Report on Institutional Study, Jambi & Sumsel Provinces

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1 Introduction

This institutional study forms part of a wider research project, the purpose of which is to identify ecological and institutional criteria for the selection and beneficial use of harvest reserves[1] in tropical artisanal fisheries; and develop guidelines for their co-management in Indonesia.

There were three main components of the data collection, undertaken in three Indonesian Provinces (Jambi, Sumsel, and Kalbar); a biological monitoring program; a socio-economic monitoring programme; and this institutional study. This report details institutional results from two of the Provinces (Jambi and Sumsel). Kalbar was investigated at a different time.

The biological monitoring program and the socio-economic monitoring programme focused on the *outcomes* (both biological and socio-economic) of reserve management. In contrast, the institutional survey was undertaken to investigate the *process* of management. In this 'institutional' study, 'institutions' refer to;

> "the sets of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided, and what payoffs will be assigned to individuals dependant on their actions" (Ostrom, p.51)

Institutions, as used here, are therefore not synonymous with organisations.

1.1 Objectives of the study

Given that an objective of this project was to develop guidelines for *co-management* of harvest reserves, recognising the importance of local community involvement, it was necessary to see what affected the capacity and willingness of communities[2] to invest in fisheries management, in general, and harvest reserves in particular.

The main objectives of this study therefore were;

- to establish to what extent rules designed (by government and / or local decision-makers) to govern resource use, were

[1] Harvest reserve "spatially defined area, managed with a specified set of technical regulations, intended to sustain or increase the potential fish yields available from existing, natural fish stocks, for the benefit of fishers".

[2] The groups of people that use a certain resource. Furthermore a property of this community is that there exists "practices which have an historical continuity among a group of people" (Berkes, 1989,p.11)

a) put in place and;
b) complied with,

by resource users (and local decision-makers). This included looking at general fisheries management regulations as well as those specific to the set up and maintenance of harvest reserves.

- to investigate how the institutional characteristics of the situation (as well as characteristics of the communities and the resources themselves) may have affected local decision-makers and resource-user communities' capacity and willingness to invest in supplying new institutions and complying with them.

1.2 The approach

A case study based approach was used for this study. The main function of such an approach is to

> " search for patterns by comparing results with patterns predicted from theory or literature" and for "explanation building in which the researcher looks for causal links and attempts to build an explanation about the case" (Creswell, 1994).

With this in mind, sites for study were chosen purposively to cover a range of different institutional scenarios.

2 Methods

Four sites, linked to 4 villages, were investigated over a period of three weeks (August 1st - August 21st, 1999). Two of these were in Jambi Province and two in Sumsel Province. In all, in addition to any other regulations in place, Dinas Perikanan, with or without the involvement of the local community, had designated one of the waterbodies within the village area as a reserve.

Information for the study was collected through semi-structured interviews with key informants at each site. Such informants included: The kepala Desa (head of village) and his administration; ketua adat (traditional leaders), where they existed; villagers with particular responsibility for waterbody management (given to them by the government fisheries department, the village or other agencies); ketua nalayan (heads of fishermen groups); and fishermen (including those working on their own or in groups). Government fisheries staff at the District and Provincial levels were also interviewed.

It is important to note that there were a number of constraints that limited the nature of information that could be collected.

Firstly, the short period spent in each village meant that there was little time to develop a strong relationship with the respondents and therefore ask potentially more sensitive questions. Secondly, the main Indonesian counterpart was a trained biologist who had little experience of the subject being covered in this study and also limited interviewing experience. There were also some language constraints.

These limitations meant that more difficult or sensitive questions and complex ideas could not be answered or explored. In particular, with regards to the perceptions of respondents of the benefits of reserves, and the extent to which they would support further action, results here can only be regarded as preliminary. In addition, in Sumsel Province, where poaching and other conflicts were apparent, it was not always possible to establish the root causes.

3 Theoretical background and data collection

As suggested above, after establishing the extent to which resource users and local decision-makers were involved in and complied with fisheries regulations (including those associated with harvest reserves), explanations of the level of community involvement were sought with reference to relevant current theory and literature. This section gives a very brief overview of the literature that formed the basis for this explanation building.

3.1 Characteristics of long-enduring community institutions

Table 1 presents the set of institutional design principles suggested as necessary conditions for *enduring* 'community' involvement in common pool resource management. The rationale behind the importance of each is discussed in the text below the table. These criteria were established after extensive research of case studies characterised by long enduring institutions for managing common pool resources and with reference to the literature on collective action.

Table 1 Design principles illustrated by long-enduring common property resource (CPR) institutions (from (Ostrom, 1991) p.90

	Characteristics
1	Boundaries of the resource and those who can use it are clearly defined
2	Appropriation and provision rules are adapted to local conditions
3	Collective-choice arrangements allow participation of resource users in designing operational rules[3]
4	Rule monitors are the appropriators or at least are accountable to them[4]
5	Sanctions are graduated, taking into consideration the seriousness and frequency of the infraction
6	Low cost conflict-resolution mechanisms exist to solve disputes
7	Rights of user-communities to devise institutional arrangements are not challenged by external government authorities[5]

[3] Lack of participation at this level was seen as a principal constraint to enhancement initiatives in Bangladesh (Thompson, 1997).

[4] Lack of resource user involvement in monitoring was seen as a principal constraint to enhancement programmes in North East Brazil (Barbosa, 1998). Monitoring was also seen as a crucial component of management success in Bangladesh. (Apu, 1988).

[5] The lack of an enabling external policy environment was seen as a principal constraint to enhancement programmes in North–East Brazil (Barbosa, 1998) and Malawi (Scholz, 1997).

