

**HOW TO INVEST IN SOCIAL CAPITAL?
LESSONS FROM MANAGING CORAL REEF ECOSYSTEM.
CASE FROM SOUTH SULAWESI, INDONESIA.**

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Abstract

Social capital defined as trust, norms of reciprocity, and networks, is believed to facilitate the formation of collective action and institution. It is significant for natural resource management, while it might alleviate problems associated with common-pool resources (Ostrom 1990, Dolšak and Ostrom 2003, Birner and Wittmer 2004, Grafton 2005). Following this concept, this study tries to seek whether investment in social capital, which includes promotion on stakeholder conferences, training of community leaders, and support for fishing organizations (Isham 2001, Folke et al 2005), can promote collective action and self-governance of resource use in coral reef ecosystem at local level.

Coral reef ecosystem in South Sulawesi has been pressured by reef-related fishing activities, which include destructive practices of blast and poison fishing. The analysis is based on a field study done between 2004-2005 in five selected small islands situated in Taka Bonerate Marine National Park and Spermonde Archipelago, South Sulawesi, Indonesia. These islands had been underwent a process of social capital investment.

Findings suggest that local rules or institutions to govern coral reef management are not yet endured. This occurs because fishers are not able to overcome collective action dilemmas, generally encountered by resource users in appropriating common-pool resources. Collective action is influenced by the extent of bonding, bridging and linking social capital held by fisher communities. Networks of conflicting interests exist. The analysis concludes on how to proceed with social capital investment, what limitations it possesses, and what opportunities to seize.

1. Introduction

Ocean and its entrenched resources such as fishery and coral reefs are categorized as commons. This resource shares two characteristics: (1) it is highly costly or impossible to exclude potential users from access to and appropriate the resource; and (2) the resource unit appropriation will subtract the resource stock available. Due to these characteristics, commons is confronted with problems of free-rider and of overuse. This situation is called “tragedy of the commons” by Hardin (1968), which occur when the resource is characterized by open access.

Many empirical studies show that common-pool resources can be used and managed sustainably by the resource users themselves (Berkes 1985, Ostrom 1990). One important feature for long-enduring self-governance of common-pool resources is the presence of social capital (*ibid*, Grafton 2005). Social capital may support collective action among individuals, and reduces free-riding problems. Social capital is trust, norms of reciprocity, and networks that facilitate the formation of collective action and institution. Investment in social capital has been promoted along with a growing urgency on collaborative management in coral reef management. Social capital investments might include expenditures on stakeholder conferences,

the training of community leaders, and support for fishing organizations (Isham 2001).

Following this emerging perspective, social capital investment have been promoted in small islands in South Sulawesi, with objectives to improve the capacity of local fishers and community members on issues related with coral reefs conservation and environmentally-friendly fishing practices. This study investigates to what extent investment in social capital of fisher communities increase social capital and succeed in promoting durable institution to govern the resource use with respect to coral reefs.

2. Theoretical Background

Social capital is a concept mainly derived from the works of Bourdieu (1992), Putnam (1993) and Coleman (1990); and it is most frequently defined in terms of the groups, networks, norms, and trust that people have available to them for productive purposes (Grotaert et al 2003, Pretty & Ward 2001, Longo 1999), including in governing common-pool resources (Ostrom et al 1994).

Even though it is difficult to measure social capital, it proposes three areas, in which social capital may contribute to societal performance: trust and trustworthiness; civic engagement and cooperation; and social networks which encompass of bonding, bridging, and linking social capital (Grafton 2005). These three areas are examined.

Dimensions of Social Capital

Three main dimensions of social capital with regard to social networks can be distinguished: bonding, bridging and linking social capital. Bonding social capital is strong bonds of social relationships which are endorsed among family members or among members of an ethnic group. Bridging social capital is weaker but more cross-cutting ties of social relationships, which can be found in relationships from different ethnic groups or acquaintances. Linking social capital are connections between those with differing levels of power or social status e.g. links between the political elite and the general public or between individuals from different social classes (Grootaert et al 2003, Aldridge et al 2002).

Another view classifies social capital as structural and cognitive social capital. Structural social capital embraces “the relationships, networks, and associations or

the institutional structures, both vertical and horizontal, that relate members”, while cognitive social capital is “norms, values, attitudes and beliefs that create and reinforce structural social capital and supports mutually beneficial collective action” (Uphoff 2000).

Social Capital and Resource Management

Grooteart et al (2003) offer three types of indicators to measure social capital, namely membership in local associations and networks; trust; and collective action. A causal mechanism for these indicators is proposed. It envisages that collective action or cooperation represent outcome of social capital, while social networks or membership in local associations represent causal factors in its determination. Further, trust represents “an input or output indicator, or even as a direct measure of social capital, depending upon one's conceptual approach” (p.14). In this study, trust is viewed as an input indicator. The causal mechanism is proposed in Fig. 1.

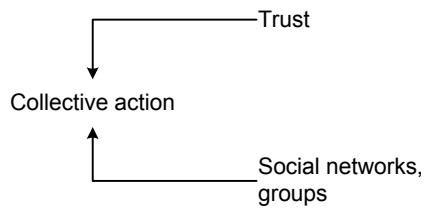


Figure 1: Relationships between three indicators of social capital.
Adapted from: Grootaert et al (2003: 14) and Grafton (2005: 754)

Norms of reciprocity and networks of civic engagement, which are defined by Putnam (1993) as social capital, can promote the sense of stewardship and the collective action of fisher communities on coastal and marine resources. Collective action evolves when shared norms and trust are existed. In this respect, “institutions serve as channels for collective action that are reinforced by diffused benefits, legitimization, and shared expectations” (Uphoff 1986:14). Birner & Wittmer (2004) adds that “collective action offers the instrument of social control and at the same time reduces transaction costs because the coordination costs within local communities decrease.”

Investment in Social Capital

Building trust and the growth of social network are closely related to investment in social capital. Social capital is built by investing in social relationships, and the

network that emerges can either focus on horizontal or vertical collaboration (Folke et al. 2005: 451). Social capital investments can be done through expenditures on stakeholder conferences; the training of community leaders, and support for fishing organizations (Isham 2001). It also includes recognizing resource users to develop rules as well as monitoring and sanctioning, in governing common-pool resource use (Ostrom et al 1994).

Investment in social capital will likely promote collective action to govern coral reef resources. Furthermore, increasing social capital that is networks of bonding, bridging and linking social capital is likely to improve fisheries governance, as proposed in Table 1 below (Grafton 2005).

Table 1: Social capital and fisheries governance

Aspects of fisheries governance	Type of social capital		
	Bonding social capital	Bridging social capital	Linking social capital
Conflict resolution	X	X	X
Rule compliance	X	X	X
Knowledge creation, diffusion and exchange		X	X
Enhanced flexibility to change		X	X
Rent-seeking behavior	X		X
Management options with uncertainty	X	X	X

Note: 'X' indicates the governance factor (row) is likely increasing in the number and quality of connections of the given type of social capital (column).

Source: Grafton (2005: 759).

3. Research Questions and Hypotheses

The aim of this study is to investigate to what extent investment in social capital of fisher communities increase social capital and succeed in promoting durable institution to govern the resource use with respect to coral reefs. Specifically, answers are pursued for the following questions:

1. Does community-based assistance increase social capital?
2. To what extent the improved social capital affect rules on resource use?

