

## **Annex 1.2: Report on Kakinada Case Study**

### **REPORT ON THE PARFISH CASE STUDY PROJECT UNDERTAKEN FOR THE STOCK ASSESSEMENT OF MUD CRAB FISHERY OF CORINGA MANGROVES IN ANDHRA PRADESH, INDIA.**

**By**

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#### **INTRODUCTION**

With the backdrop of the present system of fishery management prevailing in India in general and in the east coast state of Andhra Pradesh in particular, the importance of effective mechanisms to assess the stocks and derive management programmes to ensure sustainable use of natural resources has gained momentum in the last few years. Existing data collection systems using old and unwieldy practices no longer serve their purposes of informing or convincing at the levels of either policy makers or resource users.

Participatory Fisheries Stock Assessment (ParFish) is a new approach to stock assessment that can be undertaken with the involvement of fishers and managers and in situations where there are limited data available. It uses Bayesian statistics and Decision Theory and does not require long time series of data, but instead uses fishers' knowledge to provide a starting point for the stock assessment. As a result, an initial assessment can be carried out quickly through the use of rapid data collection techniques. Additionally, the approach brings together fishers, managers and other

stakeholders helping them enter a cycle of learning, management planning and implementation, that can support co-management

The proposal for undertaking a case study on stock assessment in Andhra Pradesh, India, was contemplated in the Fisheries Management Science Programme (FMSP) Mangalore workshop on stock assessment tools in September 2004, which introduced the ParFish methodology. It was thought that ParFish would be more relevant than conventional stock assessment techniques to support the preparation of local plans where community based fisheries management and co-management is likely to be the reality. As governments move away from centralised systems for defining fishery regulations, and towards co-management arrangements where resource users and government share responsibility and/or authority to manage, the role of fishermen and other stakeholders in the management of fishery resources will be critical. Tools that support local managers to take decisions on resource management will play a pivotal role in supporting the development and successful implementation of co-management arrangements.

Considering the request of the Department of Fisheries (DOF), Andhra Pradesh, the Marine Resources Assessment Group (MRAG), as part of a project funded by the UK Department for International Development (DFID) under its FMSP, took up a ParFish case study to carry out a ParFish stock assessment of the mud crab (*Scylla serrata*) fishery in the Coringa mangroves near Kakinada, East Godavari District, Andhra Pradesh, India. The mud crab fishery was chosen as a case study site for ParFish because it is a localised fishery, focused on a small geographical area and was easily accessible to carry out research in the short time period available. *Scylla serrata*, the edible mud crab is available all along the estuarine regions of maritime states of India. It has good demand in the domestic and export market as its availability in live condition fetches a good price, compared to other species of edible crabs.

Involved in the study were the Department of Fisheries in Andhra Pradesh, the State Institute of Fisheries Technology (SIFT), the United Fishermen's Association (UFA), MRAG and the fishermen themselves.

## **ABOUT THE CRAB FISHERY**

The mud crab (*Scylla serrata*) fishery in the Coringa mangroves near Kakinada, East Godavari District, Andhra Pradesh state, forms an important contribution to people's livelihoods in the area. The crabs are found along the creeks and in burrows in the mangrove areas, and are caught using a variety of gears: hook, baited line, baited ring



and stakenets. The crabs are sold both in the domestic market and larger individuals are exported to Malaysia, Singapore and other countries. Few data are available concerning the fishery, but previous studies and information from fishers suggest that the peak season for the fishery is from September to January, and the lean season from February to August.

Fishers each use one or more gears to catch the crabs, fish about 20 days each month and catch on average 5kg per day. Information from the fishers suggests that there has been a reduction in catch per unit effort in the last 7 or 8 years, attributed by many fishers to the canals that have been dug in the mangroves aimed at mangrove rehabilitation, which they say have destroyed the crabs' nursery areas. Overall, there seems to have been a change in the size composition of their catches, now catching more smaller and fewer larger crabs. The fishery involves nine villages that border the mangrove area, namely



Pedavalasala, Chinna valasala, Gadimoga, Kothuru, Lakshmi pathi puram, PBV Palem, CBV Palem, Ramanna palem and Chollangi peta, and supports about 5000 fishers.