Since their publication, this set of design principles has been widely cited as important by many authors studying community-based common-pool resource management and are used by many practitioners involved in designing, or diagnosing problems in, institutional arrangements. Examples in the fisheries literature include (Garaway, 1999), (Pinkerton, 1995), (Apu, 1997), (Hartmann, 1995), (Schlager, 1993) and (Thompson, 1997). Individually, some of these criteria have been recognised as important by many authors, and some for many years.

1) Boundary Rules

Design principle 1 is perhaps the most widely recognised as having a bearing on stimulating interest in co-ordinating patterns of appropriation and provision, and an individual's willingness to commit to rules. When present, it gives some assurance that any benefits produced by the group efforts of the community are not be reaped by others outside who have not contributed to those efforts. This characteristic is often used as the defining characteristic of a "common-property" as opposed to an 'open access' institution, first suggested by Ciriacy-Wantrup and Bishop (1975).

2) Rules adapted to local circumstances.

If appropriation and provision rules are not adapted to the requirements and capacity of local users, or compensation mechanisms put in place when they are not, then they will not be adhered to without substantial coercion. Under such circumstances such coercion would have to come from outside the user community, an action which is costly, often prohibitively so.

3) Resource user participation in designing operational rules

Institutions that use this principle are better able to tailor their rules to local circumstances, because the individuals who directly interact with one another and with the physical world can modify the rules over time so as to better fit them to the specific characteristics of their setting.

4) Rule monitors are appropriators or accountable to them

It is frequently presumed that participants will not spend time and effort to monitor and sanction each other's performance because such actions involve relatively high personal costs and produce public goods available to everyone. In fact, there is substantial evidence to show that appropriators do monitor each other, possibly for several reasons. Firstly, the costs of monitoring are actually often quite low as monitoring can occur as resource-users go about their usual routine. Secondly, by monitoring the situation themselves, individuals gain information about levels of compliance and therefore can make more informed choices about whether they themselves will continue to comply with regulations or not. Evidence of compliance will enable them to make more credible commitments to the collective enterprise.

5) Sanctions are graduated

The principle behind the need for graduated sanctions is recognition that in some cases, resource users may face severe difficulties, causing them to break rules that, under normal

circumstances, they would have followed. A certain amount of flexibility in the application of sanctions, taking into consideration circumstance makes the system 'fairer'. Theory is that resource-users are more likely to monitor effectively, and commit to rules if they know that, if they were faced with a similar situation in the future, they would receive some understanding.

6) Low cost arenas for conflict resolution.

No matter how good rules are, or how well enforced, disputes are always likely to occur in some circumstances and it is necessary that such disputes are resolved quickly to avoid their escalation, and at low cost.

7) Minimal rights to organise

Without this, resource users are far less likely to invest time and effort into creating, complying with, and enforcing rules regarding the appropriation and provision activities as they could be overturned at anytime.

The criteria above are characteristics of long-enduring institutions, but there is also the issue of how institutions are set up in the first instance i.e. what makes local decision-makers invest time and other resources in designing institutions for the collective good. This was particularly important in this project, as it was to provide guidelines for how communities could be involved in the *set up* of harvest reserves.

3.2 Characteristics that encourage communities to set up new institutions

Assuming individuals are broadly rational, as defined by Ostrom (1991), they are more likely to invest in new institutions when the expected benefits of doing so are perceived to outweigh the expected costs. *Perceptions* of benefits and costs in turn will be dependent on the information type and sources individual decision-makers have available to them.

When considering costs, there are two types that are commonly recognised, the up-front costs of a change in the rules (often called transformation costs, (Buchanan, 1962)) and the costs of monitoring and enforcing sets of rules once supplied. The latter costs will in part depend on the presence of the criteria mentioned in Table 1, which, if in place, will encourage collective action and therefore devolve costs across the whole community of resource users. With regard to the former, there are several variables that have long been considered important in catalysing attempts to achieve collective action, doing so in part by lowering transformation costs and they are presented in Table 2. These have come from the work of, amongst others, (Olson, 1965), (Buchanan, 1962), (Ostrom, 1992), (Tang, 1995) and (Molnar, 1985).

Table 2 Community characteristics that lower the costs of institutional supply

	Characteristics
1	Number of decision makers low
2	Similarities of interest of decision makers and resource users[6]
3	Number of participants minimally necessary to achieve collective benefit is low
4	Presence of skilful leaders or individuals with other assets[7];
5	Presence of individuals willing to undertake entrepreneurial efforts or persuade existing organisations to get involved
6	Presence of shared norms that restrain opportunistic behaviour and create conditions for mutual trust and reciprocity
7	Past institutional decisions of local appropriators lowers the subsequent degree of change that newly proposed rules imply [8]
8	Autonomy to change rules exists
9	Presence of enabling external political regime

All these variables influence the structure of the situation faced by individual decision-makers by determining, for example; whether there is likely to be a lot of conflict that could be costly to resolve; the degree of change and therefore the time-scale, effort and associated costs required to instigate changes and maintain them and the financial costs involved; the likelihood of decisions ultimately being accepted or, once made, being overturned. For more information on how these variables generally affect transformation costs see (Ostrom 1991).

Benefits of new institutions are therefore weighed up against all these potential costs. Even if the potential benefits are high, research has shown that local communities' desire to minimise costs can be greater than their desire to maximise benefits (Garaway, 1999), (Lorenzen & Garaway 1998).

