that this straightforward method for modeling the benefits associated with fishing assumes that the net social benefits are always increasing in Y_t. Under conditions where society has allocated--say through an ITQ program--a share of the fishery to a given agent, a different model would be required to show the influence of social capital on the costs and benefits of overfishing by individual agents. See Charles *et. al.* (1999) for an example of a model that can be so adapted.

[6] For example, weir fishers and their neighbors on Cape Cod value the continued existence of this way of life, apart from its commercial value (Arnold 2000).

[7] Depending on the nature of the good, A_t may be associated with, for example, exogenous weather shocks or other community-level characteristics.

as a form of social capital. For example, if experience in a community suggests that the presence of active fishing associations will be associated more cooperation among local fishers, then this is a necessary but not sufficient condition for a possible investment these associations.

Second, if the expected direct productivity of all *j* elements of the local social structure is nil:

$$(4) \qquad E_{t'<t}(\partial Q_t/\partial S_{it}) = 0, \quad i = 1 \ldots j$$

then there still may exist some justification for investments in some element of the social structure as a form of social capital, as long as one of the following conditions hold:

$$(5) \qquad E_{t'<t}(\partial K_t/\partial S_{it}) > 0; \quad E_{t'<t}(\partial L_t/\partial S_{it}) > 0; \text{ or } \quad E_{t'<t}(\partial H_t/\partial S_{it}) > 0, \quad i = 1 \ldots j.$$

In other words, if some element of the local social structure has a productive role in the creation of physical capital, labor, or human capital which in turn affects the desired output (so that, for example, $E_{t'<t}(\partial Q_t/\partial K_t)*(\partial K_t/\partial S_{it}) > 0$), then there still may exist some justification for investments in that element of the social structure. For example, if participation among fishing crews in local organizations is associated with better information diffusion--including information about more sustainable fishing techniques--then a possible investment in such a groups may be justified.

Finally, there is also a real possibility, in many cases, that some elements of the social structure have a negative effect[8] on the expected output, either directly or indirectly:

$$(6) \qquad E_{t'<t}(\partial Q_t/\partial S_{it}) < 0$$

$$(7) \qquad E_{t'<t}(\partial K_t/\partial S_{it}) < 0; \quad E_{t'<t}(\partial L_t/\partial S_{it}) < 0; \text{ or } \quad E_{t'<t}(\partial H_t/\partial S_{it}) < 0, \quad i = 1 \ldots j.$$

For example, in communities where social norms restrict social contacts across different ethnic groups, this element of the social structure will lower outcomes that depend on the cooperation of the entire fishing fleet. In such cases, while investments in this form of social capital are ruled out by definition, the presence of this form of social capital may (as further discussed below) call into question the implementation of support for local fisheries.

To summarize this section, the definition of Schiff (1992) conforms to a functional view of social capital (Coleman 1990) whereby elements of the social structure can affect outcomes in fishing communities through three main mechanisms: information sharing; the impact on transaction costs, and the reduction of collective action dilemmas. The expected functional relationship between elements of the social structure and the proposed deliverable--as summarized in (1)-(7)--can serve as a guide to potential investments in various forms of social capital.

4. FISHERIES MANAGEMENT AND POTENTIAL INVESTMENTS IN SOCIAL CAPITAL

With this perspective at hand--that elements of a local social structure can be viewed as potential inputs into a fishing harvest--one can then begin to evaluate the expected stream of benefits and costs associated with various forms of capital.

Consider first the benefits. Building on the notation established in the previous section, let the expected benefits (at time $t' < t_o$) of a potential investment which may be undertaken from time t_o to t_n be $\{U(t_o), U(t_1) \ldots U(t_n)\}$, so that the expected present value of the benefits at time t_o is:

$$(8) \qquad E_{t'<t0} \ PVB_{t0} = \Sigma[U(t_i)/(1+r)^i], \quad i = 0 \ldots n$$

In addition, let the expected benefits of the potential project be increasing and concave in

[8] Note that in this case they would still conform to the definition of Schiff (1992) as a form of social capital: as in the case of physical capital inputs or human capital inputs, some elements here can have a negative effect on production.

production of the deliverable in each year[9], so that:

$$(9) \qquad E_{t'<t0}\ \partial U(t)/\partial Q_t > 0, \quad E_{t'<t0}\ \partial^2 U(t)/\partial Q_t^2 < 0.$$

By combining material in (1)--(8), one can formally note that:

$$(9a) \qquad E_{t'<t0}\ \partial PVB_{t0}/\partial S_{it} > 0,$$

when (2) holds or when (3) and (4) hold; and that:

$$(9b) \qquad E_{t'<t0}\ \partial PVB_{t0}/\partial S_{it} < 0,$$

when (5) or (6) hold. In other words, social capital will have at positive (negative) effect on the expected net present value of a local fishery only when at least one element of the local social structure has a positive (negative) effect on the production of the deliverable at some time in future.[10]

Why are (9a - 9b) useful for local stakeholders are they assess the policy options for sustainable use of local fisheries? These equations formalize the potential relationship between elements of the local structure, other potentially productive inputs, and the net social benefits. Addressing the implications of these equations suggests that one can productively use such a framework to address a range of policy options in fisheries management. Specifically, as argued below, these equations imply that local stakeholders need to take the potential effects of social capital into account--even as they imply that such practitioners should not always be advocating investments in social capital.