Hypotheses to test are:

1. The external intervention increases social capital due to increase island community and fishers interactions.
2. The improved social capital improves institutional arrangement of resource use which beneficial for ecologically sustainable marine resources.

4. Case Studies

To test hypotheses, the study selects 5 case studies of small islands whose communities had received an externally-input assistance. The case studies must be carefully selected, so that comparisons of the range of relevant theoretical variables and their interactions can be carried out. Three parameters of selection are followed. First, the island fisher communities are situated in coral reef resources and dependent upon reef fishery.

Secondly, the communities had been receiving externally-input assistance from NGOs, universities and/or a national program for around a decade. The activities included promoting community's awareness on coastal and marine conservation and environmentally friendly resource use, convening community and fisher meetings, training of fishers and local leaders, promoting credit union, introducing mariculture and other income generating activities, establishing marine sanctuary, and initiating community monitoring. These activities are regarded as building social capital. They were disseminating particular norms, as well as promoting interactions among fishers and between fishers and other stakeholders. Regular engagements can build norms of reciprocity and trust.

The next parameter of selection is based on a comparison of a couple of indicators of the success of coral reef resource use carried out by the island community, that is (1) protection of the community marine sanctuary, (2) non-existent destructive-fishing practices i.e. using explosives and poisons to catch fish. These success indicators are considered to represent a good institutional arrangement of fisher communities that enable individuals to achieve productive outcome in situations where temptations to free-ride and shirk are ever present (Ostrom 1990:15).

Based on the preliminary information from the key-person interviews carried out during first data collection in 2004 on the characteristics and two success indicators of many candidate islands, the study determined successful and unsuccessful cases of fisher communities that have experienced investment in social capital (Table 2).

Table 2: Case studies

	Spermonde archipelago	Taka Bonerate MNP
Successful	Kapoposang	Rajuni Besar, Rajuni Kecil
Unsuccessful	Barrang Caddi	Tarupa

Source: Primary surveys (April-June 2004).

Some characteristics of the study sites are presented in Table 3. These islands are differing in the formal institutional arrangements. This difference may generate better results. The study can show whether the different formal institutional arrangements influence fisher collective action and rules.

Table 3: Characteristics of study sites

Characteristics	Islands		
	Tarupa, Rajuni Kecil, Rajuni Besar	Barrang Caddi	Kapoposang
Formal institutional arrangements	Taka Bonerate Marine National Park	–	Kapoposang Tourism Marine Park
Externally-input assistance	<ul style="list-style-type: none"> ▪ COREMAP / LP3M (1999-2004) ▪ EMDI / LP3M (1993-1999) 	<ul style="list-style-type: none"> ▪ FKB / UNHAS (2003-present) ▪ LP3M (1989-2000) 	<ul style="list-style-type: none"> ▪ YKL, LEMSA (2000-2002) ▪ Yasindo (1995-?) ▪ LP3M (1995-1998)
Geographical location and resource characteristic	<ul style="list-style-type: none"> ▪ Remote, 6-8 hours from the Kabupaten capital. ▪ Wealthy in fishery and coral reef resources. ▪ Rarely visited by tourists. 	<ul style="list-style-type: none"> ▪ Only 1 hour from the provincial capital. ▪ Poor in fishery and coral reef resources. 	<ul style="list-style-type: none"> ▪ Remote, 6-8 hours from the provincial capital. ▪ Wealthy in fishery and coral reef resources. ▪ Regularly visited by tourists.

Source: Survey (April-June 2004).

Investment in Social Capital

The studied islands have been experiencing social capital investment (Table 4). These activities are regarded as building social capital, because they are disseminating particular norms, as well as promoting relationships among fishers, and between fishers and other stakeholders. Through regular engagements norms of reciprocity and trust can be developed. Alongside with the objective to improve community's awareness on environmental issues, the activities included physical development, such as developing electricity, sanitation infrastructure, desalination system, as well as economic improvement of island residents.

Table 4: Strategies and activities of the community-based externally-input assistance

Input assistance	Rajuni Besar, Tarupa Islands (Taka Bonerate MNP)	Input assistance	Kapoposang Island	Input assistance	Barrang Caddi Island
COREMAP / LP3M (1999-2004, 2005-on going)	<ul style="list-style-type: none"> ▪ Marine sanctuary. ▪ Conservation group. ▪ Credit union. ▪ Women activities. ▪ Monitoring-Controlling-Surveillance. 	<ul style="list-style-type: none"> YKL & LEMSA (2000-2002) 	<ul style="list-style-type: none"> ▪ Awareness raising on natural resources. ▪ Local institution strengthening. ▪ Mariculture. ▪ Diving. 	<ul style="list-style-type: none"> UNHAS (2003-2005) 	<ul style="list-style-type: none"> ▪ Marine sanctuary.
LP3M (1993-1999)	<ul style="list-style-type: none"> ▪ Awareness raising/marine conservation. ▪ Mariculture. ▪ Women activities. ▪ Form community groups. ▪ Community participation in park planning. 	<ul style="list-style-type: none"> Yasindo (1995-?) 	<ul style="list-style-type: none"> ▪ Conservation group. ▪ Education. ▪ Health. ▪ Mariculture. ▪ Diving. 	<ul style="list-style-type: none"> LP3M (1989-2000) 	<ul style="list-style-type: none"> ▪ Local institution strengthening. ▪ Conservation group. ▪ Credit union. ▪ Mariculture. ▪ Women activities. ▪ Health.
WWF/P3O-LIPI/KSDA/UNHAS (1994-1995)	<ul style="list-style-type: none"> ▪ Training in diving and coral reef monitoring ▪ Community mariculture project 	<ul style="list-style-type: none"> LP3M (1995-1998) 	<ul style="list-style-type: none"> ▪ Conservation group. ▪ Credit union. ▪ Mariculture. ▪ Women activities. ▪ Health. 		

Source: Primary surveys (April-June 2004 and July-October 2005), Alder and Christanty (1998).

Note: WWF (World Wide Fund for Nature), P3O-LIPI (Indonesian Institute of Science), KSDA (Natural Resources Conservation Unit of Forestry Ministry), UNHAS (University of Hasanuddin i.e. Marine Science Laboratory).

5. Resource Use

Patterns of resource use influence the condition of resource system, its improvement or deterioration. In this way, resource system is an effect of human activities. The condition of coral reef for each area is shown below. This data is taken from secondary sources, from available ecological research results. Furthermore, resource use is examined, with regard to destructive fishing practices.

State of Coral Reefs

Corals are vital as spawning grounds for many species of fish and help prevent coastal erosion. Monitoring the status of reefs over time is an important aspect for management. The living coral cover is a useful indication of the quality of reefs. The diversity of reef fishes is correlated with the condition of reefs as determined by the percentage cover of living coral (Soekarno 1989).

Nevertheless, data of coral reef condition in Taka Bonerate MNP where Tarupa, Rajuni Kecil and Rajuni Besar situated are of poor quality, as the hard coral cover is characterized as damaged (Table 5). Similar situation portrays the condition of coral reef in Spermonde Archipelago, while only marine area near Kapoposang Island had good condition (Table 6).