Aside from these issues, institutions are more likely to be created when benefits from doing so are tangible and relatively quickly realised (and seen to be) or if the costs of *not* doing so are perceived to be high (Ostrom 1991). As mentioned above, to make decisions, individuals need *information* about benefits (& costs). Previous research has shown that communities who have direct exposure to the potential benefits of certain fishery management institutions, through direct observation of existing cases elsewhere, are far more likely to set up similar institutions themselves, than those who are purely given advice by government departments (Garaway, 1999). Also found important was a commitment to improving their resource *prior* to any government involvement (Garaway, 1999).

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[6] An important factor in institutional set up in community fishponds in central Panama [Molnar, 1985 #14]

[7] Believed to be an essential factor in community enhancement initiatives in North-east Brazil (Barbosa, 1998)

[8] Past institutional decisions that allow incremental change was identified as an important factor in encouraging enhancement initiatives in Bangladesh (Thompson, 1997)

3.3 Data collected in the field

The Indonesia case studies were investigated with respect to the presence/absence of the attributes discussed in the tables above, in order to establish the extent to which the current institutional set-up already encouraged communities to invest and to establish whether they could be used in building an explanation of the current situations. The main areas of data collection are summarised in Table 3.

Table 3 Areas of data collection

Resource characteristics	• location of harvest reserve (proposed or actual) relative to village. • location of harvest reserve relative to other fishing spots • abundance of other/alternative fisheries resources • resource size and degree of vegetative coverage, • seasonal variability, • resource discreteness, • presence of any other enhancement measures (e.g. stocking).
User-community characteristics	• size, structure (economic and cultural heterogeneity), livelihood strategies, • dependence on resource under consideration, • past strategies of resource users, • presence of entrepreneurs, skilful leaders or individuals with other assets, • presence of traditional institutions within the village, • links with external agencies and their respective roles
Institutional arrangements	• operational rules determining when, where and how individuals should be involved in appropriation and provision activities, who should monitor the actions of others and how, what information must be exchanged or withheld, and what rewards or sanctions were assigned to different combinations of actions and outcomes, • collective choice rules determining who could make decisions on rule design under what circumstances and what constraints if any were imposed from those external to the decision making body, • past institutional decisions relating to waterbody management.
Outcomes / Patterns of interaction	• *perceptions* of outcomes of management • current constraints of management, • levels of compliance with rules.

4 Results

This section is split into several parts. After a brief tabular overview (4.1), the current status of fisheries management generally, and harvest reserves, in particular, is described for each study site in sections 4.2 and 4.3 respectively. Following this, this information is analysed in light of the institutional and other characteristics of the case study sites, as discussed in the previous section. Section 4.4 investigates the extent to which the case study sites fulfil the

criteria for long enduring community-involvement in management (both fisheries management rules generally and the particular instances of harvest reserves). This analysis provides information on the capacity and desire (actual and potential) of local communities to manage their fisheries at all.

Section 4.5 looks at the other range of criteria identified as being crucial in encouraging local communities to set up *new* institutions. Many of the rules for fisheries management have been in place for a considerable time and it was not possible to establish the precise conditions under which they were set up. However, the harvest reserves were all relatively recent initiatives and it is in this section that possible reasons for the relative successes of these initiatives are discussed.

4.1 Overview of current status of fisheries institutions

There were three categories used to classify the current status of management institutions, these being;

1. designed, put in place and generally complied with,
2. designed but not put in place (i.e. not working rules[9]),
3. designed and put in place but not complied with

In terms of compliance, 'non compliance' refers to a level of non-compliance that has already led to a breakdown in management, or threatens the longer-term sustainability of any such management. Results for the four case studies for; A) Rules regarding fisheries management institutions generally and; B) Rules specifically for harvest reserves are presented in Table 4.

Table 4 The status of fisheries management and regulations in the case study villages

	Jambi Province		Sumsel Province	
Village/Reserve	Arang Arang / Danau Arang Arang	Dano Lamo/S. Berembang	Pedemaran / Teluk Rasau	Benawa/ Lebak Nilang
A (management generally)	1	1	1	1
B (harvest reserves)	2	1	3	2

Code: 1 Rules designed, put in place and generally complied with,
2 Rules designed but not put in place (i.e. not working rules),
3 Rules designed and put in place but not complied with

[9] Rules are 'working-rules' if they are "actually used, monitored and enforced when individuals make choices about the action they will take" (Commons, 1957).

4.2 Current status of fisheries management generally

As suggested in the table above, all the villages and the waterbodies within their area were subject to some form of regulation. In the case of all but Teluk Rasau, these regulations have been written up in a previous report, (MRAG Ltd, 1998). More detailed investigation confirmed much of this information but did reveal some differences or omissions and these are discussed, where relevant, in this report.

The two Provinces varied significantly with respect to their institutional structure for fisheries management and will be discussed separately. Apart from the government-issued banning of the use of poisons, 'tuba', 'putas', pesticides and electricity, (regulations that were understood and upheld in both Provinces), both the rule-makers and objectives behind the regulations were very different in each Province.

4.2.1 Jambi Province

In both villages in Jambi Province, regulations were issued by the local village administration, the villages having *de facto* (though not *de jure*) rights of ownership of waterbodies within their village boundaries. Some waterbodies within their respective areas were auctioned out on a yearly basis, a system that allocated fishing rights in a way that was perceived to **reduce conflict** and also **earned the village money for its own community development**. In these areas, fishing access was restricted to the auction owners and their teams. In areas that were not leased out, fishing was open to all village members, but not to anyone outside the village without the special permission of the village leaders. In non-leased areas, there were also other regulations designed to **protect fish stocks**. These were predominantly gear restrictions, which varied depending on the resource type. They included; the banning of *FAD's*, and *empang* barriers in river channels. There were also some species-specific regulations for all areas; for example bans on catching small kissing gourami and spawning toman (Dano Lamo), or small toman (Arang Arang).

