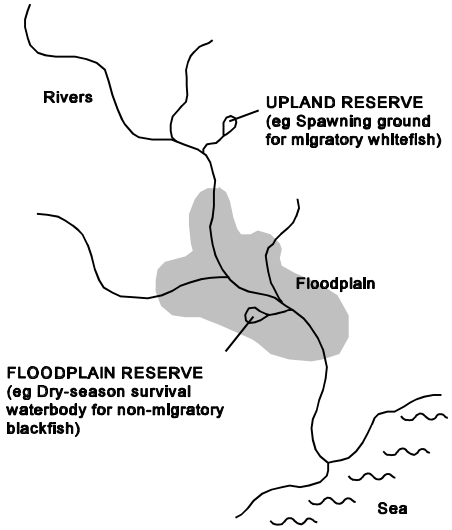
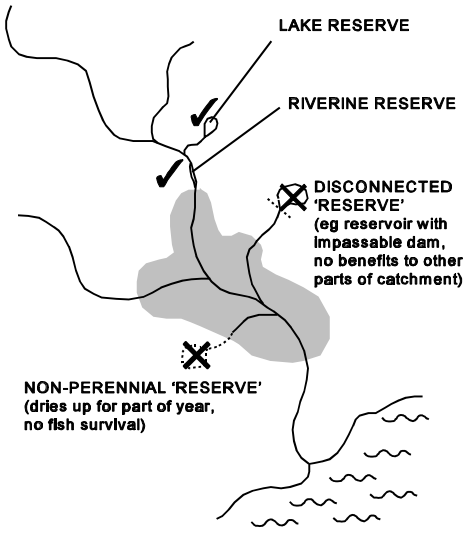
# *Selection Criteria and Co-Management Guidelines for Harvest Reserves for Tropical River Fisheries*

# *Final Technical Report*




**Reserve Catchment Positions**




**Reserve Habitat Types**

Project R7043

Fisheries Management Science Programme
managed by *MRAG*, under the DFID
Renewable Natural Resources Research Strategy

*MRAG* Ltd, June 2000

**FINAL TECHNICAL REPORT**

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| Name of Author: | Dr Daniel D. Hoggarth |
| Signature: | _____ |
| Date: | _____ |

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# 1 Executive Summary

This project was designed to identify ecological, social and institutional criteria for the selection and beneficial use of harvest reserves in tropical river fisheries, and to develop guidelines for their management. The purpose of the guidelines is the delivery of economic benefits to fishing communities, derived from enhanced recruitment to exploited fish stocks and from improved management of the fisheries.

The project ran from November 1997 to May 2000, and involved collaborators from MRAG Ltd, the Central Research Institute for Fisheries, Indonesia (CRIFI), and three provincial Dinas Perikanan Fisheries Services in West Kalimantan, Jambi and South Sumatra in Indonesia. The key target institute was the Indonesian Directorate General for Fisheries, who provide management advice to the provincial Fisheries Services.

The project investigations included preliminary surveys and categorisation of reserves in three Indonesian study provinces (Jambi, South Sumatra and West Kalimantan), followed by 13-14 month detailed monitoring programmes of both biological and socio-economic data, and 'RRA' and institutional analyses at a sub-selection of 8-9 study sites.

The detailed quantitative analysis of the MP data was constrained by substantial ecological, physical and social differences between the available field sites. These differences prevented the absolute quantification of either the biological or economic benefits from reserves though strong indications were gained on their potential effects. The integrated, inter-disciplinary analysis of the various data sets also provided a series of clear inputs to the project's 'Guidelines' on reserve selection criteria and on the institutional arrangements that may generate successful outcomes.

The project Guidelines were published in Bahasa Indonesian by CRIFI. The Guidelines include separate sections on the establishment of co-management systems for river fisheries, and on the subsequent selection and management of harvest reserves. Concise 'implementation guidelines' are also included, describing a series of key steps that may be followed. Although the Guidelines provide clear ideas and key steps for the management of flood-plain river fisheries and harvest reserves, it is also emphasised that flexibility must be allowed in the practices adopted in different villages, and that strong local participation is necessary to achieve effective uptake.

In addition to the Guidelines, the project produced a series of both internal reports and published papers. Dissemination and training was provided to project collaborators and other fishery stakeholders in each of the provincial field sites. The project also served as a case study for a BBC World TV Earth Report documentary about new fisheries initiatives.

Futher work required to develop the project outputs and their uptake has been committed by the Indonesian project collaborators in two key areas. Firstly, it has been agreed that a simple set of "Technical Guidelines" on harvest reserve selection and management should be published by the DGF for use in education, training and extension work in Indonesia. Such Technical Guidelines are now being prepared for a July 2000 deadline, by CRIFI, DGF, the Provincial Fishery Services, and NGOs (in particular Bina Swadaya).