Table 5: Coral reef condition at Taka Bonerate MNP in 2000

Location	Percent of hard coral cover	Quality of reef ¹
B. Tinanja	47.5	Damaged
Ampalasa Island	48.0	Damaged
Latondu Kecil Island	48.0	Damaged
Rajuni Kecil Island	58.1	Good
Tinabo Besar Island	48.1	Damaged
Balandia Reef	54.8	Good
Bongko Reef	47.2	Damaged
Bubbe Reef	48.9	Damaged
Gama Reef	50.4	Damaged
Gantarang Reef	49.4	Damaged
Kumai Reef	51.6	Good
Rajuni Reef	54.9	Good
Teros Reef	48.5	Damaged
T. Tumbor	45.4	Damaged
Average	50.1	Damaged

Source: Average percent of hard coral cover during detailed survey (Coremap – ACIL 2000, Appendix 2). Note: ¹ Based on Sukarno and Naamin (1986).

Table 6: Coral reef condition in Spermonde Archipelago in 2003

Kota/ Kabupaten	Area of coral reef (Ha)	Percent Damaged	Percent Good
Makassar City	1.80	46	54
Barrang Caddi Island	0.50	75	25
Pangkep Regency	210,455.03	54	46
Kapoposang Island	500.00	30	70

Source: DKP South Sulawesi (2003).

State of Destructive Fishing

Interviews with fishermen conducted in 2004 and 2005, indicate that blast fishing in the provinces of South and Southeast Sulawesi was initiated by the Japanese troops during the war. During the 1960s and 1970s, blast fishermen still used remnants bombs, but since 1980s they used materials from fertilizers. Nevertheless, poison fishing using cyanide was introduced by divers from Taiwan and Hong Kong fishing vessels around 1985 (see Halim 2002).

A dynamic of blast and poison fishing in studied islands is apparent from these surveys. Each island situated in Taka Bonerate MNP is not free from destructive fishing activities. The extent of destructive fishing in Tarupa, Rajuni Kecil, and Rajuni Besar varies depending on the presence intensity of external assistance. During survey in 2004 field facilitators were present, but in 2005 were ceased.

Furthermore, in Barrang Caddi, half of fishermen use poison fishing, and the number does not decrease on the presence of external assistance that developed marine sanctuaries since 2004. On the other hand, there was no, or only trivial number of, resident fishermen using blast and poison fishing in Kapoposang, or even when it exists the number is trivial.

It should be noted that data collection strategies for surveys in 2004 and 2005 were not the same. In 2004 a population survey was conducted, covering 3,990 respondents, while in 2005 a resource use interview was performed and covered 102 fishers. The index for poison and bomb fishing is calculated for each year. Index for 2004 is taken from the percentage of fishers using bomb or poison fish. Index for 2005 is calculated from the percentage of responses saying 'frequent' use of bomb or poison fishing by resident fishers.

The Figure 4 shows that Kapoposang has neither fishers using bomb nor poison fishing. Rajuni Besar in 2004 had no bomb and poison fishing, but proliferated in 2005. The increase in bomb and poison fishing also occurred in Tarupa and Rajuni Besar. However, both data cannot fully be comparable, especially for Barrang Caddi. There was no significant increase of the use poison fishing by fishers in this island. The difference shown in both years is because the different questions were asked. Data in 2004 shows the number of actual fishers using poison fishing, while data in 2005 shows the response of fishers on the frequent use of poison fishing.

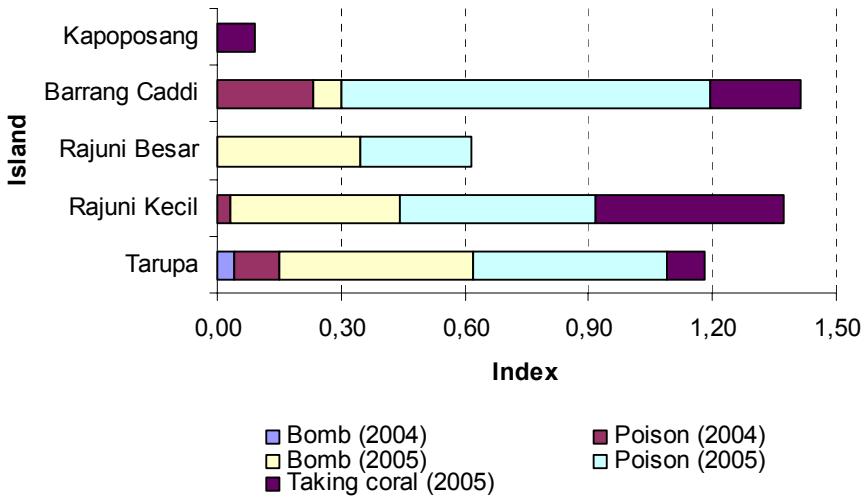


Figure 2: Index of bomb and poison fishing in 2004 and 2005

Source: Household survey (April-June 2004) with 854 valid responses, and resource user survey (July-October 2005) with 100 valid responses.

Note: There is no real increase of poison fishing in Barrang Caddi between 2004 and 2005. In particular for Barrang Caddi, the difference shown above had to do with the different type of question asked.

6. Bonding and Bridging Social Capital

This section presents social capital assessment of each study site. Three different dimensions of social capital are to assess: bonding, bridging, and linking social capital (Woolcock 1998, Narayan 1999). Linking social capital will be discussed on the subsequent section.

Index of Bonding and Bridging Social Capital

In order to measure bonding and bridging social capital of each island community, a composite measure or an index is developed. It is done by specifying different variables related to the attributes of cognitive (i.e. trust) and structural social capital (i.e. groups and networks). Each variable is then distinguished to each type of social capital, either bonding or bridging social capital (Box 1). For example, when the source of production capital is coming from community members in the island or when the market of the products is sold to island residents, then this network is regarded as bonding. On the other hand, when the capital is coming from outside the island or the products are sold outside the island, then it is regarded as bridging social capital.

Box 1: Variables of bonding and bridging social capital

Bridging social capital

Marketing of island's product: outsider
Marketing of island's product: Makassar
Source of the island's production capital: outside patron
Source of the island's production capital: patron of Makassar
Membership of group: neighboring island(s)
Membership of group: outsider
Visit out

Bonding social capital

(1) Horizontal

Marketing of island's product: residents
Source of the island's production capital: oneself or parents
Source of the island's production capital: credit union or ROSCA
Group membership
Membership of group: residents
Trust within community

(2) Vertical

Source of the island's production capital: island's patron
Membership in fishing patron-client network

Data is derived from the household and the resource user interviews based on structured questionnaires. The former was carried out in 2004 and the latter in 2005. Each has a distinctive sampling frame, but they represent the situation of each island.

The value of each variable is developed into indexes of bonding and bridging social capital. All islands have higher bonding than bridging social capital (Fig. 3). The island communities largely depend on the networks and groups of the island residents for capital and trade transactions. However, Kapoposang has higher bridging capital than other islands, which will be discussed in the following.

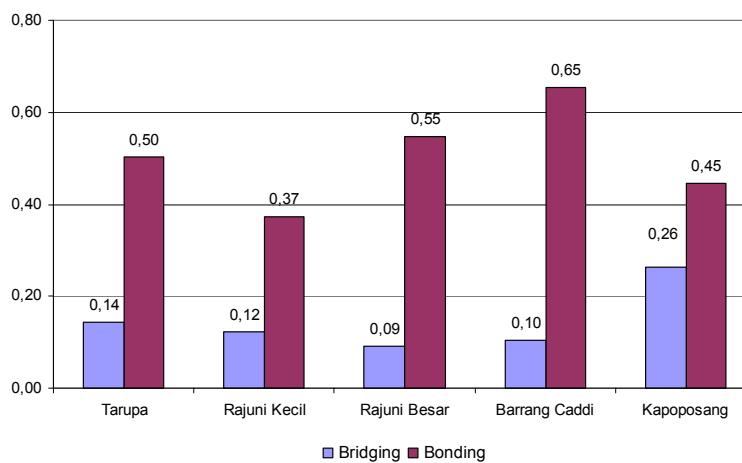


Figure 3: Index of bonding and bridging social capital.