Village members monitored each other with respect to regulations in non-leased out waterbodies, whilst temporary owners of auction units would guard their own areas. Enforcement was also carried out at the village level through the *musyawarah desa*[10]. The perception of all interviewed was that these regulations were widely upheld and there were few instances where enforcement was required. On the occasions where it was, a verbal warning from elders, the fishermen head, or village leaders was usually sufficient.

4.2.2 Sumsel Province

In marked contrast to Jambi Province, regulations in Sumsel Province were not issued by the local village but by the regional government (Kabupaten) which operated through the local district government (Kecamatan). The regulations themselves were almost solely concerned with the auctioning of waterbodies, on an annual basis, with the purpose of **reducing conflict between fishermen** and **raising revenue for government**. The revenue generated was predominantly kept at the regional level, with some being redistributed to the local districts, who in turn would redistribute some monies to the villages who had auction units within their village area.

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[10] Systematised village discussion involving selected members of the village community

The rights of villages to benefit from resources within their area were therefore recognised to some extent by government, but rights to self-governance were not. There were some other regulations issued (but not obviously monitored or enforced, and therefore not 'working rules') by Dinas Perikinan[11] for the purpose of maintaining fish stocks. These involved bans on the catching of small valuable species. There were no regulations issued by the village communities either in the auctioned or non-auctioned waterbodies within their area, except that it was widely recognised that fishers from outside the village could not fish in the village open fishing areas (which were comparatively few).

Monitoring of regulations was carried out by auction owners in the leased units and was not obviously carried out in the open areas. Whilst, as in Jambi Province, the *musyawarah desa* was present as an institution that *could* be used for solving disputes and enforcing regulations within the village, it was not apparently used for fisheries regulations. Unlike in Jambi Province, it was not clear, to either the researchers or importantly, the fishermen, what procedure was in place for enforcement and sanctioning of rule infractions apart from self-enforcement, which was, unsurprisingly, strong in the auctioned areas.

4.3 Current status of harvest reserves

As suggested in Table 4, the status of harvest reserves varied between villages, showing all combinations of design, implementation and compliance. Each village will be discussed separately.

4.3.1 Desa Arang Arang (Danau Arang Arang)

In this village, the waterbody designated as a harvest reserve by Dinas Perikanan was Danau Arang Arang. This waterbody is characterised as one where institutions for harvest reserves have been designed but *not* put in place.

Previous research had suggested that even before any involvement of Dinas Perikanan, the regulations in place in this waterbody were already characteristic of a harvest reserve. In particular, the 'Hari Berkerang', a long running tradition of communal fishing towards the end of the dry season, which was apparently accompanied by a range of restrictions prior to this harvesting time.

However information collected in this study raised doubts as to whether this could be construed as a harvest reserve. Firstly, the restrictions were not as substantial as previously thought. For example whilst early information suggested that FAD's, large lift nets and gill nets were banned in the lake, and that no fishing was allowed with any gears until the Hari Berkerang was determined, this was not the case. The only gears banned all year were FADS. Fishing was allowed before the Hari Berkerang with all gears except cast nets (only used during the Hari Berkerang). Gill nets and large lift nets were banned *only* when the water started to recede and before the Hari Berkerang began (a period estimated to be, at most, one-month). Interviewees suggested that the purpose of these restrictions was to protect fish *for* the Hari Berkerang fishing season. At all other times of year, these gears could be used. The Hari Berkerang lasted anything between one to three months, though fishermen numbers reduced as fish availability declined. The main purpose of the Hari

[11] Government fisheries department

Berkerang, in the opinion of the interviewees, was to raise revenue for the village and it was also considered a celebrative event. Fishermen, who could also come from outside the village, paid a set fee to fish there. The information suggested that the waterbody was fished intensively, only stopping when it was no longer perceived to be economically viable.

In light of this information, with no evidence that it was the intention, or the actuality, that the regulations would sustain or increase the potential fish yields available for the benefit of fishers beyond any one season, it is suggested here that no village led harvest reserve was actually in operation.

The government, however, had themselves designated the area as a reserve. There was some evidence to suggest that at least some of the interviewees at village level were aware of this. For example in several instances, particularly amongst the village administration, there was talk of buffer zones where villagers were allowed to fish, and a core zone where there was to be no fishing. Whilst some interviewees suggested that these rules were already in place, they were not known about or understood by any of the fishermen interviewed, or even the head fishermen in charge of overseeing fishing on the lake. They could not therefore be said to be working rules. Further inquiry with the village administration revealed that although they knew of the idea, they had been given no guidelines on how to implement this and therefore were waiting for further information. It is the opinion of the author that they were in no great hurry!

4.3.2 Desa Dano Lamo (S.Berembang)

In this village, the waterbody designated as a harvest reserve was a 900-metre section of the Berembang River in the middle of the village (with a 50-metre buffer zone on each side). This waterbody is characterised as one where institutions for harvest reserves have been designed put in place and complied with.

Here then, was the one example where a harvest reserve was (so far) successfully in operation. In the reserve area, fishing with any type of gear was banned. This had been the case since its set up in 1997. All those interviewed believed that the regulations were widely upheld. Given its location in the middle of the village, surrounded by houses, the ability to go fishing unnoticed was very low.

