parfish
PARTICIPATORY FISHERIES STOCK ASSESSMENT

Brief No. 2
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How can ParFish assist Fisheries Management?

Introduction

This information brief is for fisheries managers who are interested in a participatory stock assessment tool that can result in a greater understanding of their fishery, recommendations for improved management, and increased stakeholder responsibility for the resource. It covers the following:

- An introduction to ParFish
- Participation
- Relevance to management
- Comparison with other stock assessment methods
- Resource requirements
- The costs and benefits of ParFish

Fisheries Management Planning: Zanzibar

What is ParFish?

ParFish is an approach to fisheries stock assessment which uses Bayesian statistics and multi-criteria decision-making, and provides a tool for involving fishers in the management process.

What can ParFish be used for?

Suitable for small and medium scale fisheries

ParFish can be used for stock assessments of small and medium-scale fisheries to assess information on the current state of the stock and recommendations for levels of management controls. It can be set up to give recommendations on levels of effort, closed areas or quotas. While the general approach is arguably appropriate in all fisheries, the current version of ParFish is specifically for small to medium scale fisheries, and supports existing or developing co-management structures.

Suitable for fisheries that can be spatially defined

ParFish can be used for fisheries where it is possible to spatially define the 'management unit' and undertake the assessment across the whole management unit. Such a could be a clearly defined area of coral reef (as illustrated by the case studies in Tanzania and the Caribbean), banks, lakes and other well-defined spatial areas. Examples of inappropriate fisheries would include, for example, a village exploiting an offshore tuna resource which has an ocean-wide stock. In this case, the villagers would only be taking a small part of the stock and therefore any action they take would have a negligible impact on the stock.

Provides an assessment based on gear types

The ParFish approach is based on an assessment specific to fishing gear types. If data is collected for one gear type (e.g. hand-line) the results of the analysis and the management recommendations will only refer to this gear type. It is also possible to add further gears that exploit the same fisheries stock and give recommendations for changes in controls for each gear. ParFish does not currently give information on technical controls such as gear restrictions.

Figure 1 summarises where ParFish is and is not suitable

Small-scale fisheries	✓	Fisheries with highly migratory stocks outside the area of study	×
Medium-scale fisheries	✓	Fisheries with no defined management area	×
Fisheries with a defined management unit e.g. Coral reef fisheries	✓		

Promotes stakeholder buy-in

As well as giving outputs to inform management, following the ParFish approach also promotes local stakeholder buy-in. As participation is a principle of the approach it increases the acceptance of the assessment outputs and the chance of implementing management regulations.

Why is ParFish participatory?

The ParFish approach involves local stakeholders such as fishers in data collection, but also incorporates their knowledge on the resource and their preferences for future catch rates within the analysis. For example for the hand-line fisheries in the villages of Mtende and Mkunguni in Zanzibar a standard stock assessment would have suggested that effort needs to be reduced by 80% in order to reduce the chance of over-fishing to 10%. However, incorporating the preferences of the fishers indicated that a 30% reduction maximised expected fisher preferences. It would seem that an 80% reduction would be completely unacceptable to fishers, but it could well be possible to work towards a 30% reduction while monitoring the impact of such a reduction on the fishery. Since the ParFish approach advocates an adaptive management approach a reduction of effort by 10% would be a starting point by which management controls could be piloted and the impacts monitored through future data collection and re-assessment.

Following the data collection phase the ParFish process also promotes involvement of fishers in developing management options for the fishery, as well as involving other key stakeholders that are either affected by or have influence over the resource. The ParFish approach ensures that results from the assessment are carefully fed back to stakeholders so they are fully informed and therefore able to engage in management discussions. In Zanzibar a variety of meetings were held with fishers and the fisheries department to feed-back the results of the assessment. Following this a multi-stakeholder meeting was held to discuss management options for the fishery taking the assessment results into consideration.

Is ParFish relevant to fisheries management?

ParFish gives reference point outputs directly relevant to management:

- *Limit reference point:* The recommended control (effort, quota or closed area) to reduce the chance of the stock being over-fished to 10%.
- *Target reference point:* The effort control level that would result in the most preferred catch rates by fishers.

The ParFish approach is split into six phases. Data collection and analysis takes place in Stage 3, and provides recommendations for management based on the assessment.