Bonding Social Capital

The products of island's economy are fish, namely live fish, fresh fish or processed fish (i.e. salted and dried). In addition, there are small home industries such as kiosk, food stall, fuel selling, roof making and bricks producing. These products are typically sold to the collectors resided in the island, as well as for domestic consumption. This generates bonding trading networks.

Bridging Social Capital

Bridging trading networks are particularly high in Tarupa, Kapoposang, and Rajuni Kecil. Tarupa is a destination for a number of fish trading ships from many areas of Sulawesi to acquire live, fresh and processed fish; the same with Kapoposang where many small fishing traders came from Makassar to purchase fresh fish. The third highest index of bridging social capital is Rajuni Kecil, where many Buginese people operate cargo shipping business between Makassar and Nusa Tenggara that sell island products such as processed fish.

Vertical Bonding Social Capital: *punggawa-sawi*

When the overall bonding social capital is distinguished between vertical and horizontal bonding social capital, it is shown that Barrang Caddi and Tarupa have higher vertical bonding networks than other islands (Fig. 4). The vertical bonding social capital is composed of patron-client relationship variables, i.e. source of capital, group membership in a patron-client relationship, and existence of fishing patron (Table 1).

Fishermen in South Sulawesi normally maintain a relationship to a patron as the capital owner of their fishing activities, known as *punggawa-sawi*. There are independent fishers, but most are involved in these hierarchical relationships, particularly in the form of debt relations. Difficult economic and social situation but depending on a patron makes this relationship continue. This relationship places fishermen in the weak position, including in the distribution of profits (Meereboer 1998, Coremap – Socioeconomic Team 2001). A vertical or hierarchical relationship generally posses power and information imbalances, which is argued as not served to build trust and cooperation (Putnam 1993) and not correlated with good governance (Longo 1999). Nevertheless, fishermen are bond to and dependent upon

their patrons in economic and social aspects (Meereboer 1998), and it is difficult to break (Satria 2002).

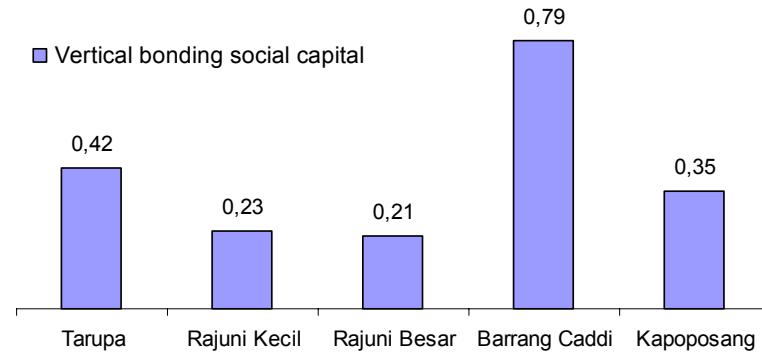


Figure 4: Index of vertical bonding social capital.

7. Building Social Capital and Collective Action

Social capital investment in the studied islands have been building social relationships and networks in bonding, bridging and linking social capital for coral reef management. To what extent networks and community and fishers capacity have been promoted, are discussed in the following. Subsequently, collective action of each island is examined, and covers two indicators of collective action, namely performance of conservation group and monitoring individual compliance.

Building Bonding Social Capital

The awareness raising brought into by the external assistance have promoted public education by regular communication and regular gathering in a community setting to island residents and fishers, in issues related with ecological conditions and processes of coastal environment including coral reefs. It dealt with avoiding resource use that ecologically destructive to environment and coral reefs. Norms of reciprocity and trust can be developed through long-term engagement (Coleman 1990, Putnam 1993, Ostrom 1990). Further, communities and fishers had been invited to observe sustainable resource use when they see infringements from these norms. This facilitation by the external assistance builds bonding social capital, where fishers observe fishing rules or sustainable fishing practices (Grafton 2005:756).

In Kapoposang where resident fishers generally using hook and line or net, they regularly disturbed by poison or blast fishing, thus prohibit and shoo away poison or blast fishers. Their actions have been increased after the public education from external assistance was received. Nevertheless, poison and blast fishings have not been ceased (KCC 2003, Jufri 2006).

During Coremap program in Tarupa, Rajuni Kecil and Rajuni Besar, the external assistance facilitated the establishment of MCS (monitoring, controlling and surveillance) to prevent destructive fishing practices in Taka Bonerate MNP. The system involved a couple of reef watchers in each island to actively engage in the monitoring activities, as well as initiated the involvement of the island residents to voluntarily monitor and protect their surrounding marine area from destructive activities.

The external assistance in these islands has increased the likelihood of fishers or community members to observe destructive fishing practices.

Building Bridging Social Capital

The external assistance had facilitated building bridging social capital that is cross-cutting ties of social relationships, which can be found in relationships from different ethnic groups or acquaintances. A bridging social capital is important for technological improvements, generating regional cooperation across fishing communities and in conflict resolution across competing fishing gears and interests (Grafton 2005: 756).

In Tarupa, Rajuni Kecil and Rajuni Besar, the external assistance promoted visits of the representatives of the island community members to visit other fishery-dependent communities. The visits were intended to learn from other communities on topics such as promoting and organizing mariculture and other income generating activities, as well as on issues related with protecting managing coral reefs and marine environment. Furthermore, field facilitators often assisted resident and external fishers promoting means to discuss common problems to resolve conflicts of competing gears and interests among them.

In Kapoposang, the activities of an NGO in the community included empowering village representative body. The facilitation was towards improving the knowledge and awareness on the function of village representative body (KCC 2003). It often

assisted conflict resolution on village government that was arisen between Kapoposang community and neighboring islands.

Learning from other communities' experience and promoting and providing medium for conflict resolution between resident and other fishers and communities account for building bridging social capital.

Building Linking Social Capital

In addition to the ability of resource users or fishers to craft rules and institution in governing resource use, the access to linking social capital is demonstrably central to well-being (Narayan 1999), as well as to effectively enforce resource use rules (Wilson 1982 in Schlager 1994). An important source of linking social capital is local leaders and intermediaries, who are able to facilitate connections between communities and external development assistance, including government programs (Krishna 2002).

Linking social capital refers to one's ties to people in positions of authority, such as representatives of public (i.e. government, police, political parties) and private (i.e. banks) institutions (Grootaert et al 2003). In fishery, "linking social is the relations between a fishery regulator or a government agency and a group of fishers" (Grafton 2005: 761).

In Tarupa, Rajuni Kecil and Rajuni Besar, the externally-input assistance of Coremap facilitated island communities to develop a community-based plan to manage coral reefs. The plan went through different stages of planning process and covered rules on resource use. During the formation of the plan, the external assistance promoted meetings and trainings that consisted of community representatives and local government, as well as government officers of Taka Bonerate MNP, fishery office and law enforcement office (LP3M 2002).