Of those interviewed, some perceived that their catches had increased as a direct result of the reserve area whilst others believed, at least, that it had done them no harm. All said there were other places to fish. Initially, the headman explained that fishermen had been doubtful about the reserve, but that after the benefits had been explained to them, they were satisfied that it would benefit them. This was helped by two other initiatives in the reserve area. Firstly, when the reserve area was first declared in 1997, it was stocked with approximately 30,000 fingerlings, an initiative paid for by the Provincial Planning Service (Bappeda). Villagers could not remember which species, but suggested that they included tilapia and climbing perch. Irrespective of the biological affect such stocking has on the natural fish stocks, this event would almost certainly have increased the value of the resource as perceived by local people. The importance of this will be discussed in more detail in following sections. The second initiative was cage culture within the reserve area implemented since the initial research in 1998. At the time of this study, many cages, culturing snakehead, could be seen throughout the reserve area. These fish were being cultured for community benefit as opposed to being privately owned. This project was also being funded by government. Again, the obvious presence of these cages, there for

community benefit, would almost certainly have increased the value of the resource as perceived by local people. It remains to be seen what effect such initiatives have had on local fish stocks, a subject which the biological monitoring part of this survey may be able to shed some light on.

Finally, the reserve area is in a river channel, which connects to other villages both up and downstream. The fact that the villagers' efforts may help to increase catches in other areas was not an issue for those interviewed, as they believed that they would be the primary beneficiaries of the reserve area.

4.3.3 Pedamaran village (Teluk Rasau)

In this village, the waterbody designated as a harvest reserve by Dinas Perikanan was Teluk Rasau. This waterbody is characterised as one where institutions for harvest reserves have been designed put in place but not (always) complied with.

Teluk Rasau was some distance from Pedemaran village, but there was a smaller sub-community of this village living around one side of the lake, whose main occupation was farming. All the waterbodies surrounding the lake were auctioned areas. In this lake, fishing was prohibited all year round. The lake had also been stocked when the reserve was declared. This was a government ruling which none of the local villages were involved in designing. However, even though not officially allowed, it appeared that subsistence fishing by the local community was to some extent tolerated by the one guard, employed by Dinas Perikinan, who lived on one side of the reserve. He knew that poaching occurred but stated that it was not professional fishermen, but the local farmers. This guard was responsible for all monitoring of regulations, for which he was paid a small fee and accommodation. All villagers were aware that the regulations existed, but very few were satisfied with the current arrangements. There were perceived to be unfair and not for the benefit of local people. There were a number of factors that led to this perception and they will be discussed in more detail in the following sections. As a result of this, it is not likely that, even if villagers saw other people breaking the rules, they would inform the appropriate authorities.

Whilst some fishermen from the auction units denied any knowledge of poaching, others gave such information freely and said that many professional fishermen fished in the reserve at night with gill nets, and not only for subsistence. In the time available, it was not possible to ascertain the full extent of this poaching. However, one fisherman estimated that poachers could get up to 10kg of fish in one night. The level of poaching and dissatisfaction at Teluk Rasau suggests that even if it is currently fulfilling its function of sustaining or increasing fish stocks, it is a very fragile system.

4.3.4 Desa Benawa, (Lebak Nilang)

In this village, the waterbody *apparently* designated as a harvest reserve by Dinas Perikanan was Lebak Nilang. This waterbody is characterised as one where institutions for harvest reserves have been designed (at some level) but *not* put in place.

Lebak Nilang was a long distance from Benawa village. Surrounding the lake, apart from a large plantation, were auctioned units as described previously. Whilst the area was designated as a harvest reserve approximately five years ago, there was no evidence to suggest that it was being managed as such. Previously it had been part of the auction

system and being designated as a reserve justified it being taken out of this system. However, professional fishermen groups and individual fishermen still operated there exactly as previously. The village administration stated that Dinas Perikinan had appointed them as 'managers' of the resource and their responsibility was to manage it so there was no conflict. No regulations had been suggested that included a ban or regulation of fishing for the purpose of increasing or sustaining fish stocks. Both the village administration and fishermen operating in the lake were reluctant to discuss fees involved for fishing there or indeed how fishermen were selected. Interviews with others in the village suggested that the 'managers' did pay a fee (equivocal to the 'norm' for auction units) and that this was to Dinas Perikinan. Dinas Perikinan did not however confirm this. The fishermen in turn paid the managers. The fishermen, it appeared, were also selected by the managers, and the fishermen were also obliged to sell their fish through one of the managers who also operated as a fish trader.

The short amount of time available for the inquiry did not allow more detailed investigation of this sensitive subject. However, it appeared that whilst rules for how harvest reserves were to be managed were present at Provincial level, Lebak Nilang, along with other reserves in the region were organised by the regional fisheries department and the same regulations were not applied. When the fisheries staff were asked about this, they explained that they had not yet received any money from the Regional planning agency for either a guard or a sign designating the area as a reserve and therefore were not in a position to implement this type of regulation. What is clear is that when fisheries management institutions do not directly benefit the local community or the fisheries department (both believing they should be the principal benefactors), as with the case of the Sumsel auction system, there is less incentive for these stakeholders to invest in resource management or to change the system to their advantage where possible.

Section 4.4 investigates the extent to which the case study sites fulfil the criteria for long enduring community-involvement in management (both fisheries management rules generally and the particular instances of harvest reserves). This analysis provides information on the capacity and desire (actual and potential) of local communities to manage their fisheries at all.

4.4 *How local community capacity and desire to be involved in management has affected current strategies*

A summary of the institutional design principles of fisheries management in the 4 case-study villages is presented in Table 5. This investigates the presence/absence of the design principles for long enduring collective action first mentioned in Table 1. If co-management of harvest reserves is to be a workable management strategy, then there have to be incentives for the local communities to get involved.

