

Can ParFish assist in the assessment and management of small-scale developing fisheries?

Introduction

This brief provides information on a recently developed participatory approach for fisheries stock assessment and tool for initiating management actions and considers the utility of this approach.

An initial version of Participatory Fisheries Stock Assessment (ParFish) has been tested in Tanzania and the Caribbean and is currently undergoing final refinements through a case study in Zanzibar in partnership with the Institute of Marine Sciences (IMS) Zanzibar, Marine Resources Assessment Group (UK) and the fishers of Kizimkazi with support from the Department for International Development (DFID, UK). There is potential to develop ParFish further and use it as a tool for management in a number of different small-scale fisheries.

Addressing management of small-scale fisheries in developing counties.

Small scale fisheries contribute to poor people's livelihoods, food security and sustainable economic growth. However there are a number of challenges to implementing the code in practice and achieving effective management of such fisheries. These challenges include:

1. There is a lack of information on small-scale fisheries (are they over or under-exploited?);
2. Resources are often unavailable for long-term data collection programmes;
3. Social and economic concerns are rarely integrated into the assessment;
4. There is a lack of involvement of fishers and no linkage to management objectives.

There has been recognition in recent years of the value of involving fishers in management decision making processes. However the lack of information on fisheries, and fishers' distrust of scientific assessments are two key constraints in achieving this. Assessments therefore need to make use of community knowledge on their stocks, and encourage the participation of fishers so they understand, trust, and are able to use the assessment results.

A tool for management: Participatory Fisheries Stock Assessment (ParFish)

ParFish provides a tool to the management of small scale fisheries by providing a methodology for assessment of a fishery which can be undertaken with the involvement of fishers, and in situations where there is limited data available.

It improves information on the fishery and encouraging the participation of fishers. When fishers are involved in the assessment of a fishery they are more likely to trust the results and engage in management planning.

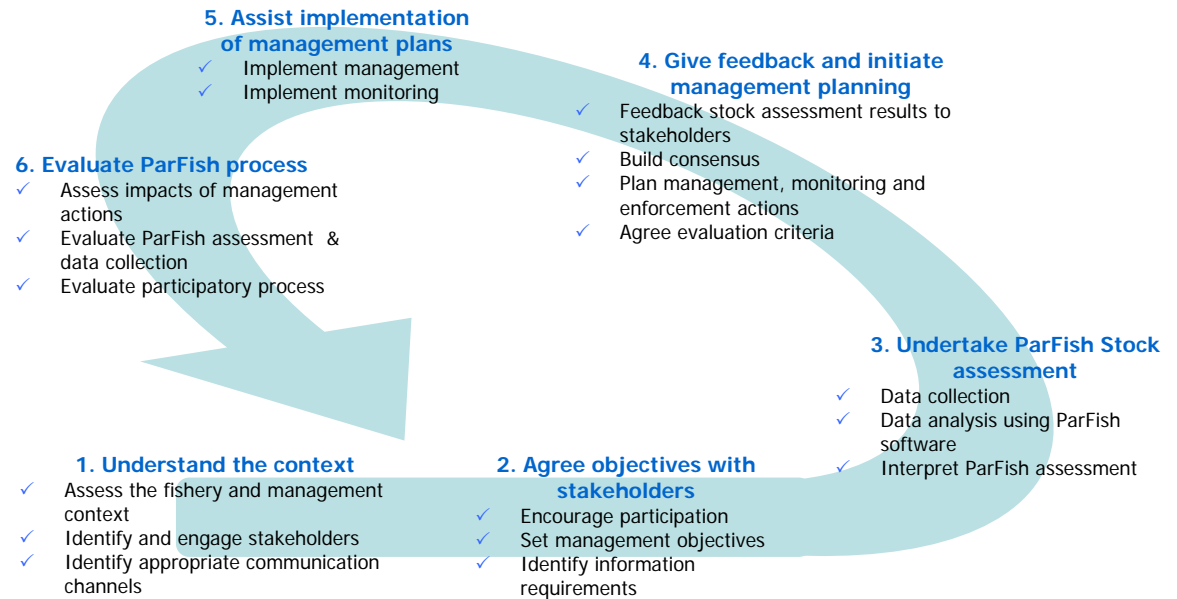


Fishers improving their understanding of fisheries management

The ParFish Approach

The ParFish approach and supporting toolkit provides a framework for participatory stock assessment. It begins with guidance on understanding of the context (Step 1); setting objectives (Step 2) and then goes on to provide tools and techniques for data collection and stock assessment (Step 3) and supports the development of management actions (Steps 4). The final stage (Step 6) is to evaluate the ParFish process (Figure 1).

Figure 1 The ParFish approach



A number of different institutions may be involved at different stages of the process so that information may be collected at the local level, assessment may occur within an institution with the expertise to use the software, and the information may be fed back through local government or NGO networks. It will also be important to identify and engage those who may be involved in supporting management planning and implementation over the long-term.

The final outputs of the ParFish process can include:

- ✓ Improved fisher understanding of the concepts of fisheries management
- ✓ Greater involvement of fishers in the management process
- ✓ Agreed management options including control levels, monitoring plans and pilot schemes.