First, using this kind of cost-benefit framework shows that potential investments in social capital should be considered only alongside potential investments in physical and human capital. While (9a) summarizes the possibility that social capital will be expected to have at positive effect on the net present value of benefits in some local fisheries, the relative magnitude of this positive effect should be compared to the corresponding (expected) effects of physical and human capital.

This leads to the conclusion that only in a limited number of cases will investments in social capital--primarily through support for local organizations or the regular convening of local stakeholders--be called for. These cases are when: the discounted stream of expected benefits of incremental social capital is significantly greater than the corresponding discounted stream of expected costs; and when the uncertainty about potential damages to the local social structure through such financial contributions is minimal. This latter case is particularly important because, in many fishing communities, outside intervention has the potential to significantly harm the local social structure.

Second, since social capital may be a substitute or a complement to other inputs which affect project performance (as illustrated by (9a), when (3) and (4) hold), the potential effect of social capital on the net present value of benefits should be assessed in the context of management of most local fisheries--even when the potential for investments in social capital is unlikely. The sunk costs of this kind of informal or formal 'social assessment' of the social structure of many communities will, in most cases, be relatively small.[11]

Specifically, social assessments may also help to identify how social characteristics of communities impede the flow of information among different sets of households; affect transactions costs; or reduce collective action dilemmas. For example, in fishing communities with norms that discourage social contacts between fishers which use different gear types,

[9] As noted in (1), X_t is an argument in the flow of net social benefits. This implies that social capital -- and other forms of capital -- affects the net present value associated with the existence of a local fishery. Tracing this dynamic effect requires the derivation of the full solution to a dynamic programming problem with a set of constraints, including the change of social capital though time. See Sethi and Somanathan (1996) for a related approach.

[10] It is of course possible that some elements of the local social structure have a positive effect on the production of the deliverable while others have a negative effect, thereby making the sign of $\partial PVB_{t0}/\partial S_t$ unknown.

[11] In the context of international development, social assessments are systematic investigations of the social processes and factors that affect development impact and results.

these norms lower the probability of collaborative and sustainable use of the local fishery. Overall, this information can provide information on which fishing communities will, *ceteris paribus*, have higher expected returns to specific management interventions.

Third, by using social assessments and by considering the costs and benefits of potential investments in social capital, outside experts in fisheries management may advocate, in selected cases, no activity be undertaken in low social capital communities. Using the cost-benefit framework presented above, this would be in the case of (9b) and when (5) or (6) hold, and when the expected net benefit of a proposed intervention in a specific region is below some standard criteria.

Less formally, this would be true when the costs of investing in physical capital, labor, or human capital in a certain region do not generate enough benefits--precisely because levels of social capital in that region are low.

Accordingly, this kind of framework suggests that primary investments should not be undertaken in some communities because low social capital dramatically reduces the likelihood of success; and--relative to high social capital communities--the potential benefits of these investments do not outweigh the likely costs. Unless considerations of existence value dictate that certain investments should be targeted to the most threatened fishing communities (including those that have very low levels of social capital), this may be the right policy prescription in the likely case that public resources are limited.

If considerations of existence value do dictate that certain projects should be targeted to most threatened fishing communities, then the allocation of investment resources for such projects may need to must be adjusted to take into account the local social structure. Consider, for example, investments in the threatened fishing communities of Nova Scotia. If regional or national policy dictates that investments in should be targeted to the most threatened communities, the allocation of investment resources may need to be adjusted to take into account the characteristics of local social structures. Possible adjustments include investments in the strengthening of local organizations and in more frequent opportunities for co-management--in the form of stakeholder conferences--among the range of local stakeholders.[12]

5. CONCLUSION

The theoretical perspective that is presented in this paper implies that investments in social capital can further increase the probability of sustainable use of many (but not all) local fisheries. First, potential investments in social capital should be considered only alongside potential investments in physical and human capital. Using a cost-benefit framework leads to the conclusion that only in a limited number of cases will investments in social capital--primarily through support for local organizations or the regular convening of local stakeholders--be called for. Second, even where investments in social capital may not be called for, the potential effect of social capital on well-being in fishing communities should be assessed in the planning of potential investments--since social capital may be a substitute or a complement to other inputs which affect well-being. Third, by using social assessments and by considering the costs and benefits of potential investments in social capital, outside experts in fisheries management may advocate, in selected cases, that no activity be undertaken in low social capital communities. Unless considerations of existence value dictate that certain investments be targeted to the most vulnerable communities (including those that have very low levels of social capital), this may be the right policy prescription.

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[12] For a good current example of how investments in social capital can potentially increase well-being in fishing communities, see the discussion of programs designed to increase communication among Oregon fishing families in Conway (2000).

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Appendix A

Table 1: The Characteristics of Economic Goods and the Likelihood of Influence of Social Capital

Type of good	*Characteristics of economic good*		*Example of good*	*Potential influence of social capital mechanism*		
				Information sharing	Transactions costs	Collective action
Private goods	Rival	Exclusive	Improved fertilizer	High	Low	Low
Toll goods	Non-rival	Exclusive	Irrigation system	Low	High	High
Collective goods	Non-rival	Non-exclusive	Feeder road	Low	High	High
Common pool resource	Rival	Non-exclusive	Community fishery	Low	High	Very high

Notes: the potential influence of social capital on the delivery of economic goods
See text for descriptions of the mechanisms and their relationship to the characteristics of economic goods