Table 5 Summary of institutional design principles of fisheries management in the 4 case-study villages

Enabling design principles from Table 1	Jambi Province			Sumsel Province		
	Arang Arang	Dano Lamo		Pedamaran		Benawa
	OM	OM	HR	OM	HR	OM
1	Yes	Yes	Yes	No	No[12]	No
2	Yes	Yes	Yes	?	No	?
3	Yes?	Yes?	Yes?	No	No	No
4	Yes	Yes	Yes	Yes[13]	No	Yes [14]
5	Yes	Yes	Yes	?	Yes	?
6	Yes	Yes	Yes	Yes	Yes?	Yes
7	Yes	Yes	Yes	No	No	No

OM = Fisheries management not including harvest reserves

HR = Harvest Reserve Management (where a harvest reserve can be said to be in operation)

? = Unable to ascertain in time available

As can be seen in the table, there are great differences between the two Provinces with respect to these principles. In Jambi Province, current fisheries management institutions encourage communities to invest in their resources (in terms of monitoring, complying with rules and sanctioning non-compliance). In contrast, in Sumsel Province, the current institutions provide little incentive for local communities to do so. Each Province will be briefly discussed in turn below.

4.4.1 Jambi Province

Both communities visited in Jambi Province had fisheries management institutions characterised by the same design principles.

1. The boundaries of their resources were clearly defined as those within the official village boundaries. Within this area there were clear rules of access, with village members being the beneficiaries. Therefore any investment made by the village members themselves, they perceived, would predominantly benefit them. Each village had rivers that connected them to other villages, and given that fish are non-stationary resources, benefits may filter elsewhere. However villagers were not concerned by this as they believed that they would be the primary beneficiaries.

[12] In this case, the benefits of reserve management would be to those fishing in waterbodies connected to the reserve area. These may be utilised by people from outside the village, may change every year and will depend only on who makes the best bid for the auction unit and therefore it is felt that this design principle is not met, even though boundaries of the harvest reserve itself are clearly defined.

[13] In auctioned areas at least

[14] In auctioned areas at least

2. The rules appeared (in the short time available for investigation) to be adapted to local conditions. Not all areas were auctioned to allow individual fishermen fisheries access. Only specific gears were banned and generally not all year. Only those within the village were able to bid for auction units, and areas were auctioned on a yearly basis so that auction owners would be rotated. With regards to provision activities, the only duty taken on by villages was monitoring which did not constitute a large individual cost. Those with greater responsibilities, i.e. the head of the individual lake fishermen in Arang Arang were compensated for their efforts.

3. It did not appear that 'ordinary' villagers had a formal role in designing rules. However, even though this was the case, they could communicate their concerns via village meetings, influential people in the village, and those whose responsibility it was to resolve conflict. It was felt therefore that these people had a voice. In addition, those who *were* formally involved in the design of rules were often resource users themselves.

4. Rule monitors were the appropriators. With all monitoring each other, as they went about their routine business, personal costs were low. In Dano Lamo, the waterbody was surrounded by households, making this even easier. In Arang Arang, the waterbody was away from the village and therefore it was primarily up to the lake fishermen to monitor. However, there were only small periods of the year where there were many regulations (before the Hari Berkerang). Other gears that were banned were large, and set and therefore quite visible.

5. Sanctions were graduated with verbal warnings preceding fines. In fact verbal warnings were generally sufficient, as social sanctioning was strong.

6. Low conflict resolution mechanisms existed in the form of the *musyawarah desa*, a system used for all village affairs.

7. The government did not seem to challenge the rights of villages to make village income from resources within their boundaries, and therefore devise rules to do so. These rights, it is believed, are not written in law, a development that would greatly enhance villagers' motivation to improve their areas.

4.4.2 Sumsel Province

In Sumsel, the villages visited also had similar institutional characteristics to each other, characteristics which did not and would not encourage local communities to invest in fisheries management.

1. Firstly, and perhaps most importantly, whilst the boundaries of the resources were well defined on a yearly basis, through the auction system, they changed yearly and could include people from anywhere. Therefore any benefits from improved management brought about through the efforts of the local community would be obtained primarily by the auction owners for that time, people the villagers may or may not know. Were the money from auction units to go directly to the village

concerned, this may not be a significant problem as they may benefit from being able to increase the prices. However, this was not the case. It is a combination of these two factors, a) rights of anyone to become auction unit owners; b) revenue going outside the village that makes the system in Sumsel different to that in Jambi and non-conducive to community investment.

2. Whether the rules were adapted to local circumstances was not specifically addressed, though it can already be seen that with rules coming from outside and formed at the regional level, particular local variation is unlikely to have been addressed. In Teluk Rasau, as discussed below, regulations did not take into consideration local circumstances, though the Dinas Perikinan guard was more aware of local constraints and tried to accommodate local needs within the confines of his orders.

3. Local resource-users, even within the village administration, did not participate in rule design.

4. Monitors in the auctioned areas were the resource users themselves, unsurprising given their direct vested interest. Monitoring did not obviously occur outside these areas. In Teluk Rasau, monitoring was carried out by one guard who was not accountable to the local community but to Dinas Perikanan.

5. Generally, sanctions were unclear and were not systematised. In Teluk Rasau, there was evidence that the guard was tolerant of minor infractions and would always give verbal warnings before taking further action.

6. Though low cost conflict mechanisms existed, (*musyawarah desa*) they did not appear to be put to use for this purpose. It is not clear what other conflict resolution mechanisms were used. In Teluk Rasau, the guard could go to Dinas Perikanan if there were rule infractions, though it was not clear what Dinas Perikanan would then do apart from talk to the headman about the problem.