Furthermore, conflict resolution on competing fishing gears between resident and external fishers had been facilitated during the period of external assistance. The conflict resolution was involving NGO and government offices at the regency level such as People Representative Body (DPRD) and Fishery Office, as well as local community and patron. It settled rules on resource use, in particular fishing gears (hookah compressor, purse seine and vertical line) that could not be utilized in Taka Bonerate MNP, and these gears could only be used if its operation was partnership with local fishers (LP3M 2002).

In Kapoposang, the Natural Resource Conservation Office (BKSDA) that manages Kapoposang TMP encourages local community to craft rules on resource use surrounding the island, including access rules to external fishers to entering fishing grounds adjacent to Kapoposang. The rules may include check in and pay entrance fee to the local island (Jufri 2006).

In Barrang Caddi, an offender broke the community rule on marine sanctuary that had been established by the community. The external assistance assisted the island community to monitor their interests in law enforcement process towards the offender who was captured by the local monitor and then arrested by the police.

A linking relationship between island community and decision makers in government can be supplied by various actors that are field facilitators from NGO or universities, as well as government officials themselves. The relationship promotes the capacity and confidence of local fishers and communities to craft and enforce rules on resource use.

Performance of Conservation Group

Facilitated by the field facilitators, collective action against blast and poison fishing had increased. The island communities and fishers have built conservation groups and promoted local rules on resource use. In order to assess fishers' collective action, a couple indicators of collective action examined namely performance local conservation group and monitoring individual compliance.

A local conservation group in each island was formed to safeguard marine resources from detrimental resource practice such as taking coral, fishing using blast and poison fishing, and/or managing marine sanctuaries. However, in Barrang Caddi, the objective of the group facilitated by external assistance is to manage marine sanctuaries and does not directly promote prohibition in destructive fishing.

When the second survey conducted in 2005, external facilitators were only present in Barrang Caddi and Kapoposang. In the rest of islands facilitation was ceased. Different from Barrang Caddi, external facilitator that currently presents in Kapoposang is not an NGO or a university, but the Natural Resource Conservation Office (BKSDA) that manage Kapoposang TMP.

The majority of responses (73%) state that the conservation groups in all islands are not active, except for Kapoposang. In Kapoposang, park rangers infrequently visit and monitor the island. Nevertheless, assistant park rangers who

are local leaders are assigned by the Office to regularly monitor the area and receive monthly remuneration.

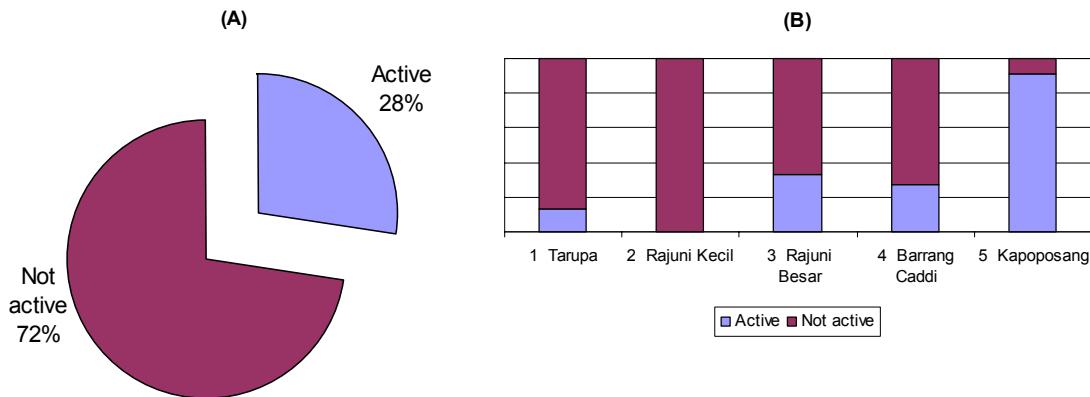


Figure 5: Performance of local conservation group in all islands (A) and each island (B).
Source: Resource user survey (July-October 2005), total N = 102

The conservation group in Rajuni Besar was active during the period of external assistance, but it is ceased since the external facilitators were absent by end of 2004. The same situation occurs in Rajuni Kecil and Tarupa. In Barrang Caddi, the conservation group in managing marine sanctuary, viewed by respondents, is not principally active. Monitoring the sanctuaries by the group had been done at the beginning and not continued.

Monitoring Individual Compliance

While fishers and communities in the islands largely understand that destructive fishing is illegal, respondents were asked if fishers normally forbid destructive fishing when they find this practice on the spot. Majority fishers (59 percent) in all studied islands state that they do not prohibit blast or poison fishing (Fig. 6).

Comparing among islands, respondents in most islands have answered 'never' prohibiting destructive fishing, except for Rajuni Besar and Kapoposang. Rajuni Besar has the highest 'frequent' prohibition destructive fishing (43 percent). Kapoposang has the highest response on 'rare'. Further, another interesting fact is shown. Even though Tarupa has a good deal fishers use destructive gears, it possesses 28 percent responses that frequently prohibit destructive fishing. This happens due to technological externalities between traditional and bomb or poison fishing gears in the same fishing grounds.

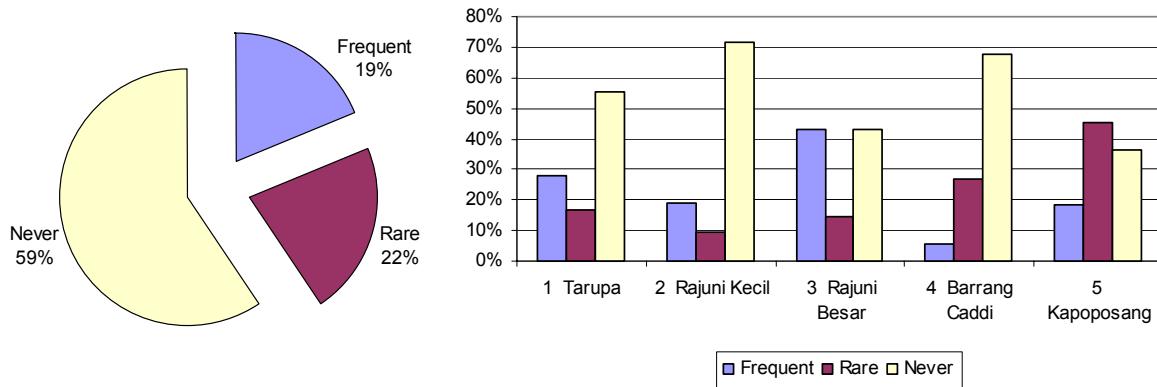


Figure 6: Monitoring individual compliance towards blast or poison fishing.
Source: Resource user survey (July-October 2005), total N = 102

The increase prohibition of destructive fishing has been influenced by the external assistance. Previously, even though destructive fishing gears interfered with traditional fishers, the latter rarely opposed it, while the former are usually richer fishermen and posses better financial and technological support. The external assistance promoted that such practices are destructive to marine environment including fish stock, which will detriment to fisher's harvest. Nevertheless, monitoring blast or poison fishers had increased the carefulness of perpetrators in conducting the illegal practices and not eliminated them.

Monitoring entails costs – such as time and resources – which only bear to fishers or community members who monitor. Likewise, it may include social cost, such as rejection or even violent tension from the blast or poison fishers. This tension might be developed into discredit or threats against those who forbid the practice. Consequently, many fishers prefer not to prohibit rather than worsening social cohesion.

