Darwin Initiative Annual Report

Darwin Project Information

Project Ref Number	17-002
Project Title	Managing coral reef fisheries for biodiversity, ecosystem and economic benefits
Country(ies)	Maldives
UK Contract Holder Institution	Marine Conservation Society
Host country Partner Institution(s)	Marine Research Centre
Other Partner Institution(s)	Maldives Dive Centres
Darwin Grant Value	£220,000
Start/End dates of Project	April 2009 – March 2013
Reporting period and annual report number	1st April 2009 to 31st March 2010 Annual Report No 1
Project Leader Name	Dr Elizabeth Wood, MCS
Project website	
Author(s) and main contributors, date	Dr Elizabeth Wood, Shahaama Sattar April 2010

1. Project Background

The project is based in the Maldives - an archipelago of nearly 1,200 low-lying coral islands in the central Indian Ocean. The Maldives National Biodiversity Strategy and Action Plan (NBSAP), produced in 2002 states that "The greatest diversity of life in the Maldives occurs in the coral reefs … the life on the reefs is characterised by high diversity and low abundance". The nation's coral reefs also underpin the two mainstays of the Maldives economy – tourism and fisheries.

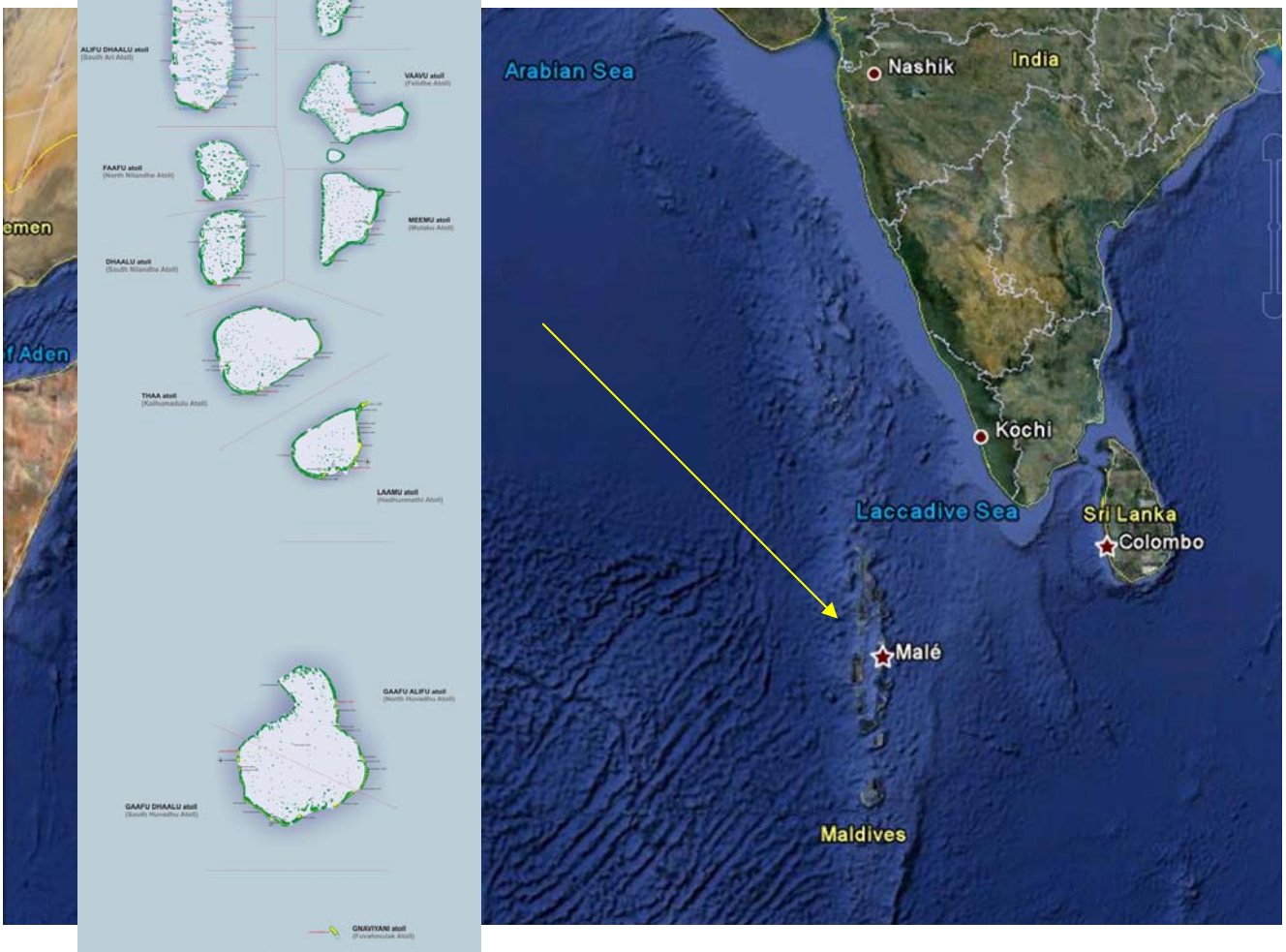
One of the attractions of the Maldives as a tourist destination is the opportunity to see healthy populations of a wide variety of coral reef fish. Apart from this indirect value, coral reef fish are of direct fishery value. At least 70 species of reef and reef-associated species are targeted for food (local consumption and export) and over 120 species for the ornamental trade.

A report on the grouper fishery by the Marine Research Centre (2005) highlighted a sharp declining trend in catch since a peak in catch in 1997, three years after the fishery started in 1994. The report recommended that action be taken to regulate fishing effort and strengthen collection of catch and effort data and export data. A separate report by MRC (2008) on the fishery for reef fish (including snappers, emperors, groupers and others) highlighted the fact that demand for coral reef fish has tripled in the last 15 years and will continue to increase as tourism spreads through the Maldives. The report stresses that the status of the fishery is not

well understood and says that survey and management of reef fish resources is critically important.

A report by MRC (2004) on the aquarium fishery called for a number of actions to be taken to ensure sustainability of the trade, including introduction of fishery log books, stock assessment of target species, and setting of catch quotas based on recent population data.