7. Government did not recognise the rights of local communities to devise their own institutions.

The institutional weaknesses mentioned above give some explanation of why there were problems with non-compliance in Teluk Rasau. In particular, neither the local community living around the lake or those fishing in units surrounding the lake felt they had anything to gain from the reserve, and the local people in particular had lost a fishery resource, without compensation. Benefits of the reserves had been poorly explained to the local community. In addition there were barriers across the reserve to prevent fish escaping from the lake, something which the fishermen pointed out as showing the waterbody was of no use to them. The local community were further angered by the fact that they saw the guard fishing in the reserve (a problem with his non-accountability). It is not sure why the guard was doing this but it was possible that the biological monitoring programme of this project, by asking him to test fish and then allowing him to keep the fish he caught, may, inadvertently, have caused this problem. At any rate, the incentives for the guard to effectively monitor regulations are low (and this is probably the case elsewhere). Payment was low and the job made him at least unpopular and at most put him in situations of some danger.

4.4.3 Conclusions

Current institutional arrangements in Jambi Province, both within the village, and between the village and government appear conducive to encouraging local involvement in management. Local capacity is apparent and has been sustained for a long time. The current system provides a good backdrop against which co-management of harvest reserves may be implementable.

However, whilst having the capacity to manage, and the desire to do so for the types of management currently in place, it should not be assumed that villager communities will necessarily adopt harvest reserve strategies on the advice of government, nor that they would comply with such regulations were they imposed. To invest and comply, local communities would need to be convinced of the benefits of such reserves to their village, *in a way that is understandable and relevant to them*. If this could be achieved, evidence suggests that such systems could be managed by communities at little extra cost to local government. Without being convinced of the benefits of such enterprises, setting up reserves would be a far more costly government measure and one that could cause tension in the villages concerned. It would also require the employment of staff from outside for monitoring and enforcement, as happens in Sumsel, systems which themselves are fraught with difficulties.

Whether new harvest institutions are set up will also depend on the costs of supplying new rules against the expected benefits, particularly transformation costs. These are discussed in the next section. In Jambi Province, whilst both villages had conducive institutional design and both had areas designated as reserves by government, only one could be said to be actually operating a reserve. Reasons for these differences will also be discussed in the next section.

In Sumsel Province, it can be seen that there is little chance of community involvement in reserve management under the current institutional arrangements. It is suggested here that at the very least, the access rights or system of allocating auction revenue would have to be changed before a local community was willing to invest resources and forgo shorter-term benefits for the sake of improving resources in its area. Of course, a community does not necessarily imply a village community, and a group could perhaps be formed between the auction owners. However, given that owners currently change on a yearly basis and access is open to anyone with the ability to bid, these fishermen also have few incentives to improve the fishery. Longer auctioning periods may be one step to addressing this.

Instead of community involvement then, any management or the setting up of management concerning the protection of fish stocks must come from outside, as is currently the case. This is more costly, and as seen in the case study villages not always successful. The case of Lebak Nilang shows that even the fisheries department, with the mandate to create reserves, face constraints and possibly disincentives to do so.

4.5 Investigation of the factors that have affected local communities willingness to supply new rules in selected sites

This section only includes those case study villages where there has been shown, from the previous section, to be some motivation for community involvement in management (i.e. villages in Jambi Province).

Characteristics known to encourage institutional supply are shown for each village in Table **6**. As can be seen, where information could be collected, the villages were very similar and both had characteristics which kept institutional change costs at a low level.

Table 6 Characteristics that encourage institutional supply

Enabling design principles (from Table 2)	**Arang Arang**	**Dano Lamo**
Number of decision makers low	yes	yes
Similarities of interest of decision makers and resource users	yes	yes
Number of participants minimally necessary to achieve collective benefit is low	yes	yes
Presence of skilful leaders or individuals with other assets;	?	yes
Presence of individuals willing to undertake entrepreneurial efforts or persuade existing organisations to get involved	?	?
Presence of shared norms that restrain opportunistic behaviour and create conditions for mutual trust and reciprocity	yes	yes
Past institutional decisions of local appropriators lowers the subsequent degree of change that proposed rule implies	?	?
Autonomy to change rules exists	yes	yes
Presence of enabling external political regime	yes	yes

With the headman and his administration being responsible for making decisions, the numbers involved were low. Villagers had similar livelihood strategies and therefore there was less likely to be conflicts of interest for the development of the resources under question. However, whilst, relatively this was the case, it would be the individual fishers and not those with auction units (in these cases) whose fishing area would be reduced as a result of harvest reserves and therefore it would not be correct to say that there would be no conflicts here. Individuals within the village have strong inter-dependent links that allowed for shared norms and the development of mutual trust and reciprocity. The individuals whose co-ordination was required to achieve collective action were just the members of a single village; a relatively small number of people all closely connected to one another. Also, the village, as mentioned previously, had the autonomy to change rules, with an enabling external political regime (at least to some extent).

The only other characteristic for which information was available was the presence of skilful leaders. This could not be ascertained in Arang Arang but was very obviously the case in Dano Lamo where the village leader was obviously very well respected and spent much of his time planning how to improve his village and developing proposals for government funding. In comparison with the leader in Dano Lamo, the leader in Arang Arang was far less active.

The presence of skilled leaders was found to be particularly important in community fisheries in Lao PDR (Garaway 1999) and it may well be that this difference (the only one obvious) provides part of the explanation for why Dano Lamo had set up a harvest reserve and Arang Arang hadn't.

However, with villages appearing to have similar institutional set up costs to each other, another possibility is that they had different perceptions, and/or different information about the benefits.

Given that institutions are more likely to be created when benefits from doing so are tangible and relatively quickly realised, it is suggested that the effect of the stocking, and cage culture in particular, in Dano Lamo may have been crucial factors in encouraging the villagers to set up the reserve. Even if the benefits of the reserve for increasing natural fish stocks may not have been so easy to see and verify, cages full of fish in the reserve area were very obvious to all individuals in the village.