The ease of planning and implementing management actions will depend on the context of the fishery, whether there is a management system in place, or if one can be developed between local stakeholders. In some areas ParFish can be used to support a current management system, or can act as a catalyst for management planning and implementation. The potential benefits of the ParFish approach are summarised in Box 2.

Box 2: Benefits of ParFish

Stock assessment	Fisheries management	Local fishers
<ul style="list-style-type: none"> ✓ Rapid assessment ✓ Long-term series data not essential ✓ Participatory methodology ✓ Resource efficient ✓ Outputs relevant to management decisions 	<ul style="list-style-type: none"> ✓ Fisher participation promotes involvement in management decisions ✓ Adaptive management approach allows for review of decisions 	<ul style="list-style-type: none"> ✓ Involvement in the process ✓ Preferences for management taken into account ✓ Improved management actions contributing to improved sustainable resource use

The ParFish assessment: scientific background

At the centre of the ParFish approach is the use of the ParFish software to undertake the analysis of the stock assessment. The software is based on Bayesian statistics and decision theory, and gives **four main outputs**:

- ✓ Recommended control levels for the fishery that can reduced the probability of over fishing, and be acceptable to fishers;
- ✓ The state of the stock at various levels of control;
- ✓ The probability of the stock being over fished at different levels of control; and
- ✓ The uncertainty surrounding these results.

The current version of the ParFish software is based on the logistical biomass growth model, which is described by four parameters (i.e. B_{now} , B_{inf} , r and q). The software requires 'prior' frequencies for these parameters provided through data collected in fisher interviews. These frequencies can then be 'updated' with data from other sources. The software currently supports data obtained from long-term catch data if they are available, and fishing experiments. Data from other sources or models can be incorporated into the software if parameter frequencies can be generated.

Fisher preferences, also collected through interviews provide information on how much fishers' prefer certain outcomes in terms of catch rates. The software therefore calculates the expected catch rates at different levels of controls on the fishery, and using decision theory determines what level of control would give the optimal preference of the fishers.

A number of different scenarios can be run within the analysis, applying different types of controls or including different types of information to see the effect on the results. It is also possible to include data collected at a later date to measure management impacts, update recommendations and reassess levels of uncertainty within the assessment.

The software based on the logistical biomass model has been tested in marine fisheries for both single and mixed-species fisheries. In the latter case, the model treats the fishery as a single population. The logistical biomass growth model has a number of benefits. It captures basic biological behaviour, requires few parameters and is suitable where there is little data. However, it would also be possible to develop the software further to incorporate models such as yield-per-recruit, multi-species and immigration models.

Experience of the ParFish methodology to date

To date ParFish has been tested in Zanzibar and in the Turks and Caicos Islands in the Caribbean.

In the [Turks and Caicos Islands](#) the conch fishery was assessed using fisher interviews, and available catch and effort data. The assessment revealed that the current quota for the fishery is adequate and fits with the optimal control level suggested by ParFish. It also illustrated that using fisher interviews alone produced a sensible result that could have been used in isolation if catch and effort data had not been available. If ParFish had been used 30 years ago only with fisher interview data it would have prevented the crash in conch stocks witnessed in the 1970s.

In [Zanzibar](#) the ParFish process has been tested within three fishing communities in Kizimkazi in the south of the island. Information has been collected on the fishery through fisher interviews and fishing experiments. The output of the software suggested that effort should be reduced by 20% to reduce the probability of an over-fished resource and give catch rates preferred by the fishers. Meetings have been held with fishers of Kizimkazi to feed back the results from the assessment. Fishers have been receptive to the results and would like to take management actions. The next step will be to work with the relevant stakeholders to make these management actions possible.



Resource requirements for ParFish

Resource requirements for ParFish will be very dependent on the specific context in each place where it is implemented. However some initial recommendations can be given for completing steps 1 – 4 of the approach (Box 2). These steps will take between 4 to 6 months to complete.

Box 2 Resource requirements for ParFish (Steps 1 -4)

Equipment required	Skills required
<ul style="list-style-type: none">✓ Computer with Windows 2000 or later and CPU (central processing unit) speeds above 500MHz.✓ Materials for data collection and participation exercises✓ Transport to fishing communities to collect information and hold meetings	<ul style="list-style-type: none">✓ Community facilitation✓ Software use✓ Data collection✓ Fisheries research and management

Next Steps

Development of ParFish until March 2005: The development of ParFish is currently being supported by UK Department for International Development until March 2005. This will result in an initial version of the ParFish tool kit containing the software, manual and guidelines on carrying out the ParFish approach.

Development of ParFish beyond March 2005 : An application for funding has been sought from DFID to develop a training course in ParFish and hold a workshop in the Eastern African region. This will develop the materials that can be used in other regions for ParFish training.

Further development of the ParFish software: The current software is based on the logistical biomass growth model and has been tested for coastal fisheries. The methodology can also support more complex models, and can be tailored to suit specific situations. Specific requirements could be identified and accommodated through undertaking a pilot case study.

Potential Collaborations with the ParFish project:

The ParFish methodology will be available for institutions in the form of software, manual and guidelines. Although the methodology can be used without any external assistance, it is recommended that initial capacity is built through:

- ✓ A training course in ParFish and/or
- ✓ A pilot case study with external support.

For further information please contact Paul Medley – software developer (Paul.Medley@virgin.net) and Charlotte Howard - communications (c.howard@mrag.co.uk).