To support the uptake of the Guidelines, assistance was also given by the project to each of the three collaborating Dinas Perikanan offices to apply for Indonesian government funds to implement Pilot Projects (PPs) in their provinces. Although funding for the PPs has not yet been approved for a range of reasons beyond the control of the project, the collaborators have agreed to monitor the situation, and to pursue their implementation as and when conditions allow. Depending on these applications, further projects have been planned both for CRIFI and FMSP funding to support and monitor the success of the new management processes.

# 2 Background

The fish stocks of floodplain river systems support intensive artisanal fisheries in many tropical countries, particularly throughout the densely populated Asian region. Facing a combination of steadily increasing exploitation rates, and highly variable (and, in many cases, changing) hydrological regimes, there is rising concern over the ability of these fish stocks to maintain themselves. These concerns are reflected in the DFID's FMSP research strategies for the years 1995 to 2005.

Closed areas or reserves are commonly used in marine and freshwater tropical fisheries for the conservation of endanged species, and also sometimes to maintain spawning stock biomasses of commercially exploited species. Reserves are particularly attractive for dispersed artisanal fisheries, such as found in tropical rivers, as they may be more easily enforceable (with a degree of community assistance) than other restrictive management measures. A substantial literature exists on the use of nature reserves for conservation purposes, and on the use of reserves to enhance yields in coral reef fisheries, but very little is known on their use in river fisheries, or on the actual magnitude of benefits they provide to the fisheries outside. In certain situations, reserves which actually provide very little benefit may be an expensive and dangerously confidence-building waste of resources.

On the assumption that they should have at least some conservation benefits, reserves were recommended as the most appropriate conservation strategy for flood-plain river fisheries by DFID project R4791 (Poverty and Sustainability in the Management of Inland Capture Fisheries in South and South-East Asia). Information subsequently collected by project R5953 (Fisheries Dynamics of Modified Floodplains in Southern Asia) confirmed that dry season fishing is by far the highest component of overall fish mortality and that the numbers of spawning fish could be substantially increased in dry season reserves. Project R5953 also showed that the migratory behaviour of floodplain fish varies strongly between the relatively resident 'blackfish' species and the more mobile 'whitefish'. Comparative studies of fishing communities in different river systems then showed that local management systems are dependent on hydrological and social conditions, and that community management for social and conservation goals is strongest for blackfish stocks perceived as locally protectable property. It was concluded that an overall co-management strategy for the multispecies resource could include elements of both locally controlled reserves for blackfish, in the most appropriate locations, and a wider contribution by a regional management authority for the more mobile whitefish.

Following these projects, Project R7043 was designed to further investigate the biological benefits achieved from existing reserves - in terms of the relative dynamics and abundances of their protected fish stocks compared to those outside - and to examine the social distribution of benefits arising from different management systems. Depending on the observed results (the actual evidence of benefits from reserves), a secondary goal of the project was to promote the effective use of reserves in Indonesia as a component of an integrated, adaptive co-management strategy for flood-plain river fisheries.

Specific demand for the project outputs was present with both the project's collaborating agencies and target institutes in Indonesia. The 1995-99 Research Strategy of the Indonesian Central Research Institute for Fisheries (CRIFI) thus includes central components on the 'management of fish reservations in floodplain river systems', 'co-management of fishery resources' and the investigation of 'socio-economic performances of ... fish reservations and maintenance of floodplain river fishery resources'.

In the field, riverine reserves are already widely used in Indonesia by village administrations and by the Fisheries Service (Dinas Perikanan) and the Directorate General of Forest Protection and Nature Conservation (PHPA). Though common in some provinces, reserves are generally implemented with minimal funding for enforcement or monitoring, and with little idea of their

actual impacts, either to local natural resources or their associated communities. At the start of the project, each of the collaborating provincial Fisheries Services had plans for developing further reserves in their inland fisheries, but little idea of which waters should be selected or how they might best be managed.

# 3 Project Purpose

The purpose of this project was to investigate strategies for the use of harvest reserves in artisanal tropical river fisheries such that they deliver economic benefits to associated fishing communities, and ecological benefits, including broodstock protection and recruitment enhancement, to protected fish stocks.

# 4 Research Activities

## 4.1 Inception Workshop and Legal Study

As planned, the project began in November 1997 with a combined Inception Workshop and Legal Study, held at CRIFI headquarters in Jakarta (see Appendix 1). The Inception Workshop provided an opportunity for the project collaborators (the Central Research Institute for Fisheries - CRIFI; and the three Dinas Perikanan provincial Fisheries Offices) and target institutes (especially the Directorate General for Fisheries or DGF) to discuss the project rationale, and to plan fieldwork activities and dissemination and uptake mechanisms.