The project seeks to carry any of these actions forward and to ensure that reef fisheries in the Maldives are sustainable. The aim is to ensure that food security is guaranteed into the future, biodiversity is protected and the reefs continue to attract visitors and support the tourist industry. An information leaflet on the project is in Annex 3a.



2. Project Partnerships

The project partner in Maldives is the Marine Research Centre (MRC), which is part of the Ministry of Fisheries and Agriculture and is responsible for carrying out marine resource surveys and for collecting fishery data. The project counterpart and local co-ordinator at MRC is Shahaama Abdul Sattar, a fisheries biologist employed by MRC who is in charge of the research programme into the grouper and reef fish fisheries. She took over the role of Darwin project counterpart following the retirement of Mariyam Saleem from MRC, with whom the project was originally devised.

MCS and MRC work closely on the project and manage it jointly. The core team comprises the project manager from MCS, Elizabeth Wood, the project counterpart from MRC, Shahaama Sattar, and two newly-appointed full time project staff who are employed by MRC but fully funded through the Darwin Initiative. These are Mohamed Ushan, Reef Survey Project Officer and Ahmed Najeeb, Reef Fishery Project Officer.

The two project staff and local counterpart work together at MRC and there is regular e-mail contact between all the team members to discuss project development and day-to-day activities.

Other project partners in the Maldives are the Dive Centres and Marine Labs associated with the resorts that are scattered throughout the country. The main purpose of these collaborations is to engage local and visiting divers in the project's reef monitoring programme which aims to gather data on the distribution and abundance of reef fish. Another purpose of the collaboration with the Dive Centres is to enlist their help in recording use of reef fish by the resorts. These partnerships are being built up one-by-one and so far the response has been positive.

The main challenge has been to build up a programme that is within the capacity of the Dive Centres to carry out, given the time and resources they need to run normal day-to-day operations.

The project is collaborating closely with fishermen, fish traders and exporters in both the aquarium trade and food sectors. Our aim is to ensure that these stakeholders are fully involved in all aspects of the project. They have an extensive knowledge of the reef fishery resources and we hope will play a key role in the development of the proposed management plans for the fisheries. We have had informal meetings with all the main exporting companies, both to find out about how the fishery businesses are organised but also to hear their views about aspects such as the status of stocks in the wild, export quotas, and ways of monitoring catch. These discussions have helped to establish good relationships and to promote trust.

Other Collaboration

At the inception of the project and at intervals thereafter, meetings have been held with government agencies and representatives from international programmes that are also involved in marine resource management. The aim of these meetings has been to ensure that the aims and objectives of the Darwin Project were understood, and collaborations built up where possible. Links have been forged with the following:

Maldives Customs Services (MCS): This government agency is responsible for inspecting exports of several of the commodities that are central to our project, namely live fish and invertebrates for the aquarium trade, live groupers for overseas markets and fresh/chilled, dried or salt dried reef fish. As well as inspecting consignments to ensure they contain what is stated on the packing list, MCS also collates and sends copies of the proforma invoices to MRC for analysis. One of the difficulties faced by Customs is with regard to identification of species. We are therefore working with them to strengthen their skills and ability to make accurate identifications and recognise prohibited species.

Ministry of Tourism, Arts and Culture: The resorts and dive centres in the Maldives come under the jurisdication of the Ministry of Tourism and we have had meetings with them to explain the project's 'Fishwatch Maldives' programme (see section 3.1). The Ministry supports this initiative and we have had discussions about the possibility of participating resorts being eligible for some kind of 'green award' if they adopt Fishwatch.

Atoll Ecosystem Conservation (AEC) project: This is a Global Environment Facility (GEF) co-financed project, implemented by the United Nations Development Program (UNDP) and executed by the Ministry of Housing, Transport and Environment (MHTE) in the Maldives. AEC is focussing on conservation and sustainable use of globally significant biological diversity in Baa Atoll and aims to establish a model system to conserve biodiversity 'in the water' and 'on the ground' through innovative national-local and public-private partnerships. Our Darwin Project has complimentary objectives and there are clear opportunities for the two projects to work together on fishery issues and reef monitoring.

Maldives Environment Management Project (MEMP). This project, initiated in 2008, is supported by the World Bank and funded by the Board of International Development Assistance. The project focuses on the North Province of the Maldives (Noonu, Raa, Baa and Lhaviyani Atolls) and is concentrating on solid waste management, capacity building for environment management and technical assistance for strengthening environmental monitoring. The Marine Research Centre is a key stakeholder in the project, particularly with regard to the fishery and coral reef components. The Marine Research Centre is a key stakeholder in the project, particularly with regard to the fishery and coral reef components. Ahmed Najeeb, the Darwin Project Reef Fishery Project Officer and Mohamed Ushan the Darwin Project Reef Survey Project Officer joined Shahaama Sattar and others from MRC on survey trips to the target area in 2009 to collect fishery data. The results have been incorporated into a 'Reef Fishery Review of the Northern Province' for the MEMP report, and provide useful information for the Darwin Project.

Darwin Project staff from MRC attended the National Inception Workshop of the Bay of Bengal Large Marine Ecosystem (BOBLME) Project which will be working over the next 5 years in Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand to '*improve the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries'*. As the BOBLME project develops, we will continue to investigate opportunities for collaborative work.

We have also discussed possible collaboration with the South African Institute for Aquatic Biodiversity in projects on biogeography of the fishes of the Western Indian Ocean and FISH-BOL (Fish Barcode of life). MRC Darwin Project staff will probably assist with fieldwork, but this is not scheduled to take place until later in 2010.

The Marine Conservation Society is working with the Reefcheck Foundation and helping to promote Reefcheck in the Maldives through the national co-ordinator, Dr Jean-Luc Solandt, MCS Biodiversity Officer. This worldwide monitoring scheme provides information on the health and status of coral reefs and will provide additional of relevance for the Darwin Project.