Nevertheless, local rules on marine sanctuary and prohibition of destructive fishing that have been promoted by local fishers are no longer in effect when the external assistance is left. One reason is because credible commitment among fishers is not established. These rules were established by resident fishers, who interact with other fishers who do not conform the same rules or norms. Thus, norms of reciprocity are hard to achieve. It may not be achieved among resident fishers themselves, where one part of fishers residing in the same island is practicing destructive fishing, while the other parts are not. Moreover, it is hardly achieved when

resident fishers receiving external assistance interact regularly with other fishers who did not receive external assistance.

8. Determinants to Collective Action

Subsequent to external assistance, norms of reciprocity and social networks – bonding, bridging and linking social capital – in relation to resource use and coral reef management have been advanced. However, local rules on marine sanctuary and prohibition of destructive fishing that had been promoted by local fishers are no longer in effect when the external assistance left. Increase of bomb and poison fishing occurred in Tarupa and Rajuni Kecil between 2004 and 2005. Rajuni Besar in 2004 had no bomb and poison fishing, but proliferated in 2005.

Collective action and norms of reciprocity of island fishers and communities against destructive fishing practices are associated with diverging interests, levels of fairness and tolerance towards destructive fishing, perception on sanctioning offenders, consistency of law enforcement, and crisis perception.

Interests of Distinctive Networks

Bonding and bridging trading networks established in each island must be differentiated on their interests with respect to fishing practices. Tarupa and Kapoposang have both dense bridging marketing networks. In Kapoposang its network is largely not on blast fishing. On the other hand, high bridging network in Tarupa is on blast fishing. The destructive fishing practices have distinct networks, extending from fishers, tools providers, backing officers, island patrons, mainland patrons to exporters. A fisherman never works alone. He normally has agreements with a patron as capital owner and trader who finance and support fishing activities and in turn claim for the harvest. This characterizes vertical bonding social capital.

The vertical bonding social capital in Barrang Caddi is exceptionally high. Fish harvested from a fisher is mostly sold to an island patron. Fishing patrons and traders have connections with mainland exporters and capital owners in Makassar, thus possess strong financial capital. This island is characterized by high vertical bonding social capital, and it is predominantly supporting to poison fishing. Apart from that, high bonding social capital is also due to high membership of local groups.

The local institutional arrangements that structure the interactions of resource users and substantial leadership are some critical aspects in assessing local-level

conservation in order to promote institution for long-endure self-governance of common-pool resources (Agrawal 2001, Ostrom 1990). Fishing patrons are normally leaders in the community and affect a decision-making process. An establishment of institution of prohibiting blast and poison fishing in Barrang Caddi and Tarupa faces immense constraint. In these islands, one part of fishers in use blast or poison fishing, while another part does not. In Rajuni Kecil the number of fishers using blast or poison fishing is minimal. Thus, conservation rules were quite strongly maintained during the period of external assistance. Leadership in Rajuni Besar and Kapoposang has been involved and strongly supported conservation efforts brought into by the external assistance. There are no patrons in Kapoposang who promote blast or poison fishing.

Community Trust

Trust is cognitive social capital that can facilitate structural social capital and supports mutually beneficial collective action (Uphoff 2000). A community trust is assessed for each island. The level of trust varied significantly with island (Chi-Square test, $p < 0.001$). Rajuni Kecil has the lowest level of trust.

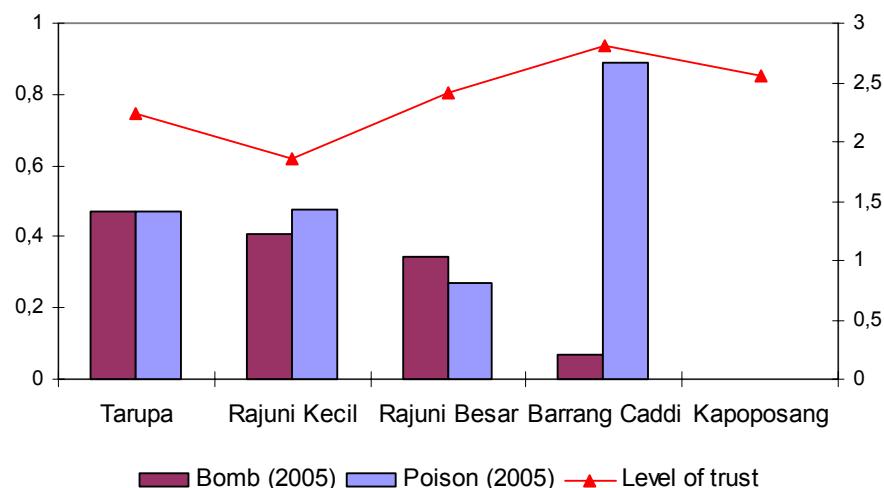


Figure 7: Level of community trust and frequency of bomb and poison fishing.

Source: Resource user survey (July–October 2005), total N = 102.

Note: 1 No trust; 2 Moderate; 3 Trust

Furthermore, trust is negatively associated with bomb fishing, with Spearman's correlation coefficient is -0.242 and test of significance $p < 0.05$ (two-tailed). Rajuni Kecil has high bomb fishing, while at the same time has the lowest level of trust.

Rajuni Besar and Kapoposang where destructive fishing practice is minimal or not existed (see section 6), the percentage of trust is higher than other islands.

However, the highest trust is in Barrang Caddi, where poison fishers are prevalent. This shows that the community trust is not necessarily related to the low level of destructive fishing practice. On the other hand, trust is also needed for practicing blast or poison fishing.

Tolerance and Fairness

Tolerance towards blast or poison fishing is an important indicator influencing fishers' actions. The level of tolerance is assessed for each island and varied significantly with island (Chi-Square test, $p < 0.001$). Barrang Caddi had the highest level of tolerance compared with others. In contrast, high percentage of no tolerance to blast or poison fishing presents in Rajuni Besar. Moreover, Kapoposang unanimously had no tolerance towards blast or poison fishers.

Furthermore, level of tolerance is positively associated with the prohibition of blast or poison fishing, with Spearman's correlation coefficient is 0,243 and test of significance $p < 0.05$ (two-tailed). Prohibition of blast or poison fishing was high in islands where there was no tolerance towards blast or poison fishers, such as in Kapoposang and Rajuni Besar.

Fairness is another consideration for fishers to forbid blast or poison fishing. Majority of fishers (58 percent, see previous section) did not prohibit bomb or poison fishing. They regarded the prohibition as not fair. The level of fairness is positively associated with the prohibition of blast or poison fishing, with Spearman's correlation coefficient is 0,279 and test of significance $p < 0.001$ (two-tailed). Rajuni Besar had highest level of fairness to forbid, compared with others. It also had highest level to forbid blast or poison fishing. Similarly, Kapoposang had high level to forbid, even though it had lower level of fairness to forbid.

Fig. 8 shows that fishers generally had high no tolerance towards blast or poison fishing, but they regarded to forbid such practice was not completely fair. Finally, their actions to forbid blast or poison fishing was lower than their level of tolerance and of fairness. However, one exception was Kapoposang, where fishers had higher level to forbid compared to its fairness.

Low level of individual monitoring by fishers and actions to forbid blast or poison fishing shows their ignorance. Ignorance came from persistent situation where fishers

felt that they did not have power or authority to do so, and their reports to officers would be useless.