At the Legal Workshop, invited legal experts discussed current Indonesian legislation on reserves and national and local opportunities and constraints on their management. The Workshop confirmed that regional 'bottom-up' variations in management strategies, as required for a co-management approach, could be accommodated by Indonesia's national administrative system, particularly with the approach of the new Regional Autonomy Act, then in preparation (and subsequently enacted in 1999).

## 4.2 Regional Reserve Survey

The initial Inception and Legal Workshops were followed by a 7-week Regional Reserve Survey (RRS) carried out in February and March 1998 (see Appendix 2). This involved six full-time staff, three from the UK and three from CRIFI, covering biological, economic and institutional disciplines, and local collaborators from each of the three Dinas Perikanan provincial offices.

The objectives of the RRS were to study a selection of known 'reserves' in the three study provinces in terms of their ecology (their water-body types, catchment positions and fish stocks etc) and their management institutions (the agencies responsible for management, and the regulations used). The information collected was used to develop a conceptual reserve categorisation system and to select an appropriate range of reserve types for further study in the following Monitoring Programme phase. Secondary objectives of the RRS were to involve provincial stakeholders in the project at this early stage, and to collaborate on the clear definition of remaining project activities. Such provincial stakeholders included the local officers of the Fisheries Services, the Regional Agricultural Assessment Institutes (BPTP system), and the planning departments (BAPPEDA) of each province.

Initial RRS activities in each province included discussions with Dinas Perikanan and other local experts on the characteristics of their known 'reserves'. A selection of these reserves were then visited to collect more detailed information on their ecology and management. In these field investigations, strong emphasis was placed on integrating the information collected by the

different collaborators to gain an inter-disciplinary perspective of the factors affecting reserves at each site. Standard checklists were used for interviewing village leaders and other members of the fishing community. Two (sometimes three) interviews were held in each village on each discipline to enable some cross-checking of responses (See Appendix 2 for original data). Comparative summaries of the village data and initial observations and proposals were then discussed during workshops with the provincial stakeholders at the end of each field phase.

Briefly, the field investigations showed that reserves were used quite differently in the three provinces. In West Kalimantan, community reserves were used by three of the forty fishing villages in the Danau Sentarum Wildlife Reserve (DSWR) to maintain their own local fish stocks. These reserves appeared to be effectively managed by strong, traditional institutions limiting certain gears or certain seasons, and local fish stocks still comprised many large, valuable fish species, compared to some other villages without reserves. Though the other 37 villages had various other local regulations on their fisheries (gear bans etc), these were not area-based as required to meet the 'harvest reserve' definition. In both Jambi and South Sumatra, reserves were more often imposed 'top-down' by Dinas Perikanan: the regulations for these reserves usually prevented all fishing activities for the whole year, and were enforced (in principle) by government-employed guards. The West Kalimantan community reserves were intended to give benefits to fishermen within the village, while the Dinas Perikanan reserves were intended to distribute their benefits more widely among the villages of the whole catchment. Some of the reserves were not well designed, confirming the urgent need for the simple reserve selection criteria and management guidelines, to be produced by the project.

Prior to the RRS, 'reserves' were most commonly understood by the project's Indonesian stakeholders to mean an area totally closed to exploitation for the purpose of nature conservation. Recognising the importance of flexible, locally appropriate management systems and of providing direct benefits to fishing communities, the RRS clarified the definition of a '*harvest reserve*' as:

> *a spatially defined area of water, managed with any specified set of technical regulations, intended to sustain or increase the potential fish yield available from existing, natural fish stocks, for the benefit of fishers.*

Reflecting this broad definition, the RRS reserve categorisation system included the following five variables from which reserves were selected for further study (see Appendix 2):

- intended beneficiaries (local or catchment);
- catchment position (upland or flood-plain);
- habitat type (river section or lake);
- management agencies (set up / managed mainly by government or community); and
- management regulations (3 categories of partial reserves or full reserves).

## 4.3 Monitoring Programmes and Institutional Analyses

Following the preparatory work in the RRS field studies, the design of the project's Monitoring Programmes (MPs) was finalised during a Monitoring Programme Implementation field trip in July and August 1998 (see Appendix 3). The MPs collected data on a selection of the study sites visited in the RRS, as required to (1) approximately estimate the impacts of different types of reserves, (2) determine what is important for the effective management of reserves (the selection and co-management criteria), and (3) demonstrate also the broader implications and requirements of other management tools and approaches for flood-plain river fisheries, to show how reserves might be integrated into existing systems (see further comments on survey design and objectives in the next sub-section).

The project's logical framework originally proposed that the Monitoring Programmes (project

Activity 3) should be based on the following basic designs:

- two 2-month comparative biological surveys of fish abundances and fish stock structures inside and outside reserves during the high water and low water seasons, (when fish are respectively most dispersed among water-bodies, and then most concentrated in dry season reserves and other water-bodies); and

- a 2-month Rapid Rural Appraisal (RRA) and institutional analysis of management systems, and the costs and benefits of reserves during the high water season.