## METHODOLOGY

ParFish is a methodology developed to carry out stock assessments for fisheries where traditional data for stock assessments are lacking. Details of the methodology can be found in the ParFish Toolkit, available from MRAG. Training in ParFish data collection techniques was carried out by Suzannah Walmsley of MRAG in



June 2005 with personnel from the Department of Fisheries - Andhra Pradesh, SIFT - - Kakinada, and UFA. The Department of Fisheries, SIFT and UFA held meetings with the fishermen and undertook interviews to obtain information about the number of days they fish and their catch rates.

Initial scoping studies of the fishery were carried out and background information about the fishery was collated from a variety of sources, including scientific papers, workshop proceedings, key informant interviews and stakeholder analysis. Meetings were held with the fishers to introduce them to the research team and the objectives of the study. The ParFish Stock Assessment and Preference Interviews were adapted for the local situation, translated into the local language, Telugu, and tested with a few fishers, after which further modifications were made. A sampling strategy was developed, with stratified sampling across gear type and village, so that the data collected were representative of the range and combinations of gears found in all nine villages in Table 1.

Table 1: number of boats, fishers and gears in each village involved in the crab fishery

| Name of Village     | Boats | Crab Fishers | Lines | Rods | Stake Nets | Rings |
|---------------------|-------|--------------|-------|------|------------|-------|
| Pedavalasala        | 350   | 1200         | 200   | 1200 | 10         | 1     |
| Chinna valasala     | 50    | 250          | 4     | 250  | 10         | ---   |
| Gadimoga            | 15    | 100          | 1     | 100  | 10         | 6     |
| Kothuru             | 13    | 40           | 10    | 1    | 5          | 3     |
| Lakshmi pathi puram | 20    | 60           | 4     | 9    | 5          | 1     |
| PBV Palem           | 20    | 80           | 1     | 35   | 5          | 8     |
| CBV Palem           | 15    | 65           | 2     | 27   | 2          | 2     |
| Ramanna palem       | 20    | 80           | -     | 20   | 30         | 31    |
| Chollangi peta      | 20    | 40           | -     | 6    | -          | 30    |

|       |     |      |     |      |    |    |
|-------|-----|------|-----|------|----|----|
| Total | 523 | 1915 | 222 | 1648 | 77 | 82 |
|-------|-----|------|-----|------|----|----|

Data collection was then carried out during the period of 27<sup>th</sup> June – 21<sup>st</sup> July 2005. 110 stock assessment interviews and 35 preference interviews were carried out. Since the data requirements for the Parfish approach are new and are to be obtained from the fishermen's point of view, the concepts and theories behind the software were provided through a weeklong training to the project team by Ms. Suzannah Walmsley, MRAG consultant. Initially, the team encountered some difficulties in explaining the interview questions to the fishermen for them to understand and be able to answer. However, as the team became more familiar with the questions and the difficulties the fishermen had to understand the questions, the interview process became smoother, easier and quicker. Through modification and simplification of the questionnaire and by using local examples the team found that many fishermen could reply without any problem.



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The main difficulty encountered was that conducting the stock assessment and preference interviews together took a long time (up to two hours, depending on the fisherman and the interviewer),

which was tiring for the fishermen and took up a lot of their time. To combat this, the interview session was divided into two parts, and the stock assessment and preference interviews were conducted separately. After completing one interview, if the fisher being interviewed was happy to continue, the second interview was also carried out.



Though it was felt initially by those conducting the interviews, that the choices of the preference cards by the fishermen were random, and were concerned that the fishers did not understand the implications, it was observed that the preferences from fisherman to fisherman and from village to village varied and when their reasons for choosing one card over another were explored, the reasons stated by them were very interesting and indicated that they had understood what the cards represented and the implications it would have for their fishing activities.