3. Project progress

3.1 Progress in carrying out project activities

Output 1. Reef fish monitoring programme established and coral reef fish stock assessments / habitat assessments completed

Activity 1.1. Stakeholder meetings and workshops

The dive centres associated with some of the approximately 90 resorts scattered throughout the Maldives are key stakeholders for this part of the project, as are the 100+ safari boats that regularly take divers to reefs throughout the country. Some of the dive centres have limited capacity or interest in participating in recording schemes, but others are willing to give time to help with conservation projects, with those that employ marine biologists particularly motivated to get involved. As a first step in planning the reef fish monitoring programme, meetings were held with a number of key potential participants – in particular marine biologists and Dive Masters from the Banyan Tree Marine Lab, Four Seasons Sea Explorers and Maldivers.

These resorts / dive centres have well established marine biology programmes and their input and feedback at the planning stage was invaluable. The aim of these meetings was to discuss what was feasible and achievable and would generate useful and scientifically credible data. We decided to call the reef monitoring programme '*Fishwatch Maldives*', so that it had an easily-recognisable identity (Annex 3b).

Various ways of carrying out fish studies were discussed, such as fixed point counts, belt transects and roving surveys. Discussions were also held about which species to record – this presents a challenge because of the large number that are exploited for food (70 species) and the aquarium trade (120 + species).

Following these initial meetings and further research and debate, preliminary protocols were devised and methodologies tested during a series of trials / training workshops held in October 2009. The workshops were facilitated by Dr Elizabeth Wood and Dr Jean-Luc Solandt, Marine Biodiversity Officer from MCS. The first workshop was held in Male with MRC staff and participants from Sea Explorers and Maldivers (two dive schools in Male'), the second at Banyan Tree and the third at Four Seasons, Kuda Huraa.

Each workshop consisted of classroom sessions to explain the background and relevance of the project and to demonstrate the methodology. Participants engaged in activities such as fish identification quizzes and length estimates to determine their levels of visual accuracy when carrying out fish censuses. This exercise was practised on land and then repeated uinderwater. Seventeen illustrated checklists were developed for the initial trials, covering 210 species and 20 family groups. A colour photograph of each species was printed on the forms on waterproof paper in order to ensure that participants could recognise the target species without difficulty (see example in Annex 3c).

Practice fish counts were carried out underwater. These counts were done during timed swims and also along 50 x 100m transect lines, in order to compare results from the two methods. The participants tried out different record sheets so that they could provide feedback about relative ease of use.

After the first set of workshops and training sessions, modifications and improvements were made to the content and design of the survey. For example, the number of target species was reduced, and scientific names were replaced by common names on the recording sheets. An example of the final recording sheets is in Annex 3d.

Activity 1.2. Network of survey teams established

A small number of Dive Centres was selected initially as described in 1.1, in order to test out the methodology prior to launching the monitoring scheme more widely. During the time that the methods were being developed and then modified, a list of Dive Centres and Safari Boats was drawn up and key contacts identified where possible.

Activity 1.3. Monitoring protocols defined

The final protocols have now been defined, following the initial discussions and trials. Fish are recorded during timed swims lasting 15 minutes. The swim is conducted at a slow, steady pace at a specific depth and in a band 2.5.m either side of the recorder. More accurate, quantitative data are obtained by surveying along a transect line, but this can be difficult in the Maldives because currents are often encountered. In addition, it was considered that the use of measuring tapes might put off potential participants. Full details of the survey method are in Annex 3e.

Activity 1.4. MRC staff and other participants trained in fish and reef monitoring

Please refer to Activity 1.1., describing the initial workshops. MRC project staff and key participants have built on this training during a second round of trials and have successfully carried out surveys and data entry. The next step is to widen out the monitoring scheme to bring in other participants. As they join the scheme they will receive individual training from the MRC Project Officer with support from MCS.

Activity 1.5. Databases established and MRC staff trained in data entry and analysis

Excel spreadsheets have been developed for data entry and master copies provided to participants (see Annex 3f). Excel is widely used by the Dive Centres and has many applications. The Dive Centres will have ownership of their own data and can use it for their own programmes or research. Preliminary analysis of the data is scheduled to take place in about 6 months time – towards the end of 2010.

Photographs that are submitted to MRC will be analysed using Coral Point Count for Excel. CPCe. is a tool designed by the National Coral Reef Institute (NCRI) for researchers in the fields of coral reef management, assessment, and monitoring. It is already used by MRC Coral Reef Unit staff. However, a need for further training in this technique has been identified, particularly with regard to accurate identification of benthic categories.

Activity 1.6. Data collection in operation

This activity is scheduled for Year 2

Activity 1.7. Data analysed and report produced

This activity is scheduled for Year 2

Activity 1.8. Continued data collection & analysis

This activity is scheduled for Year 2 onwards

Activity 1.9 (new) Management of 'Sharkwatch'

This is an additional activity not included in the original proposal. It involves management of the underwater recording scheme being run in the Maldives and called 'Sharkwatch'. The aim of this programme is to monitor populations of reef sharks in the Maldives following a ban on reef shark fishing introduced in March 2009. It is the responsibility of MRC to develop and implement the monitoring programme, and a request was made for this to be incorporated within the Darwin Initiative project since it deals with reef fish. Part of the work programme of the Reef Survey Project Officer is therefore to co-ordinate Sharkwatch, enter shark sightings into the database and analyse the results. Data entry began in August 2009 and a report will be produced in 2010.

Activity 1.10 (new) Research into spawning aggregations

It is critically important that spawning aggregations are protected, yet currently insufficient is known about their locality, the time(s) of year that the aggregations form and the species involved. Discussions have been held with fishermen during the first year of the project in order to gather more information and build on preliminary data collected by MRC. We are planning to expand this area of work in year 2 by collaborating with the dive centres and seeing if they can assist with data collection. One problem is that the aggregations may form in the evening, which is generally not a time when divers are in the water and can make observations.

Output 2: System for long-term monitoring of catch, effort and value of reef fisheries established.