This discontinuous and partly RRA-based survey design was criticised by DFID as being possibly unable to 'take account of the annual cycle of exploitation and fish behaviour' (letter from John Tarbit, 11 November 1997). Although reassurance was given before the project started that it would have been possible to generate the necessary level of understanding (in addition to the benefits arising from the interdisciplinary and collaborative style of analysis), the survey design was in the end modified during the MP Implementation trip to include continuous surveys of both biological and economic data, covering more than a full one year period, in addition to the originally planned collection of the more insightful RRA data. These modifications were enabled by the increase in the project's effective field budget following the decline of the Indonesian currency in 1998. A longer, quantitative field survey was also promoted strongly by the CRIFI collaborators during the design phase.

The revised MP ran from the July/August 1998 implementation date to the end of September 1999. The project completion date was extended to March 2000 to accommodate the new schedule. The fieldwork was largely delegated to village members recruited by the project, under the supervision of a hierarchy of MRAG, CRIFI and provincial Dinas Perikanan staff. Data collection, reporting and analysis routines were developed and managed, though with some problems, particularly at the remote West Kalimantan sites (see Appendices 4 and 5).

The revised MP included both biological components (the 'BMP') and socio-economic components (the 'SEMP'). The BMP investigated the state of fish stocks *inside* reserves, for comparison with other, similar non-reserve sites (see Appendices 4 and 8d). The SEMP investigated the economics of the fisheries in villages with and without reserves to show the potential outcomes of different types of reserves and other management systems (see Appendices 5 and 8d). The SEMP was implemented in eight contrasting villages, with 4, 2 and 2 in West Kalimantan, Jambi and South Sumatra respectively. The BMP studies were simultaneously undertaken on 7 water-bodies, with additional 'partial' studies (in only the dry season months) in 4 more sites to enable comparisons (see Appendices 3, 4, 5 and 8d for details on study site selections).

One constraint to the project's BMP outputs was caused by the dry season weather conditions during the sampling period. Both the 1998 and 1999 dry seasons were relatively wet in both Jambi and South Sumatra, meaning that water levels stayed relatively high in all of the field sites in those provinces. As a result of these weather conditions, the intended 'partial' biological sampling programmes on the Lubuk Lampam riverine reserves and control sites could not be carried out (water levels need to be low enough for the fishermen to isolate fish with nets and barriers in the deep river 'lubuks', thereby enabling their capture by cast nets). It was therefore not possible to make comparisons between reserved and fished sections of the intended *riverine* study sites. Such conditions did not restrain the sampling in the flood-plain lake study sites (9 of the 11 sites), that were sampled by the experimental gill nets (see Appendices 3 and 8d).

In addition to the BMP and SEMP studies, a supporting programme of interviews and institutional analyses (IA) was undertaken to give qualitative data on historical trends at each fishery and to explore the mechanisms contributing to the successes and failures of

management (see Appendices 4, 6 and 8d). The IA fieldwork particularly focussed on the design and implementation of management rules at each study site and the resulting levels of compliance achieved.

## 4.4 Analysis of Reserve Benefits

The data collected during the MPs were jointly analysed by both MRAG and CRIFI project staff. To assist the collaborative interpretation of the results, a two-week Data Analysis Workshop was held in London after the end of the MP fieldwork in November 1999. The Workshop was attended by both MRAG and CRIFI staff involved in the MP field work, and also by the DGF's Dr Purwanto, who as Director for Natural Resources Rehabilitation is responsible for the integration of the project's outputs into the DGF's national fisheries strategies and programmes.

The project analyses and results are described in detailed reports on each field programme (see Appendix 4 - BMP; Appendix 5 - SEMP and Appendix 6 - IA). They are also summarised in an academic paper prepared for publication in the Indonesian Fisheries Research Journal (Appendix 8d, and see also Section 5 of this report).

The integrated, inter-disciplinary analysis of the MP and IA data sets provided much support for the project's Guidelines on reserve selection criteria and on the institutional arrangements that may generate successful outcomes (see Appendix 7). The detailed quantitative analysis of the MP data was however constrained by a range of factors (as anticipated during the detailed design of the MP in 1998 - see Appendix 3). Most importantly, the ecological, physical and social differences between the available field sites prevented the absolute quantification of either the biological or economic benefits from reserves.

The original intentions for data analysis were given in the project's logical framework (Activity 4) as:

(4a) biological analysis of the relative effects of reserves on fish stock abundances, population structures and reproductive potential, within hydro-morphological and management categories;
(4b) socio-economic analysis of distributional effects of alternative reserve management systems; and
(4c) comparison of potential costs/benefits of reserves against enhancement by stocking.