## RESULTS

In the training which was conducted at Mangalore in July 2005 on the use of the ParFish software, the data from the mud crab fishery were analysed. The results indicate the current fishery is close to the point where it is fully exploited. The results also indicate significant greater benefits could be obtained for fishers and others involved in the fishery and fisher support could be obtained for management action. The optimum fishing appears to be approximately 15% lower than currently applied.

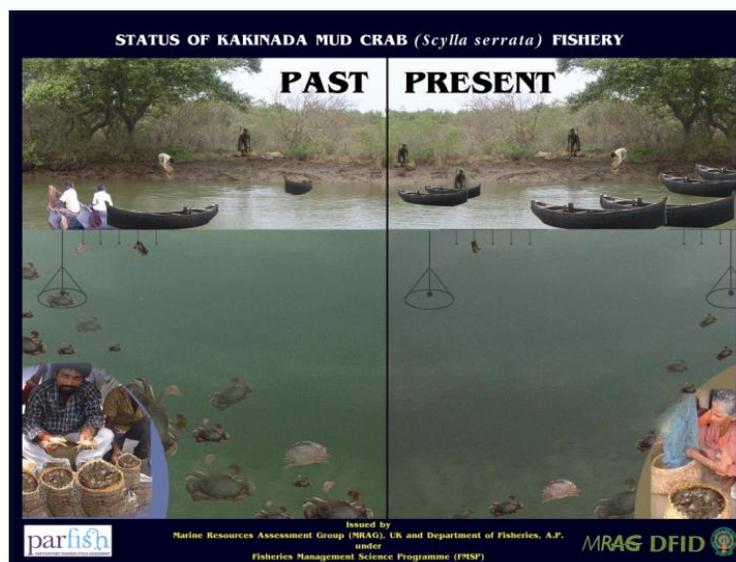
However, there is no evidence that the mud crab stock is heavily overfished or that urgent corrective action is required. By not threatening drastic controls to improve the state of the stock, it should be easier to obtain co-operation of the fishers in developing and implementing management measures. The results also suggest that the expected preference of the fishers would favour adjusting effort downwards, which is expected to increase their catch rates. A management system would have to be in place to implement this.

As there was no scientific data available for the analysis, the results represent the interpreted views of the fishers only. In previous case studies, fishers have been found to be over-optimistic as to the productivity of their resource. Further work may suggest lower levels of control. As a result of the training workshop that was held in Mangalore from 25 – 29 July 2005, already the states of Karnataka, Orissa and West Bengal have expressed an interest and intention to use ParFish in their fisheries as well after having observed and discussed the results of the Kakinada case study.

## EVALUATION AND FEEDBACK

Subsequent to the Mangalore workshop, a stakeholder meeting was held at SIFT, Kakinada, on 1<sup>st</sup> August 2005 to discuss the results of the assessment and options for management. The meeting was attended by 54 fishers, the research team, politicians,

researchers, NGOs, fisheries and forest departments officials. The results obtained were explained to the stakeholders in order to get the feedback from all the stakeholders



Poster released at the Kakinada workshop

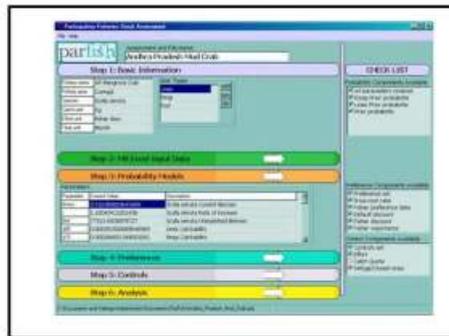
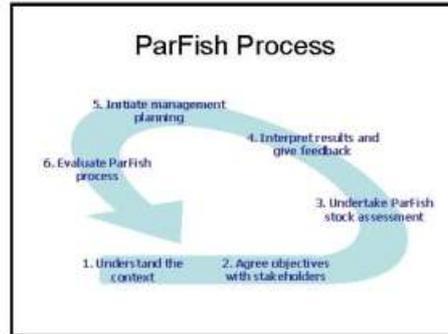
(presentation given by Dr Paul Medley is attached to the end of this report). A poster (produced in Telugu and shown here in English) to encourage discussion about the present status of crab fishery was released at the meeting. The participants showed interest right from the beginning of the meeting and interacted on the results presented in the meeting by Dr. Paul Medley, Parfish specialist. After thorough discussions and brainstorming on different aspects of fishery and possible management practices, the following points represent the main conclusions.