Activity 2.1. Daily logbook for reef fishers devised in collaboration with stakeholders

There has been considerable debate amongst stakeholders about logbooks and the challenge of introducing them to the various fisheries. It was decided early on that three separate logbooks were needed as follows:

- Aquarium fish collection logbook
- Grouper fishery logbook
- Reef fishery logbook

The aim of these three logbooks is to collect information on catch by species (number and weight/length) and fishing sites/atolls and also on catch per unit effort (CPUE). A decline in CPUE is an important indication of fishing beyond sustainable limits.

The design of the logbooks is crucial to their success and every effort is being made to ensure they are as user-friendly as possible. If they are difficult to use then compliance will be poor and the log book data may be inaccurate. Final draft 'trial' logbooks have now been produced and the English versions are in Annex 3g.

The trial food fish logbooks include records of weight or length by species. This level of detail is needed in order to provide data that will identify trends and inform management decisions. The project has also been involved in the production of more broadly-based fishery log books that have been produced by the Ministry of Fisheries and Agriculture (MOFA) to meet requirements under recent EU regulations on 'Illegal, unreported and unregulated (IUU)' fishing.

Activity 2.2. Fishers trained in data entry procedures for log books

The first trials with the detailed project logbooks are underway. A team from MRC is going out on fishing trips with fishermen (see Activity 2.6) to collect data on catch (species and length)

and at the same try out the fishing log books. The team is also helping the fishermen with the newly-introduced MOFA logbooks.

Activity 2.3. Databases established & MRC staff trained in data entry and analysis

Databases linked to each of the logbooks are currently being prepared.

Activity 2.4. Data collection in operation

This is scheduled for Year 2 onwards.

Activity 2.5. Analysis of data carried out and reports and recommendations produced

These activities are scheduled to begin towards the end of the second year.

Activity 2.6. (new) Collection of fishery data

During discussions about the need for data to back up management proposals, we recognised that it is crucial to collect fishery information first-hand from the fishermen through sampling trips. This has been done by MRC in the past and needs to be repeated / updated in order to identify changes and trends. In due course, once the log books are operational, the need for fishery survey trips should lessen, although they will probably still be needed to monitor and verify the log book data.

Ahmed Najeeb, Darwin Project Reef Fishery officer, has already been involved in a 2-week fishing survey trip organised by MRC for the Maldives Environment Management Project in which 37 fishing trips were made. Information was collected on time spent on bait and reef fishery, and data collected on length/weight by species of the day's catch. Mohammed Ushan has also taken part in similar survey trips.

A fishery survey trip organised under the Darwin project has just been completed (May 2010), and more are planned for the coming months. The 4-person field team is led by Ahmed Najeeb and includes Mohamed Ushan (Darwin Project Reef Survey Officer) and two others from MRC, all of whom have been briefed by Fisheries Biologist Shahaama Sattar.

Activity 2.7. (new). Logbooks for 'end users'

This is an additional activity not included in the original proposal. We have devised two more logbooks in order to provide a means of verifying the catch data:

- Grouper cage logbook: to record movement of stock and mortality within the cages. Species and length data will be collected. See Annex 3h.

- Resort reef fish purchasing logbooks: Two types: a) Basic – to record total weight of reef fish purchased and b) Detailed – to be introduced at selected resorts that have the capacity to record purchase by species and length. See Annex 3i.

Activity 2.8. (new) Collection, entry and analysis of export data

This is an additional activity not included in the original proposal. Export data exists for aquarium species and for groupers, and has been analysed sporadically by MRC. It was agreed early on in the project that it was important to collate and analyse data which had been passed to MRC by Customs in previous (and this current) year. This will ensure that we have as complete a picture as possible of quantities and trends. This activity has been carried out by the two full-time project staff at MRC. Examples of the export data files are in Annex 3j.

Activity 2.9. (new) Identification guide to reef fish for stakeholders

This is an additional activity not included in the original proposal. There is confusion over the naming of some of the many species used in the reef fisheries, with different common and local names being applied. A grouper poster had already been prepared several years ago, and this year the MRC team have put together a reef fish poster (see Annex 3k) which will be used in the field to help ensure accuracy when filling in the fishery logs.

Activity 2.10. (new) Consulations and fact-finding meetings with fishery stakeholders

This is an additional activity not included in the original proposal. Throughout the year we have held one-to-one meetings with fishery stakeholders, including aquarium fishermen, aquarium fish exporters, grouper fishermen, live fish cage owners and fish buyers from resorts. The aim of these meetings has been to explain the objectives of the Darwin project, build up relationships and trust, gather information and gain an understanding of issues of concern to the various stakeholders. The meetings have been held in Male where possible, but have also involved travel to locations where the fishing is based. The meetings were loosely structured around a list of questions/topics and notes taken. These are currently being incorporated into a report.

Activity 2.11 (new) Seminars with Maldives Customs Services

MRC has provided information and held training sessions with Maldives Customs Services in the past, and we realised that it was important to continue this relationship under the Darwin Project, because of the role that Customs play in monitoring exports of reef fish. As a first step, we organised a seminar to discuss the export trade and in particular to identify what would be most useful for Customs in terms of materials and training for easier/more accurate identification of species. The need for a manual / guide was identified and work on this will be undertaken in year 2. An introductory seminar on fish identification was also conducted at the request of Customs, dealing primarily with ornamental species. A longer course will be run in Year 2. Powerpoint presentations prepared for these seminars are in Annex 3l, together with the feedback from the discussion.

Output 3. Management Plans for coral reef fisheries and biodiversity conservation devised and in operation.

Work on the Management Plan(s) was not scheduled to begin until Yr 3. However, due to concerns about the sustainability of the grouper fishery, we have already begun work on a Grouper Management Plan, which we aim to produce by the end of 2010. Details of this element of the project are in Annex 3m.

Output 4. Results of reef fish stock assessment and reef health monitoring widely disseminated

The only activity planned for the first year under this output was the website. Work has been done on this, with much of the content prepared, but it has yet to be finalised and go live.

3.2 Progress towards Project Outputs

Output 1. Reef fish monitoring programme established and coral reef fish stock assessment / habitat assessment completed.