While the first and second of these intentions were broadly (qualitatively) achieved, detailed statistical testing of the impacts of reserves was not attempted by the project, and neither was the planned comparison of the costs and benefits of harvest reserves against fish stocking (project Activity 4c above).

Detailed discussion of the constraints to the effective impact assessment of reserves are given in Appendices 3, 5, 8a and 8d. With its one-year sampling period, even the quantitative indices measured by the projects long term MPs still only represent 'snap-shot' observations at the current point in time that can not be solely attributed to any single feature at each site (e.g. the presence or absence of a reserve). In future work, the effects of reserves (or other management tools) in flood-plain river fisheries may be better assessed by using long-term analyses, based on 'with-without' comparisons both 'before-and-after' the change in management. Using such methods, the actual impact of a reserve may be assessed as the *change* in benefits following the introduction of the reserve, *relative to* the simultaneous change in outputs at a 'without' control site (see further details in Appendix 8a). Such long-term approaches are recommended by the project's summary guidelines under a general adaptive management framework (see Appendix 7).

The project's analytical approach has thus been to present the observed biological and socio-

economic outcomes at the different sites, while also recognising the full range of their possible explanations. Such analyses are in line with the holistic, systems-based approaches now promoted in DFID's RNR research strategy. They were also adopted by this project to generate the broader understanding required to achieve better management of 'sustainable livelihoods' in Indonesia's river fisheries.

## 4.5 Dissemination / Training

The final Dissemination / Training (D/T) phase of the project (Activity 5) was initially defined in the project logical framework to include the following steps:

(5a) development of participatory rural appraisal (PRA) guidelines for the local selection of reserve sites and their co-management by communities and higher authorities, for subsequent implementation by the Fisheries Service target institution; translation of the guidelines into simple Indonesian with illustrations;
(5b) provision of initial training on the use of the PRA reserve guidelines to DGF / Fisheries Service trainers; and
(5c) publication of results in journals.

The drafting of the project's selection criteria and co-management guidelines for reserves - the primary output of the project - was achieved in stages over the 1999/2000 project year. Material for the 'Guidelines' and comments on drafts were contributed by both UK-based experts and Indonesian project stakeholders. Consultation workshops on the Guidelines were held both in London in November 1999 and in Jambi province in early February 2000. The Guidelines were translated into Bahasa Indonesian for the latter workshop. The final (UK language) version of the Guidelines is give in Appendix 7 of this report.

Training on the use of the Guidelines, and promoting the collaborative selection and co-management of harvest reserves, was undertaken at each of the three Indonesian study provinces in April and May 2000 (see Appendix 9). In each workshop, simple pictorial illustrations were used to disseminate the principles of the Guidelines. The lessons from the training sessions were discussed at national level at a final Project Completion Workshop held at CRIFI's Jakarta headquarters on 8 May 2000 (see also Appendix 9).

Finally, the results from the project are currently being prepared for publication in the Indonesian Fisheries Research Journal (see current draft of a summary paper on the project in Appendix 8d). In addition to this 'results' paper, three introductory and methodological papers were also published in the earlier stages of the project (see Appendices 8a-c).

# 5 Outputs

## 5.1 Biological monitoring programme results

Fish stocks inside two community-managed reserves in West Kalimantan were found to be up to 21 times more abundant than those at a nearby study site having no reserves and fished by poison in the dry season (see Appendices 4 and 8d). The reserve water-bodies contained more fish species (60-77 different types caught over the year) than in the fished site (only 46 species); and the average number of different fish species caught per night at the reserve sites was up to 2.4 times higher. The 'missing' species at the poison-fished Pulau Majang site in West Kalimantan were nearly all relatively non-migratory 'blackfish' species. This suggests that the main potential of reserves (or alternatively, the avoidance of poison-fishing) is for the protection of these locally-based species: migratory whitefish species may still be recruited from external sources.

In contrast, fish stocks in government-managed reserves in South Sumatra were little different from those in nearby exploited water-bodies. Management and enforcement appeared to be less effective at the government-managed Teluk Rasau site in South Sumatra, which experienced illegal fishing on 35% of sampled nights, compared to only 0% and 6% of nights at the two well-managed community reserves in West Kalimantan.

While it is impossible to attribute the observed differences in West Kalimantan purely to the presence of the reserves, the evidence does suggest that well-managed reserves may give significant protection to the fish stocks they contain. Effective enforcement and the placement of reserves in suitable water-bodies appear to be more important factors than the permanence of closure. Both of these criteria may be best achieved by a co-management approach, drawing on the joint capacity and knowledge of local fishers, communities and government officers. Further details on the BMP studies are given in Appendices 4 and 8d.