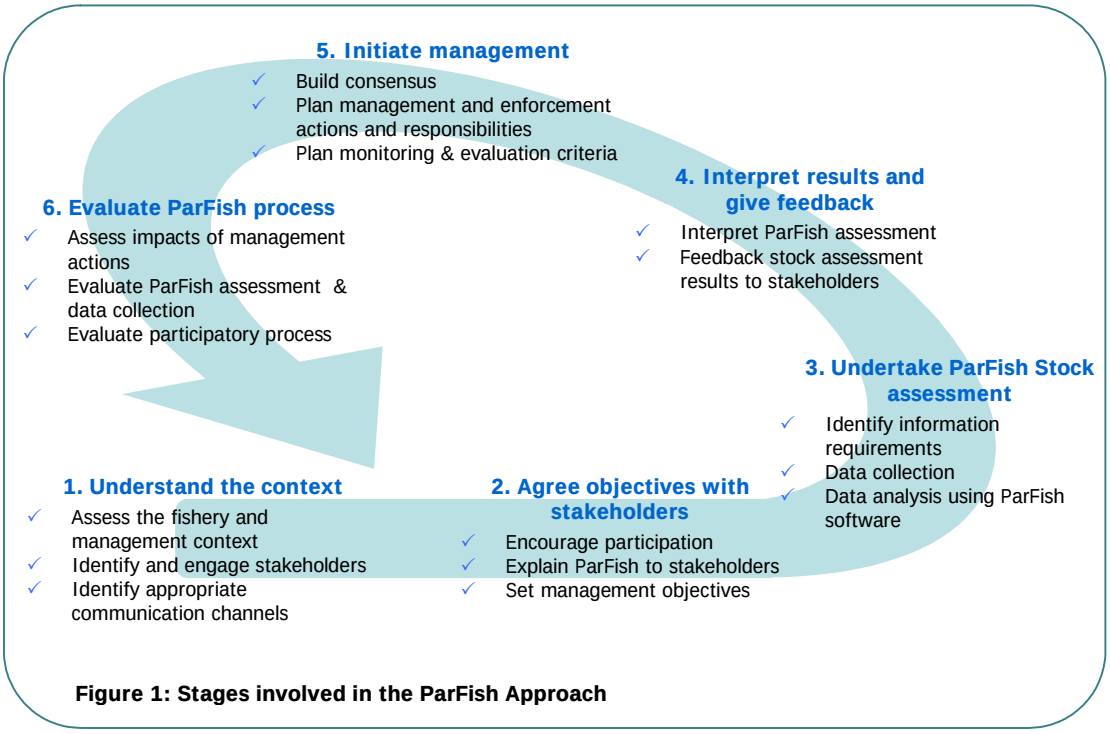

Figure 1: Stages involved in the ParFish Approach

Stages 1-2 ensures that the context of the fishery is understood and objectives for the assessment are agreed with stakeholders. It will also be important to consider at this stage whether the management is set up to be 'participatory' i.e. do fishers currently have a role in management or are they powerless to take any action. If they already have a defined role within a co-management structure this will assist the application of ParFish leading to concrete management actions. If this is not the case it will be necessary to ensure that the relevant stakeholders are on board to be able to take action to support the recommendations, or it may be a longer-term objective to encourage a co-management system where fishers have increased empowerment to manage their resources.

Stages 4-5 ensure that the results of the assessment are fed back to stakeholders and used to develop management actions. Stage 6 allows for evaluation of the process and outcomes.

How does ParFish compare to other stock assessment methodologies?

ParFish works on the same principles as all other stock assessment software so that the mechanisms behind the population models are the same. Currently ParFish uses a limited range of models: the Schaeffer surplus production model to describe the overall stock dynamics and the no-recruitment model for fishing experiment data to determine certain parameters. ParFish has the capability to incorporate other models such as yield-per-recruit (to determine levels of fishing that will maintain sustainable recruitment levels) but are not included in the beta-release version but may be considered for future versions.

The most fundamental differences between ParFish and other stock assessment methods are firstly the way that it combines information on parameters from different sources through Bayesian statistics, and secondly the use of decision theory to select the best management option for the fishery based on maximising the preference of fishers for future catch rates. It is also possible to include or exclude different sources of information to see what impacts they have on the results.

Although ParFish can provide some valuable information for small-scale fisheries it is still advised that the available data is run through a number of different assessment methods to see and understand the differences. Results will be similar between CEDA and ParFish when information on preferences is not included – as both software are based on similar models.