Our main targets for the first year of the project have been met – these were to create the framework for the monitoring programme, define the survey protocols, create databases, establish survey teams and train potential participants. The survey programme relies on voluntary support from local Dive Centres and Safari boats and in order to make it as recognisable and appealing as possible we have 'branded' it as Fishwatch Maldives (see Flyer Annex 3b). Recognising that visiting divers are on holiday and Dive Centre staff have many other responsibilities, our aim from the outset was to make Fishwatch Maldives as 'user-friendly' as possible so that people would be more likely to participate. The discussions, trial sessions and training courses that we held at MRC and key Dive Centres helped greatly to determine what would be feasible and would produce meaningful results. The final protocols are now in place, underwater record sheets prepared and data entry forms prepared (see Annex 3d,e,f).

The target list of species has been narrowed down to 70 species out of a potential 200 plus and includes both food fish (groupers, snappers, jacks) and aquarium species (e.g. angelfish, butterflyfish). In addition to Fishwatch Maldives, the Marine Conservation Society is also helping to promote Reefcheck in the Maldives through the national co-ordinator Dr Jean-Luc Solandt, MCS Biodiversity Officer. This worldwide monitoring scheme provides information on the health and status of coral reefs and will provide additional information of relevance for the Darwin Project.

So far, our assumption that stakeholders would support the project monitoring programme has held true, but we acknowledge that this has been due largely to linking with Dive Centres and Resorts that have marine biologists on their staff who are knowledgeable and interested in contributing to conservation initiatives. Our challenge next year will be to try and extend the reach of 'Fishwatch Maldives' and get a significant number of other Dive Centres involved.

Although not in our original work plan, we are also supporting 'Sharkwatch', with the Darwin Initiative Reef Fish officer in charge of collecting and analysing data. This is a scheme launched in to provide information on the distribution and abundance of reef sharks that was introduced to run parallel with the recently-introduced ban on shark fishing and export in Maldives.

Output 2. System for long-term monitoring of catch, effort and value of reef fisheries established

Three separate fisheries are being addressed under the overall heading of 'reef fisheries'. These are the aquarium fishery (for ornamental species), the grouper fishery (mainly for export) and the 'general' reef fishery which includes snappers, emperors, groupers and others (mainly for consumption in local resorts).

Our main targets for the first year were to develop log books for the fishermen, train the fishermen in data entry and set up databases at MRC. Development of the log books took

longer than anticipated, partly because of extra activities (see next paragraph) and also because of work carried out to see if it was possible to integrate the project's proposed detailed species-based logs with more general logs based on overall weights of 'species groups'. The project team, MRC and Ministry of Fisheries and Agriculture (MOFA) worked through a number of options and drafts and finally produced two types of logbook, both of which will be tested out n the coming months.

We have added on a number of activities to ensure that Output 2 is achieved, including survey trips to collect raw fishery data, analysis of export data, logbooks for 'end-users' and identification aids to ensure accurate data entry.

One of our assumptions was that fishermen would be cooperative and participate fully in the monitoring and management initiatives. We have found that some fishermen have frustrations and grievances about the way the fisheries operate and are reticent about filling in logbooks. To counter this, we have taken steps to promote open communication and to ensure that the benefits of monitoring and managing fish stocks are fully explained. We have seen that trust can be built up quite quickly once project staff work alongside the fishermen and will be building on these relationships in year 2 and beyond. We have also produced a leaflet targeted specifically at the grouper fishermen. This explains the benefits of monitoring the fishery and the important role fishermen can play by sharing ideas and knowledge and helping to take care of the resources now, so that there will be a plentiful supply of groupers into the future (see Annex 3n).

Output 3. Management Plans for coral reef fisheries and biodiversity conservation devised and in operation.

All of the activities undertaken so far will feed into the Management Plan(s). By the end of Year 1 we had come to the conclusion that our projected outcome of a conservation management plan for the Maldives coral reef fisheries will in fact consist of three separate plans as mentioned above: grouper fishery, reef fishery and aquarium fishery. Preparation of the plans is dependent on data from the monitoring schemes and was scheduled to begin in Year 3. However, due to concerns about the sustainability of the grouper fishery, we will be working on a management plan for this fishery in Year 2, focussing on four priority areas where pressure on grouper resources is high (see Annex 3m).

Output 4. Results of reef fish stock assessment and reef health monitoring widely disseminated

We had planned to have a website up and running by the end of Year 1 but this is behind schedule. Much of the content has been prepared and we plan to launch the site shortly. Other progress relating to this output is not anticipated until later in the life of the Project.

3.3 Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	Total to date
4C	Number of postgraduate students receiving training	0 * see note				0
4D	N^{o} of training weeks	0 * see note				0
6A	Number of people receiving other forms of education/training.	6 staff from MRC. 12 x dive team				

	Training in underwater fish surveys	members from Private Sector				18
6B	Number of training weeks to be provided	18 x 3d = 11wks				11
7	Number of training materials produced for use by host country	2 Powerpoint presentations; CD of survey protocols				
8	Number of weeks spent by UK project staff on project work in the host country	8				8
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities, or other implementing agencies in the host country	0				0
10	Number of individual field guides/manuals to be produced to assist work related to species identification, classification and recording	Reef fish ID poster (A1) Illustrated field survey record sheets (x 4 incorporating 70spp)				2
11A	Number of papers to be published in peer reviewed journals	0				0
11B	Number of papers to be submitted to peer reviewed journals	0				0
12A	Number of computer based databases to be **established** and handed over to host country	4 Fish survey results; grouper exports; aquarium fish exports;				4
14A	Conferences/seminars/ workshops **organised** to present/disseminate findings	0				0
14B	N^{o} of conferences/ seminars/ workshops **attended** at which findings from Darwin project work presented/ disseminated.	2				2
15A	Number of national press releases in host	0				0

	country(ies)					
15C	Number of national press releases in UK	0				0
17A	Number of dissemination networks **established**	0				0
20	Estimated value of physical assets	£1,350 (computer + dive slates)				£1,350
23	Value of resources raised from other sources: Support in kind from volunteers & private sector MRC time & overheads	Volunteer survey time £4000 Accommodation & transport for project staff £4,500 £4,500				13,500

- Re 4C & 4D, these measures were included in the original proposal because it was anticipated that the two staff who joined the project would be graduates. In the event they were not, and so their training is included in 6A.