## 5.2 Socio-economic monitoring programme results

The SEMP did not aim to measure the impact of reserves on fisheries outcomes, since they are influenced by so many factors in addition to the status of the stock. Instead, it looked in greater detail at the outcomes in each village, their relationship to each other and the influence factors such as access regime might have on them. In particular, the relationship between fish production and economic surplus was to be examined, focussing on the role of markets and prices. So too was the relationship between economic surplus and surplus distribution, focussing on the role of access conditions.

The reasons for adopting this approach were that in general, these issues are:

- neither well documented nor well understood;
- critical to an improved understanding of the influence of access regimes on the returns to different stakeholder groups; and
- of great importance in situations where improved fisheries management is proposed as a means of alleviating poverty on floodplains

The SEMP experienced problems with data collection especially in West Kalimantan, largely due to the limiting effect of civil unrest on the number of supervision missions that could be mounted.

The highest catch rates found by the SEMP tended to be where the resource was relatively lightly exploited, where there was a reserve or where there was stocking (or some combination of these). This clearly underlined the importance of supporting the stock when fishing pressure is mounting or this can be anticipated. High catches do not automatically result in high revenues however - a good market is also important.

Economic surplus is influenced by revenues but the way in which fishing is undertaken is also important. Economic surplus in one village (Danau Lamo) was certainly boosted by the leasing system that allowed a few individuals to make very high catches with relatively little effort. The distribution of this surplus is skewed towards the leaseholding individuals.

The qualifications over the data on Pedamaran make hard and fast conclusions on the impact of its leaseholding system difficult to draw. If the catch data were correct, the results demonstrate that the returns to leaseholders can be very low (and might have been negative in an analysis that took account of the full costs of the large static gears). However, the much higher levels of catches reported in more informal interviews for previous years suggests that there can be significant benefits for leaseholders as well as for government revenues and the individual fishers who get the opportunity to fish. (Though those denied the chance to fish by such tight controls should not be forgotten.)

The use of lotteries as an access control system, as in West Kalimanatan, certainly appeared a viable and probably more equitable alternative to leasing in some circumstances. Which allocation system is most appropriate in each place has to be a local decision. First, because it is the ecological and hydrological features of the local system that, together with comparative advantage of different gear technologies, will determine the trade-offs involved. Second, because the relative need for economic surplus, government revenue or improved equity is a value judgement and should reflect the preferences of those most affected.

## 5.3 Institutional analysis results

The Institutional Analyses (see Appendices 6a and 6b) highlighted the differences between the study provinces, and reinforced the need for locally specific approaches to developing new management institutions. The Institutional Analysis provided many possible explanations for the results observed in the Monitoring Programmes and were used to provide examples and illustrations in the Management Guidelines (Appendix 7).

Due to the differences in existing community participation in management, prospects for co-management were shown to be stronger in Jambi and West Kalimantan than in South Sumatra. In the latter province, management is undertaken at a regional level, largely without the participation of local fishers. More significant changes in management institutions would be required in that province to give incentives for local participation in management. Such requirements were discussed in detail at the final Dissemination / Training workshop in South Sumatra and incorporated into draft proposals for pilot projects for that province (see Appendix 9).

## 5.4 The management guidelines

The project's reserve selection critieria and co-management guidelines (the 'Guidelines') are sub-divided into four main sections (see Box 1 and Appendix 7):

(1) introduction, definitions and guiding principles;
(2) general recommendations on the establishment of co-management systems for river fisheries;
(3) specific guidelines on the selection and management of harvest reserves; and
(4) a summary of key steps required for implementation of new co-management systems.

The sub-division of material between sections (2) and (3) emphasises that local participation in co-management systems should come ***before*** the selection of harvest reserves or other management tools. Section (2) of the Guidelines may also still be useful even in locations where reserves are not necessarily the best local answer.

The concise 'implementation guidelines' given in section (4) describe separate and sequential components in the management process (see Box 1). By following these key steps, the most important village-based management activities may be initiated in the best locations before the more challenging 'between village' integration and adaptive management is developed.

Although the Guidelines provide clear ideas and key steps for the management of flood-plain river fisheries and harvest reserves, it is also emphasised that flexibility must be allowed in the practices adopted in different villages, and that strong local participation is necessary to achieve effective uptake.

**Box 1 Table of Contents of the Project's Selection Criteria & Co-Management Guidelines for River Fishery Harvest Reserves**



# 6 Contribution of Outputs

## 6.1 Contribution of outputs to the project goal

This project was undertaken in direct collaboration with Indonesia's primary fisheries research and management agencies (CRIFI and the provincial Dinas Perikanan fisheries services respectively). Regular contact has also been maintained with other Indonesian target institutes, especially the national Directorate General for Fisheries (DGF) and the provincial Agricultural Extension and Assessment Services.