The costs and benefits of ParFish

Benefits	Costs
Stakeholder buy-in	Time required to encourage participation of stakeholders
Greater chance of achieving implementation of management regulations	Time and resources for data collection and monitoring
Allows an adaptive-management approach	Time and expertise in using the software and interpreting the results

What practical inputs are required to use ParFish?

The ParFish approach needs to be led by a single institution e.g. a fisheries management or research institute or a NGO, but will also require a number of partnerships to carry out different elements of the approach. For example: beach recorders may be involved in the data collection; NGOs in facilitating participatory meetings with the different stakeholder groups; and Fisheries Departments (and other management institutions) in assisting preparation and implementation of management plans.

ParFish is a relatively rapid approach to assessments. However it will require time to go through all the stages in the approach to ensure that the outcomes of the process support management. The exact time required will depend on the context and the familiarity with the fishery. For example the process can be speeded up if there is already a lot known about the fishery and a relationship built up between the facilitator and the stakeholders.

Table 1 gives an indication of the resources and expertise required for each Stage. These estimates are based on the Zanzibar example and will obviously be context-specific and reliant on the sampling designs employed. Stage 6 is not included as it will be entirely context specific and should involve roles and responsibilities for a number of different stakeholders.

Further information

The ParFish Toolkit is available to assist with the implementation of the approach, and contains:

Guidelines	Takes you through the six stages of the ParFish approach
ParFish Software	Allows data input and analysis
ParFish Software Manual	Gives step-by-step guidance on using the software
ParFish supporting materials	Provides interview forms and other recording sheets

The ParFish Toolkit can be accessed either through the web-link below or contacts below.

Web address:

- http://www.fmsp.org.uk [Go to current projects and search under R 8464.]

Contacts:

General queries: Suzannah Walmsley or Charlotte Howard, MRAG
(s.walmsley@mrag.co.uk, c.howard@mrag.co.uk
Tel: +44 207 255 7755)

Zanzibar queries: Dr Narriman Jiddawi, IMS (jiddawi@ims.udsm.ac.tz
Tel: +255 24 2232128)

Software queries: Dr Paul Medley. (paul.medley@virgin.net
Tel: 01347 838236)

Table 1 Resource requirements for ParFish

Steps	Sub-Activities	Time Inputs General	Person days for the Zanzibar example (A)	Personnel Inputs
1. Understanding the context	° Literature Reviews ° Meetings ° Participatory approaches (e.g. stakeholder analysis)	° Anything from 2-4 weeks depending on the current understanding of the fishery and current contacts with fishers and other stakeholders	° 5 person days	° Fisheries researchers/ managers ° Community facilitators
2. Agree objectives with stakeholders	° Meetings		° 5 person days	
3. Undertake Par Fish Stock Assessment	a) Training of data collection personnel	1 week training	° Trainer: 5 person days ° Data collectors (4 in this case): 20 person days	° Trainers
	b) Data collection (selection of below)	2-6 weeks depending on data collection programme	°	° 4 + Data collectors ° Community facilitators ° Fisheries researchers or managers ° Divers (for visual census count within fishing experiment – optional)
	- Fisher Interviews	(1-2 weeks)	° Data collectors: 20 person days	
	- Collation of existing catch & effort data (optional)	(1 – 2 weeks)	° Fisheries research: 10 person days	
	- Fishing experiments (optional)	(2 weeks)	° Data collectors: 40 person days (optional) ° Divers: 20 person days (optional)	
	b) Data input	2-3 weeks (for both fisher interviews & experiments)	° Data input: 15 person days	° 1 – 2 Data inputers
	c) Analysis using ParFish software	1 - 2 weeks	° Software user: 5 person days ° Fisheries research interpretation: 5 person days	° Software user (fisheries researcher) ° Fisheries researchers or managers
4. Give feed-back and initiate management planning	° Meeting and presentations to stakeholders (e.g. fishers, fisheries department, NGOs) ° Workshops	2 weeks	° Community facilitation/meetings: 10 person days	° Community facilitators ° Fisheries researchers or managers
[5. Implementation of action plans/ 6. Monitoring and evaluation]	° Define roles & responsibilities ° Design long-term data collection system ° Undertake further assessments	*Variable*		° Community facilitators ° Fisheries researchers or managers
Total		***2 - 5 months (Steps 1-4 only)***		