Table 2 Publications

Type (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £ 0
Information leaflet*	Darwin Reef Fish Project	MCS/MRC		0
Information leaflet*	Fishwatch Maldives	MCS/MRC		0
Field identification sheets for fish	Fishwatch Maldives fish survey sheets	MCS/MRC		0
Survey protocols*	Fishwatch Maldives: information for participants.	MCS/MRC		0
Poster *	Reef fish	MRC		0

* Digital copies provided. Hard copies available on request

3.4 Progress towards the project purpose and outcomes

The project purpose is to establish a long-term monitoring and evaluation programme that provides data for the development of a conservation management plan for Maldives coral reef fisheries. The monitoring programme has two main elements, the first of which is to determine the population status of fishery target species through underwater visual surveys. The framework for this has been established through the development of 'Fishwatch Maldives' and over the next year we will be concentrating on bringing in more participants so that a sufficient number of records are available for an initial analysis of the data towards the end of Year 2. We have also adopted 'Sharkwatch' as an additional activity.

The second element of the monitoring programme is to establish a system for recording fishery data. This requires three separate protocols – one for the grouper fishery, another for the general reef fishery and the third for the aquarium fishery. Good progress has been made in so far as the data requirement needs have been identified and log books designed. Our Year 2 targets are to introduce the log books and begin data collection and analysis.

By the end of Year 1 we had come to the conclusion that our projected outcome of a conservation management plan for the Maldives coral reef fisheries will in fact consist of three separate plans as mentioned above: grouper fishery, reef fishery and aquarium fishery. Preparation of the plans is dependent on data from the monitoring schemes and was scheduled to begin in Year 3. However, due to concerns about the sustainability of the grouper fishery, we will be working on a management plan for this fishery in Year 2, focussing on four priority areas where pressure on grouper resources is high.

3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

The goal for the project is for all types of reef fisheries in the Maldives to be set at a sustainable level. We are satisfied that the first steps have been taken to reach this goal. It is unlikely that we will be able to measure change / success until the end of the project. It will only be when the management plan has been devised and implemented and the monitoring programmes have been running for a few years that the impact of the project on biodiversity and resource use will be measurable.

4. Monitoring, evaluation and lessons

Project progress is monitored against the targets set in the implementation timetable and indicators in the logframe. This overall plan is used to guide activities and ensure that the project goals are achieved. One of the outcomes of the monitoring and evaluating process is that we identified several additional activities that needed to be incorporated into the work plan in order to ensure that the projected outputs will be achieved. These additional activities are described in section 3.1.

One of the main lessons learnt is the need to be flexible and in particular to ensure that we engage fully with the different stakeholders – particularly the fishermen, who may be resistant to change or management initiatives. We have learnt that it is essential that methods we suggest for monitoring catch are feasible and practical – for example that the methods for monitoring fish catch fit in as far as possible with the regular daily routine of the different fishermen.

Similarly, the in-water surveys need to be 'user-friendly' and fit with the capacity of the dive centres to give time to contribute to the monitoring programme. We need also to make sure that we provide feedback to the stakeholders and ensure that they understand the important role they can play in management of the fisheries.

5. Actions taken in response to previous reviews (if applicable)

Not applicable.

6. Other comments on progress not covered elsewhere

During the first year, following discussions with stakeholders and within the project team, we have expanded the activity plan in order to be better able to meet the objectives of the project (see section 3.1). The design of the project has been enhanced by these additions but the overall objectives and structure remain the same.

7. Sustainability

During the first year we have made sure that all stakeholders and interested parties are aware of the Project and what it hopes to achieve. Meetings were held early on with the Fishery and Tourism Ministries and with all the key international initiatives / programmes that are committed to biodiversity conservation and resource management. We have met with almost all of the reef fish traders and exporters, and are building up good relationships with the fishermen. We have also linked up with the private sector, in particular the Dive Centres and resorts that have a key role to play in reef monitoring. These collaborations are seen as vital to the long-term success and sustainability of the project.

Our target for the end of the 4-year project is to have new systems in place for monitoring, evaluating and managing use of reef fish in the Maldives. These will be carried forward by MRC, which has a statutory responsibility to carry out marine resource surveys and collect fishery data.

Following the Project, we expect that stakeholders will be much more involved with resource monitoring and management than they have in the past and we will continue to work towards promoting this approach.

8. Dissemination

Currently, dissemination is concentrating on informing and involving the stakeholders, and we anticipate that this will be scaled down to some extent, as the monitoring schemes become embedded within MRC and the Dive Centres. There will then be a shift towards collating and disseminating results to the stakeholders. MRC will hopefully be ideally placed to disseminate information about the fisheries and fisheries management once the project has finished, although staffing could be a critical issue and depends on government priorities. We will work with the private sector to try and ensure that the dissemination activities associated with Fishwatch Maldives can be continued beyond the lifetime of the project.

Project Expenditure

Table 3 Project expenditure during the reporting period (Defra Financial Year 1 April 2008 to 31 March 2010)

Item	Budget	Expenditure	Variance
Rent, rates, heating, overheads etc			
Office costs (postage, telephone, stationery)			
Travel and subsistence			
Operating costs (insurance, field allowances; equipment hire, medical & miscellaneous survey items)			
Printing			
Conferences, seminars, etc			
Capital items/equipment (computer; recording slates)			
Others Job adverts, design of underwater recording sheets, misc survey items			
Salaries E Wood 7,500 Dr JL Solandt 2,750 Clare Perez 500 M Ushan 8500 A Najeeb 8500			
TOTAL			

9. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

Photographs are available of fisheries in operation, underwater surveys taking place and fish in situ on the reef.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2008/09

Project summary	Measurable Indicators	Progress and Achievements April 2008 - March 2009	Actions required/planned for next period
Goal: *To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve* *The conservation of biological diversity,* *The sustainable use of its components, and* *The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources*			*(do not fill not applicable)*
Purpose The Project purpose is to establish a long-term monitoring and evaluation programme that provides data for the development of a conservation management plan for Maldives coral reef fisheries	1. Coral reef fish monitoring programme established and functioning by end of Project. 2. System for recording catch and effort in place and operating. 3. Management plan (s) for coral reef fisheries produced and implemented by end of Project.	Good progress has been made in designing the monitoring programmes that will provide information on the population status of reef fish and data on resource use. Work on the management plans is not scheduled to begin yet, but we have taken steps to ensure that the monitoring programmes will provide all the relevant information.	Efforts will be concentrated on ensuring that all the strands of the monitoring schemes are operating effectively, including data analysis. Adjustments will be made to the monitoring programmes if it appears that additional information is needed for the management plans.