The provincial fisheries services in all three of the study provinces have moved substantially towards the acceptance of more collaborative management approaches over the duration of the project, and also gained an increased understanding of stakeholder livelihoods and influences. This capacity building is well coordinated with Indonesia's recent decentralisation of management authority to the provincial level (as legislated under the Regional Autonomy Act *UU Otonomi Daerah* No 22/1999).

The clear Management Guidelines produced by the project and the increased capacity generated in the collaborating and target agencies provide firm ground for improved management of Indonesia's flood-plain river fisheries in the future. Further work towards achieving this goal has been committed by the project collaborators in two key areas. Firstly, the DGF have agreed to develop a simple technical version of the Guidelines for field use (see Section 6.5.1). Secondly, commitments have also been made by the collaborators to implement the Guidelines during follow-on pilot projects in each of the study provinces (see Section 6.5.2).

## 6.2 List of publications

In the project's second year, following the initial survey design and implementation fieldwork, two presentations were made about the project, as follows:

- Hoggarth, D.D. and M. Aeron-Thomas, in press. Adaptive Co-Management of Harvest Reserves in Indonesian Rivers. Proceedings of the 51st Gulf and Caribbean Fisheries Institute Annual Meeting, 9-13 November 1998, St Croix, U.S. Virgin Islands. (*see Appendix 8.1*)

- Koeshendrajana, S. and D.D. Hoggarth. Harvest Reserves in Indonesian River Fisheries. Paper presented at the 5th Asian Fisheries Forum - International Conference on Fisheries and Food Security Beyond the Year 2000. 11-14 November 1998, Chiang May, Thailand. (*see Appendix 8.2*)

Given the project's interim stage, both papers were intended to introduce the project and present general ideas on the management of river fishery reserves. The costs of the second presentation in the U.S. Virgin Islands were shared between the project and Dr Hoggarth.

In 1999, the following article about the project was written for a policy-maker / general public audience, following an invitation by the Commonwealth Secretariat. The article describes the project as one component of the series of DFID projects undertaken since 1992 about Asian flood-plain river fisheries.

- Hoggarth, D.D., 1999. Flood-plain river fishing in Asia - helping fishing communities through management partnerships. Pages 122-124 *in* 'Paths to Prosperity: Science and Technology in the Commonwealth 1999/2000'. Kensington Publications Ltd, London, UK, for the Commonwealth Secretariat. (*see Appendix 8.3*)

The latter article was also published in Aquaculture News, as given below, following up on a previous article published by the 'Modified Floodplains' FMSP project in the same source, in 1997.

- Hoggarth, D.D., 1999. Adaptive Learning for Flood-plain Fishing Communities in Asia. Stirling Aquaculture News No 25 (ISSN 1356-1117). July 1999. Pages 19-22.

Finally, the following article has recently been written to present the results from the project, and to support the uptake of the Management Guidelines in Indonesia. It is intended that the article will be submitted for publication in the Indonesian Journal of Fisheries Research.

- Hoggarth, D.D., M. Aeron-Thomas, C. Garaway, S. Koeshendrajana, A. Sarnita and A.S. Halls. Integrated assessment of Indonesian river fishery reserves. *For submission to:* Indonesian Journal of Fisheries Research. (*see Appendix 8.4*)

## 6.3 Training

In addition to the general training and capacity building achieved during the project's fieldwork and planning and discussion workshops, specific Dissemination / Training (D/T) workshops were held in each of the project's three provincial field sites in April and May 2000 (see Appendix 9). Each of these workshops lasted for 2.5 to 3 days. The first day at each site included presentations on the project results and other introductory material, and was attended by approximately 50 participants in each province. Training on the use of the project guidelines and on the basic principles of co-management was then conducted in the following two days to a core group of approximately 30 participants at each site.

Participants for the D/T workshops were invited from a wide range of local institutions including the Dinas Perikanan Fisheries Services, other government offices, academic bodies and NGOs. Village members from some of the project field study sites were also invited.

Details of the D/T activities and the key lessons learnt in the training process are given in Appendix 9.

## 6.4 Other dissemination of results

During the 1999/2000 year, the project worked with staff of the Television Trust for the Environment (TVE) to produce material for a TV documentary about recent work on natural resources management. Filming took place during April and May 2000 at the project's South Sumatran and Jambi field sites. The documentary was screened in TVE's 'Hands On' strand as part of BBC World TV's Earth Report. Project material was broadcast in June 2000 as part of one of 12 Hands On issues featuring fisheries initiatives.

The aim of the Hands On programmes is to introduce people around the world to ideas, technologies and initiatives which might prompt them to introduce or use them locally. Each TV broadcast is accompanied by a four page back-up information leaflet prepared by the NGO, Intermediate Technology so that interested viewers can write in and find out more. There are also web pages (see http://194.72.163.91/ho/index.cfm) and a radio feed. The Hands On programmes are funded by DFID in collaboration with the EC, the UK National Lottery Charities Board, WWF and UNEP.