1. Though there is no immediate danger to the stocks from overexploitation, it has been agreed to the point that some regulations are needed to increase the productivity of the stock size.
2. The M.S. Swaminathan Foundation accepted the point of view of the crab fishers that the channels, which were intended for the restoration of the mangroves, may have destroyed the crabs' nursery grounds, underlining the importance of co-management for the identification of management measures that involve all groups that use the mangrove area.
3. The fishers showed an interest in co-management after hearing the results of the assessment and the options of regulatory measures. They agreed in principle to form a committee to undertake management of the crab fishery. This would enable them to choose regulations which would not negatively impact on their livelihoods.
4. The village elders and fishermen's leaders who participated in the meeting agreed to the implementation of participatory management (co-management).
5. The following are the advantages found in co-management implementation:
  - Ideal size of the stock and limited geographical area;
  - The fishing methods are unique and specific which cannot be undertaken by other than the existing crab fishers easily;
  - There is a strong belief on the resource potential among the fishers;
  - At present, the fishers are enjoying the resources with informal hereditary rights;
  - There is a commitment among the fishers to protect the resources for their benefit;
  - The political support is equally good to sustain the resources as well as livelihoods.

## **CONCLUSIONS**

The study provided an excellent opportunity to explore the status of crab fishery and the means by which the stock could be protected from the dangers of over-exploitation, habitat loss and pollution. The results obtained and the feedback received from the fishers suggest that ParFish is an appropriate stock assessment methodology in comparison with conventional scientific data based methods. ParFish will be a useful stock assessment method where fisheries co-management is implemented and supported by resources users and policy makers alike. The present study has provided us with a starting point for initiating management and involving fishers in the process, which is a key element for co-management. Trip interviews through a year will allow estimates of crab catch rates by size and gear, which is important information for monitoring the fishery and updating the assessments. However, the further evaluation of the crab stock with data from fishing experiments and historical catch-effort information will be needed to design the management programme more precisely through ParFish assessments, thereby improving the livelihoods of the fishing communities.

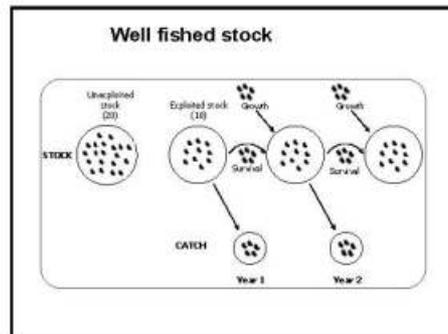
Presentation given by Dr P. Medley at the workshop at SIFT, on the results of the case study, to fishers, managers, local government and NGOs.