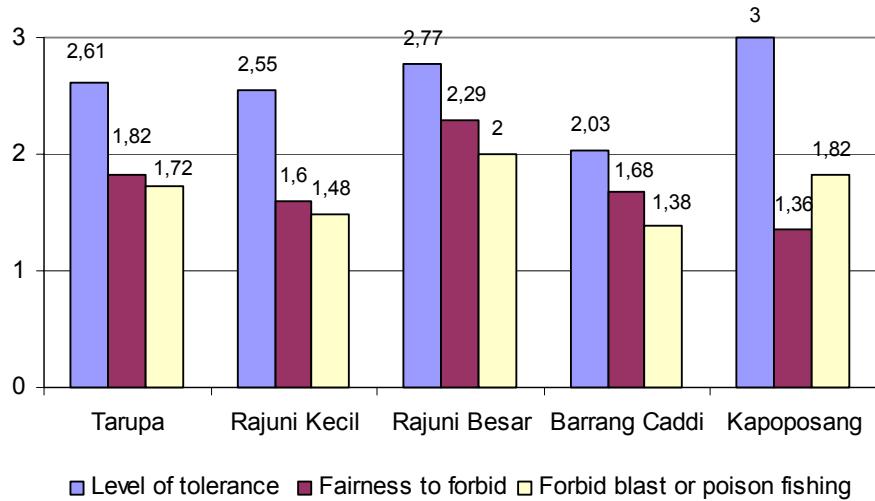


Figure 8: Level of tolerance towards blast or poison fishing; Fairness to forbid; dan Frequency to forbid blast or poison fishing

Source: Resource user survey (July-October 2005), total N = 102.

Note:

Level of tolerance: 1Tolerate; 2 In-between; 3 Not tolerate.

Fairness to forbid: 1Not fair; 2 In-between; 3 Fair.

Forbid: 1 Never; 2 Rare; 3 Frequent

Trust to Law Enforcement

The majority responded that formal law enforcement is not consistent (61 percent), and only 10 percent responses said it is consistent. The process of formal law enforcement against lawbreaker is cumbersome, complex, and rarely reliable, because of some constraints, namely: (1) difficulty to obtain complete evidence in order to verdict offender; (2) rent-seeking behavior of officers, who receive bribes from offenders by disregarding enforcement rules. Rarely that formal sanction is imposed to offenders.

Nevertheless, social sanction by fishers is only limited to prohibit and shoo away the blast or poison fishers. Informal sanctions were hardly ever carried out. It had been performed in Kapoposang, Rajuni Besar and Tarupa, by way of making declaration or confiscation of fishing boat; but it was only carried in Rajuni Besar and Tarupa during the period of external assistance.

A formal law emphasizes that sanctioning offenders of blast and poison fishing must follow a formal sanctioning process. Thus, even though offenders are discovered by fishers or community members who monitor, they must be reported

and formally arrested by officers that are police, park rangers, or field officers (*babinsa* or *binmas*).

Due to the fact that only formal sanction can be performed, fishers only avoid practicing destructive fishing when formal monitoring presents and disregard monitoring of other fishers. Thus, destructive fishing is still largely regarded as a breach of formal law, but not of informal or social rules. However, exception appears in fishing grounds where fisher rules are in place such as only to fish by hand lining.

Crisis Perception

It is important to notice how fishers perceive future resource stock, i.e. coral reefs and fish stock (Ostrom 1990:34). Resource users tend to take benefits from resources at present time, and care less for the future. When discount rate is high, users have normally less consideration on future benefit. The level of discount rate of resource users depend on the resource characteristics utilized or accessed by fishers. In the fisher communities studied, fishing grounds are indefinite and vast, due to the quasi open access characteristics of the resource, except on locations where fishing rights prevail. Mobile fishers can go to different fishing grounds where the former ones are no longer rewarding. It means the discount rate is high.

Fishers' perception on the impact of external assistance on the conditions of coral reefs and fish size is an important indicator influencing fishers' actions. The impact of external assistance on the conditions of coral reefs and fish size were assessed for each island and varied significantly with island (Chi-Square test, $p < 0.001$).

No crisis in fish resources is perceived by destructive fishers. It is shown by the impact of external assistance on the conditions of coral reefs and fish size that were negatively associated with the frequency of poison fishing, with Spearman's correlation coefficient is -0,251 ($p < 0.05$ two-tailed) and -0,408 ($p < 0.001$ two-tailed) respectively. Thus, islands with high frequency of poison fishing such as Barrang Caddi, Rajuni Kecil and Tarupa viewed that the condition of coral reefs were not changed subsequent to the presence of external assistance (Fig. 9). Correspondingly, Tarupa and Barrang Caddi perceived that there is no change in size of fish. These islands had prevalent destructive fishery than others. Fishing patrons in Barrang Caddi believe that poison fishing is not detriment to coral reefs nor fisher's harvest.

These islands had low crisis perception of resources, which were in contrast with Kapoposang that viewed that coral reefs condition worsened. Likewise, Kapoposang, Rajuni Kecil and Rajuni Besar perceived that the size of fish caught have increasingly been smaller or worsened in the last five years.

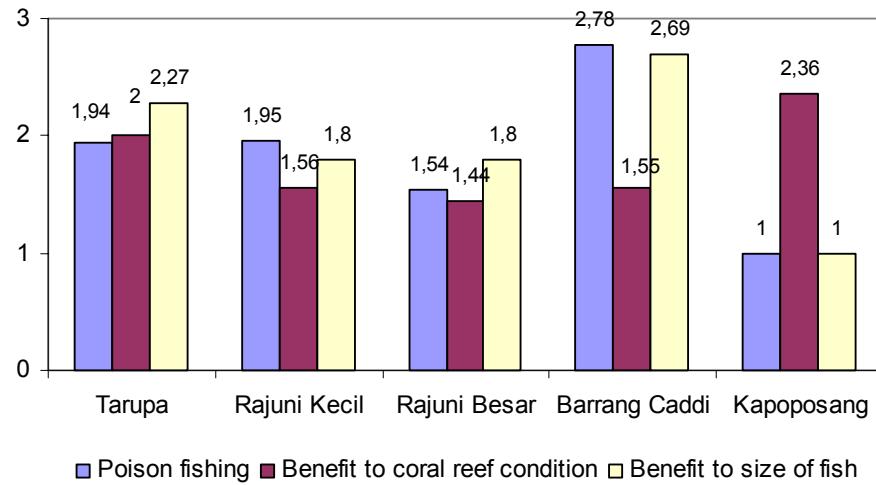


Figure 9: Poison fishing; Perceptions on benefit to coral reef condition and benefit to size of fish.
Source: Resource user survey (July–October 2005), total N = 102.

Note:

Poison fishing: 1 Never; 2 Rare; 3 Frequent.

Benefit to coral reef: 1 Worse; 2 No change; 3 Better.

Benefit to size of fish: 1 Worst; 2 Worse; 3 No change

9. Conclusion: Opportunities and Limitations of Social Capital Investment

To conclude, a confirmation of hypotheses can now be made. The social capital investment in island fishers and communities has increased social capital. The improved social capital had to some extent improved the institutional arrangement of resource use that beneficial for sustainable marine resources. Nevertheless, a durable institution is yet to achieve in all islands. Opportunities and limitations are observed.