## 6.5 Follow-up action

### 6.5.1 Development of Technical Guidelines

Following the Jambi Consultation Workshop in February 2000, and the experiences of the three D/T workshops, the project's Guidelines are recognised as too detailed and complicated to be used effectively by local resource managers such as extension workers, customary leaders and local people. Although the Guidelines are seen by the Indonesian collaborators and target institutes as a valuable policy-level statement on the principles of reserve selection and co-management, it was also felt that a simpler version was required to support effective field use. It was therefore agreed at the national Project Completion Workshop (see Appendix 9) that the project Guidelines should be simplified and published by DGF in the form of "Technical Guidelines" on harvest reserve selection and management. It was agreed at the Workshop that the Technical Guidelines should be:

1. derived from the concepts and material in the project's Management Guidelines;
2. produced in a simple form (e.g. as posters with a strong graphical basis supported by simple text), to be easily understood and used as a source for education, training and extension;
3. recognise the importance of regional, local and community-based rules and regulations;
4. delivered widely via the mass media, meeting forums, training workshops etc., and
5. formulated and developed by a 'Small Team' consisting of CRIFI, DGF, the Provincial Fishery Services, and NGOs (in particular Bina Swadaya).

It was also agreed at the Project Completion Workshop that these Technical Guidelines would be produced by the 'small team' by July 2000. Simple, visual illustrations of the Guideline principles were prepared during the D/T workshops, suitable for this purpose.

### 6.5.2 Promotion of locally funded Pilot Projects

To support the uptake of the project outputs (the Guidelines), support was given by the project

to each of the three collaborating Dinas Perikanan offices to apply for Indonesian government funds to implement Pilot Projects (PPs) in their provinces. These proposals were backed by the Director General of the DGF, and preparations were made for their submission in July 1999 to enable the pilot projects to start in the 2000/2001 year immediately following the project's final dissemination stage.

It was proposed that the purpose of the PPs should be to establish institutional mechanisms for the integrated, adaptive co-management of selected river fishery units, using harvest reserves or other tools. Draft materials on the possible components of the PPs were prepared by the project for consideration and adaptation by CRIFI, DGF and the Diskan offices. The collaborators were encouraged to focus on developing new co-management institutions rather than simply establishing reserves in new locations for three reasons. Firstly, due to local variations in ecological and institutional conditions, reserves may not be the best management tool in all flood-plain river locations. Secondly, the optimum management approaches for reserves (or other tools) will not be determined by the current project, and will only be determined by a long-term adaptive and comparative approach. Thirdly, a truly participatory and collaborative *co-management* project must allow all of the stakeholders to contribute to the selection of management strategies and tools, and not impose reserves (or any other tools) on study sites in a *top-down* way. These general principles are now well understood by most of the project collaborators.

It is understood that PP proposals were submitted by the provincial Dinas Perikanan offices in both Jambi and West Kalimantan, but not in South Sumatra. Conditions in the latter province are relatively unfavourable for the introduction of co-management practices, as identified by the IA fieldwork (see Appendix 6a), though solutions may be possible (see Appendix 9). Progress on the submission and review of the pilot projects was discussed at the Jambi Consultation Workshop and the final Project Completion Workshop in February and May 2000 respectively.

As described in Appendix 9, funding for the PPs has still not yet been approved by the end of the project for a range of reasons beyond the control of the project. The collaborators have, however, agreed to monitor the situation, and to pursue the implementation of the PPs as and when conditions allow. Following the D/T workshops, the requirements of the pilot projects are now better understood by all of the potential collaborators. In case the PP proposals need to be re-submitted for future funding years, revised briefing documents were also prepared by the project team during the D/T field trip, clarifying the suggested components of the Pilot Projects in each province, and also their links to the detailed material contained in the Guidelines (see Appendix 9).

### 6.5.3 Supporting research

In addition to the three provincial PPs, a proposal was also prepared by CRIFI for an umbrella project to coordinate activities in the three provinces. If funded, this will provide opportunities for networking and for monitoring the success of the different PPs. This project will be supported by CRIFI's own funds, and is also scheduled to start in their 2000/2001 programme (also still awaiting confirmation from central government).

A Concept Note describing a project to study the success of the pilot projects was also prepared by Daniel Hoggarth, Phillip Townsley and CRIFI, and submitted in December 1999 for funding by the FMSP. This has since been provisionally approved by the FMSP Project Advisory Committee. Depending on the availability of programme funds, and on the outcome of the Indonesian project applications, the new FMSP project will develop approaches for monitoring the 'process' of setting up new co-management institutions, based on the experiences of the different pilot projects.