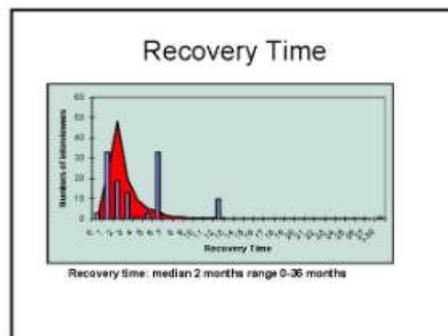
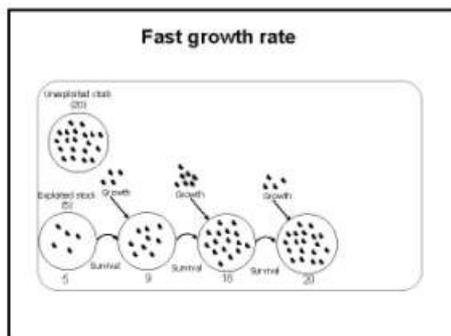
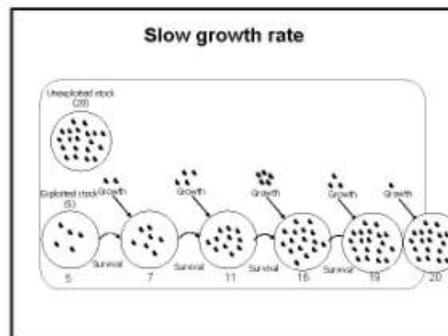
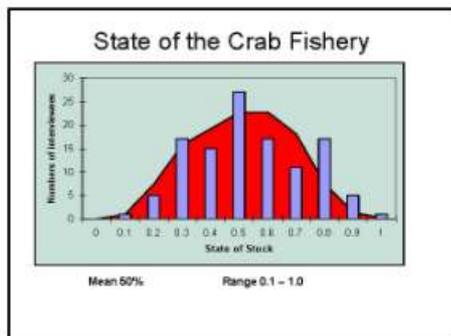
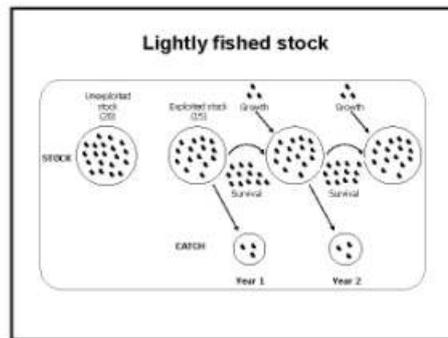
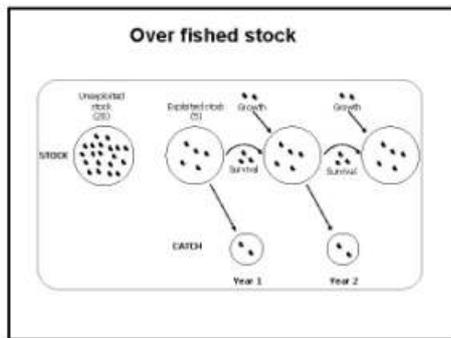


### Study Area

| Name of Village        | Boats      | Crab Puffers | Lines      | Rods        | Stake Nets | Range     |
|------------------------|------------|--------------|------------|-------------|------------|-----------|
| Fedavilavala           | 258        | 1200         | 289        | 1200        | 10         | 1         |
| Chinna valavala        | 58         | 250          | 4          | 250         | 10         | —         |
| Gadivoga               | 15         | 100          | 1          | 100         | 10         | 4         |
| Kothuru                | 13         | 40           | 10         | 1           | 5          | 3         |
| Lakshmi pathi<br>palem | 25         | 80           | 4          | 5           | 5          | 1         |
| TBV Palem              | 28         | 80           | 1          | 25          | 5          | 3         |
| CBV Palem              | 15         | 65           | 2          | 27          | 2          | 2         |
| Bananna palem          | 28         | 80           | -          | 20          | 30         | 31        |
| Chollangi peti         | 25         | 40           | -          | 6           | -          | 30        |
| <b>Total</b>           | <b>523</b> | <b>1315</b>  | <b>222</b> | <b>1648</b> | <b>77</b>  | <b>82</b> |

- ### Research Activities
- Compilation of available information
  - 21 days for
    - 110 stock assessment interviews
    - 35 preference interviews
  - Stock assessment analysis
  - Training

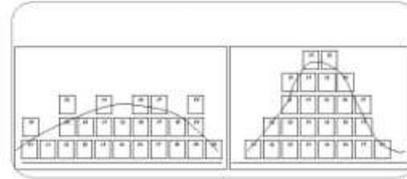




### Results

- The stock is **not** heavily overfished
- Interviews indicate fishers would prefer the outcome of lower fishing effort
- Co-management probably best option

### Building knowledge



- Monitoring – Experiments - Interviews

### Fishery Control Options

- Closed seasons
- Habitat restoration
- Minimum size controls
- Returning berried females
- Effort control
- Closed areas

### Benefits of Management

- Sustainable catches
- Improved livelihoods

#### Additional Benefits of Co-Management

- Community development
- Improved Decisions
- Better enforcement
- Better understanding of resources