Opportunities

The community-based coral reef management is the process of building social capital as well as organizational or institutional capacity of island communities. During the process, trust, norms of reciprocity, engagements of different networks were built.

The external assistance in these islands have increased the likelihood of fishers or community members to observe destructive fishing practices, which means

bonding social capital was improved. Fishers monitor resource use and prohibit and shoo away blast or poison fishers. Nevertheless, a distinctive network and a vertical bonding social capital are prevalent, that support blast or poison fishers. Thus, two different networks influence the level of local collective action towards conservation, and tension among them is dynamic in nature.

Learning from other communities' experience and promoting and providing medium for conflict resolution between resident and other fishers and communities can be accounted as building bridging social capital. Building bridging social capital is promoted by resolving conflicts with other resource users, through communication and discussion.

Building linking social capital had been promoted by opening ways to meet, discuss, and inform decision makers on issues faced by fishers. Medium for conflict resolution on competing fishing gears had been facilitated. The recognition for resource users to develop and monitor rules has been initiated through communications between fishers and people in positions of authorities such as government, police and people representative body.

Limitations

Apart from opportunities of social capital investment in local communities, lessons from five island communities studied shows that there are limitations as the following.

First is lack of sanctions towards offenders. Local rules without proper sanctioning and acknowledgement of local fishing rules and sanctions from wider resource users and formal institutions rarely gain sustained achievement. Further, resource users see that formal sanctioning by government is lacking or less reliable.

Second, element of fairness and of sympathy to not sanction offenders is paramount, that make fisher rules on prohibiting blast or poison fishing is difficult to craft, nonetheless to maintain.

Third, promotion of local collective action is difficult to achieve when asymmetries of interests exist. A vertical bonding social capital is maintained by many fishermen in South Sulawesi. The relationship between fishermen and capital owners extends to networks of capital formation and trade of reef fish are involving importers, traders, capital owners, and even rent-seeking law enforcement officials.

References

- Agrawal, A. 2001. Common Property Institutions and Sustainable Governance of Resources. *World Development*, 29 (10) : 1649-1672.
- Alder, J. & Christiandy, L.. 1998. Taka Bonerate: Developing a strategy for community-based management of marine resources. in Robinson, K. & Paeni, M. (eds). *Living Through Histories: Culture, History and Social Life in South Sulawesi*. The Australian National University, Research School of Pacific and Asian Studies.
- Aldridge, S., D. Halpern and S. Fitzpatrick. 2002. Social Capital: A Discussion Paper. Performance and Innovation Unit. London: PIU.
- Berkes, F. 1985. Fishermen and 'The Tragedy of the Commons'. *Environmental Conservation* 12(3): 199-206.
- Birner, R. and H. Wittmer. 2004. On the Efficient Boundaries of the State: The Contribution of Transaction Costs Economics to the Analysis of Decentralization and Devolution in Natural Resource Management. *Environment and Planning C: Government and Policy* 22 (5): 667 - 685.
- Coleman, J. 1990. Foundations of Social Theory. Harvard University Press, Cambridge.
- Coremap – Socioeconomic Team. 2001. Final Report. Socioeconomic Assessment Spermonde Islands. South Sulawesi. Socioeconomic Team Pokja Coremap Sulawesi Selatan, Indonesia.
- DKP South Sulawesi. 2003. Data Kondisi Terumbu Karang Tahun 2003 Untuk Menetapkan Prioritas Lokasi Rehabilitasi.
- Dolšak, N. and E. Ostrom (Eds.). 2003. *The Commons in the New Millennium, Challenges and Adaptation*. Cambridge: MIT Press
- Folke, C., T. Hahn, P. Olsson, and J. Norberg. 2005. Adaptive Governance of Social-Ecological Systems. *Annu. Rev. Environ. Resour.* 30: 441-73
- Grafton, R.Q. 2005. Social capital and fisheries governance. *Ocean and Coastal Management* 48: 753-766
- Grootaert, C., D. Narayan, V. N. Jones & M. Woolcock. 2003. Integrated Questionnaire for the Measurement of Social Capital (SC-IQ). Washington, DC: World Bank
- Halim, A. 2002. Adoption of cyanide fishing practice in Indonesia. *Ocean & Coastal Management* 45: 313-323.
- Isham, J. 2001. Can Investments in Social Capital Improve Well-Being in Fishing Communities? A Theoretical Perspective for Assessing the Policy Options. In: *Microbehavior and Macroresults: Proceedings of the 10th Biennial Conference of the International Institute of Fisheries Economics and Trade*, July 10-14, 2000, Corvallis, Oregon, USA. Edited by Richard S. Johnston and compiled by Ann L. Shriver. International Institute of Fisheries Economics and Trade (IIFET), Corvallis

- Jufri, A.M. 2006. Konflik Kenelayanan Kepulauan Spermonde, Sulawesi Selatan. Tesis. Universitas Indonesia.
- KCC (Kapoposang Care Consortium). 2003. Laporan Akhir. Otorita Pengelolaan Pulau Kapoposang yang Terpadu dan Berbasis Masyarakat.
- Krishna, A. 2002. Active Social Capital: Tracing the Roots of Development and Democracy. New York: Columbia University Press.
- Longo, J. 1999. "What Exactly Do You Mean, 'Social Capital'?" Multiple Meanings and a Myriad of Terms in the Space Between the Market and the State. CPSS Working Paper. Victoria: Centre for Public Sector Studies.
- LP3M. 2002. Laporan Akhir Proyek: Pengelolaan Berbasis Masyarakat (PBM) - Program Rehabilitasi dan Pengelolaan Terumbu Karang (COREMAP).
- Meereboer, M. 1998. Fishing for Credit: Patronage and debt relations in the Spermonde Archipelago, Indonesia. in Robinson, K. & M. Paeni. Living Through Histories: Culture, History and Social Life in South Sulawesi. Canberra: Australian National University
- Narayan, D. 1999. Bonds and Bridges: Social Capital and Poverty. Policy Research Working Paper 2167. Poverty Division, Poverty Reduction and Economic Management Network. Washington, D.C.: World Bank. Pretty, J. and Ward, H. 2001. Social Capital and the Environment. *World Development* 29 (2): 209-227.
- Ostrom, E. 1990. Governing the commons: The evolution of institutions for collective action. Cambridge: Cambridge University Press.
- Ostrom, E., R. Gardner, and J. Walker. 1994. Rules, Games, and Common-Pool Resources. Ann Arbor: University of Michigan Press.
- Putnam, R. D. 1993. Making Democracy Work: Civic Traditions in Modern Italy. New Jersey: Princeton University Press.
- Satria, A. 2002. Pengantar Sosiologi Masyarakat Pesisir. Jakarta: Cidesindo.
- Schlager, E. 1994. Fishers' Institutional Response to Common-Pool Resource Dilemmas. In: E. Ostrom, R. Gardner, J. Walker. Rules, Games, and Common-Pool Resources. Ann Harbor: University of Michigan Press.
- Soekarno, R. 1989. Comparative Studies on the Status of Indonesian Coral Reefs. *Netherlands Journal of Sea Research*, Vol. 23, No. 2, pp. 215-222.
- Uphoff, N. 2000. Understanding Social Capital: Learning from the Analysis and Experience of Participation. In: Social Capital: A Multifaceted Perspective (eds. P. Dasgupta and I. Serageldin). Sociological Perspectives on Development series. Washington, D.C.: World Bank. Pp. 215-52.