Output 1. 1. Reef fish monitoring programme established and coral reef fish stock assessments / habitat assessments completed	1.1. Stakeholder meetings and workshops carried out to establish appropriate methodology. 1.2. Network of survey teams established by Yr 1. 1.3. Monitoring protocols defined by Yr 1. 1.4. MRC staff and other participants trained in fish & reef monitoring by Yr 1. 1.5. Databases established and MRC staff trained in data entry & analysis by Yr 1 1.6. Data collection in operation by Yr 2. 1.7. Data analysed and report produced by Yr 2/3. 1.8. Continued data collection & analysis Yr 4	Progress towards this output is on target, as explained in detail below. Several activities have been added (blue type) in order to ensure that the information and data needs for the management plans are met. During the next period we will be concentrating on running and expanding the reef fish monitoring programme and doing preliminary data analysis.
Activity 1.1. Stakeholder meetings and workshops carried out to establish appropriate methodology.		Stakeholder meetings were held in the early stages of the project as planned and were followed by training workshops with MRC staff and Dive Centres where methodologies were tested.
Activity 1.2. Network of survey teams established by Yr 1.		A small number of Dive Centres was selected initially in order to test out the methodology. A list of Dive Centres and Safari Boats has been drawn up and we are now in the process of building up more survey teams.
Activity 1.3. Monitoring protocols defined by Yr 1.		Final protocols have been defined, following initial discussions and trials with MRC and Dive Centres. A CD with the field methods has been produced, together with waterproof, illustrated data recording sheets.
Activity 1.4. MRC staff and other participants trained in fish & reef monitoring by Yr 1		Three separate training courses were held for MRC project staff and marine biologists/divers from 4 Dive Centres. Key participants including MRC staff built on this training during a second round of trials and have successfully carried out surveys and data entry.
Activity 1.5. Databases established and MRC staff trained in data entry & analysis by Yr 1		Excel spreadsheets have been developed for data entry and master copies provided to participants. Training of MRC staff in data analysis is ongoing.
Activity 1.6. Data collection in operation by Yr 2.		This activity is scheduled for Year 2
Activity 1.7.		

Data analysed and report produced by Yr 2/3.		This activity is scheduled for Year 2/3
Activity 1.8. Continued data collection & analysis Yr 4		This activity is scheduled for Year 4
Activity 1.9 (new) Management of 'Sharkwatch'		The Darwin project officer has coordinated Sharkwatch throughout the year, promoting it to dive centres and entering shark sightings into the database.
Activity 1.10 (new) Research into spawning aggregations		Discussions have been held with fishermen during the first year of the project in order to gather more information and build on preliminary data collected by MRC. This will feed into the management plans.
Output 2. System for long-term monitoring of catch, effort and value of reef fisheries established.	2.1. Daily logbook for reef fishers by Yr 1 2.2. Fishers trained in data entry by Yr1. 2.3. Databases established & MRC staff trained in data entry & analysis Yr 2 2.4 Data collection in operation by Yr 2. 2.5 Analysis of data with reports and recommendations by Yr 2/3	Considerable work has been undertaken to design a system for monitoring catch and effort in each of the three fisheries (grouper, reef fish and aquarium fish). In addition to designing logbooks we have also incorporated new activities (blue type) including data collection from fishing trips and from end users. During the next period we will be concentrating on introducing the logbooks, completing fishing survey trips and working with different sectors and stakeholders to promote the various strands of the monitoring programmes.
Activity 2.1. Daily logbook for reef fishers devised in collaboration with stakeholders by Yr 1.		Three logbooks have been devised (grouper, reef fish and aquarium fish) and trials are scheduled for early in Year 2.
Activity 2.2. Fishers trained in data entry by Yr1.		The first trials with the detailed project logbooks are currently underway.
Activity 2.3. Databases established & MRC staff trained in data entry and analysis by Yr 1		Databases linked to each of the logbooks are currently being prepared.
Activity 2.4.		This activity is scheduled for Year 2 onwards.

Data collection in operation by Yr 2.	
Activity 2.5. Analysis of data carried out and reports and recommendations produced by Yr 2/3.	These activities are scheduled to begin towards the end of the second year.
Activity 2.6. (new) Collection of fishery data	Several survey trips have been successfully conducted to collect weight/length data by species. The aim of this is to monitor catch per unit effort and identify fishery trends.
Activity 2.7 (new) Logbooks for 'end users'	These logbooks were developed in order to investigate the value and market for reef fish and also to verify catch data.
Activity 2.8. (new) Collection, entry and analysis of export data	Proforma export forms for aquarium species and for groupers are collected by Customs and passed to MRC for data entry and analysis. This activity has been undertaken throughout Year 1 by the two Darwin project officers.
Activity 2.9. (new) Identification guide to reef fish for stakeholders	An A1 reef fish poster was prepared by the MRC team. This will be used in the field to help ensure accuracy when filling in the fishery logs.
Activity 2.10. (new) Consultations and fact-finding meetings with fishery stakeholders	Meetings have been held with aquarium fishermen, aquarium fish exporters, grouper fishermen, live fish cage owners and fish buyers from resorts. The aim of these meetings has been to explain the objectives of the Darwin project, build up relationships and trust, gather information and gain an understanding of issues of concern to the various stakeholders.
Activity 2.11. (new) Seminars with Maldives Customs Services	Maldives Customs Services play an important role in monitoring exports of reef fish and two seminars were organised during the first year to promote close collaboration with the project. The first seminar identified what help was needed to enable Customs to carry out their responsibilities more effectively, and the second was an introductory seminar on fish identification.