Another key is information about benefits. One of the principle reasons it is felt that Arang Arang had not set up the reserves was because they did not appear convinced of the benefits of doing so. They had not seen other reserves and were only instructed/advised by government. More active extension by government and possibly discussions with other villagers who had seen for themselves the benefits of reserves may have led to a more successful outcome. In Dano Lamo the village leaders seemed clearer about benefits and had explained this to their communities. The majority, but not all, of those villagers interviewed appeared to understand well the purpose of the reserve. This may have been due to better extension efforts or more skilled individuals. However another factor was that Dano Lamo, in contrast to Arang Arang, had sought the advice of government and asked for financial assistance. They therefore had a commitment to improving their resource *prior* to government intervention. This is perhaps the most crucial difference and one which government extension should bear in mind. If some way could be found to promote the idea widely and effectively and create interest amongst villages first, and only later consider implementation with interested villages, the success rate may improve. Dano Lamo had not originally thought of what they wanted to do with their fishery resource when they sought government assistance, but were motivated to improve it in some way, and the government were able to persuade them that, along with other strategies, a reserve would be a useful measure.

5 Conclusions

- Designation of areas as harvest reserves by the Department of Fisheries is by no means a sufficient condition for the successful operation of such initiatives. It is a small step in a process that must take into consideration the capacity and willingness of communities to support such initiatives, or alternatively, how the Department of Fisheries are going to monitor effectively, enforce and pay for such initiatives externally.

- In this brief study, all variations of the current status of harvest reserve institutions were encountered: Institutions that had been designed but not implemented (either by local communities or local government); those that had been designed and implemented but not complied with; and one fully operational reserve institution.

- Provincial variation in institutional design was great and greater between Provinces than within them. Therefore, recommendations for improving institutional design should start at this level as the adaptations required in each Province may differ significantly. Provincial government institutions have a profound effect on what will and can be achieved at local community level and therefore on the potential for co-management. This research showed that Jambi Province was currently in a far better position to promote co-management strategies than Sumsel.

- In areas were the external policy environment was generally conducive to encouraging local communities to invest and manage their natural resources, as in Jambi Province, it has been shown that they have considerable capacity to do so. Under such circumstances the communities show many of the characteristics known to encourage sustained local collective action. This capacity is shown by their ability to design their own rules, implement them, monitor compliance and sanction non-compliance, all without external assistance. In contrast, an external policy environment that is not enabling, and in particular does not acknowledge rights of self-governance, is likely to lead to local institutional fragility or failure, or in the case of Sumsel Province, no locally managed fisheries institutions at all.

- Fisheries management by local user-communities is undertaken for a range of reasons. Conflict avoidance through spatial allocation of fishing areas and community income generation appeared to be the most important. However, there was also evidence that there were rules designed for the protection of future fish stocks and therefore that the objectives of harvest reserves are not alien.

- The set–up of reserve areas had, in two of the case study sites, been accompanied by other initiatives in the reserve area, including stocking and cage culture. It is felt that such initiatives can catalyse changes in management, and in particular, more controlled access. Such changes (into more restrictive regimes) have been documented in other research (e.g. Lorenzen & Garaway 1998). This is thought to be because such initiatives are more obviously *perceived* to increase the value of the resource, through physical inputs to the system and therefore require more control by the investors (or benefactors). Such initiatives, or others, depending of course on their biological impact, may be helpful in increasing interest in harvest reserves initially (until the benefits of these are apparent to the user community). However such initiatives are also not in themselves sufficient as illustrated in Teluk Rasau, where stocking occurred but access restriction rules were not (always) complied with. In this case, with no participation in rule design or monitoring, the increase in the perceived value of the resource may have increased incentives to poach.

- The case of Teluk Rasau shows how rules designed without the participation or consent of local communities, or without rules being adapted to local circumstances can cause disruption and discontent within the local community. In such circumstances, coercion would be required, which in turn requires far greater governmental financial and human resources that governments may be hard-pressed to meet.

- The case of Teluk Rasau also shows that incentives to monitor effectively, even for government employed individuals are low when salaries are low and there is substantial local disagreement with rules. Such conditions make an outsider's monitoring job extremely difficult.

- The case of Lebak Nilang shows that even government staff at the Kabupaten level may not have great enough incentives to implement harvest reserve institutions. Firstly, access to financial resources for this, which come from the regional planning agency, are not always available. Secondly, using such waterbodies for Department of Fisheries income generation may seem a more attractive option (in the short term).

- In terms of promoting harvest reserves where none currently exist, local communities would need to be convinced of the benefits of such reserves to their village, *in a way that is understandable and relevant to them*. If this could be achieved, evidence suggests that such systems could be managed by communities at little extra cost to local government. Whether new harvest institutions are set up will also depend on the costs of supplying new rules against the expected benefits, particularly transformation costs.

- In the villages in Jambi Province in particular, characteristics of the existing institutions and community characteristics both kept the transformation costs of setting up new institutions low. Therefore if villages were convinced of the benefits of harvest reserves, they may be able to implement new rules at relatively low cost, almost certainly lower than the government costs for successful implementation.

- In Sumsel Province, there is little chance of community involvement in reserve management under the current institutional arrangements. It is suggested here that at the very least, the access rights or system of allocating auction revenue would have to be changed before a local community was willing to invest resources and forgo shorter-term benefits for the sake of improving resources in its area. Of course, a community does not necessarily imply a village community, and a group could perhaps be formed between the auction owners. However, given that owners currently change on a yearly basis and access is open to anyone with the ability to bid, these fishermen also have few incentives to improve the fishery. Longer auctioning periods may be one step to addressing this.

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