Output 3. Management Plans for coral reef fisheries and biodiversity conservation devised and in operation	3.1 Draft management plans produced by end of Yr 3 3.2. Revised management plans produced by end of Yr 4. 3.3. Management measures introduced on the ground by end Yr 4	Work on the Management Plan(s) was not scheduled to begin until Yr 3. However, due to concerns about the sustainability of the grouper fishery, we have already begun work on a Grouper Management Plan, which we aim to produce by the end of 2010. Details of this element of the project are in Annex 3m.
Activity 3.1. Draft management plans produced by end of Yr 3		See above
Activity 3.2. Revised management plans produced by end of Yr 4.		This activity is scheduled for Year 3/4
Activity 3.3. Management measures introduced on the ground by end Yr 4		This activity is scheduled for Year 3/4
Output 4. Results of reef fish stock assessment and reef health monitoring widely disseminated.	4.1. Website established 4.2 Articles and scientific papers prepared 4.3 Data shared with global databases	The only activity planned for the first year under this output was the website. Work has been done on this, with much of the content prepared, but it has yet to be finalised and go live.
Activity 4.1. Website established		See above – the website is behind schedule but will be launched soon
Activity 4.2. Articles and scientific papers prepared		This activity is scheduled for Year 2 onwards, once sufficient data has been collected and analysed.
Activity 4.3. Data shared with global databases		This activity is scheduled for Year 2

Annex 2

Project's full current logframe

The project logframe is as in the original proposal with no changes to the purpose and outputs. However, additional activities have been incorporated as described in section 3. These are shown in blue type

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.			
Sub-Goal: Harvesting of coral reef fish in the Maldives for the aquarium trade and for food are set at a sustainable level that promotes conservation of biodiversity, retains ecosystem function and provides maximum benefits to local communities.	In-situ surveys in fished and un-fished areas show no significant differences in reef health and populations of target species. Catch/unit effort for target species is stable	Data from the field surveys DI Project evaluation	
Purpose The Project purpose is to establish a long-term monitoring and evaluation programme that provides data for the development of a conservation management plan for Maldives coral reef fisheries	4. Coral reef fish monitoring programme established and functioning by end of Project. 5. System for recording catch and effort in place and operating. 6. Management plan (s) for coral reef fisheries produced	1. Reports of workshops 2. Monitoring reports 3. Fishing log books 4. Management plan(s) 5. Fishing log books	

	and implemented by end of Project.		
Outputs 1. Reef fish monitoring programme established and coral reef fish stock assessments / habitat assessments completed	1.1. Stakeholder meetings and workshops carried out to establish appropriate methodology. 1.2 Network of survey teams established by Yr 1. 1.3. Monitoring protocols defined by Yr 1. 1.4 MRC staff and other participants trained in fish & reef monitoring by Yr 1. 1.5. Databases established and MRC staff trained in data entry & analysis by Yr 1 1.6. Data collection in operation by Yr 2. 1.7. Data analysed and report produced by Yr 2/3. 1.8.Continued data collection & analysis Yr 4 1.9. Management of Sharkwatch 1.10. Research into spawning aggregations.	1. Discussion papers. 2. Manual defining protocols. 3. Illustrated field guides for participants. 4. Report(s) of training workshops. 5. Report(s) of research seminars 6. Databases containing field data. 7. Reports containing results, analysis and recommendations for conservation / fishery action (first report end Yr 2).	1. All stakeholders support and become involved in the reef monitoring programme 2. Trained staff and volunteers continue to use skills provided under the project
2. System for long-term monitoring of catch, effort and value of reef fisheries established.	2.1 Daily logbook for reef fishers devised in collaboration with stakeholders by Yr 1. 2.2 Fishers trained in data entry by Yr 1. 2.3 Databases established & MRC staff trained in data	1. Log books. 2. Reports of training workshops and meetings. 3. Databases containing field data 4. Reports of findings and recommendations.	1. Fishers are cooperative and participate fully. 2. Trained staff are committed to carrying out data collection and analysis

	entry and analysis by Yr 1. 2.4 Data collection in operation by Yr 2. 2.5 Analysis of data carried out and reports and recommendations produced by Yr 2/3. 2.6 Collection of fishery data. 2.7 Logbooks for 'end users' 2.8 Collection, entry & analysis of export data. 2.9 Identification guide to reef fish for stakeholders. 2.10 Consultations & fact-finding meetings with fishery stakeholders. 2.11 Seminars with Customs.		
3. Management Plans for coral reef fisheries and biodiversity conservation devised and in operation	1.5 Draft management plans produced by end of Yr 3 3.4. Revised management plans produced by end of Yr 4 3.5. Management measures introduced on the ground by end Yr 4	1. Report of management planning workshops and meetings. 2. Final Management Plans for reef fish, grouper and aquarium fish produced. 3. Recorded evidence of management measure in place and operational	1. Agreement on management is reached by all the stakeholders 2. National government backs and implements the Management Plan(s)
4. Results of reef fish stock assessment and reef health monitoring widely disseminated	1.6 Website established 4.4 Articles and scientific papers prepared 4.5 Data shared with global databases	1. Website 2. Electronic and hard copies of articles & reports	

Annex 3 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

a) Darwin Reef Fish Project information leaflet (A4 folded)
b) Fishwatch Maldives flyer (A4)
c) Example of Fishwatch Maldives recording sheets produced for first trials
d) Example of final Fishwatch Maldives recording sheet
e) Fishwatch Maldives survey protocols
f) Fishwatch Maldives data entry files.
g) Aquarium fish, grouper fishery & reef fishery logbooks
h) Grouper cage logbook
i) Resort reef fish purchasing logbooks
j) Fish export data files
k) Reef fish identification poster
l) Customs seminars
m) Work Plan for production of Grouper Management Plan
n) Information leaflet for grouper fishermen